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R P M S

FINAL REPORT

Romanian Primary Mathematics Study (RPMS)

Final Baseline Study Report

Prepared by the RPMS team, January 2024

Contents

Executive summary

Our research aimed 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.

We surveyed 775 primary teachers. We followed up with observations and interviews of 41 teachers, across 10 different regions, as well as speaking with their students and headteacher. We then discussed our emerging findings with two groups of educational experts. Our aim was to establish a baseline of what is working well and what is not working well, with a view to making recommendations for future development.

We believe, through analysing contextual data, that our questionnaire sample was broadly representative of teachers in Romania (there was a slight under-representation of younger teachers in the sample). Of course, some bias is introduced through the sample being self-selecting and teachers needing to engage in an online form. Nonetheless, through taking representative samples from our survey participants, we also believe we have observed 41 lessons which give a balanced snapshot of practice across Romania.

The following 12 points summarise what we learnt, within four broader categories; potential implications are offered in italics, in each of the four sections. One key element of context is that Romania has a large and expanding atainment gap in mathematics between those students from relatively affluent families and those students from poorer backgrounds. Students from higher socio-economic backgrounds in Romania achieve as highly as anywhere in Europe, however it is students from lower socio-economic backgrounds who fall far behind expectations, based on averages across Europe or the OECD.

1. Overall need

1.1 There were strong contrasts in teaching practices observed and also large differences in overall school atainment data. In weaker lessons, it was found that teachers showed video recordings to students, rather than teaching or explaining themselves. The tasks given to students were often routine, with litle problem-solving. In schools with low outcomes, students were often absent for long periods and were missing basic information and knowledge in mathematics. In stronger lessons, content was offered in a coherent and creative manner, with students fully engaged and participating and with tasks that went beyond the practice of routine skills. While rural schools have significantly lower atainment than urban and there was, in some regions, evidence of rural schools having weaker teaching practices compared to urban settings, overall, there was no correlation between strength of teaching observed and either school setting, or whole school outcomes for mathematics.

1.2. A common challenge mentioned by teachers is a lack of teaching resources (e.g., didactical materials, or digital resources). There is a lack of concrete manipulatives to support learning. There is a lack of access to high quality digital resources.

1.3. The students we spoke to often thought mathematics was their favourite subject, or one of their favourite subjects. This finding was a surprise to many of the experts in our study.

Schools require more teaching resources and more support to counter absenteeism and lack of parental engagement, where these exist. It would make sense to focus training and resources on those students currently showing the weakest attainment in mathematics, who tend to be students in rural settings, and (in all schools) students suffering socio-economic deprivation.

2. Teacher professional development

2.1. We found many teachers saying they would like more professional development opportunities than they have available to them. There is a need for high quality courses on mathematics teaching, and practical courses where the methodology is visible in action. While there are many resources available, many of these courses are not relevant and, more importantly, it is difficult for the teacher to make a choice because the training offer is not explicit and has not been tested for effectiveness.

2.2. We observed a common practice of students coming to the front of the classroom and writing on the board, addressing the whole class. It seems this is one of the most common forms of organising work in mathematics classrooms. This practice is working well in some cases, allowing opportunities for students to explain their reasoning and in a manner which supports other students to learn. In other cases, the student at the board engages in a 1-1 conversation with the teacher and there is litle benefit for the rest of the class, who wait to copy down a solution.

2.3. From our lesson observations, it seemed that there was relatively litle "student agency", by which we mean opportunities for students to explain their reasoning, or for discussions that build on student ideas. When asked by the teacher, students do not like to explain the reasoning, even if they know how to solve the exercise correctly. They like to explain to their peers, however, there is litle use of group work in mathematics lessons. There were also relatively few “uses of assessment” in lessons, by which we mean actions of the teacher designed to check the on-going understanding of a class, leading to adaptations in the teaching as a result. These are both areas of pedagogy which could usefully come into focus in training.

2.3 A large majority of teachers (71%) viewed coping with different student ability levels as challenging. In other words, support on how to deal with the individual needs of students emerged as a professional development need desired by around three quarters of teachers.

2.4. Another common practice which teachers told us about was the use of textbooks and the setting of homework. In many cases homework is overloaded, unstructured and sometimes not checked.

Training is needed, which is designed to meet teachers’ needs and which supports collaboration in schools (see 3.2 also). Areas of potential need include: developing student agency, e.g., in the context of problem solving; developing uses of assessment and ways to support individuals; enhancing subject knowledge; supporting teachers in effective use of text-

books and homework. However, given the ubiquity of the practice of students explaining ideas at board, we consider it a matter of priority to support the effective use of this strategy, through research and training.

3. Initial teacher education

3.1. Teachers and experts felt that initial teacher education could be improved. Our experts also agreed that initial training is basic, in many cases it is poor and there is a need for more practice during initial training.

3.2. At school level, much could be improved in relation to how planning of lessons takes place. In the broad Romanian school culture, it appears there is not a habit, nor obligation, for school teachers to meet to discuss the planning of lessons, solve common problem-situations that arise, analyse student behaviour, and so on. We also note some confusion about expectations of planning, with some inspectors still calling for an old model of planning which is no longer recommended by the Ministry.

We suggest exploring the viability of a professional development course for teacher educators. We propose this offer could be based around the priorities identified in this study, and with a focus on how teacher educators could support teachers in those areas.

4. Curriculum

4.1. A common complaint from teachers and headteachers was that the primary curriculum is overloaded with content and does not provide a good preparation for middle or secondary school.

4.2 A key concept in primary mathematics is that of "number". In both the curriculum and in text books, the number concept is presented as expressing a characteristic of a set of objects. The following sequence in the construction of the number concept appears to be in use across schools: Cardinal; Ordinal; Verbal expression; Writen expression; Measurements, after studying operations with numbers. We note that there is research suggesting balancing cardinal, ordinal and measure aspects of number, from the start, can bring significant benefits.

The case for curriculum reform could be explored further. Experimental research into alternative approaches to developing the number concept in Romanian schools could provide important evidence for potential curriculum reform.

1. Background

In line with our original research proposal, this report aims 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 8.
- Explore the main areas for development of mathematics teaching.
- Make recommendations to the design of future interventions.

A lot is already known about the teaching and learning of mathematics in primary schools in Romania. For example, the following comments are derived from past international studies about mathematics education in Romania, updated from TIMSS 2019:

- Romania is placed both in mathematics and in science, below the international average of 500 points.
- This absolute position in relation to the middle of the measurement scale (below average) remains unchanged since Romania participated in these studies.
- In mathematics, the scores obtained by Romanian 8th grade students in the TIMSS tests have not changed significantly in the last twenty years (479 points in 2019, 474 points in 1995).
- 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.
- "Numeric illiteracy" is found in 22% of the 8th grade school population, and another 48% of students are below the average-functional level of performance, these are far higher figures than other comparable countries.
- Girls perform substantially better than boys in mathematics. In fact, Romania's gender gap in 8th grade mathematics performance is among the largest of all participating countries, with a difference of 16 points. This gap has remained constant for about a decade, when it was first observed.

In more qualitative judgments, according to the TIMSS 2019 report on Romania:

> “Despite emphasis on modifying mathematics teaching and learning in recent years, the provisioned reforms have not reached most teachers and students due to various changes in education policies over the last decade and weak professional development programs for teachers. Consequently, the reforms have not effectively influenced student learning.” (p.3).
>
> “The impact of the new generation of subject curricula was diminished by weaknesses in the teacher training programs.” (p.4)

The TIMSS report therefore concludes that teacher education and professional development for mathematics teachers are key priorities. The same report noted (at the time) that teachers are required to accrue 90 credits, for professional development every 5 years.

The TIMSS report proposed the following as areas for development of teachers, in line with the curriculum.

> "According to the mathematics curriculum, to develop these competencies, teachers should favor classroom activities emphasizing:
>
> - Problem solving activities requiring active involvement in practical contexts and searching for solutions beyond the given frame of school knowledge;
> - Formulating questions, analyzing steps, and motivating decision making in problem solving;
> - Using various motivational strategies to help learning;
> - Working in teams;
> - Assessments as a part of learning" (p.4)

The context of the national curriculum is important background for interpreting the results of the survey, and the topics in which teachers express a desire for training.

Since our own project began, new results from PISA have been published. We now know:

- Between 2012 and 2022, the gap in mathematics performance between the top and the botom 25% of students in terms of socio-economic status widened in Romania, while the average gap across OECD countries remained stable.
- Socio-economic status was a predictor of performance in mathematics in all participating PISA countries and economies. It accounted for 26% of the variation in mathematics performance in PISA 2022 in Romania (compared to 15% on average across OECD countries).
- Some 7% of disadvantaged students in Romania were able to score in the top quarter of mathematics performance. These students can be considered academically resilient because, despite their socio-economic disadvantage, they have atained educational excellence by comparison with students in their own country. On average across OECD countries, 10% of disadvantaged students scored in the top quarter of mathematics performance in their own countries. (PISA, 2023)
- There are shortages of teaching staff, teaching assistants, materials, infrastructure and digital resources, with these shortages most acute in rural areas. At present, funding is not well aligned with need.

Given this background, our study aimed to assess the views of teachers and then to investigate, in more detail than has been done before, the actual practices taking place in primary classrooms.

2. Methodology

This study set out with three aims:

O1 Identification of participants in the study, by the creation of a database with relevant contacts of the stakeholders (schools, heads of schools, inspectors, teacher educators (metodisti), primary education teachers, other experts) and a list of teachers with potential of becoming lead teachers in a further intervention (entirely British Council team's task).

O2 Developing a good understanding of the way mathematics is being taught in primary education classes in Romania, by designing and conducting a research programme in 10 locations in Romania (from 5 Jan 2023 - 15 July 2023).

O3 Providing insights into the existing good practice and areas for development, including recommendations for the improvement of the current teaching practice, by designing a Baseline Study report, based on the findings identified in the research, in July 2023.

The study timeline was delayed as a result of teacher strikes, which took place in the summer of 2023, when classroom observations were due to take place. These observations were postponed to October 2023. The research team judge that the three aims have all been achieved, as can be seen through the results, below.

The intended results were as follows, in italics is a comment on what was achieved.

- A database with relevant stakeholders for the research; *we have this database, comprising teacher volunteers, NGOs, and educational experts in Romania.*
- 10 Research tools developed by the Academic Manager (Alf Coles); *these were created and used as intended.*
- Responses to the online questionnaires analysed by the Academic Manager; *this was done for the Interim Report (July 2023).*
- 40 primary education teachers to be case teachers identified; *these were identified from the questionnaire.*
- Five consultants recruited and trained by the Academic Manager to conduct field research; *this training took place online in the summer and autumn of 2023.*
- Field research conducted (40 classroom observations and video recordings, 40 interviews with the observed teachers, 40 focus groups with students, 40 learning units/lesson plans collected, 40 questionnaire responses from headteachers) - by the team of 5 consultants academically coordinated by the Academic Manager; *all observations and interviews were carried out and reports were submitted by all consultants.*
- Analysis of the Romanian national curriculum and two Romanian text-books for primary mathematics; *we approached these questions through discussion with educational experts and invited reflections on both curriculum and textbook design.*
- Experts and inspectors views collected (interviews/focus groups with 30 people) - by the team of 5 consultants, potentially with the Academic Manager participation, if the subjects speak English; *these interviews took place in December 2023.*
- Baseline study (research report) produced by the Academic Manager; *you are reading the final study report.*

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. Q2 was answered through classroom observations. In line with the project plan, Alf Coles created a questionnaire for Primary Mathematics Teachers. This questionnaire was based on past TIMSS surveys (see Appendix 2, Tool 1).

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 (these would have arrived at a general school email – we had no control over whether the message was passed on). We also disseminated the questionnaire via the following NGOs (who are working with primary teachers in Romania): Aspire Teachers, https://www.aspireteachers.ro/; Asociatia Techsoup www.asociatiatechsoup.ro ; New Horizons Foundation, https://www.noi-orizonturi.ro/. These NGOs posted the link on their own WhatsApp and mailing lists.

We anticipated gaining 200 respondents, in fact we received replies from 775 teachers (1.6% of the entire primary teaching population). Furthermore, teachers took around 45 minutes to complete the survey – indicating that real care was taken in offering responses.

Survey sample

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.

In terms of the ages of our participants, 20% were 39 or younger, 44% were 40 to 49 and 36% were 50 or older. Nationally, the figures indicate: 32% are 39 or younger, 39% are 40 to 49, 29% are 50 or older, again broadly matching our sample (our sample was skewed slightly towards older ages). The average number of years teaching was 26 years, from our sample. In our survey, 98% were female; across the country, 93% of primary teachers are female, again broadly in line with our profile.

Overall, these contextual figures indicate that our sample was broadly representative of the characteristics of teachers across the country and there was also a good geographical spread across regions. Looking at the average number of years in post, it is clear that Romania has a workforce of teachers who have generally been teaching for many years and hence are potentially an incredible asset to the country.

Approach to survey analysis

For this report 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)[1]. This model was established from a study conducted in England and has been found, since then, to be robust. The three orientations relate to beliefs of teachers:

> Connectionist – beliefs based around both valuing pupils' methods and teaching effective strategies with an emphasis on establishing connections within mathematics'
> Transmission – beliefs based around the primary of teaching and a view of mathematics as a collection of separate routines and procedures; and
> Discovery – beliefs based around the primacy of learning and view of mathematics as being discovered by pupils. (Askew et al., 1997, p.341)

It was noted that these descriptions are idealised and, in reality, teachers tend to hold elements of different orientations. In the results of the study on effective teachers of numeracy in England, it was found that all the highly effective teachers (as judged by student outcomes) held strongly connectionist beliefs (Askew et al., 1997).

From the 775 respondents, we asked each one if they would be interested to allow our researchers to observe them while teaching a mathematics class at primary level, on a volunteer basis. A significant number of the 775 teachers said they would like to host a classroom observation. We believe the numbers wanting to be involved indicates that teachers crave feed-back on their teaching and wish to identify their strengths and areas of development, although the general perception is often that teachers are reluctant to have their lessons observed because they fear judgement. This belief is supported by informal discussions with teachers who say that the only time their classes are observed is in the formal framework of inspections, carried out by county school inspectorate staff. These inspections are perceived more as a way of checking that they are doing their work properly and less in a way involving feed-back, mentorship and guidance. All the volunteers gave us contact information and we added to their survey responses publicly available school atainment data (taken from the national database of scores in Romanian, in mathematics and overall).

Observation sample

From the 775 participants, we needed to identify 40 teachers for follow up observations. We initially listed all of those who indicated willingness to take part by region (we needed schools to be relatively close, in order to make observations logistically feasible). From this list we chose 10 regions, with the aim to have a representative balance across the country and to have enough volunteers in each region. Having chosen the regions, we then chose 4 volunteers, aiming for a range of schools and also a range of views (from the survey results). In

[1] Askew, M., Brown, M., Rhodes, V., Wiliam, D., & Johnson, D. (1997). The contribution of professional development to effectiveness in the teaching of numeracy. *Teacher Development*, *1*(3), 335–356. https://doi.org/10.1080/13664539700200030

the end 41 teachers were observed as one consultant took the opportunity to observe two teachers from one school, including one teacher not on our original list.

Approach to observation analysis

Five consultants conducted lesson observations and interviews. Before visiting the schools, the consultants were trained by Alf Coles in the use of the Teaching for Robust Understanding Framework (see Appendix 2, Tool 5) and also in ways of conducting the interviews. The TRU Framework involves initially segmenting lessons into component parts (whole class discussion or instruction, individual work, group work, etc). Within each component, the consultants then had to give a score on a 5-point scale (1, 1.5, 2, 2.5, 3). During training, consultants were encouraged to take notes of the details of what took place in lessons and to apply the analytical judgment later. We worked on viewing some video recordings of lessons all together and then sharing our ratings.

Interviews were carried out with a small sample of students (Appendix 2, Tool 7), in general these took place immediately following the observation. In most cases, it was also possible for the consultant to interview the headteacher during the same visit (Appendix 2, Tool 8). In all cases, the consultants kept field notes of what took place, which were later analysed and compiled into a report for the Academic Manager (Alf Coles).

Interviews with educational experts

Towards the end of the project (November 2023) two groups of experts were invited to discuss the tentative results. Nine discussion points were raised (see Appendix 2, Tool 9/10). Through the process we were able to sense check our initial findings and a tenth point was introduced. These interviews also allowed us to confirm our understanding of the national curriculum and text-book approach to the teaching and learning of number concepts.

3. Findings

Our research questions were organised into three strands, as follows. We offer, in italics, our broad answer to each sub-question, and then give more detail.

1. What are primary teachers' orientations towards teaching mathematics?
    - To what extent do teachers indicate they hold transmission, discovery or connectionist orientations? (This framework is adapted from a study in England on effective teachers of numeracy, mentioned above.) *We found inconclusive evidence about orientations, i.e., there were no strong patterns observed. And while there was some evidence of rural teachers holding more transmission views, this was not a pattern across all regions.*
    - What is the typical orientation and who are the outliers? *We did not find a typical orientation, but did choose for our observation sample, teachers with a range of views.*
    - Is there any correlation between age, or experience, and orientation? *Nothing clear emerged from the data and, indeed, our observations suggest that quality of teaching may not be what is holding back students from lower socio-economic backgrounds.*
    - How do teachers view different students' potential for learning mathematics? *In general, teachers overestimate their students' achievements in mathematics.*

2. What are teachers' classroom practices, related to teaching for understanding in mathematics (self-reported and observed).
    - To what extent is the mathematics taught coherent, with connections between procedures, concepts and contexts addressed? *Maintaining mathematical challenge is one of the strongest aspects of pedagogy apparent from our observations.*
    - To what extent do classroom interactions create and maintain an environment of intellectual mathematical challenge? *We observed many lessons where the level of challenge was appropriate.*
    - To what extent are classroom activities structured to invite and support the active engagement of all students? *We observed a very common practice of students coming to the front of the class to explain an idea at the board.*
    - To what extent do students have opportunities to conjecture, explain, make mathematical arguments and build on one anothers' ideas? *We observed few lessons where such practices were taking place routinely. In many classrooms, students mainly respond with short contributions that are evaluated by the teacher.*
    - To what extent does the teacher solicit students' thinking and respond to those ideas in subsequent interactions, including addressing students' alternative conceptions? *The use of assessment, by the teacher, to monitor student learning, was one of the weakest aspects of pedagogy observed.*

3. What structures exist to support teachers' on-going professional development?
    - How do schools support teachers to reflect on their own teaching? *There appear to be few mechanisms in operation to support reflection.*

- How do other structures (e.g. inspectors, curriculum guidance) support teachers in developing their mathematics teaching practice? *It is not clear how current structures support teachers in a systematic manner.*
- What professional development is available to teachers of mathematics? *While there are opportunities available, these are not currently meeting teachers' needs.*

The remainder of this section is split into three, we first report on the survey data (3.1), then the observation data and school-based interviews (3.2) and finally, the interviews with educational experts. These findings will elaborate on the answers above.

3.1 Survey data

The following groupings are used to categorise survey responses: professional development opportunities, teacher beliefs, teacher pedagogy, teacher perception of challenges and retention and careers. We then consider, briefly, the school atainment data we have for the 10 different counties of our stage 2 volunteers, which consists of the classroom observations.

Professional Development opportunities

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

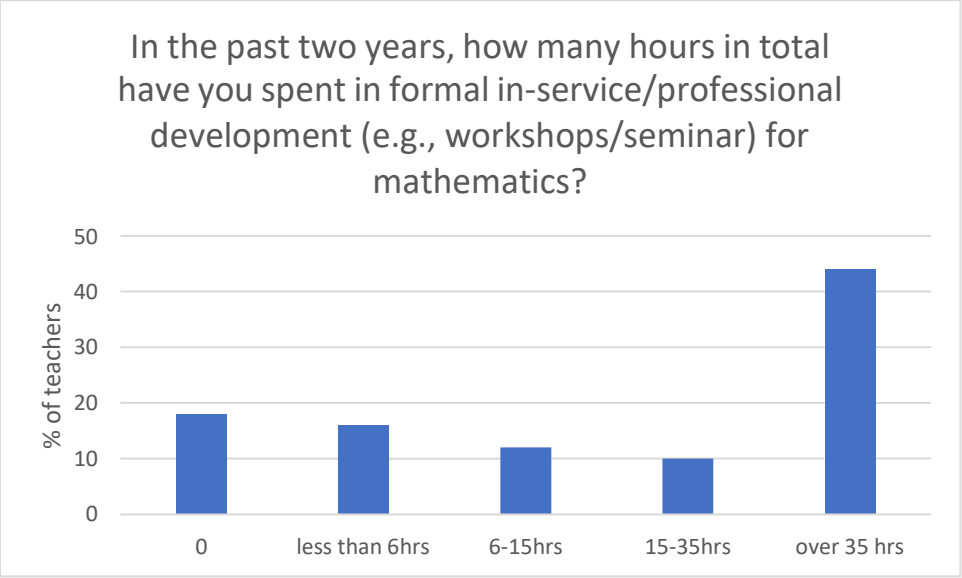

Figure 1: Teachers' experience of Professional Development

We asked teachers about how often they meet with colleagues to plan and discuss teaching (see Figure 2). 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.

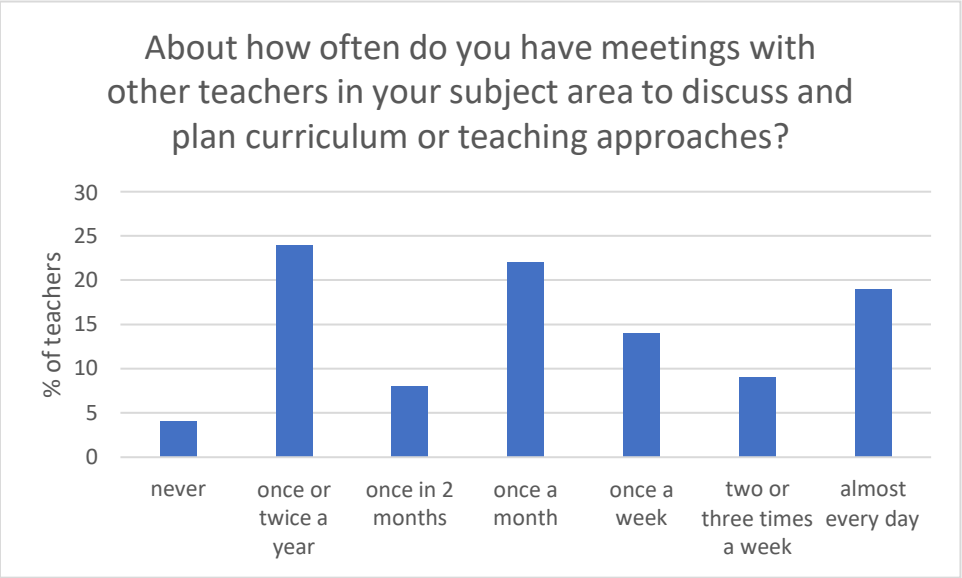

Figure 2: Teachers' experience of collaboration in school

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 clear 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 an urgent 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.

Teachers' Beliefs

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: understanding concepts, being able to think creatively, understanding how maths is used in the real world, 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% 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 Romanian 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 atainment of their students. Teacher were asked to estimate what proportion of their students were in the top, middle or botom third of the country, in terms of atainment. When we averaged these scores, teachers believed only 25% of their students were in the botom third of the country, in terms of atainment (we would expect this figure to be 33%). We might take from this that teachers are positive about their students' potential in mathematics.

In terms of developing 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 terms of training. In other words, any suggestions around new pedagogical approaches will need to take account of the reality of teachers' classrooms and current practices.

Teacher pedagogy

For pedagogy questions, we looked at results overall and also checked to see if teachers from rural schools held similar views. In terms of averages, there was again strong consistency in the responses given by teachers from rural schools, compared to other schools. According to teacher responses, around 38% of lesson time in Romania is spent with students working on textbooks. The majority of teachers (71%) sometimes divide classes into atainment groups and sometimes do not (i.e., they do not have a fixed patern of grouping students).

Teachers make use of their own plans when preparing teaching (85% using their own material quite a lot, or a great deal), while 90% also make use of textbooks.

- 78% of teachers set students homework after the last lesson they taught and 69% assign homework after every lesson.
- 69% of teachers get students to explain the reasoning behind an idea in all or most lessons. We would like to observe that practices of encouraging student explanations, on the surface, appears to be an encouraging sign of connectionist practice and a practice on which further developments could be planned.

- 87% of teachers practice computational skills in all or most lessons, again consistent with transmission orientations. 31% of teachers use paired or group work in most (or all) lessons, which might indicate more discovery-based pedagogy.

The survey aimed to explore teachers' views about number work. In particular, teachers were asked if they viewed numbers, at primary school, as being centrally about counting, and if they viewed numbers as centrally about measuring. To both questions, around 70% disagreed, or strongly disagreed (and most gave the same response to both). This is an intriguing finding, raising the question of what teachers do think numbers are centrally about? One possibility is that teachers view numbers in a more "ordinal" manner, i.e., in terms of their sequence and relationship (this question was not asked). Another possibility is that teachers think number is not centrally about one idea but is a mix, without one interpretation being central. If either case were true for a lot of teachers, there is the potential for developing practices from this basis.

Alternatively, it could be that teachers do not think of number as a concept at all, and view numbers in more operational terms. In other words, numbers are things you operate with and use and there is no need to consider what they are in themselves. Such an interpretation needs to be put alongside the finding that most teachers felt that students understanding concepts was very important.

The overall picture which emerges is that primary mathematics teaching is fairly heavily text-book based. Unless resources are well designed, a text-book based pedagogy can lead to a reliance on memorisation and an atomisation of the subject, leaving students with litle conceptual understanding of the curriculum. Professional development could be offered around making effective use of text-books, given this seems to be a dominant pedagogical approach.

Teacher perceptions of challenges

The survey asked about teachers' perceptions of challenges they face. Notable responses were that 71% viewed coping with different student ability levels as challenging. Support on how to deal with the individual needs of students also emerged as a professional development need desired by around three quarters of teachers, so there is a consistent message here about support teachers feel they need.

Just under half (48%) considered the number of students in the classroom to be a difficulty. We also note that 76% of teachers reported that none of their students have access to a calculator.

Rural teachers and teachers overall, yet again, had broadly similar views on the challenges they faced. Teachers in rural school experienced more challenges from uninterested students and uninterested parents, and shortages of IT hardware. However, they experienced fewer challenges around large numbers of students in one class and low morale of colleagues and low morale of students.

Retention and careers

For 84% of teachers, teaching was their first-choice career and only 13% would change career if they had the opportunity. 43% believe society appreciates their work, but 89% felt appreciated by their students. These figures paint an incredibly positive picture of the teaching profession in Romania. Coupled with the data on the level of experience of teachers, there is a precious resource in Romania of experienced and commited teachers. We believe we should be encouraged from our survey that there is likely to be an appetite for high quality professional development.

School performance by region

There appear to be stark regional differences in school performance, a finding which is consistent with past studies (e.g., TIMSS 2019; PISA 2022). We collected school performance data for those teachers who volunteered to be part of the follow on observational study (i.e., those teachers who will have one of their lessons observed by a researcher). From these volunteers we chose 10 counties where there were at least 4 volunteers and looked up school performance data. From this data, in terms of mathematics performance at the National Evaluation, the inequalities can be illustrated through comparing the regions of Prahova and Salaj. The range of mathematics scores for schools in Prahova (6.55 to 8.46) compared to Salaj (4.24 to 6.04) shows that the lowest performing school in Prahova outperforms the highest performing school in Salaj. Our data indicates, therefore, that there are priority regions in the country, for professional development.

3.2 Observation and school-based interviews

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 unique methodological approach, we have been able to add substance to the numerical data and provide some further evidence as to what might be going wrong, for some students, and what might be going well, for others.

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 very well, they challenged students with relevant questions that maintained an intellectually challenging environment. Mathematical language was very 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, provide explanations, a challenging learning environment was created. The children had a lot of mathematical knowledge, they worked with pleasure, they were engaged, very active, they 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 and the reference to the number axis, something that does not happen very often in primary education in Romania."

Overall, the consultants analysed lessons in relation to 5 areas (see Appendix 2, Tool 5) and submited the data from their schools, which was compiled by region, the summary is in Table 1. It should be noted that a score of 3 represents strong practice (as conceived by the TRU framework) and a score of 1 represents weaker practice.

	Bucharest	Prahova	Cluj	Brasov	Sibiu	Bacau	Iasi	Salaj	Neamt	Suceava	OVERALL
The Mathematics	2.32	2.45	1.79	2.03	2.63	2.56	2.39	2.93	2.15	2.68	2.39
Cognitive Demand	1.73	2.08	1.55	2.02	2.53	2.54	2.35	2.59	2.27	2.25	2.19
Access to Maths Content	2.43	1.97	2.03	2.19	2.69	2.59	2.26	2.65	2.48	2.69	2.40
Agency, Authority and Identity	1.20	1.43	1.40	1.73	2.02	2.10	1.93	2.10	1.67	1.77	1.74
Uses of Assessment	1.55	1.56	1.37	1.79	1.81	2.39	1.97	2.27	1.38	1.63	1.77
OVERALL	1.85	1.90	1.63	1.95	2.34	2.44	2.18	2.51	1.99	2.20	

Table 1: Averages of consultant ratings of 4 lessons, by region (5 observations in Salaj)

There are two important things to note, 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 atainment data (i.e., it was not the case, overall, that teaching quality was higher in schools with higher performance data).

Agency, Authority and Identity concerns: "*the extent to which students have opportunities to conjecture, explain, make mathematical arguments, and build on one another's ideas, in ways*

that contribute to students' development of agency, authority, and their identities as doers of mathematics". There were few occasions, across the 41 observations, when students built on each others' ideas, or commented on another's work. In general, students are called on to make short responses, which are evaluated by the teacher. And yet, a common practice of students coming to the board and presenting work to the whole class, could offer ample opportunity for agency. The practice of students writing on the board occurs often in lessons. In lessons scoring less highly, when students were at the board, the rest of the class were waiting in order to copy down a solution into their books and so opportunities for argument or questioning were lost.

Uses of Assessment means: "*the extent to which the teacher solicits student thinking and subsequent instruction responds to those ideas, by building on productive beginnings or addressing emerging misunderstandings".* Teaching practices around assessment do not appear to be well developed in Romania and there were few occasions observed when teachers explicitly checked on students' progress and changed the course of the lesson as a result.

Turning now to the apparent lack of connection between average teaching score by region and atainment score by region, we followed up this potential finding by plotting the individual lesson scores against school atainment data (based on the National Evaluation). The results are below and, as can be seen, there is again no correlation (confirmed by a Spearman's Rank of-0.017).

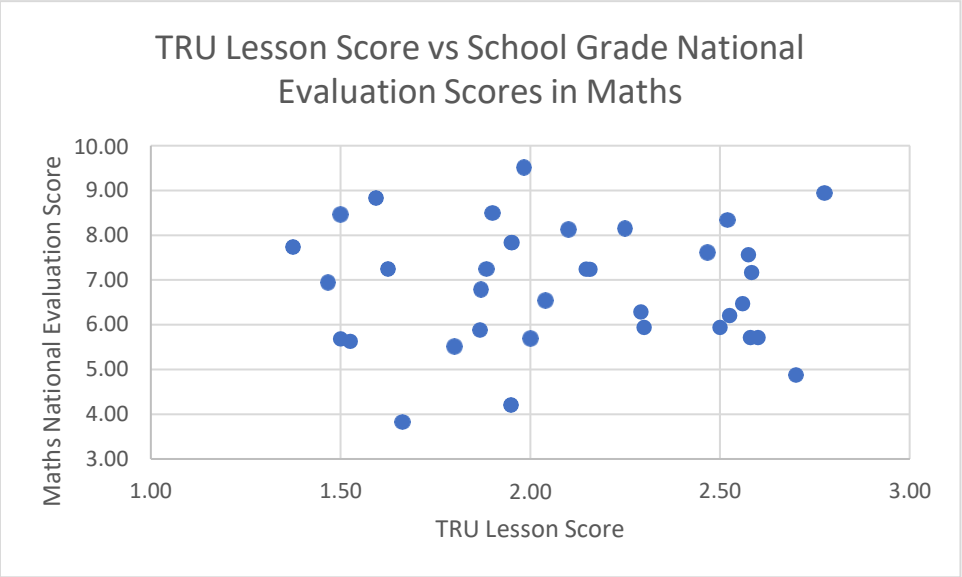

Figure 3: Lesson scores against National Evaluation scores

The findings suggests that the cause of the low atainment by Romanian students with low socio-economic status is unlikely to be fully explainable as a result of differences in the quality of teaching. In other words, although we did observe some differences between practices in rural and urban settings, we also observed practices in rural areas which scored more strongly than practices in urban areas. We recognize that there could be some unreliability in the scoring of different consultants and, indeed, the time for training was somewhat constrained.

Nonetheless, even within the rankings of single consultants' (four of whom observed two regions) there was no correlation between quality of lesson and overall school atainment.

We looked at the rural and non-rural schools in our observation sample. Looking at the school National Evaluation mathematics scores, for rural schools the average was 5.8 and for non-rural schools the average was 7.4, which is a significant gap. Looking at the average lesson observation scores, for rural schools the average was 2.0 and for non-rural schools, the average was 2.1, which is a small difference given the scale used. So, again, we note there is a difference in atainment across rural and non-rural schools but this not appear, on the whole, to be atributable to differences in teaching quality.

To explore further the possible reasons for the atainment gap in Romania, we turn now to the interviews with students, teachers and headteachers. From the sample of students we interviewed, one of the remarkable things we learnt is that for a great number of them, mathematics is their favourite subject and for most others it is among their favourites. We also note that almost all headteachers were happy with the quality of mathematics teaching taking place in their schools.

A great many teachers spoke to us about a lack of teaching resources, by which they meant teaching materials (e.g., manipulatives to help understanding of concepts), suggestions for teaching (e.g., tasks) and digital resources. In line with our survey results, many teachers in interview spoke of wanting more professional development. Proposals for making the situation in schools beter were:

- Existence of tangible, intuitive teaching material in schools
- Colleague interaction, collaboration between fellow teachers
- Guidelines for effective teaching
- Collaboration with middle school mathematics teachers
- Developing teachers' digital skills

There was an almost universal view that the curriculum for mathematics is overloaded. Teachers spoke about wanting more space to engage in work in the classroom that would lead to deeper understanding for students and therefore provide a beter grounding for middle and secondary school study.

It appears as though a number of schools struggle with the issue of student absenteeism. And it is students from lower socio-economic groups for whom this absenteeism is the most major problem. In keeping with findings from PISA 2022, several teachers also complained about students spending a lot of their free time on screens and this impacting their ability to concentrate. There was also a perception (again confirming PISA 2022) that for some of the most needy students, there was not adequate parental support, which limited the impact schools were able to have.

3.3 Interviews with educational experts

For the interviews with educational experts, we presented for discussion some emerging findings. We focus here on the key points of alignment which emerged through discussion across the two groups.

One point of convergence is that not enough resources involving manual skills are used in schools, either because of the convenience of the teacher or because of the teacher's lack of understanding of the need to use them.

In terms of professional development of teachers, it was felt there is a need for courses on mathematics teaching, including practical courses where the methodology is visible in action. In terms of training needs, everyone agrees that there are many resources. However, going deeper into the question, many of these courses are not relevant and, more importantly, it is difficult for the teacher to make a choice because the training offer is not explicit enough. It was suggested there is no culture of identifying training needs. Although apparently a lot of training has been done (e.g. the CRED project mentions 20,000 teachers trained, the PROF project mentions 30,000 teachers trained, and there are many other externally co-financed projects focused on teacher training), there is no analysis of the effectiveness of these training programmes expressed in terms of impact on pupils.

In terms of planning, opinions here were unanimous among teacher educators: in the Romanian school culture, there is neither the habit nor the obligation for school teachers to meet to discuss the planning of lessons, solve common problem-situations that arise, analyse student behaviour, etc. It is interesting to note here the extent of the discussion on the lesson plan. Although there is a model of planning by learning units, a model recommended by curriculum experts and subsequently by the Ministry of Education since 2000-2001, in 2023 inspectors still call for the old model in which the lesson plan is spread over 10 pages (containing a lot of redundant and unrealistic information such as various categories of operational objectives).

We asked about the relative lack of "student agency", seen in lessons. The experts felt that when asked by the teacher, students do not like to explain the reasoning, even if they know how to solve the exercise correctly. But they like to explain to their peers. They also felt agency is learned, there is modular furniture in the classroom, which would allow for group work, but children have to be taught to work in groups, to debate.

We observed a common practice of students coming and writing on the board in front of the whole class. The experts also considered this to be the most common form of organising work in the mathematics classrooms. They had no solutions that would lead to optimising this procedure, indeed, even the question of how to make this practice more effective seemed to be a difficult one to answer. The practice is perhaps so common it is hard to even “see”.

In terms of homework, experts felt that homework is often overloaded, unstructured and sometimes not checked. The experts were surprised by the idea that students might actually enjoy mathematics lessons (they were much more familiar with the perception of "I hate maths", especially in middle and high school) – it was even commented that perhaps, given that the study is on mathematics, the respondents wanted to please those applying the tools.

There was consensus that there exists a big urban/rural divide. There was a feeling this divide is a very big and real problem, caused by the material and social condition of the population, the employment of poorly trained and unmotivated teachers.

Turning specifically to the teaching of the concepts of number, the teacher educators agreed on the following points: the number concept is presented as expressing a characteristic of a set of objects; it starts from the cardinal aspect, then to the ordinal aspect, while the units of measurement appear later.

And finally, all experts stressed the need for more hours of practicing teaching skills in initial training. The professor who teaches the course on mathematics teaching in initial training for primary education, addressed the following issues:

- Prospective teachers are very poorly prepared in mathematics. Teaching careers are unattractive.
- Under current legislation, prospective teachers can take the tenure exam as an educator (without a mathematics test) and then enter the system as a first- to fourth-grade teacher, where they must teach mathematics without having the knowledge of the subject.
- There is the ID (distance learning) system and graduates of this form of education arrive in schools totally unprepared.

4. Discussion and next steps

We believe, through analysing contextual data, that our questionnaire sample was broadly representative of teachers in Romania (there was a slight under-representation of younger teachers in the sample). Of course, some bias is introduced through the sample being self-selecting and teachers needing to engage in an online form. Nonetheless, through taking representative samples from our survey participants, we also believe we have observed 41 lessons which give a balanced snapshot of practice across Romania.

We have grouped our 12 findings into four key areas.

1. Overall need
1.1 There were strong contrasts in teaching practices observed and also large differences in overall school atainment data. In weaker lessons, it was found that teachers showed video recordings to students, rather than teaching or explaining themselves. The tasks given to students were often routine, with litle problem-solving. In schools with low outcomes, students were often absent for long periods and were missing basic information and knowledge in mathematics. In stronger lessons, content was offered in a coherent and creative manner, with students fully engaged and participating and with tasks that went beyond the practice of routine skills. While rural schools have significantly lower atainment than urban and there was, in some regions, evidence of rural schools having weaker teaching practices compared to urban settings, overall, there was no correlation between strength of teaching observed and either school setting, or whole school outcomes for mathematics.

1.2. A common challenge mentioned by teachers is a lack of teaching resources (e.g., didactical materials, or digital resources). There is a lack of concrete manipulatives to support learning. There is a lack of access to high quality digital resources.

1.3. The students we spoke to often thought mathematics was their favourite subject, or one of their favourite subjects. This finding was a surprise to many of the experts in our study.

2. Teacher professional development
2.1. We found many teachers saying they would like more professional development opportunities than they have available to them. There is a need for high quality courses on mathematics teaching, and practical courses where the methodology is visible in action. While there are many resources available, many of these courses are not relevant and, more importantly, it is difficult for the teacher to make a choice because the training offer is not explicit and has not been tested for effectiveness.

2.2. We observed a common practice of students coming to the front of the classroom and writing on the board, addressing the whole class. It seems this is one of the most common forms of organising work in mathematics classrooms. This practice is working well in some cases, allowing opportunities for students to explain their reasoning and in a manner which supports other students to learn. In other cases, the student at the board engages in a 1-1 conversation with the teacher and there is litle benefit for the rest of the class, who wait to copy down a solution.

2.3. From our lesson observations, it seemed that there was relatively litle "student agency", by which we mean opportunities for students to explain their reasoning, or for discussions that build on student ideas. When asked by the teacher, students do not like to explain the reasoning, even if they know how to solve the exercise correctly. They like to explain to their peers, however, there is litle use of group work in mathematics lessons. There were also relatively few “uses of assessment” in lessons, by which we mean actions of the teacher designed to check the on-going understanding of a class, leading to adaptations in the teaching as a result. These are both areas of pedagogy which could usefully come into focus in training.

2.3 A large majority of teachers (71%) viewed coping with different student ability levels as challenging. In other words, support on how to deal with the individual needs of students emerged as a professional development need desired by around three quarters of teachers.

2.4. Another common practice which teachers told us about was the use of textbooks and the setting of homework. In many cases homework is overloaded, unstructured and sometimes not checked.

3. Initial teacher education
3.1. Teachers and experts felt that initial teacher education could be improved. Our experts also agreed that initial training is basic, in many cases it is poor and there is a need for more practice during initial training.

3.2. At school level, much could be improved in relation to how planning of lessons takes place. In the broad Romanian school culture, it appears there is not a habit, nor obligation, for school teachers to meet to discuss the planning of lessons, solve common problem-situations that arise, analyse student behaviour, and so on. We also note some confusion about expectations of planning, with some inspectors still calling for an old model of planning which is no longer recommended by the Ministry.

4. Curriculum
4.1. A common complaint from teachers and headteachers was that the primary curriculum is overloaded with content and does not provide a good preparation for middle or secondary school.

4.2 A key concept in primary mathematics is that of “number”. In both the curriculum and in text books, the number concept is presented as expressing a characteristic of a set of objects. The following sequence in the construction of the number concept appears to be in use across schools: Cardinal; Ordinal; Verbal expression; Writen expression; Measurements, after studying operations with numbers. We note that there is research suggesting balancing cardinal, ordinal and measure aspects of number, from the start, can bring significant benefits.

Next steps

1. Overall need

It does seem clear that schools require more teaching resources and, linking to point 2, more professional development around effective use of resources.

A next step could be to identify (from our observational data) what resources are being used well and to base a training offer around those practices, along with support for schools to purchase the resources. It would make sense to focus training and resources on those students currently showing the weakest atainment in mathematics, who tend to be students in rural settings, and (in all schools) students suffering socio-economic deprivation.

The issue of absenteeism and parental support was mentioned in all regions.

A next step could be to return to the headteachers in our database and explore what strategies schools are using to combat these issues and share approaches that seem effective, while researching the effect of different approaches.

2. Teacher professional development

Training is needed, which is designed to meet teachers' needs and which is subject to on-going evaluation. Areas of potential need include: developing student agency, e.g., in the context of problem solving; developing uses of assessment and ways to support individuals; enhancing subject knowledge; supporting teachers in effective use of text-books and homework. However, given the ubiquity of the practice of students explaining ideas at board, we consider it a priority to support the effective use of this strategy, through research and training. To be clear, we see great promise in this pedagogical strategy. There is the potential for this strategy to be a powerful vehicle for developing student agency and uses of assessment.

A next step could be to prepare a professional development offer for teachers which covers a range of the key areas identified from this research. Linking to the issue of supporting more collaboration in schools, models of professional development which necessitate collaboration should be considered (see Appendix 1), again focused particularly on rural schools, or collaborations across schools, including rural ones.

3. Initial teacher education

Support for new approaches to initial teacher education seems important (we note reforms are on-going). There is a need to support a culture shift around lesson planning in schools, and we suggest that initial teacher education could be a key driver of change (as well as collaborative professional development).

A next step could be to offer professional development for teacher educators. We propose this offer could be based around the identified priorities, and in the case of teacher educator professional development, the focus would be on how to support teachers in those areas.

4. Curriculum

The case for curriculum reform could be explored further. The overloading of the curriculum was mentioned everywhere we went. And while this is perhaps a complaint of teachers across the world, the issue could be investigated.

A next step could be to undertake a comparative study of the curriculum, in relation to three or four other countries, with a view to making policy recommendations.

The curriculum approach to number work is exclusively a “cardinal” first method, i.e., linking number to discrete objects. There is a growing international movement which indicates the benefits of a more mixed approach, e.g., balancing work on number as linked to objects, and number as a length.

A next step could be to commission experimental research into alternative approaches to developing the number concept in Romanian schools, to provide evidence for potential curriculum reform and more effective practice.

Conclusion

We hope this report offers a basis on which to plan for improvements in Romanian primary mathematics teaching and learning. Our primary approach has been to identify strengths and offer potential ways forward, building on those strengths. We return to the fact of the dedicated teacher workforce that appears to be in place in Romanian schools, which we feel offers substantial hope that long-lasting improvments are possible. We would like to acknowledge our thanks to all the consultants who undertook the research and all the participants, who gave freely of their time.

APPENDIX 1: Approaches to Professional Development

There is a lot of research on effective forms of professional development in mathematics, which could support any new offer. A classic, and still relevant, study in England (Askew et al., 1997)[2] made clear recommendations about the most desirable forms of professional development for primary mathematics teachers:

> "'more subject knowledge' is not on its own likely to improve [teaching], but deeper understanding of the mathematics being taught, integrated with learning about pupil and adult strategies, is more likely to be effective … traditional out-of-school [training] courses can be effective but only if they are extended in duration". (p.352)

The extended nature of any offer seems key. The approach of developing communities of practice[3] among teachers is one which seems to have worked well in Romania in the past, in relation to teaching language. A community of practice is defined along three dimensions[2], it needs a *joint enterprise* (in this case, improving mathematics teaching); there needs to be *mutual engagement* (which would need to be designed into any programme); and, there needs to be a *shared repertoire* (e.g., of resources, teaching strategies and vocabulary) which again would need to inform any professional development offer.

Within mathematics education, the community of practice model has been used successfully and also adapted. Jaworski[4] developed the theory and practice of "communities of inquiry", and Coles and Brown (2021)'s professional development work has been conceptualised in terms of establishing "collaborative groups" of teachers[5].

One strategy which has proved successful recently in England has been to create a set of professional development resources, which cover the entire curriculum (see: https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/) and include materials that could be adapted for the classroom, to supplement a text-book. Training is offered around these resources, typically to one teacher in a school, with the expectation that this teacher will support the other teachers in the school to also make use of the resources.

One advantage of linking professional development to a set of resources which could be used by teachers is that there is the potential for influence to extend beyond those teachers who attend training. The nationally accredited text-books are clearly an important background to

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[2] Askew, M., Brown, M., Rhodes, V., Wiliam, D., & Johnson, D. (1997). The contribution of professional development to effectiveness in the teaching of numeracy. *Teacher Development*, *1*(3), 335–356. https://doi.org/10.1080/13664539700200030

[3] Wenger, E. (1998). *Communities of practice: learning, meaning, and identity.* By Etienne Wenger, Cambridge University Press.

[4] Jaworski, B. (2005). Learning communities in mathematics: Creating an inquiry community between teachers and didacticians. *Research in Mathematics Education*, *7*(1), 101–119. https://doi.org/10.1080/14794800008520148

[5] Coles, A., & Brown, L. (2021). Differentiation from an advanced standpoint: Outcomes of mathematics teachers' action research studies aimed at raising attainment. *Mathematics Teacher Education and Development, 23*(3), 166-181.

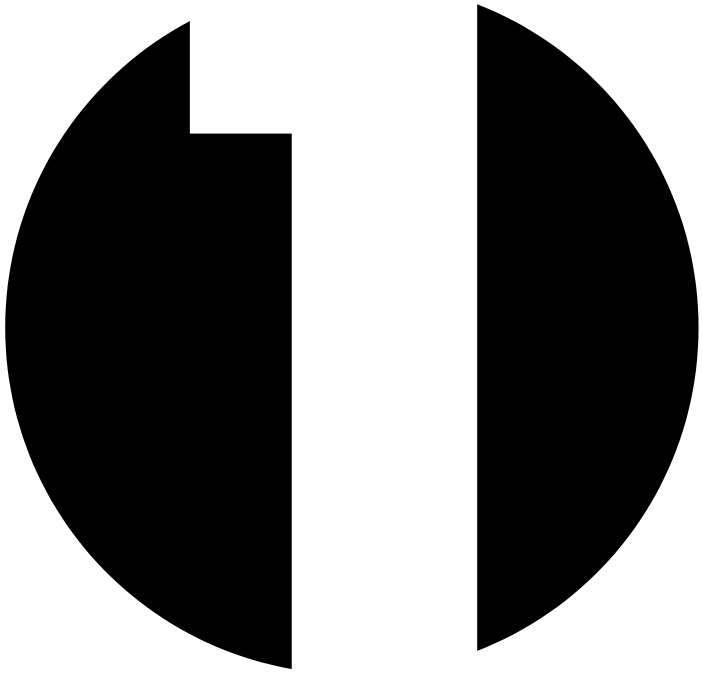
any offer we would need to ensure that materials and professional development dovetailed with those books and with the way that teachers plan. It would need to be clear that the offer was not replacing the books but rather supporting teachers' understanding of key concepts and key representations, to allow them to make more effective use of the text-books.

APPENDIX 2

Research tools

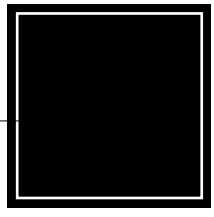
Tool 1 – Online questionnaire
Tool 2 – Sample of ethics documents (for permission from the University of Bristol)
Tool 3 – Lesson plan analysis protocol
Tool 4 – Text book analysis protocol
Tool 5 – Classroom observations
Tool 6 – Post observation teacher interview
Tool 7 – Focus group meetings (students)
Tool 8 – Headteacher interview
Tool 9/10 – Inspectors and teacher educators interview

R P M S



Tool 1 - English Language Version of Background Questionnaire

Romanian Primary Mathematics Study (RPMS)



2023 Assessment

Teacher questionnaire

Teacher Questionnaire

Dear teacher, we kindly ask you to help us with your opinions to carry out an educational research. The British Council in partnership with the Romanian-American Foundation and with academic guidance from a researcher at the University of Bristol, is conducting research to investigate the teaching and learning of mathematics in Romania at primary level. The research has a strictly scientific purpose, and the present questionnaire is designed to contribute to the understanding of the situation, best practices and recommendations for improving the teaching and learning of mathematics in primary schools in Romania. The survey is called Primary Mathematics Study (RPMS) in English, but please fill in your answers in whichever language you prefer, Romanian or English.

This questionnaire is addressed to primary school teachers who are asked to provide information about their academic and professional background, instructional practices and attitudes towards teaching mathematics. Your answers are very important to help describe the teaching of mathematics in Romanian classrooms, because you know best the reality in the classroom, and your opinions are very relevant.

Some of the questions in this questionnaire relate to the class you are currently teaching.

It is important that you answer each question carefully so that the information provided reflects your situation as accurately as possible. It is estimated that it will require approximately 30 minutes to complete this questionnaire.

Your cooperation in completing this questionnaire is greatly appreciated.

GENERAL DIRECTIONS:

1. Identify a place and a time when you will be able to complete the questionnaire without being interrupted. The questionnaire has been designed to be completed within 30 minutes by most teachers. However, the amount of time you will need may be either more or less. To make it as easy as possible for you to respond, most items may be completed simply by checking the appropriate box.

2. There are no “right” or “wrong” answers to any of these items. The questionnaire is designed to provide information about teachers’ professional experiences, opinions, and class- room activities.

3. Several items ask you to think of a recent class period as you respond. In responding to these items, choose a recent class period with your class which you can recall in some detail and which was fairly typical of what occurs in your classroom i.e. a class period which was not affected by special events such as assemblies, guests, student testing other than short quizzes, or any other unusual circumstances.

4. More specific instructions to assist you in responding are found in *italics* for each item.

Again, thank you for your time, effort and thought in completing this questionnaire!

1. Please specify the county in which you teach.

_____

2. Please specify if you teach in:

Check one box only.

Rural environment ..... ☐
A school in a small town ..... ☐
A school in a large city ..... ☐

3. How old are you?

Check one box only.

under 25 ..... ☐
25-29 ..... ☐
30-39 ..... ☐
40-49 ..... ☐
50-59 ..... ☐
60 or more ..... ☐

4. Are you female or male?

Check one box only.

female ..... ☐
male ..... ☐

5. What is the highest level of formal education you have completed?

<HIGH SCHOOL>
<PEDAGOGICAL HIGH SCHOOL>
<BA OR EQUIVALENT WITHOUT TEACHING TRAINING>
< BA OR EQUIVALENT + TEACHING TRAINING>
<MASTER'S DEGREE/ WITHOUT TEACHING TRAINING>
<MASTER'S/PhD + TEACHING TRAINING>
<PhD DEGREE/ WITHOUT TEACHING TRAINING>
<PhD DEGREE + TEACHING TRAINING>
<UNQUALIFIED TEACHER>

6. At which grade levels are you teaching <u>Mathematics</u> during this school year?

Check one box in each row.

☐ Do not teach mathematics this year

	Yes	***No***
a) <GRADE 0>	☐	☐
b) <GRADE 1>	☐	☐
c) <GRADE 2>	☐	☐
d) <GRADE 3>	☐	☐
e) <GRADE 4>	☐	☐
f) <GRADE 5>	☐	☐
g) <GRADE 6>	☐	☐
h) <GRADE 7>	☐	☐
i) <GRADE 8>	☐	☐

7. Do you teach part-time or full-time?

Check one.

Part-time	☐
Full-time	☐

8. By the end of this school year how many years will you have been teaching altogether?

Please round to the nearest whole number.

_____

9. At which of these grade levels have you taught in the past 5 years?

Check one box in each row.

	Yes	*No*
a) <GRADE 0>.....	☐	☐
b) <GRADE 1>	☐	☐
c) <GRADE 2>	☐	☐
d) <GRADE 3>	☐	☐
e) <GRADE 4>	☐	☐
f) <GRADE 5>	☐	☐
g) <GRADE 6>	☐	☐
h) <GRADE 7>	☐	☐
i) <GRADE 8>	☐	☐

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10. APPROXIMATELY how many hours per week do you normally spend on each of the following activities outside the formal school day?

Check one box in each row.

	none	*less than 1 hour*	*1 - 2 hours*	*3 - 4 hours*	*more than 4 hours*
a) preparing or grading student tests or exams	☐	☐	☐	☐	☐
b) reading and grading other student work	☐	☐	☐	☐	☐
c) planning lessons by yourself	☐	☐	☐	☐	☐
d) meeting with students outside of classroom time (e.g., tutoring, guidance)		☐	☐	☐	☐
e) private tutoring					
e) meeting with parents	☐	☐	☐	☐	☐
f) professional reading and development activity (e.g., seminars, conferences, etc.)		☐	☐	☐	☐
g) keeping students' records up to date	☐				
h) administrative tasks including staff meetings (e.g. photocopying, displaying students' work)	☐	☐	☐		

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11. In the past two years, how many hours in total have you spent in formal in-service/professional development (e.g., workshops/seminar) for mathematics?

Check one box only.

none ☐

less that 6 hours ☐

6-15 hours ☐

16-35 hours ☐

over 35 overs ☐

12. About how often do you have meetings with other teachers in your subject area to discuss and plan curriculum or teaching approaches?

Check one box only.

never ..... ☐

once or twice a year ..... ☐

every other month ..... ☐

once a month ..... ☐

once a week ..... ☐

two or three times a week ..... ☐

almost every day ..... ☐

13. In the past two years have you participated in professional development in any of the following areas?

		yes	*no*
a)	mathematics content	☐	☐
b)	mathematics pedagogy/instruction	☐	☐
c)	mathematics curriculum	☐	☐
d)	improving students' problem-solving skills	☐	☐
e)	mathematics assessment		☐ ☐
f)	individual students' mathematical needs	☐	☐

14. Do you need professional development in any of the following areas?

		yes	*no*
a)	mathematics content	☐	☐
b)	mathematics pedagogy/instruction	☐	☐
c)	mathematics curriculum	☐	☐
d)	improving students' problem-solving skills	☐	☐
e)	mathematics assessment	☐	☐
f)	individual students' mathematical needs	☐	☐

15. To be good in mathematics at school, how important do you think it is for students to...

Check one box in each row.

		not important	*somewhat important*	*very important*
a)	remember formulas and procedures.....	☐	☐	☐
b)	be able to follow a process, algorithm, or procedure.....	☐	☐	☐
c)	understand mathematical concepts, principles, and strategies	☐	☐	☐
d)	be able to think creatively	☐	☐	☐
e)	understand how mathematics is used in the real world		☐	☐
f)	be able to provide reasons to support their solutions....	☐		

16. To what extent do you agree or disagree with each of the following statements?

Check one box in each row.

		strongly disagree	***disagree***	***agree***	***strongly agree***
a)	Mathematics is primarily an abstract subject.....	☐	☐	☐	☐
b)	Mathematics is primarily a formal way of representing the real world.	☐	☐	☐	☐
c)	Mathematics is primarily a practical and structured guide for addressing real situations.	☐	☐	☐	☐
d)	If students are having difficulty, an effective approach is to give them more practice by themselves during the class.	☐	☐	☐	☐
e)	Some students have a natural talent for mathematics and others do not.	☐	☐	☐	☐
f)	More than one representation (picture, concrete material, symbol set, etc.) should be used in teaching a mathematics topic.	☐	☐	☐	☐
g)	Mathematics should be learned as sets of algorithms or rules that cover all possibilities.			☐	☐
h)	Basic computational skills on the part of the teacher are sufficient for teaching Primary School mathematics.			☐	☐
i)	A liking for and understanding of students are essential for teaching mathematics.				
j)	Numbers, at primary school, are centrally about counting objects.....	☐	☐		
k)	Numbers, at primary school, are centrally about measuring things (e.g., lengths)	☐	☐		

17. Indicate your familiarity with each of the following documents:

Check one box in each row.

	no such document	*not familiar*	*fairly familiar*	*very familiar*
a) <THE School CURRICULUM GUIDE FOR MATHEMATICS and exploration of the environment>	☐	☐	☐	☐
b) <THE School CURRICULUM for mathematics>	☐	☐	☐	☐
c) <Guide to the SCHOOL CURRICULUM GUIDE>	☐	☐	☐	☐
d) <THE NATIONAL ASSESSMENT SPECIFICATIONS>	☐	☐	☐	☐

N.B.: In many of the questions which follow, a reference is made to <u>your class</u>. This is the class you are currently teaching.

What grade you are currently teaching?

Garde 0
Grade 1
Grade 2
Grade 3
Grade 4

18. How many students are in your class?

Write in a number for each.
Write 0 (zero) if there are none.

boys_____ girls _____

19. Compared with other students in Romania at this grade level, estimate what percent of students in your class have:

Please write a number.

a) high achievement levels (i.e. in the top third nationally) ..... _____%

b) middle achievement levels (middle third nationally) ..... _____%

c) low achievement levels (bottom third nationally) ..... _____%

TOTAL..... 100%

20. How many minutes per week do you teach mathematics to your class?

Please write in a number.

_____ *minutes*

Note: **TEXTBOOKS** <Insert specific textbook list>

21. Do you use a textbook in teaching mathematics to your class?

Check one box.

Yes ☐ No ☐

If YES, write in the title, author, etc. of the textbook(s) you use most.

Title:_____

Author (Publisher):_____

Year:_____

Other: _____

---

22. Approximately what percentage of your weekly mathematics teaching time is based on the text(s) indicated in the previous question?

Check one box.

0 - 25%..... ☐

26 - 50%..... ☐

51 - 75%..... ☐

76 - 100%..... ☐

23. Do you divide your class into attainment or ability groups for teaching mathematics?

Check one box.

never ..... ☐

sometimes ..... ☐

always ..... ☐

24. In your view to what extent do the following limit how you teach your class?

Check one box in each row.

		not at all	*a little*	*quite a lot*	*a great deal*
a)	students with different academic abilities.....	☐	☐	☐	☐
b)	students who come from a wide range of backgrounds, (e.g., economic, language)	☐	☐	☐	☐
c)	students with special needs, (e.g., hearing, vision, speech impairment, physical disabilities, mental or emotional/psychological impairment)	☐	☐	☐	☐
d)	uninterested students	☐	☐	☐	☐
e)	disruptive students	☐	☐	☐	☐
f)	parents interested in their children's learning and progress.....	☐	☐	☐	☐
g)	parents uninterested in their children's learning and progress.....	☐	☐	☐	☐
h)	shortage of computer hardware	☐	☐	☐	☐
i)	shortage of computer software	☐	☐	☐	☐
j)	shortage of other instructional equipment for students' use	☐	☐	☐	☐
k)	shortage of equipment for your use in demonstrations and other exercises	☐	☐	☐	☐
l)	inadequate physical facilities	☐	☐	☐	☐
m)	high student/teacher ratio	☐	☐	☐	☐
n)	low morale among fellow teachers/administrators	☐	☐	☐	☐
o)	low morale among students	☐	☐	☐	☐
p)	threat(s) to personal safety or the safety of students	☐	☐	☐	☐
q)	lack of internet connection	☐	☐	☐	☐

25. How many of your students have access to hand held calculators during mathematics lessons?

Check one.

almost all.....	☐
about three quarters	☐
about half	☐
about one quarter	☐
none	☐

26. How often do students in your class use calculators for the following activities?

Check one box for each row.

	almost every day	***once or twice a week***	***once or twice a month***	***never, or hardly ever***
a) Checking answers	☐	☐	☐	☐
b) Tests and exams	☐	☐	☐	☐
c) Routine computation.....	☐	☐	☐	☐
d) Solving complex problems	☐	☐	☐	☐
e) Exploring number concepts	☐	☐	☐	☐

27. When planning mathematics lessons, how much do you rely on:

Check one box for each row.

	not at all	***a little***	***quite a lot***	***a great deal***
a) your own previously prepared lessons.....	☐	☐	☐	☐
b) a written plan compiled by teachers in the school	☐	☐	☐	☐
c) other teachers or math specialists in your school/department	☐	☐	☐	☐
d) student textbooks	☐	☐	☐	☐
e) other textbooks or resource books	☐	☐	☐	☐
f) external examinations or standardized tests	☐	☐	☐	☐

28. In planning mathematics lessons, what is your main source of written information when...

Note: <List only Romania-specific and appropriate options.>

Check one box in each row.

	<School Curriculum for Maths and Exploration of the Env>	***<School Curriculum for Mathematics>***	***<School Curriculum Guide>***	***<National Assessment Spec>***	***Student Edition of Textbook***	***Other Resource Books***
a) deciding which topics to teach (goals)	☐	☐	☐	☐	☐	☐
b) deciding how to present a topic	☐	☐	☐	☐	☐	☐
c) selecting problems and exercises for work in class and homework	☐	☐	☐	☐	☐	☐
d) selecting problems and applications for assessment and evaluation	☐	☐	☐	☐	☐	☐

Mathematics Topics

Think of the last lesson in which you taught mathematics to your class. (If this lesson was atypical, e.g. an examination or a field trip, pick the previous one.)

26a. How many minutes was this class period?

Please write in a number.

_____ *minutes*

26b. For each of the following mathematics topics, indicate if it was the subject of this lesson.

Check one box in each row.

	Yes	***No***
1. Whole Numbers	☐	☐
2. Common Fractions	☐	☐
3. Decimal Fractions	☐	☐
4. Percentages	☐	☐
5. Other Number Sets and Concepts	☐	☐
7. Estimation and Number Sense	☐	☐
8. Measurement Units and Processes	☐	☐
9. Perimeter, Area and Volume	☐	☐
10. Basics of One and Two Dimensional Geometry	☐	☐
14. Ratio and Proportion	☐	☐
15. Functions, Relations and Patterns	☐	☐
17. Probability and Statistics	☐	☐
18. Sets and Logic	☐	☐
19. Problem Solving Strategies	☐	☐
20. Other Mathematics Content	☐	☐

26c. Was this lesson...

	Yes	*No*
1. the introduction of this topic	☐	☐
2. a continuation of a previous lesson on the same topic.....	☐	☐
3. the end of the coverage of this topic	☐	☐

26d. Did you assign homework after the class lesson?

Check one box.

Yes ☐ No ☐

26e. If yes, how long would it take a typical student to complete this homework?

Please write in a number.

_____ *minutes*

Think of the same mathematics class period.

27a. How did the lesson proceed?

The following presents a list of activities that may occur during a lesson. Although the list is not exhaustive of what happens in a classroom, most classroom activities may be considered as variations of those listed below. Using this list, indicate how your lesson developed. In the blanks on the right, write in the order in which the activities used in the lesson took place (1 = first, 2 = second, and so on) and estimate the amount of time you spent on each one. Ignore activities you used that do not fit into the descriptions listed. Write in the order and the approximate number of minutes for each activity. NOTE: If you did not do a certain activity write zero in the blank next to it.

	order	***minutes***
• review of previous lesson(s)	_____	_____
• a short quiz or test to review previous lesson	_____	_____
• oral recitation or drill (students responding aloud)	_____	_____
• review or correction of previous lesson's homework	_____	_____
• **introduction** of a topic (class discussion, teacher explanation/demonstration, film, video, use of concrete materials etc.).....	_____	_____
• **development** of a topic (class discussion, teacher explanation/demonstration, group problem solving, film, video, etc.)	_____	_____
• small group activities (with or without teacher)	_____	_____
• students do paper-and-pencil exercises related to topic (not the same as homework)	_____	_____
• assignment of student homework	_____	_____
• students work on homework in class	_____	_____
• student data collection activity or hands-on session.....	_____	_____

27b. In this class period did the students work in small groups?

Check one box.

none of the time ..... ☐

some of the time ..... ☐

all the time ..... ☐

28. In your mathematics lessons, how often do you usually ask students to do each of the following?

Check one box in each row.

		never or almost never	*some lessons*	*most lessons*	*every lesson*
a)	explain the reasoning behind an idea	☐	☐	☐	☐
b)	represent and analyze relationships using tables, charts, or graphs	☐	☐	☐	☐
c)	work on problems for which there is no immediately obvious method of solution	☐	☐	☐	☐
d)	use computers to solve exercises or problems	☐	☐	☐	☐
e)	write equations to represent relationships	☐	☐	☐	☐
f)	practice computational skills	☐	☐	☐	☐

29. In your mathematics lessons, how frequently do you do the following when a student gives an incorrect response during a class discussion?

Check one box in each row.

a) correct the student's error in front of the class .....

b) ask the student another question to help him or her get the correct response .....

c) call on another student who's likely to give the correct response .....

d) call on other students to get their responses and then discuss what is correct .....

never or almost never	*some lesson*	*most lessons*	*every lessons*				
				☐	☐	☐	☐
				☐	☐	☐	☐
				☐	☐	☐	☐
				☐	☐	☐	☐

30. In mathematics lessons, how often do students...

Check one box in each row.

		never or almost never	*some lessons*	*most lessons*	*every lesson*
a)	work individually without assistance from the teacher	☐	☐	☐	☐
b)	work individually with assistance from the teacher	☐	☐	☐	☐
c)	work together as a class with the teacher teaching the whole class	☐	☐	☐	☐
d)	work together as a class with students responding to one another	☐	☐	☐	☐
e)	work in pairs or small groups without assistance from the teacher	☐	☐	☐	☐
f)	work in pairs or small groups with assistance from the teacher	☐	☐	☐	☐

31. How often do you usually assign mathematics homework?

Check one box.

- never ..... ☐
- less than once a week ..... ☐
- once or twice a week ..... ☐
- 3 or 4 times a week ..... ☐
- every day ..... ☐

32. **If you assign mathematics homework, how many minutes of homework do you usually assign your students?** *(Consider the time it would take an average student in your class.)*

Check one box.

- I do not assign homework ..... ☐
- less than 15 minutes ..... ☐
- 15-30 minutes ..... ☐
- 31-60 minutes ..... ☐
- 61-90 minutes ..... ☐

more than 90 minutes ..... ☐

33. If you assign mathematics homework, how often do you assign each of the following kinds of tasks?

Check one box in each row.

	never	*rarely*	*sometimes*	*always*	*I do not assign homework*
a) worksheets or workbook	☐	☐	☐	☐	☐
b) problem/question sets in textbook	☐	☐	☐	☐	☐
c) reading in a textbook or supplementary materials	☐	☐	☐	☐	☐
d) writing definitions or other short writing assignment	☐	☐	☐	☐	☐
e) small investigation(s) or gathering data.	☐	☐	☐	☐	☐
f) working individually on long term projects or experiments	☐	☐	☐	☐	☐
g) working as a small group on long term projects or experiments	☐	☐	☐	☐	☐
h) finding one or more uses of the content covered	☐	☐	☐	☐	☐
i) preparing oral reports either individually or as a small group	☐	☐	☐	☐	☐
j) keeping a journal	☐	☐	☐	☐	☐

34. If students are assigned <u>written</u> mathematics homework, how often do you do the following?

a) record whether or not the homework was completed .....

b) collect, correct and keep assignments....

c) collect, correct assignments and then return to students .....

d) give feedback on homework to whole class

e) have students correct their own assignments in class .....

f) have students exchange assignments and correct them in

class .....

Check one box in each row.

		never	*rarely*	*sometimes*	*always*	*I do not assign homework*
g)	use it as a basis for class discussion	☐	☐	☐	☐	☐
h)	use it to contribute towards students' grades or marks	☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐
		☐	☐	☐	☐	☐

35. Was Teaching your first choice as a career when beginning university or teacher education college?

Yes ☐ No ☐

36. Would you change to another career if you had the opportunity?

Yes ☐ No ☐

37. Do you think that society appreciates your work?

Yes ☐ No ☐

38. Do you think your students appreciate your work?

Yes ☐ No ☐

39. Please rank the following professions in order of social status. Assign a rank of '1' to the profession with the highest social status, and ' 9' to the profession with the lowest status.

a) accountant ....._____

b) medical doctor ....._____

c) lawyer ....._____

d) engineer ....._____

e) nurse ....._____

f) senior civil servant ....._____

g) teacher, primary school ....._____

h) teacher, secondary school ....._____

i) unskilled worker ....._____

40. Hundreds of teachers in Romania are helping us by completing this questionnaire. 40 of them will be selected by Romanian researchers, to come and observe a class of mathematics, of course with the prior consent of the school director. If necessary a partnership will be established between the British Council and your school.

Would you like to be one of these 40 teachers and host a class of your own?

Check one box.

Yes, I am interested in hosting a visit to a maths class. ☐

Please leave your contact details.

Name, phone, email, school where you teach, location.

_____

I do not wish to take part in the research section involving classroom visits. ☐

THANK YOU for the thought, time, and effort you have put into completing this questionnaire.

TOOL 2: ETHICS

Information sheet for Students

ROMANIAN PRIMARY MATHEMATICS STUDY – Part 2

Information about the research project

This study aims to understand more about Romanian Primary Mathematics teaching, to make recommendations for the professional development needs of teachers and, potentially, for curriculum change. The study is being carried out as a collaboration between the British Council in Romania and Professor Alf Coles from the University of Bristol (UK). The study is funded by the Romanian-American Fund, who carried out similar work in the past around teaching English in Romanian Primary Schools. Part 2 of the project involves lesson observations and interviews.

What taking part involves

Your child's teacher has been selected to take part in the study. We would like to video record one a mathematics lesson. Your child's teacher will then select a small group of students to be involved in a focus group interview.

What will happen to the data collected

The only people who will look at the video recording of the lesson are the research team. The video recording will not be made publicly available. All names will be anonymised, of the school, teacher and children. Once the research project is finished, the video recording will be deleted (at the latest by December 2024). The research will comply with all the legal requirements in the General Data Protection Regulations (GDPR). Video data will be stored securely on British Council Romania servers.

Your right to withdraw

You have the right to withdraw your child's involvement in this research at any time *up until the point when the lesson observation takes place* (May/June 2023). If you wish to withdraw, please email Alf Coles at the University of Bristol <alf.coles@bristol.ac.uk>, or Alina Constantinescu at the British Council in Romania, <Alina.Constantinescu@britishcouncil.ro>. No reason has to be given, and no atempt will be made to encourage you to re-engage with the research. If your child withdraws then they will still be involved in the lesson but we will make sure they sit somewhere that is not in the view of the camera.

After the research is completed

The research team will write a report about teaching mathematics in Romania and will make recommendations for how it can be improved. If you would like to see a copy of the report, please let one of the research team know.

Complaints procedure

If you have any concerns or complaints to make about any aspect of this research, then please contact Alf Coles at the University of Bristol <alf.coles@bristol.ac.uk>, or Alina Constantinescu at the British Council in Romania, <Alina.Constantinescu@britishcouncil.ro>.

If you have any questions or queries about the content of this information sheet, please contact Alf Coles at the following email address: alf.coles@bristol.ac.uk.

Thank you for reading this information sheet and for your interest in this research.

Information sheet for Teachers

ROMANIAN PRIMARY MATHEMATICS STUDY – Part 2

Information about the research project

This study aims to understand more about Romanian Primary Mathematics teaching, in order to make recommendations for the professional development needs of teachers and, potentially, for curriculum change. The study is being carried out as a collaboration between the British Council in Romania and Professor Alf Coles from the University of Bristol (UK). The study is funded by the Romanian-American Fund, who carried out similar work in the past around teaching English in Romanian Primary Schools. Part 2 of the project involves lesson observations and interviews.

What taking part involves

You have been sent this information sheet because you have indicated you are interested in being part of this further research. Involvement in Part 2 means agreeing to:

- provide the research team with 1 learning unit plan/or lesson plan (related to the classroom observation);
- participate in one classroom observation (about 40 – 45 minutes);
- take part in a research interview (and reflection post-observation);
- arrange for 3 to 4 of your students to be interviewed by the same researcher.

What will happen to the data collected

All of the data collected will be treated as confidential. The data will be analysed, and the findings will be summarised in the form of a summary report. You will be emailed a copy of this report, if you would like to receive it. The findings of this research will potentially inform the direction of further research on Romanian Primary Mathematics. It is hoped that the research findings will also be reported in a peer-reviewed journal article (late 2023).

The research will comply with all the legal requirements in the General Data Protection Regulations (GDPR). Video data will be stored securely on British Council Romania servers and will only be made available to the research team.

Once the research is completed and reports are writen video data will be deleted. This will be, at the latest, December 2024.

Your right to withdraw

You have the right to withdraw from this research at any time *up until the point when the lesson observation data are to be analysed* (June 2023). If you wish to withdraw, having completed the questionnaire, please email Alf Coles at the University of Bristol <alf.coles@bristol.ac.uk>, or Alina Constantinescu at the British Council in Romania, <Alina.Constantinescu@britishcouncil.ro>. No reason has to be given, and no atempt will be made to encourage you to re-engage with the research.

After the research is completed

You will be asked if you would be interested in being part of an email list, where any opportunities for further involvement in research into Romanian Primary Mathematics teaching will be posted.

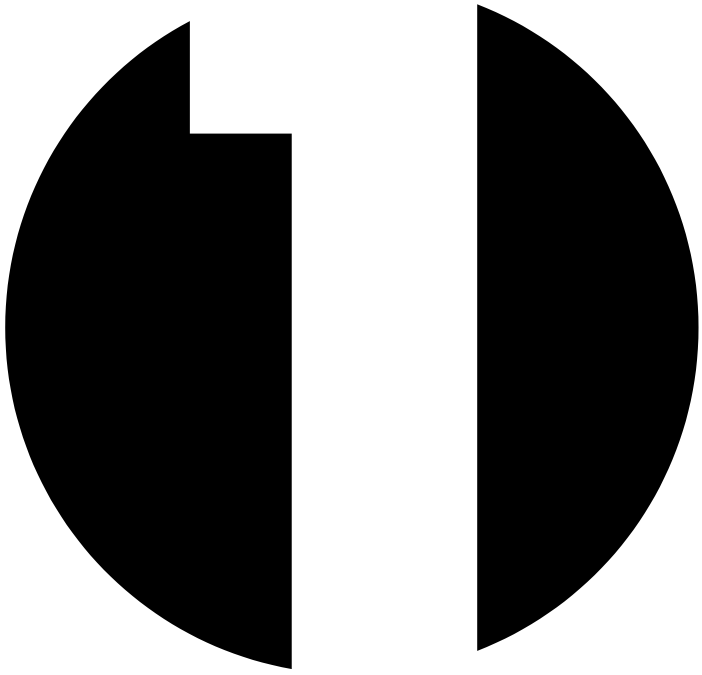
Complaints procedure

If you have any concerns or complaints to make about any aspect of this research, then please contact Alf Coles at the University of Bristol <alf.coles@bristol.ac.uk>, or Alina Constantinescu at the British Council in Romania, <Alina.Constantinescu@britishcouncil.ro>.

If you have any questions or queries about the content of this information sheet, please contact Alf Coles at the following email address: alf.coles@bristol.ac.uk.

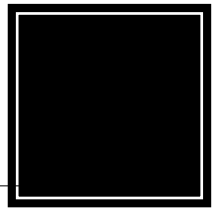
Thank you for reading this information sheet and for your interest in this research.

R P M S



Tool 3 - Lesson Plan Analysis

Romanian Primary Mathematics Study (RPMS)



2023 Lessom Plan Analysis Protocol

Identification Label

Teacher:

Romanian Primary Mathematics Study (RPMS)

Analysis Protocol

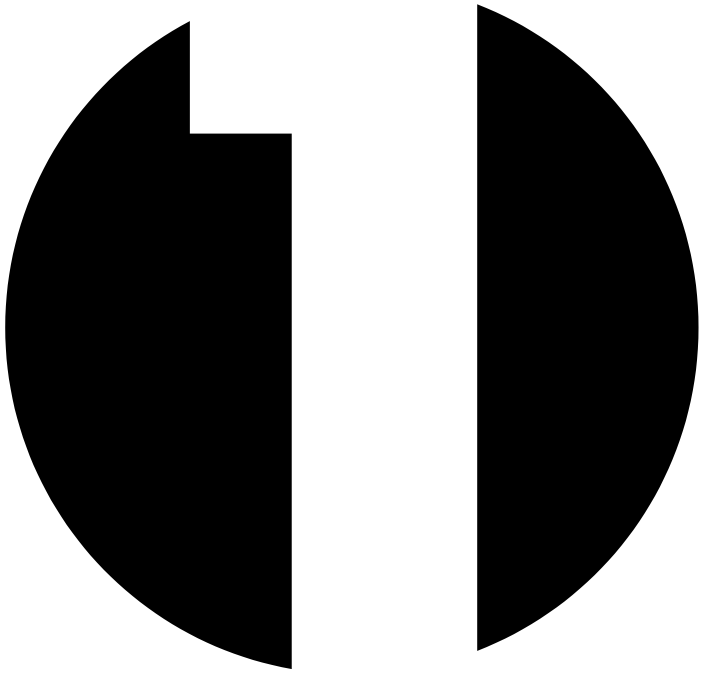
The analysis of lesson plans (where they exist) will be as follows.

Q1 – Does the teacher have a plan for this specific lesson?

Q2 – Does the teacher have a plan for the unit within which this lesson fits?

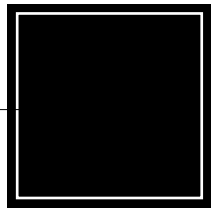
Q3 – What forms of practice are students asked to do? Do exercises practice the same skill or procedure? Is there evidence of variation? What balance of problem-solving versus routine tasks are students offered?

R P M S



Tool 4 - Text-Book Analysis

Romanian Primary
Mathematics Study (RPMS)



2023 Textbook Analysis Protocol

Identification Label

Textbook Name:

Romanian Primary Mathematics Study (RPMS)

Analysis Protocol

The analysis of Romanian textbooks will focus on the concept of number.

Q1 – How is number introduced? In particular, is number presented as being about objects? Being about measures (e.g., length)? Or, is it introduced more formally as a place in a sequence?

Q2 – How is the number concept developed? Are there consistent representations of number used through the text book (e.g., a numberline, or a bar model)? If any of the representations of number mentioned above are identified (object, measure, sequence), are these present as the number concept is developed?

Q3 – What forms of practice are students asked to do? Do exercises practice the same skill or procedure? Is there evidence of variation? What balance of problem-solving versus routine tasks are students offered?

TOOL 5 – CLASSROOM OBSERVATION RUBRIC AND OBSERVATION SHEET

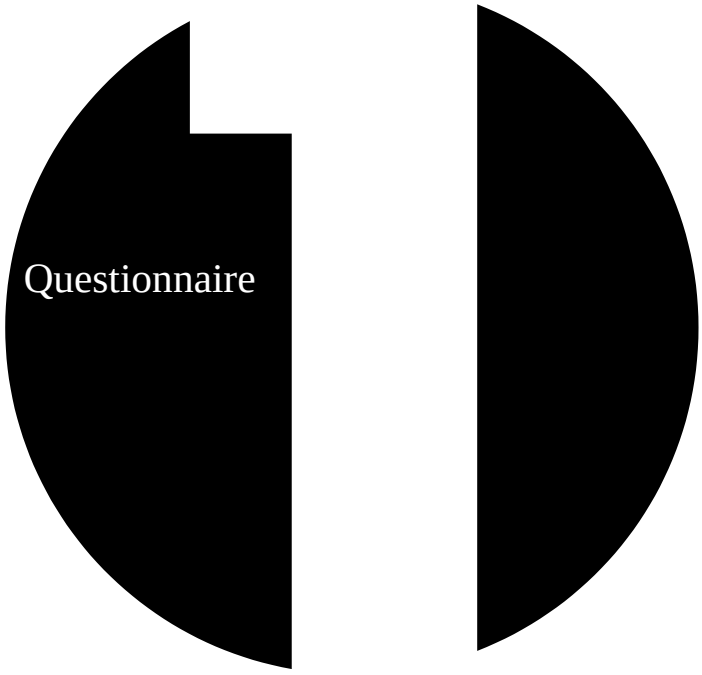
Summary Rubric

	The Mathematics	Cognitive Demand	Access to Mathematical Content	Agency, Authority, and Identity	Uses of Assessment
	How accurate, coherent, and well justified is the mathematical content?	*To what extent are students supported in grappling with and making sense of mathematical concepts?*	*To what extent does the teacher support access to the content of the lesson for all students?*	*To what extent are students the source of ideas and discussion of them? How are student contributions framed?*	*To what extent is students' mathematical thinking surfaced; to what extent does instruction build on student ideas when potentially valuable or address misunderstandings when they arise?*
1	Classroom activities are unfocused or skills-oriented, lacking opportunities for engagement with key grade level content (as specified in the Common Core Standards)	Classroom activities are structured so that students mostly apply memorized procedures and/or work routine exercises.	There is differential access to or participation in the mathematical content, and no apparent efforts to address this issue.	The teacher initiates conversations. Students' speech turns are short (one sentence or less), and constrained by what the teacher says or does.	Student reasoning is not actively surfaced or pursued. Teacher actions are limited to corrective feedback or encouragement.
2	Activities are at grade level but are primarily skills-oriented, with few opportunities for making connections (e.g., between procedures and concepts) or for mathematical coherence (see glossary).	Classroom activities offer possibilities of conceptual richness or problem solving challenge, but teaching interactions tend to "scaffold away" the challenges, removing opportunities for productive struggle.	There is uneven access or participation but the teacher makes some efforts to provide mathematical access to a wide range of students.	Students have a chance to explain some of their thinking, but the teacher is the primary driver of conversations and arbiter of correctness. In class discussions, student ideas are not explored or built upon.	The teacher refers to student thinking, perhaps even to common mistakes, but specific students' ideas are not built on (when potentially valuable) or used to address challenges (when problematic).
3	Classroom activities support meaningful connections between procedures, concepts and contexts (where appropriate) and provide opportunities for building a coherent view of mathematics.	The teacher's hints or scaffolds support students in productive struggle in building understandings and engaging in mathematical practices.	The teacher actively supports and to some degree achieves broad and meaningful mathematical participation; **OR** what appear to be established participation structures result in such engagement.	Students explain their ideas and reasoning. The teacher may ascribe ownership for students' ideas in exposition, **AND/OR** students respond to and build on each other's ideas.	The teacher solicits student thinking and subsequent instruction responds to those ideas, by building on productive beginnings or addressing emerging misunderstandings.

School		Region	
Observer		Date	
Time		Class	

Classroom notes	W-G-P-I

R P M S



Tool 6 - English Language Version of Teacher Interview

Romanian Primary Mathematics Study (RPMS)

2023 Post-lesson Interview Protocol

Identification Label

School:

Romanian Primary Mathematics Study (RPMS)

Draft Interview Protocol

Thank you for allowing us into your classroom to observe today.

Q1 – If you think back on the lesson you have just taught, what went well, what did not go so well and is there anything you would do differently, if you had to teach this again?

Q2 – Are there any moments from the lesson that stand out for you? Can you choose a moment and describe it and what makes it stand out?

Q3 – Are there any students whose work particularly stood out for your today? Can you say who and what they did and what makes it stand out?

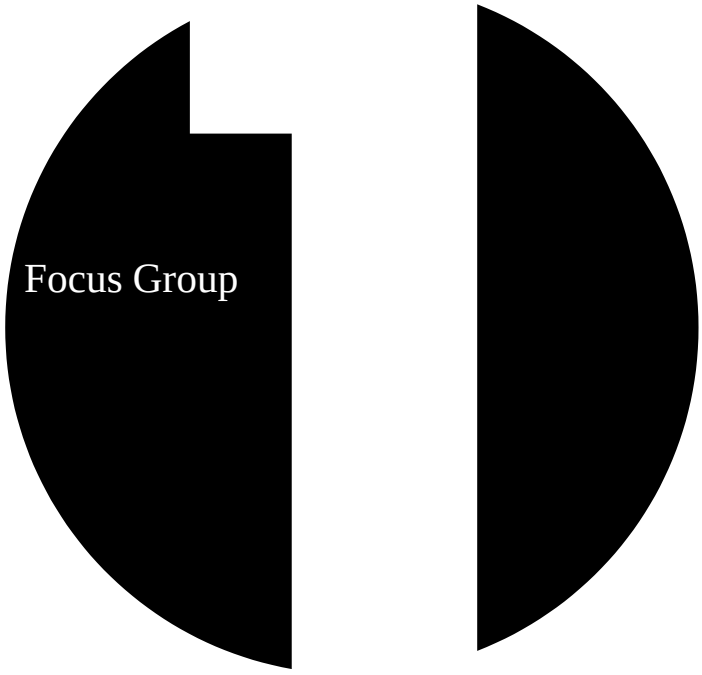
Q4 – If we look at the unit plan you submitted, what has been going as expected and what have you had to change?

Q5 – Thinking more broadly now, what do you view as the major challenges facing you and other primary mathematics teachers in your school/area?

Q6 – If you had to make some recommendations for the improvement of teaching and learning of primary mathematics, what would you propose?

THANK YOU for your thought, time, and involvement in this study.

R P M S



Tool 7 - English Language Version of Student Interview

Romanian Primary Mathematics Study (RPMS)

2023 Focus Group Student Protocol

Identification Label

School:

Romanian Primary Mathematics Study (RPMS)

Focus Group Protocol

Thank you for agreeing to be part of this interview.

Q1 – If you think back on the lesson you have just been taught, what did you learn? And, what did you find difficult?

Q2 – How similar or different was this lesson to your usual maths lessons? Can you describe what happens usually in maths?

Q3 – How much do you enjoy maths lessons, compared to other subjects?

Q4 – Please think back to a maths lesson you have had this year that stands out for you, one where you remember something clearly. Please describe this lesson and then say what makes it stand out for you.

Q5 – Counting challenge: get students to choose a starting number and to choose a step number … then their challenge is to write out the number sequence they get, e.g., if they chose 15, going up in 2s then they would write the following [they should start a new line after 5 numbers]:

15 17 19 21 23

25 27 29 31 33

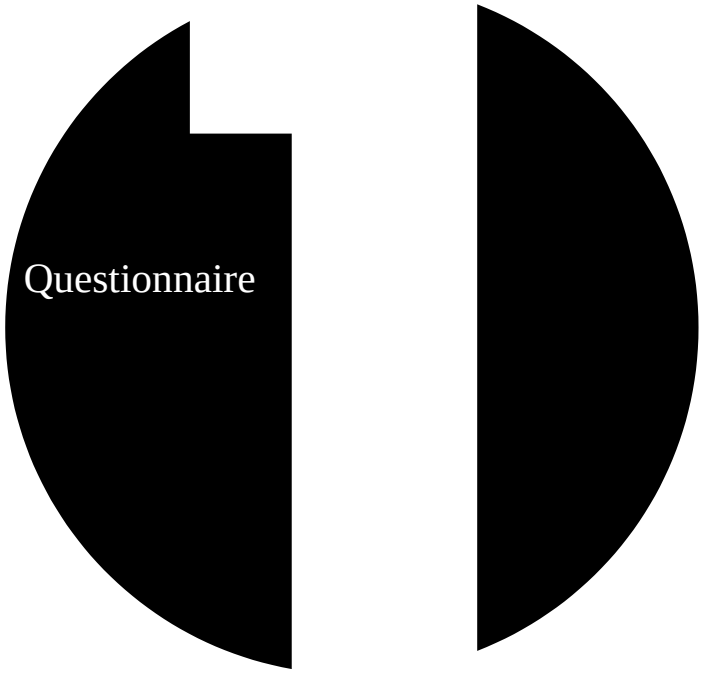
35 etc

Get students to do this together and then ask them about any patterns they notice or any predictions they could make. If they seem interested in this, they could choose a new starting number and a new step number.

Q6 – Do you have any ideas for how you would like to learn maths?

THANK YOU for your thought, time, and involvement in this study.

R P M S



Tool 8 - English Language Version of Headteacher/ Inspector/ Consultant Interview

Romanian Primary Mathematics Study (RPMS)

2023 Interview Protocol

Identification Label

Area/School:

Romanian Primary Mathematics Study (RPMS)

Draft Interview Protocol

A teacher in a school for which you have some responsibility has been selected to participate in the Romanian Primary Mathematics Study (RPMS), an educational research project sponsored by the British Council. RPMS is investigating student achievement in mathematics in Romania. It is designed to measure and interpret differences in approaches, to improve the teaching and learning of mathematics.

We have some questions to ask you and are grateful for any insights you can offer us about the challenges and successes of primary mathematics teaching in this area.

Q1 – How successful do you feel the primary mathematics teaching is, in your school/area? And, on what basis do you judge success?

Q2 – Please bring to mind anyone you know who is a highly successful primary mathematics teacher, in your school/area. Please can you describe what they do and, in particular, anything they do which might be different to their colleagues?

Q3 – Do your primary school teachers generally feel confident in teaching mathematics?

Q4 – Now can you do the same thing, but this time thinking about a teacher who is struggling in teaching mathematics. What do they do and how is it different to their colleagues?

Q5 – What do you view as the major challenges facing primary mathematics teachers in your school/area?

Q6 – If you had to make some recommendations for the improvement of teaching and learning of primary mathematics, what would you propose?

THANK YOU for your thought, time, and effort in answering these questions.

R P M S

Interview Guide

Tool 9/10 - English Language Version of Interview Guide for Inspectors, Teacher Educators and other experts

Romanian Primary Mathematics Study (RPMS)

Interview Protocol

Introduction

We have conducted a survey with over 700 primary schools teachers and observed 40 lessons and interviewed those teachers, their students and headteachers. From this database, we have tried to gather what seems to be going well and what common challenges there are. In this session we would like to present to you some of our initial findings and ask for your opinions. There are 10 points for discussion.

Discussion Point 1
A common challenge mentioned by teachers is a lack of teaching resources (e.g., didactical materials, or digital resources). What are your views? Do you think primary maths teachers in Romania lack adequate resources for their teaching? And, if so, what resources would you like to see available?

Discussion Point 2
We found many teachers saying they would like more professional development opportunities than they have available to them. Would you agree there is a lack of provision? How might opportunities be made more available? What would you see as priorities for teachers' professional development?

Discussion Point 4
From our lesson observations, it seemed that there was often litle "student agency", by which we mean opportunities for students to explain their reasoning, or for discussions that build on student ideas. Does this sense of a lack of agency fit your observations and knowledge? Do you have experience of, or ideas about, how this situation can be improved?

Discussion Point 5
We observed a common practice of students coming and writing on the board in front of the whole class. Would you agree this is a common practice? Do you have experience or suggestions for how the teaching strategy, of getting students coming to the board, can be used in a way that supports the learning of all students?

Discussion Point 6
Another common practice teachers told us about was the use of text-books and the setting of homework. Do you have ideas for how text-books and homework can be used most effectively, to support student learning?

Discussion Point 7
The students we spoke to often thought mathematics was their favourite subject, or one of their favourite subjects. Is this a picture you recognize? Do you have any comments about this?

Discussion Point 8

A big contrast was found between rural and urban schools, in terms of the quality of teaching and also school outcomes on national assessments. In several rural schools, it was found that teachers showed video recordings to students, rather than teaching or explaining themselves. In rural schools, students were often absent for long periods and were missing basic information and knowledge in mathematics. The tasks given to students were often routine, with litle problem-solving. Urban schools tended to be beter equipped and to get beter results; in some cases students were competing to gain entry into secondary schools. Is this picture of differences one you recognise? What do you think can be done to improve the situation?

Discussion Point 9

We got a mixed picture from our survey about how the number concept is taught in schools. Would you say that number is introduced primarily as relating to objects and counting (cardinality)? Or would you say number is introduced primarily as a measure (e.g., length)? Or perhaps there is a mix, or something different? More broadly, do you think there are any issues with the curriculum for mathematics?

Discussion Point 10

Some teachers felt that their initial teacher education could be improved. Do you think there are any issues with initial teacher education in Romania? If so, what are the issues and how might the situation be improved?

THANK YOU for your thought, time, and effort in discussing these questions!