

## Project proposal KA2 Strategic partnership SCHOOLEDUCATION: Do you speak MATH

### Content

|       |   |   |
|-------|---|---|
| 1     | Teaching mathematics in multilingual classrooms (TEAMM) ..... | 2 |
| 2     | Introduction .....  | 2 |
| 3     | Theoretical framework.....                                    | 3 |
| 4     | Aims of the project .....                                     | 4 |
| 5     | Project consortium .....                                      | 5 |
| 5.1   | Partners .....  | 5 |
| 5.1.1 | Poland .....  | 5 |
| 5.1.2 | Spain .....   | 5 |
| 5.1.3 | Turkye .....  | 5 |
| 5.1.4 | Sweden .....  | 6 |
| 5.1.5 | Belgium .....   | 6 |
| 5.2   | Commitment national project coordinator .....                 | 6 |
| 6     | Project timeline .....  | 7 |

## 1 Teaching mathematics in multilingual classrooms (TEAMM)

This project focuses on teachers and others who work within educational contexts with groups of young children (4 to 6 years old) ; thus before the start of the actual formal language and math instruction for these children. Because these persons work in very diverse contexts in different European countries, we refer to this settings in the text below as "early childhood education and care (ECEC)" settings.

## 2 Introduction

In a fast-changing and increasingly digital world, early mathematical skills are crucial for children's further development (ref: Increasing achievement and motivation in mathematics and science learning in schools | European Education Area (europa.eu)). Young children develop their mathematical skills through interactions with others at home and in early childhood education and care (ECEC) settings. To properly develop these math skills, children need sufficient language skills as language helps to conceptualize the world around you and to grasp abstract ideas. Research has recently pointed towards the important role of domain-specific mathematical language on top of more general language skills (Purpura & Reid, 2016; Turan & De Smedt, 2022). Therefore, in this project, we choose to focus on mathematical language skills for young children as a foundation for mathematical thinking later in school and in life.

In the EU Member States, almost 10% of all students go to school in a language that is different from their mother tongue (ref: Multilingual classrooms | European Education Area (europa.eu)). For these multilingual children, acquiring specific school language such as mathematical language is challenging. Moreover, if these students live in families characterized by low socioeconomic status, they are even more at risk. Teachers need support to give these children an extra push and to narrow the gap with other children. This project aims to address the need for more professional development in the field of mathematics (ref: Increasing achievement and motivation in mathematics and science learning in schools | European Education Area (europa.eu)) by developing a hands-on training on mathematical language for teachers working in multilingual classes. The effects of this training will be monitored in an evidence-based way.

By strengthening the skills of teachers in the above areas, we are working towards inclusive education as more children will be able to complete the regular curriculum. We are also responding to the challenges teachers are currently facing due to the influx of immigrant newcomers, including many Ukrainian refugees. As such, this project might lead to a more inclusive society in which the potential assets of a multilingual society are better harnessed.



### 3 Theoretical framework

All across Europe, schools are confronted with an increase in the number of children speaking a different language at home (OECD, 2018). Nevertheless, it remains a challenge for early childhood educators to meet the needs of multilingual families in many countries (OECD, 2017). Although preschool is commonly framed as a potential counterforce for the language achievement gap for all children (European Commission, 2018), the equalizing effect strongly depends on the quality provided (Taggart, Sylva, Melhuish, Sammons, & Siraj, 2015). For academic language learning, high quality teacher-child interactions are crucial (Dickinson & Porche, 2011). During high-quality interaction, students are provided with authentic and rich input, they are given the opportunity to produce output, and they receive support and feedback (Ellis & Shintani, 2014).

Through their language interactions, teachers play a key role in children's language development based on the frequency, quality and affective nature of these interactions (Kim & Yun, 2019). Paradoxically, a wide range of classroom interaction studies (e.g., Myhill, 2006; Peleman, Vandenbroeck, & Van Avermaet, 2019) point to the relatively poor quality of educationally supportive teacher-child interactions and a lack of affordances for language acquisition. This has been observed in multiple countries including the Netherlands (e.g., Slot, Leseman, Verhagen, & Mulder, 2015) and Belgium (Flanders; e.g., Peleman et al., 2019). Both the quantity and quality of teacher-child language interactions tend to be low and opportunities for children's language production are often scarce (Franco, Bryant, Gillanders, Castro, Zepeda, et al., 2019; Peleman et al., 2019). This might be even more problematic for multilingual children, as they have a higher risk of experiencing lower-quality teacher-child interactions and developing lower language skills (OECD, 2018).

High-quality teacher-child interactions are also important for young children's mathematical development. Given that preschoolers' mathematical skills are an important indicator of their later academic performance (Claessens & Engel, 2013; Rittle-Johnson et al., 2017) and their socio-economic status in adulthood (Ritchie & Bates, 2013), it is crucial to support children's mathematical development from a young age onwards. One essential aspect of proper mathematical understanding is being able to express mathematical ideas and situations, both on a concrete and a more abstract level (Clements & Sarama, 2014). To do so, children need to develop mathematical language skills, which "refers to the key words and concepts that are required to comprehend and participate in mathematical activities" (Turan & De Smedt, 2022, p. 2).

Children's mathematical language skills in preschool are both concurrently and longitudinally related to their mathematical abilities (Turan & De Smedt, 2022), and there is even support for a causal association (Purpura et al., 2017). Mathematical language interventions hold a lot of potential for stimulating early mathematical development, particularly for multilingual children. A good proficiency in both the home and the school language has been found to be



an important indicator of children's mathematical performance (de Araujo et al., 2018), but so far little is known about the mathematical language skills of multilingual children (Turan & De Smedt, 2022). Even though these children might need additional support for developing their mathematical language skills, little is known about how teachers can support the development of these skills. More insight into this matter seems crucial to improve the quality of early childhood education and to support early childhood educators, as research shows teachers feel unprepared for teaching mathematics in multilingual contexts (de Araujo et al., 2018). We therefore need to gain insight into how we can effectively train teachers to stimulate mathematical skills in multilingual children (de Araujo et al., 2018), which is what the present project proposal aims to do.

Multilingual children that stem from low SES-backgrounds might suffer from an even higher risk. Prior research has already shown that children from low SES-backgrounds show lower mathematical language skills than their peers (Purpura & Reid, 2016). This might explain why the former experience difficulties connecting the everyday mathematical activities they engage in with more formal school mathematics (Clements & Sarama, 2014).

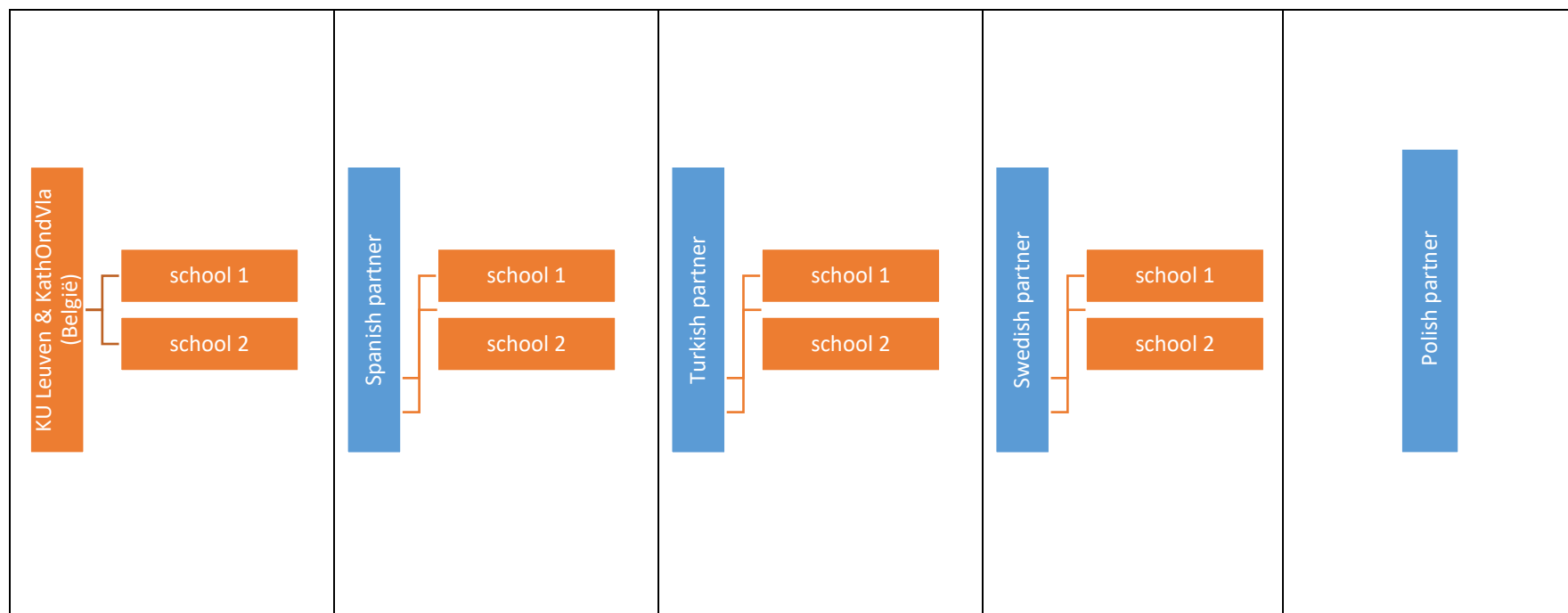
#### **4 Aims of the project**

The present project proposal has four main aims:

- Mapping the current situation in ECEC with a special focus on the needs of teachers
- Making the conclusions from existing research accessible (and if necessary identifying gaps in research related to teaching mathematics in multilingual classes)
- Developing a toolkit by adapting/applying existing tools to follow the development of multilingual children's mathematical language skills
- Developing a shared vision on teaching mathematics in multilingual classrooms
- Developing a continuous professional development course for preschool teachers focusing on mathematical language skills of multilingual children and monitor its effect on teacher skills



## 5 Project consortium



### 5.1 Partners

#### 5.1.1 Poland

Codeforgirls as leading partner in the work package communication & dissemination

#### 5.1.2 Spain

Consejería de Educación Región de Murcia (as national project coördinator) in active partnership with two primary schools (EU-registered/active schools)

#### 5.1.3 Turkey

Turkish partner (as national project coördinator) in active partnership with two primary schools (EU-registered/active schools)

#### 5.1.4 Sweden

The City of Stockholm (as national project coördinator) in active partnership with two primary schools (EU-registered/active schools)

#### 5.1.5 Belgium

- KU Leuven (University Leuven) - CTO (Centre for Language and Education) (as leading partner of the research/survey/study) in active partnership with two primary schools (EU-registered/active schools)
- Katholiek Onderwijs Vlaanderen (Catholic Education Flanders) (as ERASMUS+ projectcoördinator).

### 5.2 Commitment national project coordinator

- Actively working with two primary schools; these are EU-registered primary schools.
- Jointly (together with the two active primary schools) conduct a survey of at least 30 primary school teachers working with 4- to 6-year-olds. This group of teachers represent a group of at least 150 preschoolers with as much diversity as possible (low SES and/or multilingual preschoolers).
- Taking the lead in one workingpackage in the project: taking the lead in a work package does not mean that one should do all the work in this work package. It does mean taking on the coordination of this work package which means setting clear objectives and deadlines with all involved and following them up. If a partner does not comply with this you should hold him/her accountable. Taking the lead in a work package is done in close collaboration with the ERASMUS+ project coordinator (Catholic Education Flanders).
- Implement the prepared communication and dissemination strategy at national/regional/local level.
- Where necessary and appropriate, participate in the development of the materials in the relevant work packages.
- Coordinate the testing phase of the materials that will be developed, collect feedback from the end users and share it with the project consortium.
- Jointly (together with the two active primary schools) conduct a national/regional/local multiplier event at the end of the project.
- Collaborate on the final conference of this project.
- Help ensure the smooth running of the project by participating in all planned project activities (transnational project meetings = TPM, Learning, training or teaching activities = LTTa) both online and in real life throughout the duration of the project.
- Meet the European administrative requirements for the efficient and qualitative implementation of an ERASMUS+ project.



## 6 Project timeline

### Target groups

1. Group 1: the national project coordinators
2. Group 2: the national project coordinators + representatives of the actively involved schools (minimum 2 persons from 2 primary schools per participating country)
3. Group 3: the national project coordinators + representatives of the actively involved schools + all teachers involved in the research/study
4. Group 4: all persons interested in the topic of this project who do not belong to the organisations of the project consortium

| 2023   |     |   |     |     |     |     |     |     |                             |                         |   |  |
|--|-----|---|-----|-----|-----|-----|-----|-----|-----------------------------|-------------------------|---|--|
| JAN  | FEB | MAR   | APR | MAY | JUN | JUL | AUG | SEP | OCT                         | NOV                     | DEC                                       |  |
|  |     | Deadline online applications KA2 CALL 2023 22/03/2023 |     |     |     |     |     |     |                             |                         | TPM Kick-off (beginning of November 2023) | LTTa Introduction to the approach to the theme in each participating country + explanation and preparation to carry out the research initial situation |
|  |     |   |     |     |     |     |     |     |                             | 3 days                  | 1 week                                    |  |
| Target group of the activity + other attendees from the project consortium |     |   |     |     |     |     |     |     |                             | Group 1                 | Group 2                                   |  |
|  |     |   |     |     |     |     |     |     | Preparation Kick-off (nov.) | Preparation LTTa (dec.) |   |  |



| 2024   |  |  |   |  |   |     |     |   |   |  |   |
|--|--|--|---|--|---|-----|-----|---|---|--|---|
| JAN  | FEB  | MAR  | APR   | MAY  | JUN   | JUL | AUG | SEP   | OCT   | NOV  | DEC   |
|  |  | ONLINE meeting state of play implementation of research study/survey |   | TPM<br>Research results + alignment of materials to be developed +<br>ONLINE MOMENT WITH ALL SCHOOLS involved in the study |   |     |     | ONLINE meeting state of play development work | TPM<br>Progress report project year 1 and preparation of subsequent project activities                |  | ONLINE meeting state of play development work |
|  |  | 1 day - morning & afternoon  |   | 3 days   |   |     |     | ½ day   | 3 days  |  | ½ day   |
|  |  | Morning = group 2<br>Afternoon group 3                               |   | Group 2  |   |     |     | Group 1                                       | Group 2   |  | Group 1                                       |
| Conduct teacher and pupil initial situation survey |  | Partners deliver results survey                                      | Formulating OVERALL conclusions research study/survey initial situation (preparation TPM May) |  |   |     |     | Preparation TPM (okt.)                        |   |  |   |
|  | Discussing and constructing framework for material development (preparation TPM May) |  |   |  | Developing materials for (professionalising) teachers/supervisors |     |     |   | Further development and/or translation of materials for (professionalisation of) teachers/supervisors | Overview of materials developed (preparation TPM Jan.) |   |



| 2025  |     |     |     |     |  |     |     |  |  |     |     |
|---|-----|-----|-----|-----|--|-----|-----|--|--|-----|-----|
| JAN   | FEB | MAR | APR | MAY | JUN  | JUL | AUG | SEP  | OCT  | NOV | DEC |
| LTTa<br>Preparation for<br>testing phase<br>developed materials |     |     |     |     | ONLINE meeting<br>state of play of the<br>testing phase<br><br>Or LTTa depending<br>on the budget  |     |     |  | ONLINE meeting<br>preparation<br>implementation follow-<br>up survey<br><br>Or LTTa depending on<br>the budget |     |     |
| 3 activity days + 2<br>travel days                              |     |     |     |     | 1 day:<br>in the morning with<br>local project<br>coordinators<br>in the afternoon<br>with the schools<br>involved; first<br>nationally in break-<br>out rooms<br>afterwards<br>internationally<br><br>in case of an LTTa:<br>3 activity days + 2<br>travel days |     |     |  | ½ day<br><br>in case of an LTTa: 3<br>activity days + 2 travel<br>days   |     |     |
| Group 2   |     |     |     |     | Group 2  |     |     |  | Group 2  |     |     |
| Use of materials in practice                                    |     |     |     |     |  |     |     | Prepare follow-<br>up survey<br>(prepare<br>meeting Nov) |  |     |     |

| 2026                                      |  |   |                                   |     |     |     |               |                 |     |     |     |
|---|--|---|-----------------------------------|-----|-----|-----|---------------|-----------------|-----|-----|-----|
| JAN                                       | FEB  | MAR   | APR                               | MAY | JUN | JUL | AUG           | SEP             | OCT | NOV | DEC |
|   |  | TPM results follow-up survey, conclusions and preparation MEs | National and/or international MEs |     |     |     |               | Final TPM       |     |     |     |
|   |  | 3 days + online moment with all schools involved              |                                   |     |     |     |               | 3 days          |     |     |     |
|   |  | Group 2 + one moment with group 3                             | Group 4                           |     |     |     |               | Group 1 (or 2?) |     |     |     |
| Partners deliver results follow-up survey | Bringing together results of follow-up research across countries (preparation TPM) | Preparation MEs   |                                   |     |     |     | Preparing TPM |                 |     |     |     |