



## Knowledge hub - Collection of best practices

### Summary of the best practice

1. Title of the best practice (e.g. name of policy, programme, project, etc.) \*

Practice: From Concrete to Abstract for improving EGM in settlement schools. Project: Education for Life. Programme: MYIP Education Cannot Wait

2. Country or countries where the practice is implemented \*

Uganda

3. Please select the **most relevant** Action Track(s) the best practice applies to \*

- Action Track 1. Inclusive, equitable, safe, and healthy schools
- Action Track 2. Learning and skills for life, work, and sustainable development
- Action Track 3. Teachers, teaching and the teaching profession
- Action Track 4. Digital learning and transformation
- Action Track 5. Financing of education

#### 4. Implementation lead/partner organization(s) \*

AVSI Foundation and Luigi Giussani Institute of Higher Education

#### 5. Key words (5-15 words): Please add key descriptive words around aims, modalities, target groups etc. \*

Early Grade, Teaching Methods, Refugees, Uganda, Singapore Maths, Quasi-experimental

#### 6. What makes it a best practice? \*

Mathematics learning outcomes in Ugandan primary schools, and particularly in refugee settlements are a major challenge. To respond to this, a holistic approach that involved: systemic needs assessment, training of teachers on professional development, training of teachers on Singapore Maths approach, and follow-up system for teachers, was implemented in one school in Palabek refugee settlement, Northern Uganda. Therefore, the objective of this study is to evaluate the effectiveness of the proposed approach in improving early grade Mathematics skills. The study adopted a quasi-experimental design that involved 2 primary schools (1 treatment and 1 control). The findings showed that, Mathematics skills of learners in the treatment school significantly improved in the areas of: number discrimination, missing numbers, addition, subtraction and word problems, and slightly improved in the area of number identification. This study has therefore demonstrated the effectiveness of the proposed holistic model and presented a need to verify it in different contexts.

## Description of the best practice

### 7. Introduction (350-400 words)

This section should ideally provide the context of, and justification for, the practice and address the following issues:

i) Which population was affected?

ii) What was the problem that needed to be addressed?

iii) Which approach was taken and what objectives were achieved? \*

In Ugandan refugee settlements, as well as in the whole country, the achievement levels of learners in Mathematics are moderate to low. According to the latest study by Uwezo in Uganda's refugee contexts, about 50% of refugee and non-refugee children had acquired full numeracy competence thus able to solve Primary 2 numeracy problems up to division level. Furthermore, only about 10% of the Primary 3 children had full numeracy competence (Uwezo 2018).

Over the years, Mathematics and Sciences have been performed poorly worldwide, and particularly in developing countries (Mullis et al. 2015). Schools in developed countries continue to lead in Mathematics performance while developing countries continue to experience exponential decline in Mathematics performance (UNICEF 2016).

The relevance of Mathematics and Sciences in improving the human mind, developing man's rational thoughtfulness, improving one's intellect, and developing critical thinking and problem-solving skills is well known (Genlott and Grönlund 2016; Kafata and Mbetwa 2016; Musiimenta et al. 2019). Some of the few studies conducted in refugee settlements in Uganda, propose an e-Learning program to improve the teaching-learning process of Mathematics and Science

(Musiimenta et al. 2019). Nevertheless, the participants of this study identified the following challenges that could hinder the program: limited access to modern teaching and learning resources such as Information, Communication and Technology (ICT) equipment, limited access to internet and modern libraries; lack of ICT pedagogical skills; learner's negative attitudes about Mathematics and Science; and overwhelming number of learners in class (Musiimenta et al. 2019; Kimwise et al. 2019). E-Learning approach as the principal method does not seem to be the ideal approach in the critical context of refugee settlements in a country that suffers internet problems in daily normal work.

The characteristics of Singapore Maths approach is that it does not build on a fixed and rigid curriculum but it rather introduces a methodology of facilitating the learning among learners and allows tackling most of the challenges in Ugandan Education System including the schools in refugee settlements: the rote learning - repetition, memorization and copying work. The model is made up of the following components: i) systemic needs assessment that aimed to identify needs related to teaching and learning in the intervention settlement; (ii) socioemotional support for teachers based on refresher trainings that included: teachers' role and well-being, child protection, well-being and inclusion; (iii) technical support for teachers of Mathematics based on trainings that included: development and use of teaching and learning materials, teaching and learning methods based on participatory processes, and use of Singapore Maths approach; and (iv) follow-up system for teachers through classroom observations, support supervision and participation in the teacher learning cycles. This model, which could also be tested in other contexts, is posited to improve Mathematics levels of refugee children in Uganda.

## 8. Implementation (350-450 words)

Please describe the implementation modalities or processes, where possible in relation to:

- i) What are the main activities carried out?
- ii) When and where the activities were carried out (including the start date and whether it is ongoing)?
- iii) Who were the key implementation actors and collaborators? (civil society organizations, private sector, foundations, coalitions, networks etc.)?
- iv) What were the resources needed (budget and sources) for the implementation?

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A quasi experimental design where measurements were done in the 2 schools both before and after exposure to the intervention, was adopted to assess the effectiveness of the intervention. The schools were as follows:

Group 1: School X as a treatment school. Teachers of lower primary (Primary 1 to Primary 3) were involved in a series of trainings and follow-ups on teaching and learning methods for improving EGM in their school. This intervention was conducted over a period of 4 months (July to October, 2019).

Group 2: School Y as a control school. In this school, teachers did not receive any extra interventions related to improving Mathematics skills of learners during the period of study. The stated Holistic Approach was implemented in phases. The sessions covered in these phases are described as follows:

(a) Phase 1 - Inception: In this phase, Project Officials conducted inception meetings with head teachers and teachers of the project schools in order to comprehend the project, the modalities of different activities that were to be conducted and also discuss on the roles and responsibilities of each party. This phase also entailed drafting and agreeing on the workplan of implementation of the various activities.

(b) Phase 2 - Systemic Needs Assessment: This was conducted with head teachers, teachers and learners of the project schools in order to detect all kinds of needs related to the quality of teaching and learning. This phase included interviews with head teachers, classroom observations, pre-intervention assessment of learners' EGM skills, debrief with teachers to explore factors affecting the performance of their learners, and literature review to guide the development of the manuals used for training of teachers.

(c) Phase 3 - Training of Teachers: This phase entailed:

i) An induction training of teachers to help them manage the social emotional learning needs of the learners and also prepare them to effectively teach in refugee contexts. The modules covered included: Teacher's Role and Well-being; Child Protection, Well-being and Inclusion; Pedagogy; Curriculum and Planning; and an introductory module titled The Risk of Education which focussed on empowering teachers to have a greater understanding of the importance of their roles as educators.

ii) A pedagogical approach to teaching EGM based on Singapore Maths approach. The backbone of this pedagogy is the goal of empowering learners with the ability to both acquire and master a smaller range of mathematical concepts in greater depth. This is accomplished through a phased approach to learning that heavily focuses on problem-solving skills: the concrete phase, the pictorial phase, and the abstract phase. In addition to this pedagogical approach participants received trainings on: development and use of teaching and learning methods; and creation of teacher learning cycles that bring teachers together to share successes, challenges and best practices in teaching learners.

(d) Phase 4 – Follow-up System for Monitoring Implementation: This entailed classroom observations and support supervision of teachers to help them apply the knowledge and skills learnt in the preceding phases. During this phase, facilitators too supported the formation of

teacher learning cycles and the follow up of their operations and guiding them on how to learn from each other.

## 9. Results – outputs and outcomes (250-350 words)

To the extent possible, please reply to the questions below:

- i) How was the practice identified as transformative? (e.g., impact on policies, impact on management processes, impact on delivery arrangements or education monitoring, impact on teachers, learners and beneficiary communities etc.);
- ii) What were the concrete results achieved with regard to outputs and outcomes?
- iii) Has an assessment of the practice been carried out? If yes, what were the results? \*

Overall, the percentage of learners who correctly scored at least 50% of the test items on the number identification subtask within 60 seconds in the control school increased by 13% (from 57% at baseline) whereas those in the treatment school increased by 18% (from 59% at baseline). This revealed an improvement of 5% in the treatment over the control school that can be attributed to the intervention (P-value=0.343). Furthermore, the results show no differential impact of the intervention on the sex of the learners, in terms of the percentage of learners who correctly scored at least 50% of the test items within 60 seconds (P-value=0.196), at 5% level of significance.

Overall, the percentage of learners who correctly scored at least 50% of the test items on the number discrimination subtask in the control school increased by 13% (from 71% at baseline) whereas those in the treatment school increased by 33% (from 62% at baseline). This revealed a statistically significant (P-value=0.014) improvement of 20% in the treatment over the control school that can be attributed to the intervention. Furthermore, the results show differential impact of the intervention on the sex of the learners (in favour of males), in terms of the percentage of learners who correctly scored at least 50% of the items on number discrimination subtask (P-value=0.007), at 5% level of significance.

Overall, the percentage of learners who correctly scored at least 50% of the test items on missing number subtask in the control school did not change (13% at baseline) whereas those in the treatment school increased by 21% (from 3% at baseline). This revealed a statistically significant (P-value=0.051) improvement of 21% in the treatment over the control school that can be attributed to the intervention. Furthermore, the results show no differential impact of the intervention on the sex of the learners, in terms of the percentage of learners who correctly scored at least 50% of the items on missing number subtask (P-value=0.580), at 5% level of significance.

Overall, the percentage of learners who correctly scored at least 50% of the test items on the addition subtask in the control school increased by 10% (from 60% at baseline) whereas those in the treatment school increased by 31% (from 60% at baseline). This revealed a statistically significant (P-value=0.031) improvement of 21% in the treatment over the control school that can be attributed to the intervention. Furthermore, the results show no differential impact of the intervention on the sex of the learners, in terms of the percentage of learners who correctly scored at least 50% of the items on addition subtask (P-value=0.314), at 5% level of significance.

## 10. Lessons learnt (300 words)

To the extent possible, please reply to the following questions:

- i) What were the key triggers for transformation?
- ii) What worked really well – what facilitated this?
- iii) What did not work – why did it not work? \*

Competencies and skills formation for teachers is paramount since it is not possible to conceive Mathematics learning under a lecture structure only. Therefore, a Holistic Model which included a systemic needs assessment, a refresher training of teachers on professional development, a training for teachers using Singapore Maths approach, and a follow-up system for monitoring implementation, has been assessed.

Based on the study results, statistically significant improvements (at 5% level) were realized in the subtask areas of: number discrimination, missing numbers, addition, subtraction and word problems. Smaller intervention effects were realized in the subtask areas of 'number identification' in terms of the percentage of learners who scored at least 50% of the test items. We find these results to be consistent with those realized among Singapore learners where the CPA approach is a characteristic of the Singapore's Mathematics curriculum.

Precisely, positive impacts of the approach were revealed in TIMSS performance of Singapore learners (Mullis et al. 2015). Furthermore, the Bridge International Academies study that aimed to assess the efficacy of their multi-year EGM approach in Kenya - where pupils' annual performance was tracked over time, also found significant gains in the Bridge pupils' performance for several subtasks (quantity discrimination, addition, subtraction and word problems), when compared to their peers in other schools. These studies therefore demonstrate that, EGM interventions, though in different forms and contexts, play significant roles in improving the achievement levels of learners.

## 11. Conclusions (250 words)

Please describe why may this intervention be considered a "best practice". What recommendations can be made for those intending to adopt the documented "best practice" or how can it help people working on the same issue(s)? \*

The main strength of this study is that it identifies important insights from teachers and learners in schools located in a refugee settlement. These insights can inform the development of interventions that meet the educational needs of such vulnerable populations. Furthermore, implications from these findings can help school leaders and/or policy makers consider the choice and implementation of this holistic approach based on Singapore Maths approach as an effective ground up, teacher driven professional development platform to raise the collective expertise of teachers in the long run. This is because a teacher's subject knowledge, including use of appropriate teaching and learning methods, are key components to achieving desired learning outcomes in learners (Hill et al. 2005; Kho et al. 2009).

In the same way, as teaching methods for Mathematics should change, assessment of learning outcomes should also be done in a different way. These should change from a memorized application of the process, to assessments which include the way learners are assimilating mathematical processes and concepts from real life to abstract concepts. This change is only possible in an education system that has structures in place to support teachers (Yeap 2010). In conclusion therefore, if all refugee learners get a good academic experience, they will be presented with great opportunities for growing-up as well as achieving success in life. This would be a great contribution towards Sustainable Development Goals 2030, precisely Goal 4 and Goal 5 which seek to ensure that all youth, both men and women, achieve literacy and numeracy by 2030 (United Nations 2015: 21).

## 12. Further reading

Please provide a list and URLs of key reference documents for additional information on the “best practice” for those who may be interested in knowing how the results benefited the beneficiary group/s. \*

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