Primary Science Programme

Independent Evaluation of the Counting with Coronation Project

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1. List of Abbreviations

AMP	annual mass planning
ATP	annual teaching plans
CAPS	Curriculum and Assessment Policy Statement
CRM	customer relationship management
CwC	Counting with Coronation
DBE	Department of Basic Education
EA	education assistant
ECD	early childhood development
FP	foundation phase
HOD	head of department
LTSM	learning and teacher support material
MERL	monitoring and evaluation, reflection and learning
NGO	non-government organisation
PSP	Primary Science Programme
SACE	South African Council for Educators
SIP	school improvement plan
SMT	school management team
UWC	University of the Western Cape
WCED	Western Cape Education Department

2. INTRODUCTION

A recent working paper from the World Bank Group[1] tackles how to improve education outcomes most efficiently, given the range of interventions from non-profits, governments, and individuals. 'When researchers compared more than 150 interventions in developing countries, one trend stands out: Investing in teachers is strikingly cost-effective. If we want to improve schools, the most cost-effective approach is getting teachers professional development and training.'[2]

This is the work of the Primary Science Programme (PSP), a well-established non-profit organisation which uses its expertise with passion to improve the quality of teaching and learning in under-resourced schools in South Africa in the sciences, maths, languages, and environment. It supports teachers in their professional development to increase their skills, knowledge, and confidence in the classroom, knowing that each effective teacher has the ability to impact their colleagues and hundreds of learners over the course of their career.

Underpinning PSP's methodology is its understanding that children learn best when their education is:

- Hands-on – when they can experience and do
- Minds-on – when they question and think
- Words-on – when they talk, read and write
- Hearts-on – when they participate and enjoy.[3]

This is PSP's vision of quality education.

Although it is based in the Western Cape, where most of its face-to-face interventions take place, PSP's reach extends nationwide through its online courses. As it approaches its 40th anniversary in 2024, it continues to expand and innovate – in 2023 it offered 224 courses and 418 classroom support sessions in total, thereby reaching 3,645 teachers from 668 schools in all nine provinces, double the school reach of the previous year, and with an estimated impact on 200,000 learners. In addition, it also trained 2,083 youth EAs from 554 schools and 330 SMT teachers from 155 schools from all 9 provinces.

The organisation works through a range of projects, one of which is Counting with Coronation (CwC), which specifically addresses Foundation Phase maths in 25 primary schools in the Western Cape. Part of the funding for CwC was earmarked for a two-part external evaluation – a process evaluation in 2023, followed by an outcomes evaluation in 2024. This report concludes the first part. It assesses how effective PSP's professional development model is in its CwC project on teachers' maths content knowledge, teaching skills and use of resources.

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[1] Angrist, N. et al. 2020. 'How to Improve Education Outcomes Most Efficiently? A Comparison of 150 Interventions Using the New Learning-Adjusted Years of Schooling Metric', Policy Research Working Paper 9450, World Bank Group.
[2] https://www.vox.com/future-perfect/21552985/improve-schools-invest-in-teachers
[3] PSP Newsletter, Term 3, 2023, p. 2.

3. Research Methodology

In July 2023, PSP appointed two independent researchers – Dr Andrew Hartnack and Ms Helen Hacksley – to assess the impact of its CwC project. The researchers conducted in-depth, qualitative interviews with six key PSP staff members:

- Zorina Dharsey (Director)
- Novosti Buta (Programme manager)
- Kerry White (Fundraising manager)
- Glenda Barnes (Finance manager)
- Sandra Rossouw (Overberg facilitator)
- Tracy-Lee Stevens (Metro facilitator)

They observed PSP's approach during one teacher training session in Ravensmead (14 October), where they were able to engage with teachers to ascertain their perspectives of PSP's process and value. They also attended two online meetings: the annual mass planning (AMP) forum for teachers on 18 October and one for school management teams on 1 November.

This was supplemented by relevant document analysis of annual reports (2019–2022), PSP's theory of change, PowerPoint presentations, monitoring and evaluation tools, quarterly newsletters, teacher support materials, and course plans, to inform a desk study of PSP's model. The researchers compared PSP to three other primary school maths programmes in South Africa, namely Bala Wande, JumpStart and Penreach, to set PSP's strategy in context.

4. Overview of Three Comparable Maths Programmes

4.1 Bala Wande

Bala Wande (Calculating with Confidence) is the maths arm of the Funda Wande (Reading for Meaning) project. It is aimed at Foundation Phase (FP) teachers to improve learning outcomes for numeracy in low-fee schools. The programme is fully integrated into Funda Wande. It seeks to simplify the curriculum delivery, make more efficient use of classroom time and increase opportunities for learners to practise in class. It focuses on bilingual learning and teacher support material (LTSM) in the form of full-colour, bilingual learner activity books with matching bilingual teacher guides to prepare learners to receive instruction in English by Grade 4 for maths. To support teachers, Bala Wande offers them Home Language/English maths dictionaries, which translate vocabulary, phrases and explanations. It also provides resource boxes of manipulatives for teachers and each learner (with bead strings, multilink cubes, ten frames, number name cards, numeral cards, dice and counters). Additionally, Bala Wande offers teachers videos with weekly overviews and short sample lessons.[4] In terms of

[4] This seems to be underutilised. Of the teachers surveyed, 41% reported never making use of the videos and a further 32% used it only once a month, which may be as a result of poor access among the teachers to steady internet connections and personal computers (Funda Wande Eastern Cape Workbooks Evaluation Endline Report, April 2023. SALDRU & UCT).

content, sequence and pacing, its learner books match the CAPS[5] curriculum closely, with somewhat more focus on number work in Grade 1.

The first Grade 1 learner cohort to use the Bala Wande LTSM was in 2020. Subsequent grades were added each year thereafter. Attached to its LTSM, Funda Wande (including Bala Wande) began by offering three different models of support to teachers: utilising education assistants (EAs) in Limpopo, providing coaches in the Eastern Cape, and training subject advisers in the Western Cape. EAs were drawn from unemployed youth with Grade 12 qualifications who lived near the schools being served. When the organisation saw that its EA model in Limpopo was more effective than the coaching in the Eastern Cape, it switched to recruiting EAs for the Eastern Cape as well. These EAs were tasked with identifying struggling learners and working with them individually or in small groups. Mentors communicated with EAs via WhatsApp and visited each school at least once a month. Funda Wande provided four days of training per term (two for maths, two for literacy) for teachers, mentors and EAs on the content to be covered as well as how to help struggling learners.[6]

Based on the results of its 2022 evaluation of the programme, BW is currently trialling a teacher support framework to improve teaching practices.[7] It aims at a three-year intervention, with the last year being one of embedding the coaching programme through the heads of department (HODs) while exiting the schools.

4.2 JumpStart

JumpStart, a Johannesburg-based non-government organisation (NGO), works in schools to transform underperforming classrooms around South Africa into centres of maths and science excellence and provide meaningful work experience to unemployed youth at the same time. Core to JumpStart's endeavour is its primary school maths programme, which seeks to improve learner outcomes within 18 months for children in under-resourced schools with very high teacher–learner ratios. It offers teacher training and HOD leadership support, together with in-class support by EAs, who visit each class twice a week. EAs are selected from unemployed youth living close to the schools and receive training as well as ongoing support during school visits by the JumpStart team. It offers one-on-one attention to struggling children.

JumpStart uses the Number Sense Comprehensive Workbook series, designed by Brombacher and Associates as an alternative method of teaching maths.[8] Grade 1–3 learners work through twelve workbooks over the course of three years, according to their own pace. Each one cycles through key concepts, rather than following a termly programme. At foundation phase the focus is on teaching children to count with meaning, to manipulate numbers, and to solve problems with a range of age-appropriate calculation strategies. JumpStart hopes to

[5] The National Curriculum and Assessment Policy Statement.
[6] Makuluza, N. and B. Mpeta. 2022. 'Two birds with one stone: Improving Grade 1 learning outcomes using Funda Wande teaching assistants in Limpopo 2021–2022', p. 155.
[7] Funda Wande Annual Report, 2022, p. 15.
[8] These are available in all official languages.

influence Department of Basic Education (DBE) officials that a learner-focussed curriculum like this meets individual learners at their level and is an improvement on the highly controlled and centralised CAPS approach.

A feature of JumpStart's intervention is the use of electronic tablets to conduct real-time monitoring and evaluation of learner progress, assess how JumpStart's programme is being implemented as well as engage learners in digital maths games. One EA with a tablet per grade can move between classes in a school and upload the data to a database later when in a Wi-Fi area. Learner performance is tracked through a learner information management system called JumpTrak. EAs spend a good deal of time marking completed worksheets and entering these marks into JumpTrak. JumpStart had hoped to get each learner to do the workbooks digitally on their own tablets, thus avoiding having to mark, and utilising the digital worksheets algorithms which repeat subject matter individually based on what the learner struggles with, but relying on this technology has been problematic. Their digital assessments are also intended to direct EAs' involvement. Based on their progress, learners are called to small groups where EAs address specific areas of difficulty as they arise. EAs can also administer Early Grade Maths Assessments annually on these devices. Unfortunately, the organisation has been hindered from using the e-learning component of its model in rural schools as the tablets attract thieves and cannot be stored safely. Internet connection for uploading data is also an issue.

In 2021, JumpStart partnered with Penreach to form the Mpumalanga PenStart Numeracy Project to strengthen Foundation Phase maths and literacy instruction in five primary schools in Ehlanzeni Municipality. This pilot project used JumpStart's Primary School Maths project with Penreach's support, such as their communities of practice for teachers, parent support groups and literacy support. PenStart is looking to start a joint project in Limpopo as well, combining early childhood development (ECD), numeracy and literacy.

4.3 Penreach

Penreach, a social impact organisation of 30 years, strives for educational excellence in marginalised, rural communities and under-resourced schools in Mpumalanga, primarily in the Ehlanzeni Municipality. It is designed to support and build capacity in each aspect of the education ecosystem to ensure sustainable, lasting change. Its five programmes focus on early childhood development (ECD); literacy and numeracy; science, technology, engineering and maths; school leadership development; and outreach through art, sport, bursaries and skills development, benefiting children aged 0 to Grade 12 in ECD centres and schools, together with teachers, school leaders, parents and communities.

In schools, Penreach uses Change Agents to build capacity with educators and school leaders, working closely with the Department of Education and school circuits. It also collaborates with the Department of Social Development and educational NGOs. All its programmes support the national goal of 90% of learners achieving scores of above 50% in Maths, Science and Language by 2030.

As a SACE-accredited[9] training provider, Penreach has trained thousands of teachers and ECD practitioners in teacher development workshops, believing that effective teaching is the main driving force behind learner performance. In partnership with the Department of Education in Mpumalanga, it offers intensive, practical, in-service training workshops from ECD level to Grade 9 and engages teachers in peer-to-peer learning with their colleagues. Penreach provides ongoing coaching for teachers to increase their competence and confidence. It also employs EAs to help teachers in classrooms where class sizes are typically 60–80 learners. Penreach trains school management teams (SMTs) and school governing bodies on effective school management practices to better support teaching and learning.

One of Penreach's programmes, Asifundze ('Let us read' in SiSwati), tackles literacy and numeracy education for Foundation Phase learners. It trains teachers at workshops, coaches them in their classrooms, and provides books and materials for them to use, while simultaneously helping HODs to manage and track curriculum delivery. It promotes literacy in the community with weekly reading camps, distributing graded readers through its Books in Homes Bookshop, using book banks, and organising community-based special events. For numeracy in the classroom, it uses the Number Sense workbooks, which it encourages teachers to use for ten minutes a day. Penreach also shows teachers how to make their own numeracy resources with recycled material of whatever is available locally. Penreach's Foundation Phase work is supported by its ECD Maths4All programme, which teaches 3–4-year-olds maths creatively in terms of algebraic thinking, measurement, shapes, and word problems.

Penreach works to increase parental involvement and develop education spaces that provide a rich learning environment. For example, it strengthened its connections with parents in the wake of the Covid-19 pandemic, when it supplemented learning material for Grade R learners by distributing activity card packs for their parents to use alongside daily household chores to support numeracy and reading skills. It extends its reach through community radio broadcasts. During Covid-19 closures, for example, it took CAPS-aligned lessons into homes together with advice on home teaching and learning.

The organisation makes use of young interns on 12-month contracts, who are recruited and trained through the Youth Employment Service programme – a collaboration between government, labour and the private sector aimed at reducing youth unemployment among black South Africans with skills development and work experience. Interns help with Foundation Phase teaching and remedial work with struggling learners.

[9] South African Council for Educators

5. OVERVIEW OF THE PRIMARY SCIENCE PROGRAMME

The Primary Science Programme (PSP) has been responding to the needs of teachers since 1984 with its teacher programmes, which have evolved over time as PSP actively confronts the legacy of unequal education opportunities in South Africa. It uses its knowledge and expertise to make a systemic impact on education by influencing maths, science, and language school curriculums as well as developing teacher training curriculums with the DBE, teaching institutes and others in the sector. It collaborates with partners to maximise the collective contribution to education. PSP runs three core projects to achieve its goal, namely an Innovation Project, Mentorship Project, and Cluster Project.

5.1 Innovation Project

The Innovation Project offers professional training to in-service teachers, education assistants and SMTs from disadvantaged communities to develop their practical skills, classroom innovation, teaching methodologies and content knowledge. It runs throughout the year and covers generic topics, such as planning, teaching, assessing, classroom management and developing 21st-century skills, as well as hundreds of specific concepts within Mathematics, English, IsiXhosa, Natural Sciences and Technology, and Life Skills. Each course consists of up to four 2-hour SACE-accredited workshops, presented virtually[10] on term weekdays in the afternoon. These target primary schools and SMTs, but are also attended by high school teachers. In the fourth term each year, PSP consults with teachers and SMTs teachers to determine their priority topics for the following year before drawing up the programme of courses.

Any teacher can attend these workshops independently, and at no cost. For value added benefits including annual certification, request for teacher or school record of PSP professional development, teachers can contribute R150 per course for selected paid courses, or schools can register for R1,300 per year to gain access for their teachers and SMTs to 70+ courses, including course materials.[11] To make them more accessible online, PSP also offers data contributions for selected courses to registered schools (a consequence of COVID-19) which in time will be phased out. Courses have the added benefit of being SACE-accredited, thus counting towards professional development points for teachers. Teachers from PSP-registered schools each receive certificates at the end of the year from PSP outlining all the workshops they attended, and hours of professional development points accrued. Facilitators also demonstrate online, where appropriate, how to make relevant resources from low-cost/recyclable materials, which they can replicate.

In 2023, the project reached 3,337 teachers in 683 schools, more than three-quarters of which were in the Western Cape, but which spanned every province

[10] The Language Project, a recent innovation to develop language teaching, offers face-to-face workshops as well, currently.
[11] PSP recommends that schools register it as a service provider as part of their school improvement plan.

in South Africa. The fact that busy teachers sign up voluntarily for these workshops, many repeatedly, indicates the value they derive from this support.

5.2 Mentorship Project

This is a collaborative project between PSP, higher education institutions and education districts to intensively support up to 25 individual novice[12] teachers per year[13] from within the Cape Town metro by mentoring them at their schools, training them at content and skills workshops, and supporting their overall development each month over a two-year period. A larger group of novice teachers are invited to attend the workshops as part of a professional learning community. Novice teachers are further supported through PSP's other project work in addition to being invited to the Mentorship Project training workshops. As part of its work to reduce the attrition rate of teachers, PSP recognises the need of novice teachers for practical support to acclimatise to their classrooms and to use their qualifications effectively. PSP guides them on matters such as school orientation, teaching preparation, classroom management, teaching strategies (with examples of how to apply them in lessons), tools for classroom activities at different times of the day, examples of learner task cards, guidance over school policies, discipline, codes of conduct, record-keeping, assessments, administration, and communication with parents. These topics are also addressed in PSP's publication, *TeachSmart*, a practical guide for teachers and schools, which is available to all teachers in PSP's projects. In addition, PSP guides school management teams on how to support novice teachers and offers courses online nationwide. In total, 283 teachers from 126 schools attended face-to-face and online workshops for novice teachers in 2023.

5.3 Cluster Project

While the Mentorship Project is aimed at individual teachers, the Cluster Project works with clusters (groups) of schools. Together with the WCED education districts, PSP identifies underperforming primary schools to support through a targeted intervention over two years. The focus is on how to plan, teach, assess and manage Maths in the foundation phase, Life Skills in the foundation phase and Natural Sciences and Technology at intermediate and senior phases to improve learner outcomes. Teachers are trained to teach their subjects in a practical, fun way, and to integrate science, language and maths development across all subjects. Since its inception in 2002, the Cluster Project has reached more than 200 schools in the Western Cape. Of the education districts in the province, PSP works mostly in the City of Cape Town (divided into Metro East, South, Central and North districts), extending into the semi-rural Overberg. In 2023 alone, it ran 100 courses and reached 688 teachers from 36 schools. Once schools have been identified within the five districts, PSP presents the programme to SMTs and their teams of teachers before they commit via a MOU to participate in the project cycle for two years.[14]

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[12] Those in their first three years of teaching.
[13] In 2023, these mentees came from 20 different schools.
[14] Schools sign a memorandum of understanding with PSP, in which they agree to implement PSP's recommendations, for SMTs to participate and manage curriculum delivery, and for every

6. COUNTING WITH CORONATION

Counting with Coronation falls under PSP's Cluster Project. It supports FP teachers at 25 project schools. CwC's primary outcomes are to:

- strengthen teachers' mathematical content knowledge
- incorporate effective teaching methodologies and strategies into the classroom to achieve best practice and build confidence
- provide PSP resource material
- promote professional collaboration among teachers and school leadership to develop a whole school approach to maths as part of their school improvement plan (SIP)
- provide teachers with tools and ideas to assist parents in supporting maths learning in the home.

In line with the overall Cluster Project model, CwC provides (1) intensive teacher training, (2) follow-up classroom coaching, (3) remote support and (4) educational material and resources. It has been running in two-year project cycles since 2013, during which it has reached 136 schools and trained more than 1,600 teachers.[15]

6.1 Intensive teacher training

PSP's training courses model practical teaching methods and innovative teaching strategies. Training focuses on deepening teachers' content knowledge[16] and is designed to integrate maths and language curriculums. Each term, PSP facilitators run six-hour Saturday training workshops in English, Afrikaans, and isiXhosa. Facilitators also give copies of the presentation to all participants. The workshops ensure teachers understand the CAPS curriculum and the annual teaching plans (ATPs).[17] Importantly, facilitators highlight the overall progression of the curriculum across the foundation phase so that each grade teacher can situate their teaching within the broader framework and use appropriate strategies for their particular learners.[18]

6.2 Classroom coaching

PSP facilitators complement what has been learnt in workshops with follow-up classrooms visits, where they demonstrate different teaching strategies and co-teach classes or observe lessons and give feedback. This extends the training and

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teacher to participate in all aspects of the programme and keep records of teaching and assessment plans.

[15] The project originated from an initiative by Marinda Kleinschmidt, a CSI practitioner at Coronation in 2010.

[16] For example, early numeracy development, conceptual progression, reasoning proportionally and spatially.

[17] This has become more pertinent since the DBE revised the ATPs as part of their multiyear curriculum recovery approach after the Covid-19 disruptions.

[18] 'Sometimes they can't believe they're not doing what they're supposed to be doing. I explain, "You're not supposed to tell the children to divide in this way in Grade 1. That's only coming in Grade 4."' (Sandra Rossouw)

monitors how teachers are implementing new knowledge and skills and using the resources provided. Visits are also a primary way of making sure the interventions are relevant: 'When we arrive in the classroom, we always ask the teachers, "What is your specific need? How can I support you?"' (Tracy-Lee Stevens) During their visits, facilitators observe, reflect and give constructive feedback to teachers on how to improve their practice, plan good lessons, teach using practical methods, incorporate additional resources, manage their classrooms effectively and assess learners. This includes testing a sample of learners twice a year, and an analysis of a selection of learners' workbooks at the beginning and end of each year, which PSP uses for its ongoing monitoring and evaluation of the programme's effectiveness. Results shape facilitator feedback to teachers where they are, amongst other things, encouraged to make sure corrections are done and feedback is given to learners.

The facilitators' observations from classroom coaching sessions directly inform training workshops, where they address areas of concern (e.g. doing group work, teaching using differentiation etc.).

6.3 Remote support through technology

PSP facilitators communicate regularly with teachers in CwC via telephone and WhatsApp. They encourage teachers to share ideas with their peers on group chats, plus examples of lessons that have worked well in their classrooms. Ad hoc consulting and advice is also available remotely. This extends informally beyond the two-year project cycle as facilitators respond to questions and requests as they arise from previous years.[19]

6.4 Educational material and resources

PSP provides practical classroom resources such as printed/visual material, manipulatives, and maths teaching and learning equipment. Each teacher also receives a copy of PSP's activity booklet, *Practical Maths for the Foundation Phase*, which outlines strategies on how to make maths accessible, interesting, and practical using everyday or readily available recycled materials. Facilitators also show teachers how to make such resources for the topic at hand during training workshops and classroom support Additional equipment such as measuring jugs, cups, spoons, measuring ruler mats, pattern cards, dominoes, fraction circles, time sequence flash cards, geared clocks, solid geometric shapes, giant dice, pattern matching cards, balancing scales with weights, play money, shaped beanbags is included in maths kits which are made available to each teacher at participating schools along with input on how to use and care for.

[19] Many teachers are still in touch with PSP's longest-serving facilitator, Sandra Rossouw, 21 years later.

6.5 Project activities at CwC partner schools

The following activities are repeated over the two-year project cycle period:

- PSP facilitators conduct a needs analysis of each school in person once a year,[20] which covers quantitative data on teachers, learners and classes, basic infrastructure, technology, and teaching apparatus available, the difficult socio-economic context and major challenges in the community.[21] Each school's systemic tests results are collected for comparison before and after PSP's intervention. To establish what support is needed, the needs analysis also probes teachers' experience in maths, the availability of teaching resources and their use. Each intervention is thus planned to suit the specific needs of each teacher and school.
- A sample of five Grade 2 and five Grade 3 learners are selected[22] from each of the ten selected schools for baseline assessments in maths. These are designed by PSP[23] and conducted at the start and end of each year to measure PSP's impact on a range of learners.
- A sample of maths workbooks from three learners per Grade 2 and 3 classrooms are analysed in Terms 2 and 4 each year for three different performance levels (good, average, and weak) to establish the extent to which the teacher is planning good lessons, covering the curriculum, consolidating concepts, progressing learners, practising differentiation, using appropriate assessment strategies, giving constructive feedback and using interventions to address learner challenges.
- One 6-hour FP maths workshop is offered termly (during three terms in the first year and four terms in the second year).
- Schools receive two 4-hour follow-up classroom coaching sessions per term (during two terms in the first year and three terms in the second year).
- There are 2-hour additional online support sessions for the SMT (one in the first year and two in the second year), which cover the school's needs for FP maths, discuss how to bridge the gaps identified, involve parents if needs be and consolidate the project plan. It is vital for the school management to be fully engaged and take ownership over the project.
- In the first and last terms of each year, PSP plans to use a teacher confidence index tool to gauge its impact and gather feedback to incorporate into the project design. Each teacher will be asked to rate their confidence levels after receiving support through CwC. The tool and processes are currently being trialled and refined.
- The project cycle concludes with a conference, where teachers within the programme share what they have learnt over the two years and showcase their best practices.

[20] In the second year, this is simply updated to establish what might have changed, for example whether any other NGOs have begun working with the school.
[21] The needs analysis also indicates if schools are sufficiently functional to benefit from PSP's intervention.
[22] Teachers select a range of learners ranging in performance levels from good to weak.
[23] PSP set out to use the WCED baseline assessment tests, but because these are inconsistently applied at schools, it uses its own tests instead.

7. KEY SUCCESS FACTORS, CHALLENGES, INNOVATIONS AND LESSONS

Zorina Dharsey summarises the three fundamental aspects of PSP's work: maths needs to be taught by (a) highly skilled, committed, confident teachers, (b) using a range of approaches, (c) in an active, child-centred way. It is vital that this takes place at foundation phase level to 'promote greater understanding of maths so that there is a more sustained trajectory through high school. All children have the ability to do maths, but it's *how* they are taught those essential basics that is going to take them further.'

Counting with Coronation's two-year project design gives PSP enough time to build relationships of trust with participating teachers, upskill them and embed new practices in schools with the SMTs. It works in very challenging circumstances, which the organisation meets with innovation. Its success has been built up over many years, in consultation with multiple stakeholders, collectively striving towards a vision of excellent primary education for all. Among its key innovations are its context-specific teaching strategies, and the selection of experienced facilitators who develop positive supportive relationships with teachers, build rapport and secure their active participation. PSP also uses a tailored approach to deal with learning difficulties. Central to its intervention is meaningful, applicable mathematics which is integrated and differentiated. The programme offers opportunities for peer mentorship, professional learning communities to develop, conference networking and further development after the project concludes. It has a responsive project design, which is both sustainable and keeps costs low. A wide range of qualitative and quantitative tools for monitoring, evaluation, reflection, and learning (MERL) are built into the project design and inform its data-driven decision-making and communication. Each of these aspects of CwC's model are outlined below.

7.1 Context-specific teaching strategies

Rather than a scientific, top-down approach, which is rolled out to schools, instructing teachers what and how to teach, PSP meets them where they are. This means PSP can develop curriculum and content knowledge specific to each teacher, to improve their practical teaching abilities and assessment, as well as classroom confidence. PSP notes that each classroom is unique, and children learn in different ways. It therefore promotes reflective teaching. Each teacher needs continuously to evaluate what worked well for them and why, and to adapt their strategies and material accordingly. They should interpret the content in the curriculum for their learners, not just follow a textbook. This requires more imagination and ultimately more work from teachers, but it improves learner outcomes and makes the job more enjoyable too. For such a model to work, PSP facilitators confront the reality of overwhelmed teachers – facing huge discipline problems and weighed down by administrative tasks – who are 'just keeping the kids busy but not learning'.[24] They do so with positivity

[24] Sandra Rossouw, Zoom interview, 5 October 2023.

and empathy, coming alongside teachers, building relationships, acknowledging their challenges, and enthusing them with fun activities to try. 'We use a very non-intrusive approach so that the teacher is not put off and disgruntled. Facilitators make it clear that they don't know everything. It's a two-way street. We share with each other. I'm not coming there to say, "Use this strategy – it's effective". I say, "Here's something I've used in my classroom when I taught it. See how you can use it to adapt to your context."' (Tracy-Lee Stevens)

7.2 Facilitator selection

It is significant that all PSP facilitators are educators with extensive experience working in the types of schools where they now provide support. Their first-hand knowledge of the challenges teachers face especially in quintile 1 and 2 schools creates a firm platform on which trust can be built. Tracy-Lee Stevens explains, 'These areas have a lot of crime. But the facilitators go regardless. We want to show them that we're not just there as a lip service. This builds trust and means a lot to the teachers.'

7.3 Positive, supportive relationships

It is within an empathic relationship that facilitators can have the greatest impact, providing encouragement and intentionally giving positive feedback while coaching. PSP facilitators' starting point is what teachers are doing right and then to build on that. 'We don't ignore what they're not doing well, but we don't correct them in a way that makes them feel inadequate.' (Tracy-Lee Stevens) Sandra Rossouw adds, 'I always tell them, "I'm coming to see what you are doing right. How are your kids enjoying maths? Let's get them to enjoy it more. I'm coming to help make it better."'

7.4 Building rapport

Initially teachers are nervous of PSP and apprehensive of being burdened with more administrative work. As Sandra Rossouw notes, 'The biggest thing is to get the teachers on board. As soon as they see this is not more work for them but is actually enhancing their discipline, their own knowledge, the kids' knowledge … you can work with them. The personal relationship with the teacher is really important. Only by the third term of the first year do they start trusting you. Then only in the second year do you actually start seeing results and you start seeing teachers trying out what you're saying and showing them. It takes time.'[25]

7.5 Active participation

Teachers receive practical training from the same facilitators who visit their classrooms to help them apply it practically in context. Coaching is scaffolded over the two years: facilitators first demonstrate lessons on topics covered in their workshops, then co-teach with them, boosting teachers' confidence incrementally, and motivating them to practise what they are learning in the workshops. 'We say, "This is the strategy – remember from the workshop? Let's

[25] Zoom interview, 5 October 2023.

try it out. Let's see how *your* kids react to this strategy." Sometimes they're astounded by seeing what the kids can do.' (Sandra Rossouw) This cycle of training and coaching holds teachers accountable and ensures their active participation. Building teachers' confidence and strengthening their support increases their resilience in dealing with the many challenges of/in their jobs.

7.6 Tailored approach

Individual classroom visits also allow facilitators to pinpoint challenges teachers are facing. For example, they might discover that teachers need to include more questions that challenge learners. For IsiXhosa children growing up using slang numbers, facilitators encourage teachers to model the vocabulary learners are required to use and make it visible in class. They also give teachers new insights into their learners' capabilities. 'Through the demonstration lessons, the teachers see how the learners respond. Learners who are struggling respond for the first time because the facilitators ask them questions.' (Tracy-Lee Stevens)

7.7 Dealing with learning difficulties

For children presenting behavioural issues or learning difficulties,[26] facilitators look for potential underlying issues and try connecting with them. 'Just like in our teacher workshops, where we start by building the relationship with the teachers, we encourage the teachers to start each day by checking in with the learners before starting with mental maths. Then they find out what might be causing children to behave in a certain way. We try to advocate for developing the executive functions of the brain – we expose teachers to what you need to put in place for the children to function effectively. It is important to create a safe space – we show them breathing exercises, stress-tapping, calming strategies, how to make maths fun.' (Tracy-Lee Stevens) PSP also offers trauma-informed teaching courses, which facilitators draw on in their training.

7.8 Key teaching strategies

The goal of PSP's teacher training goes beyond delivery of the maths curriculum or improving assessment outcomes. Rather, PSP inspires teachers to engage their learners with a range of teaching strategies which hone the fundamentals of true learning: on it being meaningful, applicable, integrated into real life, and part of essential life skills like communication, critical thinking, problem-solving and curiosity. These strategies are woven into the intensive training workshops and reinforced in the follow-up demonstration lessons. Facilitators also advocate that teachers involve learners in the lesson objective using a co-authored WALT strategy – What Are we Learning Today? – stating the objective at the beginning of a lesson and reflecting on what they have learnt at the end. This often improves their attention in class, while developing metacognition and a sense of responsibility.

[26] The schools where PSP works have a high proportion of such learners.

Table 1: The top 10 teaching strategies which PSP promotes:

	Strategy	Purpose
1	Promote active learning	To make it more meaningful and motivating
2	Use real or concrete objects	So that learners understand concepts more quickly and remember them longer
3	Build comprehension skills by focussing on language in every lesson	To develop listening, speaking, reading, and writing skills
4	Build on prior knowledge	To anchor learning in what children already know
5	Encourage questions and ask questions effectively	To develop curiosity, critical thinking and problem solving
6	Integrate learning	To develop a holistic understanding of the real world
7	Differentiate learning	To meet the learners where they are at and scaffold learning accordingly
8	Use role-play	For deeper, experiential learning
9	Encourage talking	To enhance self-confidence, practise communicating and consolidate knowledge
10	Use visual material	To aid learners' understanding

Teachers are encouraged to use a wide range of strategies according to the needs of the child. As Zorina Dharsey notes, 'You as the teacher need to have this deeper, diverse toolbox for you to draw on for particular concepts for particular learners.' Throughout, PSP tries to make maths fun for teachers and children, using rhymes, songs and games.

7.9 Meaningful maths

PSP promotes 'learning by doing' through practical, inquiry-based teaching, thereby making it meaningful. 'We all need maths skills to help us make choices, solve problems, analyse and interpret information.'[27] PSP therefore ensures that its workshops, coaching, teachers' guides and resource books and other support materials focus on practical examples and strategies which teachers can try out. Tracy-Lee Stevens shares: 'At PSP, we say, "Here are strategies, here are examples. Now try it, adapt it yourself."' PSP also supports teachers to implement theory and teach concepts in a fun way by demonstrating the usefulness of concrete resources, empowering them to make and use their own, and providing timely teaching aids as needed, directly related to the content being taught.

7.10 Applicable maths

PSP shifts the focus from finding the correct answer to understanding the process and learning from mistakes. To make maths useful and applicable, children need to develop their thinking and problem-solving skills. Therefore,

[27] PSP. 2021. Practical Maths for the Foundation Phase, p. 2.

PSP trains teachers to use a central problem to: challenge children; encourage them to devise strategies to find the answer for themselves; and guide them to learn through a series of questions, discussions, experiments, and hands-on activities. Stimulating children's curiosity by letting them wrestle with questions and validating different approaches is a noteworthy shift away from the more common rote learning and completing of worksheets. PSP advises: 'Allow children to struggle. They have the courage to persevere and will experience a special exhilaration that comes with overcoming difficulty. This builds grit and will encourage them to keep on trying new things.'[28] Facilitators use this technique with the teachers themselves in the workshops, by giving them problems to struggle with.

7.11 Integration

PSP promotes integration not only so that children can make meaningful connections between maths, language and science, but use maths as a life skill. It does so in a variety of ways:

- Facilitators alert teachers to how many opportunities there are in a maths lesson to develop language skills simultaneously, such as with maths stories or using group work to combine verbal skills with mental maths. Sandra Rossouw explains, 'When teachers realise that they can integrate and that they get so much language from a data lesson and so much maths from a language lesson, it makes them feel less overwhelmed with the curriculum.'
- Facilitators discourage teachers from telling children the answers so that they can develop their verbal skills. 'Instead of teachers demonstrating their understanding, the learners get an opportunity to explore and learn.' (Tracy-Lee Stevens)
- Facilitators prepare classroom activities based on familiar life events according to different contexts, for example using a Cape Town train timetable to calculate how long it will take to travel between stations, or counting different forms of transport families use to attend an event in a farming community.

7.12 Differentiation

PSP courses demonstrate how to differentiate lessons for learners with different abilities. This is particularly significant for teachers in small farm schools, who are required to teach multi-grade classes. 'Teachers think differentiation means they need three different worksheets for three different groups. But we show them that the learners can all be learning the same concept and solve the same problem, but one learner can do a lower number range while stronger learners can have a multistep word problem. Most teachers focus on the struggling ones not the ones who are needing more stimulation. We show them how to stretch the more advanced ones while also boosting the weaker learners.' (Tracy-Lee Stevens)

[28] PSP Newsletter, Term 3, 2023, p. 2.

7.13 Broader curriculum perspective

In workshops, facilitators also show teachers how the same topics differ across grades. 'We find that teachers tend to focus just on whatever grade they are teaching. They don't have a sense of what the children learnt in the previous year or what they will do in the next year. The PSP training helps teachers to build on the knowledge children have already acquired and understand what they are teaching towards.' (Tracy-Lee Stevens)

7.14 SMT involvement

The SMTs are involved in the project from the outset. PSP helps them to develop a whole-school approach to teaching maths as part of their School Improvement Plans (SIPs) by promoting collaboration amongst teachers and sharing of best practices. This is informed by the broader perspective PSP offers each teacher on the curriculum progression. The three SMT workshops that are held over the course of the two years reflect on how the project is going, outline challenges and potential solutions, and invite dialogue. Facilitators also meet with SMT members informally during every school visit, usually the HODs or Deputy Principals, during which they share feedback about general patterns observed across each grade.[29] SMTs are able to ask about learners' abilities, the level of group work taking place, etc. Towards the end of the project, facilitators discuss how SMTs will sustain the work on their own the following year.

7.15 Parental involvement

PSP works with teachers to promote active parental involvement in children's maths learning. Its guide for parents and caregivers of children aged 4–9, *Practical Maths at Home*, is designed to be used alongside ordinary activities. These books are available for purchase by teachers, schools, and parents.

7.16 Peer mentorship

PSP not only resources individual teachers but helps them to use each other as a resource. Peer mentorship is encouraged within each school across grades during the project, and after the project cycle ends. It is modelled at PSP workshops, where teachers are put into groups to work on problems together. One novice teacher shared how affirming she found it at a recent workshop to see that even senior teachers were still struggling with the same issues as she was – this highlights the strength of CwC in connecting teachers with each other. It echoes Robert John Meehan's view that, 'The most valuable resource that all teachers have is each other. Without collaboration our growth is limited to our own perspectives.'

[29] It is important for this to be handled sensitively from the facilitators' side, as they establish relationships of trust with teachers. They therefore avoid reporting on individual teachers' struggles to the SMTs when they are identified, and instead work with the teachers themselves and report on the improvements at a later date.

7.17 Professional learning communities

Peer engagement is reinforced informally between schools through the WhatsApp groups facilitators create for each cluster, which serve as professional learning communities. These are motivating spaces, which encourage teachers to try out and share new strategies. 'They like to brag if they tested something out.' (Sandra Rossouw) Facilitators post relevant educational videos and photos while keeping the groups personal with birthday wishes. They use the platform to create a sense of camaraderie among teachers facing similar challenges. This extends beyond the two-year project cycle, as alumni groups keep in touch. Sometimes teachers from different schools attending a workshop form their own WhatsApp group afterwards to keep in touch and support each other as well.

7.18 Conference network

Teachers in each project cycle actively participate in the concluding biennial CwC conference by giving short presentations on how PSP changed their teaching practice and confidence,[30] for example lessons learnt, successful strategies for group work, teaching effectively with limited resources, practical tips for large class sizes. This provides another opportunity for peer mentorship, something which PSP plans to extend at the 2024 CwC conference by inviting fourth year UWC teaching students to attend.

7.19 Further development after CwC

All teachers and SMTs are able to continue their professional development after the intervention ends. They can do so through PSP's accredited online courses in the Innovation Project. As Kerry White notes, 'Once teachers join the PSP family, they come back year after year' – in 2023, a fifth of the previous CwC project cycle signed up for courses of their own accord. Teachers can attend courses on all aspects of teacher development as well as specific subject content relevant to them. Courses for SMTs cover issues such as conflict management, developing and implementing SIPs, staff induction and mentoring, discipline, leadership, parent involvement, community development, supporting teachers with classroom management. In this way each school continues to benefit from PSP's programmes. 'Also, teachers recommended PSP workshops to colleagues, who then attend in subsequent years.' (Tracy-Lee Stevens)

7.20 Responsive project design

Through its AMP Forum, PSP invites all teachers in the programme to set the agenda for the training they need. This advances teacher participation and buy-in, and shapes courses to be of maximum benefit. In addition, PSP uses a flexible approach based on the needs analysis of each CwC partner school. Facilitators divide their time between classrooms within each school to maximise their support in different contexts. For smaller schools, facilitators work with each

[30] Maximum participation and benefit are ensured by running two parallel sessions delivered in isiXhosa and English/Afrikaans.

teacher at every visit. For larger schools, facilitators focus on the teachers who need the most assistance. Schools also request help as needed, for example arranging for all their FP education assistants to attend PSP demonstration lessons as part of their training. PSP's responsiveness is built into the materials it develops and distributes as well. Facilitators continually hone their training material based on what worked well in classrooms and workshops. Over time, their workshop slide presentations form the basis of PSP's resource books with relevant, practical examples that have proved effective.

7.21 Sustainability

PSP's two-year cycle has proved integral to its success, first establishing individual relationships with teachers and SMTs, offering intensive support for two years, followed by affordable further training opportunities and long-term networks of alumni support. As the project closes, PSP shares the sustainability action plan with teachers and schools. At the same time, PSP fosters relationships with WCED officials and the subject advisors who oversee each district where PSP operates. Subject advisors are invited to attend PSP workshops, and many do.

7.22 Low-cost resources

Rather than providing new learner workbooks or electronic equipment, PSP works with the material teachers already have, namely the DBE textbooks. This makes the intervention more cost-effective and sustainable. Schools do not need any additional funding or external resources to continue the work begun during CwC's two-year cycle. PSP also maximises its resource budget by offering only those materials that teachers cannot easily make and empowering them to make their own.

7.23 Tools for monitoring and evaluation

PSP uses a range of MERL tools to track the impact of the CwC project, monitor improvements and shape it as the intervention progresses.
These include:

- Needs analyses for each school
- Classroom registers
- Facilitators' classroom observation rubrics
- Coaching feedback from teachers
- Baseline learner assessments
- Learner book analyses
- Systemic results from each school
- Project reflection questionnaires
- Consultation with teachers, SMTs and district officials
- PSP workshop registers
- Pre- and post-workshop tests for teachers
- Facilitator process notes from each workshop and school visit.

At the project's conclusion, facilitators gather feedback from SMTs on how the school has benefited overall (in terms of classroom support, training workshops, impact on learner performance, resources, etc.). PSP uses qualitative and quantitative tools to corroborate feedback.

The five facilitators[31] involved in CwC have a four-hour reflection session at the end of each school term to discuss project successes and challenges and to brainstorm recommendations moving forward. This formative assessment is summarised and sent to the rest of the PSP team.

7.24 Data-driven decision-making and communication

Since 2021 PSP has been using a comprehensive customer relationship management (CRM) system, which it developed over four years to streamline its operations. This enables it to centralise all data gathering, management and processing, something which has become vital as PSP's operations have expanded (with a five-fold reach increase in the last decade). The CRM system captures PSP activities and detailed teacher profiles, tracking their involvement. This is a significant improvement on previous systems which PSP tried and allows for not only effective monitoring and evaluating but for strategic data-driven decision-making. It also enables cost-effective, personalised communication with beneficiaries. For example, it identifies relevant teachers to invite to upcoming courses rather than flooding everyone's inboxes with all PSPs offerings and wasting money on extraneous SMSes.

7.25 Overcoming staff changes

Attendance at PSP workshops is sometimes impacted by teachers being called to district workshops and events at the last minute. PSP tries to avoid this by coordinating its planning with WCED events in mind. CwC outputs are also impacted by unavoidable staff changes among teachers and SMTs. PSP incorporates new staff members immediately into the project to mitigate the disruption and maximise the benefits they might receive. In addition, PSP works with SMTs to incorporate their strategy in writing into the SIP, so that when key members leave the school, an HOD or champion teacher can take it forward.

8. CONCLUSIONS AND RECOMMENDATIONS

PSP's professional development model is highly effective, much needed, well thought-out, based on real life experience and honed over decades in consultation with hundreds of educators. Its flexible, responsive, tailored approach keeps it relevant to each context in which it operates. It succeeds in improving individual teachers' maths content knowledge, teaching skills and use of resources through positive, trusting relationships with a team of committed, experienced facilitators. Moreover, it builds greater support structures around teachers through the school management teams as well as professional learning communities and the broader 'PSP family'. Always bearing in mind the child's

[31] Yanga Greyi-Centane, Sarah Kleinsmith, Sandra Rossouw, Tracy-Lee Stevens, Mandisa Xobongo.

needs, PSP equips teachers with a range of active teaching strategies to integrate maths into real life and make it meaningful. Its MERL tools are used for reflection and learning and give PSP the confidence for ongoing innovation.

We highly recommend that Counting with Coronation continues as a valuable, sustainable, dynamic intervention for foundation phase maths. In line with the World Bank Group's conclusions, PSP's model of investing deeply in teachers is a 'strikingly cost-effective',[32] high-intensity intervention with long-term benefits of systemic improvements, in contrast to low-intensity, scalable interventions, which provide improved LTSM, for example.[33] Comparable organisations, like Penreach, working in the same areas, have reached the same conclusion. PSP's low-technology design is also more feasible in resource-poor schools than rolling out technological solutions, which rely on electronic equipment. Investing primarily in teachers rather than education assistants also has greater capacity to elicit deeper change. Director Zorina Dharsey argues, 'we need to focus on the *implementers*. Who is implementing the material? That is the main tool you need to strengthen – and with a range of approaches, not just one approach. There isn't just one magic wand.'

In line with these concluding observations, we make the following recommendations:

- PSP's strategy is highly replicable and worth expanding. With greater funding, we recommend additional facilitators be appointed to support more clusters across the Western Cape, as well as in other provinces.
- PSP's compact termly newsletters keep its network well informed of its work, but the current website needs to be updated to better showcase the excellent work of the organisation.
- There are many opportunities for PSP to train subject advisors and we recommend it continues to explore this in other provinces, such as its Grade R 'Train the trainer' project with the Gauteng Education Department.
- The amount of coaching time facilitators can provide to individual teachers depends on how many FP classes there are in any given school. Instead of dividing their time evenly between the same number of schools, it would be worthwhile to investigate providing additional support to bigger schools.
- The material which PSP has developed for parents to use at home with their children is fun, engaging, very relatable and easy to use alongside home chores. We recommend that PSP enhances its work by adding a parent workshop as part of the memorandum of understanding with each

[32] https://www.vox.com/future-perfect/21552985/improve-schools-invest-in-teachers
[33] A study which has shaped Funda Wande's recent strategy concluded: 'Findings show that low-intensity, scalable models which consist of LTSM and centralised training lead to improved learning outcomes only when there is enough time for teachers and learners to engage with the materials, not when exposure to the programme is limited. Where the programme is viewed by teachers as a resource intervention rather than a programmatic one, there is little fidelity to the programme and little impact in improving instructional practices by the teachers' (Funda Wande Annual Report 2022, pp. 14–15).

school, to be facilitated by PSP during the second year of each CwC cycle, once solid relationships have been established with the SMTs and teachers. It would also form a valuable addition to any ECD centres.

This concludes the process evaluation study of Counting with Coronation, which will be followed by an outcomes evaluation in 2024.