



**Noah Project
Impact Report 2020/2021**

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1.Introduction

“Maths is a ‘gateway subject’ critical to South Africa’s economic growth and development in the wake of the 4th Industrial Revolution”. – Shay (2020)

The 2020 Matric Maths results have added to concerning evidence of the continued decline in Maths performance amongst South African learners. Nearly half (46%) of all students writing Matric Maths did not achieve a minimum pass rate of 30%. Comparatively, South African learners scored well below the global average in Maths, ranking 68th out of 69 countries that participated in the Trends in International Maths & Science Study (DBE, 2019). The TIMSS 2019 study highlighted that learners’ poor Maths performance extends right back to primary school, with 63% of our Grade 5 learners failing to have acquired basic Mathematical Knowledge, according to their scores on the test (BusinessTech, 2020).

A range of socio-economic factors have been cited as responsible for learners’ poor Maths performance, but these are discounted when considering that 39 other African countries performed better than South Africa in the TIMSS 2019 study. More recent research points to the importance of competent and confident Maths teachers (Verster, 2021), and the importance of promoting creative problem solving skills, as opposed to teaching a method to solve a problem (Nkosi, 2021). If Maths is considered to be a ‘gateway subject’ that is critical to South Africa’s economic growth and development in the wake of the 4th Industrial Revolution (Shay, 2020), then recommendations aimed at improving learners’

Maths performance must be attended to as a matter of urgency.

Boikanyo the Dion Herson Foundation embarked on The Noah Project to improve the Maths potential of learners in lower quintile schools. It was first implemented with Gr 8 learners at Sekano-Ntoane Secondary School in Soweto. The programme achieved measurable success, but it was noted that earlier intervention was necessary. In 2020, Boikanyo partnered with Glenridge Primary School in Soweto, to provide Gr 4 and Gr 5 learners with an extra Maths Programme.

2. Noah Project

The Noah Project aims to improve children’s understanding of core mathematical concepts that form the basis of concepts taught in the GDE curriculum. To achieve this, the project has the following objectives:

1. To train and mentor educators in the effective delivery of an engaging and interactive Maths programme.
2. To support the delivery of extra maths lessons

The Noah Project began at Glenridge Primary in January 2020, and was completed in April 2021.





2. Methodology

2.1 Aim

This study aims to explore the impact of the Noah Project on educators and participating learners at Glenridge Primary school.

2.2 Data collection & Analysis

A mixed methods approach using both quantitative and qualitative data sources and methods of analysis was adopted.

Sample	Data Collection Tools	Analysis
12 Educators	Training feedback survey <i>Experiences of the training</i> Focus group <i>Experiences & perceptions of the project impact</i>	Thematic Analysis
68 Caregivers	Parents survey Baseline: <i>Explore ACE's*, attitudes to Maths & parent skills</i> Endline: <i>Explore attitudes to Maths & perceptions of impact</i>	Thematic content analysis
279 Children	Pre & post Maths test <i>Investigate changes in maths performance</i>	Paired sample t-test

A Results-Based Analysis (RBA) approach has been used to structure the presentation of the findings.

2.3 Results-Based Analysis

RBA provides a simple framework for presenting evaluation findings, which is done in relation to 3 key questions:

1. How much did we do? →

2. How well did we do it? →

3. Is anyone better off? →

Reach & outputs

Short-term impact

Med to long-term impact

The results are presented in relation to these three questions, following an infographic overview of key findings.

2.3 Ethical Considerations

Appropriate ethical procedures have been followed to ensure that the data used for the impact study remains confidential, and anonymous.

Baseline



Maths is a 'gateway subject' critical to South Africa's economic growth and development in the wake of the 4th Industrial Revolution



Glenridge Learners' average score on the **Baseline Maths Test**

17%
(n = 279)

Outputs

14

Educators trained, mentored & supported in delivering an engaging Maths Project

Teaching & learning resources provided to the school.



279

Gr 4 & Gr 5 Learners enrolled in the project



Snacks provided to learners at each session

Outcomes

Educators gained:

Maths knowledge & skills

Strategies & Methods for teaching Maths

Confidence & Motivation towards teaching Maths



Competent & confident educators = better learning environment

Learners:

Found Maths fun & enjoyable

Gained more Maths Vocabulary & problem-solving strategies

Developed a Love for Maths

Improved attitudes towards Maths

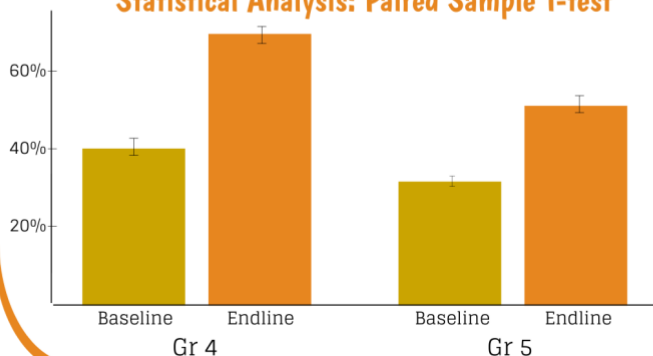


Impact: Learners' Maths Results

60%

Glenridge learners average score on the final Maths test (n = 90)

Statistical Analysis: Paired Sample T-test



Gr 4 Results:

Baseline: M = 40%; SD = 2.9%
Endline: M = 69%; SD = 2.9%
t(50) = 2.4; p = 3.2

Gr 5 Results:

Baseline: M = 32%; SD = 1.5%
Endline: M = 51%; SD = 2.8%
t(38) = 2.43; p = 9.61

There was a significant improvement in Gr 4 & Gr 5 learners' Maths results



3. Results

3.1 Baseline Study

At the start of the project, 279 children completed a baseline maths test. In addition, 68 caregivers completed a survey exploring the frequency of Adverse Childhood Experiences (ACE's), parenting skills and attitudes towards Maths.

Baseline Maths Test

The baseline Maths test consisted of 50 questions, designed according to international standards of basic Maths outcomes for learners in Gr 4. The questions are notably comparable to those included in the Annual National Assessments (ANA), and cover 3 of the 5 content areas:

1. **Numbers, operations** and **relationships**;
2. **Patterns, functions** and algebra;
3. Space and shapes;
4. **Measurement**; and
5. Data Handling

The test was administered to 149 Gr 4 learners and 130 Gr 5 learners at the start of the project, who collectively achieved an **average score of 17%**.

Baseline Maths Test Scores	Gr 4	Gr 5
No. of learners completing test	149	130
Average score	17%	17%
Minimum score	0%	3%
Maximum score	45%	37%

By comparison, Glenridge Learners' 17% average on the baseline test, is considerably lower than the National average of 37% achieved by Gr 4 and Gr 5 learners on the ANA in 2014 (DBE, 2014).

Albeit a one-dimensional observation, the disparity suggests that:

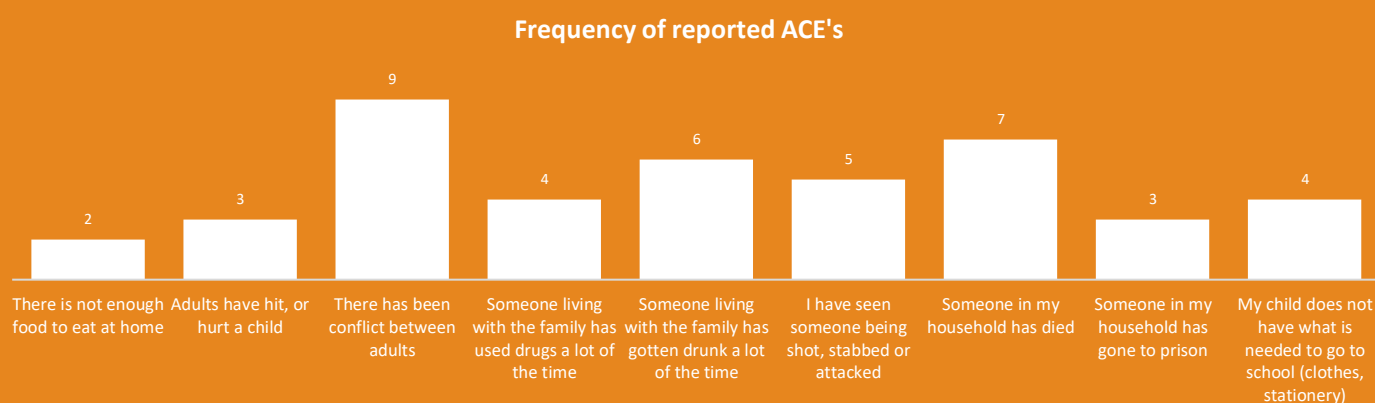
Glenridge learners' Maths performance was well below the National average at baseline.

Of further concern is that Glenridge learners would be regarded as high risk for not achieving a Matric pass in Maths, according to studies linking foundation phase performance in Maths to Matric Maths performance (van der Berg, 2015).

Adverse Childhood Experiences (ACE's)

ACE's are known to have a negative impact on children's ability to learn, affecting their school engagement and academic achievement (Stempel, 2017). ACE's were thus explored to understand if they may be a factor affecting learner's participation in the project and possibly their Maths performance.

Amongst the 68 caregivers that completed the survey, 72% (49 out of 68) reported no occurrences of ACE's in their families within the last 6 months. 22% (15 out of 68) reported that their families had been subject to between one and three of the ACE's listed. These were most commonly family bereavement, conflict and substance use. Only 2 families had experienced more than four ACE's, with 1 family having been exposed to all nine ACE's within the last 6 months. The frequency of reported ACE's, as illustrated in the chart below, suggests that the majority of the children had a reportedly safe home environment within the 6 months prior to the Baseline Maths Test.





Caregiver Skills and Attitudes

It is widely known that parental support benefits children's learning, and that this support is mitigated by the skills a parent has, as well as their attitude towards learning (Jay, Rose & Simmons, 2018). Measures of caregivers' 'parenting' skills and attitudes towards Maths were thus included in the baseline study to better understand the level of learning support that Glenridge learners have at home.

With regards to caregivers' sense of self-efficacy within their families, 100% felt confident in their capacity to support their children and families, reporting that they usually know what is needed to keep their children safe and healthy, and that they always do their best to ensure this.

Although caregivers reported to feel uncertain of their ability to assist their children with Maths homework, their responses to questions around their attitudes towards Maths, revealed that they considered Maths to be important. This is consistent with literature stating that parents often find it difficult to assist with Maths, because of their own levels of achievement in the subject (Peters, Seeds, Goldstein and Coleman, 2008).

Irrespective of Caregivers' Maths Ability, the low frequency of ACE's and reported levels of caregiver support suggest that Gr 4 and Gr 5 learners at Glenridge Primary have safe and supportive learning environments at home.

Based on this evidence, it is then not likely that learners' poor performance on the Baseline Maths

Test was a result of negative circumstances in their home environments. This is aligned to more recent literature suggesting that the competence and confidence of Maths teachers is a stronger predictor of Maths performance (Verster, 2021).

It is important to note that the above self-report findings on ACE's, parenting skills and attitude towards Maths are subject to three important limitations.

1. Data is self-reported by those caregivers who made an effort to attend the information session – inclining the sample towards more supportive caregivers.
2. Parents may not have felt comfortable admitting to negative behaviours and circumstances in their family.
3. The responses only represent 24% of the children and families that participated in the baseline Maths test.

These limitations bias the data towards a reportedly more safe and supportive learning environment at home and limit the generalisability of the findings. However, given that the findings are consistent with the literature, does lend support to their reliability.

The baseline findings ultimately support the need for the Noah project and underscore the importance of its focus on training and mentoring educators in the effective delivery of engaging and interactive Maths lessons.

3.2 How much did we do?

This question refers to the reach and **outputs** of the Noah Project. In relation to training and mentoring educators to support the effective delivery of extra Maths lessons, the following outputs were achieved:



14 Glenridge Primary Educators were trained on key components of the Singapore Maths methodology, which involves teaching Maths in ways that help learners progress from concrete to abstract Mathematical concepts. Educators then received weekly mentorship while implementing the methodology in their extra lessons.

To support the Educators in their extra lessons, resources in the form of manipulatives (concrete teaching resources), teaching manuals and learner workbooks were provided to Glenridge Primary.



279 Gr 4 and 5 learners completed the baseline Maths test at the start of the project in February 2020. Extra Maths lessons were scheduled to take place on two afternoons each week. Records show that the implementation took place as planned except during Nationwide Covid-19 Lockdown levels when school closures were enforced (March to August 2020). School closures not only disrupted schooling for both educators and learners, but also had a negative impact on project implementation and learner participation.

In terms of outputs, extra Maths lessons were extended to April 2021 to compensate for lost sessions in 2020. Learner participation, however, declined from 279 learners at baseline, to 120 (43%) at the midline assessment, and then even further to 90 (32%) learners by the endline Maths test. Anecdotal evidence from the school also shows a decline in school attendance in 2020, but not to the same degree as that recorded for the programme. This suggests that although there may have been variables outside of the project, and specifically related to the impact of Covid-19 on the community, that resulted in a decline in attendance, there may also have been minimal efforts made to encourage children back into the programme at the start of the new school year.

Finally, at each extra Maths lesson that did take place, learners were provided with a snack before each session, in order to remove hunger as a potential barrier to learning.



Ultimately, the data shows that the outputs relevant to set project objectives have been achieved, in terms of educator training and mentoring, the provision of resources to the school and, for the most part, the implementation of extra Maths lessons with a snack. However, the output data also highlights that school closures during the Nationwide lockdown had a notable impact on learner participation in the project, which dropped to a third of the original number of learners who completed the baseline.



3.3 How well did we do it?

This question refers to the short-term outcomes of the Noah Project. These have been measured using qualitative data based on Educators' and parent's perceptions of quality and impact. Clear themes arose from the qualitative data, and these have been organised into two categories: (1) Educator Outcomes and (2) Learner Outcomes.

3.3.1 Educator Outcomes

As a part of the project, 14 Educators received training on the Singapore Maths methodology, and this resulted in three important outcomes.

Firstly, the educators reported that they themselves had gained new Maths **knowledge and skills** that would improve their capacity to teach learners these same concepts in Maths:

"The terminology...clarity for the dropping down of numbers in long division...the challenges of explaining 'borrowing' or 'carrying over' as opposed to re-grouping have made me feel confident to explain that to learners." - teacher

This gain in new knowledge and skills extended to shifts in some of their core beliefs about problem solving in Maths.

"That Maths is not about rules and explaining each concept, (that) is not learning...have to figure it out themselves..." - teacher

Where they had previously been taught that certain rules must be applied to solving each kind of Maths problem, they came to the realisation that problem solving in Maths could be approached in multiple ways, allowing for a greater amount of creativity and independent thinking.

Secondly, Educators reported that the training introduced them to new **strategies and methods** for teaching Maths, which included another important shift. This time it was a shift in their core beliefs around teaching:

"Instead of teaching, facilitate learning." - teacher

"A teacher mustn't be the one to perform in front of the classroom, but learners must display what they know by being 100% involved in the lesson."
- teacher

To compliment this shift in their thinking about how they teach children, Educators also gained a number of new methods for teaching Maths.

"Maths is about sharing ideas and discussion...I will put more concrete resources in my lesson and give learners opportunities to discuss the answers on their own." - teacher

"Explore or play and discuss" - teacher

The educators shared considerable excitement around these new strategies and methods, which extended beyond applying them to their extra Maths lessons, and to their other lessons as well.

The combination of Educators' gaining in Maths knowledge and skills, as well as in strategies and methods for teaching Maths, resulted in a noteworthy increase in **confidence and motivation** towards teaching Maths.

"Teachers have confidence to teach..." - Principal

"I am confident that my learners will understand me more..." - teacher

After completing the project, Educators shared reflections on the learning environment that had been created in their extra Maths lessons.

"Through the Maths programme, learners were able to interact, gain more knowledge, become motivated and use different strategies to solve problems." - teacher

They essentially described a learning environment that is interactive, encourages diversity and supports creativity, and then linked it to outcomes noted amongst the learners.

In relation to the educators, the training facilitated a sense of competence in Maths, as well as improved confidence in how they go about teaching it. Together, this contributed towards creating a better overall learning environment, which proved to be a key mechanism of change in achieving the short-term outcomes noted amongst the learners.



3.3.2 Learner Outcomes

Within the context of a learning environment that was interactive, creative and supportive of diversity, three significant outcomes were achieved amongst the learners.

Firstly, both Educators and Caregivers noticed that learners started to find Maths **fun and enjoyable** in the extra lessons. This was observed most especially in relation to their motivation to attend these sessions.

“She always remind me every Wednesday Night that: I can’t wait to see my Maths class teacher tomorrow.” - Parent

Secondly, learners’ Maths **vocabulary and store of problem-solving strategies** increased, which appeared to boost their confidence according to Educators and Caregivers.

“I can see her enjoyment as well as confidence...Maths classes helped her to become more interested in the subject and the ability has much improved. Thanks a lot!” - Parent

Finally, the Educators found that the activities in the lessons, as well as the interactions and discussions triggered greater interest and promoted a **love for maths**. This perception was supported by the Caregivers’ observations.

“He is now keen to learn more in Maths and he always gets excited when he talks about Maths lessons.” - Parent

“She is confident in doing her Maths, I don’t push her anymore to finish her Maths work.” - Parent

Across all of the responses, it is clear that:

Educators and Caregivers noticed a positive shift in learners’ attitudes towards Maths, which seemed to arise in response to their affirming experiences of the extra Maths lessons, and their increased confidence, motivation, Maths vocabulary and problem-solving skills.

The evaluation then looked at whether learners were any better off as a result of these positive outcomes.

3.4 Is anyone better off?

The question of whether or not anyone is better off was addressed in relation to any changes in learners' Maths scores. It is based on the assumption that positive outcomes, such as a better learning environment and an improved attitude towards Maths, would result in an overall increase in learner's Maths scores.

At Baseline, 279 Gr 4 and Gr 5 learners scored an average of 17% on the Maths test. At endline, 90 Gr 4 and Gr 5 learners completed the Maths test and scored an average of 60%. The descriptive statistics point to a massive difference of 43% between the average baseline and endline scores on the Maths test. In order to understand whether, or not this difference was statistically significant, a paired sample t-test was conducted on the data.

For the purpose of the paired sample t-test, only scores for learners who had completed both the baseline and endline tests were included. This resulted in a sample of 90 learners (51 Gr 4 learners and 39 Gr 5 learners). It was noted that the mean baseline scores for the smaller set of Gr 4 and Gr 5 learners were markedly higher than the mean scores for the broader group at baseline.

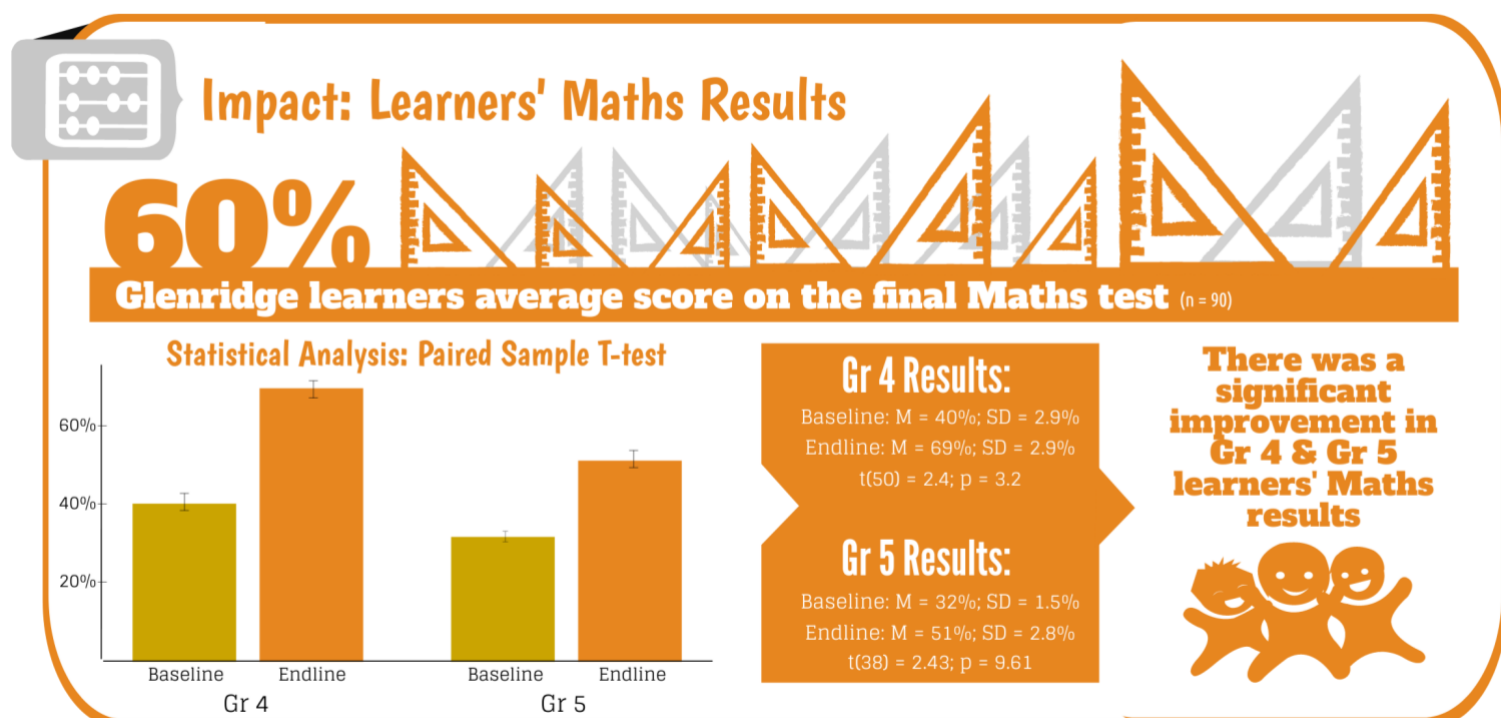
The Gr 4 and Gr 5 learners' results were run separately through the t-test. The infographic below provides the main details resulting from the analysis.

Ultimately, the paired sample t-test demonstrates that for both the Gr 4 and the Gr 5 learners, there is a significant difference between the baseline and endline scores.

Although, a direct causal link between the Noah Project and the improved Maths scores cannot be established from the paired sample t-test, the qualitative data from Educators and Caregivers lends substantial support to the conclusion that the learners do appear to be better off as a result of the extra Maths lessons, based on their Maths scores.

While this study focussed on the longer-term impact of the project on learners' Maths scores only, a theme described in the short-term outcomes for Educators suggests that learners beyond the direct reach of this study may also be better off.

The short-term outcomes for Educators included their experiences of a shift in their core beliefs about teaching strategies that create an effective learning environment. Their responses imply an awareness that these strategies can be applied in their other lessons too, thereby extending the reach of the Noah Project beyond those learners directly enrolled in the extra Maths lessons.



4. Conclusion

This study set out to explore the impact of the Noah Project on Educators and the Maths scores of participating Gr 4 and Gr 5 learners' at Glenridge Primary School.

Overall, the findings provide evidence for the positive impact that the Noah Project has on Educators and participating Gr 4 and Gr 5 learners, as well as alluding to the potential indirect impact on other learners at the school.

The findings from the baseline study emphasised the need for the Noah Project, drawing attention to the learners' poor baseline Maths scores, in spite of reportedly safe and supportive home environments. Within the context of literature stating that competent and confident Educators are better predictors of learners' Maths performance, the baseline findings also underscored the value of focussing on training existing educators at the school, to conduct the extra lessons. The results of the study support the efficacy of this particular component to the Noah project.

Despite the noted limitations to the self-report data, the qualitative findings indicated that Educators experienced a greater sense of competence and confidence as a result of the training, and with the addition of the resources provided, were able to create a better learning environment in their extra maths lessons. Observations of learners' overall improvements in their attitude towards Maths also supported this finding.

The quantitative findings, consisting of a comparison between learners' baseline and

endline Maths scores, gave further substantiate the efficacy of the Noah Project, showing a significant improvement in learners' Maths results. Although, the study does not establish a direct causal link between the Noah Project and these results, the qualitative and quantitative findings together provide evidence that the Noah Project had a positive impact on participating Educators, and learners. The results, in fact, suggest that the impact of the project will extend beyond its' direct reach.

References

- Business Tech (2020). The Shocking state of Maths and Science Education in South Africa. Accessed online: <https://businesstech.co.za/news/government/455406/the-shocking-state-of-maths-and-science-education-in-south-africa/>
- DBE (2014). Report on the Annual National Assessment of 2014: Grades 1 to 6 & 9. Pretoria: Department of Basic Education.
- DBE (2019). Introducing the trends in International Mathematics and Science Study 2019 Results. Pretoria: Department of Basic Education.
- Nkosi, B. (2021). Half of all matriculants who write Maths fail it each year. Accessed from IOL: <https://www.iol.co.za/the-star/news/half-of-all-matriculants-who-write-maths-fail-it-each-year-fdd3af06-2569-46e6-a0f0-ae87754dd696>
- Peters, M.; Seeds, K.; Goldstein, A. & Coleman, N. (2008). Parental involvement in children's education 2007. BMRB International Ltd.: Department of Children Schools and Families.
- Jay, T.; Rose, J. & Simmons, B. (2018). Why is parental involvement in children's Mathematics learning hard? Parental perspectives on their role supporting children's learning. Creative Commons: Sage Open.
- Stempel H, Cox-Martin M, Bronsert M, Dickinson LM, Allison MA. Chronic School Absenteeism and the Role of Adverse Childhood Experiences. Acad Pediatr. 2017 Nov-Dec;17(8):837-843. doi: 10.1016/j.acap.2017.09.013. Epub 2017 Sep 18. PMID: 28927940.
- van der Berg, S. (2015). What the Annual National Assessments can tell us about learning deficits over the education system and school career. South African Journal of Child Education, 5(2).
- Verster, J. (2021). Why do South African's fair worse at Maths than their counterparts in other countries? Accessed from IOL: <https://www.iol.co.za/education/why-do-south-african-students-fare-worse-at-maths-than-their-counterparts-in-other-countries-31008bdb-7692-4347-988d-c27516e03618>

