Centre for the Advancement of Science & Mathematics Education

CASME

CENTRE FOR THE ADVANCEMENT OF SCIENCE AND MATHEMATICS EDUCATION

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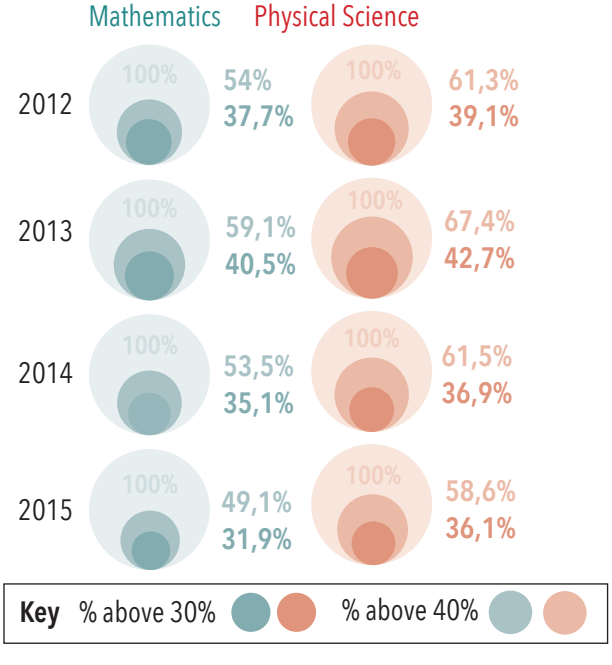
BSC for Educators Project: Looking Forward

Introduction

Many South African learners are struggling to perform at an optimal level in Mathematics and Physical Science, and yet these subjects are crucial for boosting economic growth and ensuring that South Africans remain globally competitive. Recent trends in the National Senior Certificate (NSC) results for these critical 'gateway' subjects are concerning. In 2015, only 49.1% of learners achieved a result of 30% and above in Mathematics, and in Physical Science, 58.6% of learners achieved a result above 30% (DBE, 2015).

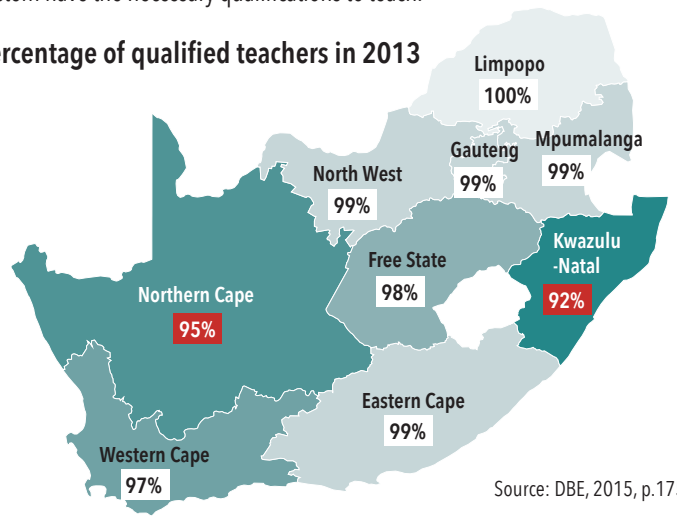
NSC Achievement Rates in Mathematics and Physical Science 2012-2015

Source: DBE, 2015, p.150



Whilst the Department of Basic Education (DBE) have made incredible strides in increasing enrolment figures and access to basic education, questions have been raised regarding the quality of schooling at these levels. According to the 2015 General Household Survey (GHS), school attendance of individuals between the ages of 7-15 was almost universal (Statistics South Africa, 2016). In addition, recent statistics show that the majority of educators in the schooling system have the necessary qualifications to teach.

Percentage of qualified teachers in 2013



Source: DBE, 2015, p.175

Despite these positive trends, there has not been an associated improvement in learner results. It is within this context that the University of KwaZulu-Natal (UKZN) initiated a pilot project in the Northern Cape (NC) to upgrade the qualifications of 22 educators. In 2013, the NC had the second lowest percentage of qualified educators (95%) across the country, only slightly higher than KwaZulu-Natal (92%). The University offered the educators an opportunity to complete a BSc degree part time, with majors in Mathematics and Physics (FET level). Funded by BHP Billiton, the project aimed to investigate whether supporting educators to advance their subject knowledge would result in improvements in learner performance.

Project Outcomes

In 2010, the educators enrolled at the University and began attending lectures on the Westville Campus (Durban) during the school vacation periods. The selected educators were drawn from rural and remote schools in Kuruman (4 schools), Kimberly (4 schools), De Aar, Colesberg, Strydenberg and Olifantshoek . Whilst undertaking their degrees, full academic support was provided at a central location in the NC, and the NC DBE provided the educators with transport to the Westville Campus contact sessions. In 2014, 15 of the educators completed their degrees and they took part in the 2015 graduation ceremonies.

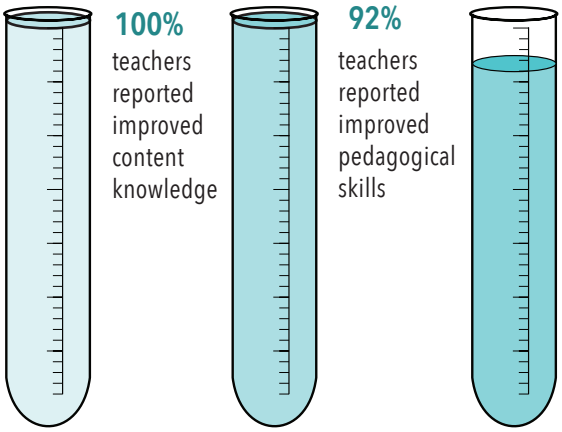
Once the project became established, CASME was approached by UKZN to track and document changes in educator practices and learner performance. In 2012 and 2013, CASME conducted 4 site visits to the schools in the NC where the participating educators taught. During this time, the educators were still in the process of completing their degrees. The purpose of these visits was to assess the impact of the project on teaching and learning in the classroom, and to get a sense of how the educators were experiencing the programme. In 2014, CASME conducted another 2 site visits to the schools. The aim of these final visits was to assess any further changes in how educators interact with learners and deliver content, but also to explore the overall impact of the programme on educators' personal and professional development.

During the visits, the CASME team engaged in a range of methods to collect the necessary data, including interviews, lesson observations, questionnaires, and obtaining data on learners' results and the subjects that the educators taught during the project period. A tailor made observation tool was developed to guide the lesson observations and to generate structured feedback. The visits revealed that the educators' confidence, content knowledge, lesson preparation, and teaching skills improved over time. As a result, classroom interactions were more lively and meaningful. Although some educators struggled with the long distance traveling between provinces, as well as balancing their studies and school workloads, the majority of participants felt more capable and confident to deliver their lessons, and some have obtained promotions within their schools and within the DBE. Feedback from the educators' immediate supervisors (HODs, Deputy Principals and Principals) reflects equally positive sentiments; school managers are satisfied with the work of these educators and some were seen entrusting them with more responsibilities at the FET level. Own best practices in terms of planning for lessons, lesson delivery, and assessment are attributed to the programme. In terms of learner results, CASME identified a general steady increase in some schools, although this was not consistent. In a handful of schools, the learners' results remained at an inadequate level. The fluctuations in results were partly attributed to the fact that some educators did not teach at the Grade 12 level each year.

100% teachers reported improved confidence

100% teachers reported improved content knowledge

92% teachers reported improved pedagogical skills



Key Lessons

In conducting the impact assessment for the UKZN BSc project, CASME realised the importance of:

- **Limiting Traveling Distances:** The 7 educators who did not manage to complete the programme cited the long traveling distances between provinces as a critical factor that played a part in their inability to finish their courses. Partnering with closer Higher Education Institutions (HEIs) would have allowed lecturers to deliver classes in closer proximity to the educators' schools. Not only would this reduce the strain placed on educators, but this also offers the possibility of a more cost-effective implementation model.
- **Teaching at the Correct Level:** It was disappointing to discover that in many instances the trained educators were not teaching Mathematics and Physical Science at the Grade 12 level consistently every year. Because of this, their training was not fully utilised. In future it is advisable to encourage the DBE to play a more active role in advocating within schools to ensure that trained educators are teaching at the correct level.
- **Accessibility of Data**: The learner results data needed to conduct the impact assessment were not available from the DBE and thus this information was obtained from the schools. The raw school data had gaps and were unreliable, which made analysis difficult and limited. In future, it is advisable to check the availability and accessibility of necessary data at the start of an assessment and to adjust planning accordingly.
- **Longitudinal Analysis:** Although the impact assessment took place over a 3 year period, this was insufficient in order to draw conclusive findings regarding the impact of the programme on learner results. The impact assessment took place whilst the educators were still completing their degrees, and at this point it was too early to attribute the fluctuations in learner results to the programme. It is thus recommended that assessments of this sort be conducted sometime after implementation in order to better understand the longer term impacts on learner attainment.

The Centre for the Advancement of Science and Mathematics Education (CASME) is the operating name of a Public Benefit Organisation (PBO) registered as a Section 18(a) Educational Trust. CASME's vision is "To be the world class centre for advancing the teaching and learning of mathematics and science in South Africa."

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