The Dinaledi program

The strengthening of secondary school education in mathematics and science poses a significant challenge for South Africa. Few students study math and science and fewer still pass the Senior Certificate examinations needed to qualify for university admission into technical fields like engineering, accounting, and science, particularly among traditionally disadvantaged youth. In 2004, in former (African) Bantustan schools, only 2 percent of students enrolled in Higher Grade physical sciences compared to 14 percent in former (white) House of Assembly (HoA) Schools. Only 43 percent passed in Bantustan schools compared to 86 percent in HoA schools.

Yet, professionals with these skills are in high and increasing demand in the labor market. Therefore, the task of expanding youth access to technical professions, particularly for traditionally disadvantaged youth, is of great importance for the South African Government.

The Dinaledi program aims to expand the number of students in secondary schools studying and passing math and science certificate examinations. Launched by the Government of South Africa in 2001, the Dinaledi program offers secondary schools resources to improve math and science education based on need in an attempt to close the historical resource gap between former Bantustan schools and HoA schools. Resources are used to provide teachers, enhance teachers’ skills, and supply textbooks and calculators, while targeting and monitoring by the Department of Education helps schools stay on track.

Impact evaluation

The National Department of Education has been collaborating with the World Bank since 2008 to answer the question: did and can a program like Dinaledi significantly contribute to this agenda? The team assembled test score, infrastructure, and program data to understand the evolution of the program and develop a strategy to evaluate its impact. This brief summarizes the findings of a retrospective impact evaluation covering the program’s second phase of expansion in 2004 across 350 schools, and presents the estimated program effect between 2005 and 2007.

The study used a matching and difference-in-difference (DID) strategy to measure student math and science uptake and passing rates in Dinaledi schools, relative to student behavior and achievements in similar non-Dinaledi schools. The study was also able to separately identify the impact of the Dinaledi program among former Bantustan schools.
Impact evaluation results

The results are positive. The Dinaledi program made an important contribution to reducing inequalities and expanding math and science education in 2005–2007.

Enrolment and passing rates in HG physical sciences increased as a result of the program: every year, Dinaledi schools had 5 to 7 percent higher enrolment than control schools. More importantly, the Dinaledi program increased the number of students passing the Senior Certificate examination in Higher Grade (HG) math and physical sciences by 55 percent, compared to control schools.

The Dinaledi program was very effective in schools with the greatest need. In former Bantustan and Department of Education and Training (DoET) schools, the program increased the number of HG physical sciences passes sevenfold (from two in control schools to 16 in former Bantustan schools and from five to 11 in former DoET schools). By contrast, the Dinaledi program had little measurable effect in former HoA schools.

Regional differences confirm these results. The Dinaledi program was very effective in the provinces of Kwazulu Natal and Limpopo where a large share of former Bantustan schools are located. There, the program increased the number of HG physical sciences passes fivefold. The effects are smaller in other provinces, such as Free State, Gauteng, North West, and Western Cape.
Policy recommendations

The results provide support for scaling up the Dinaledi program and targeting schools that have fewer resources and that service disadvantaged populations. However, many questions remain unanswered: What are the mechanisms through which the Dinaledi program delivered these results? Why was the Dinaledi program particularly effective in former Bantustan schools? Will the program be equally effective in the remaining schools? Are these short-term effects or will they be sustained over time? What features of the program could be improved to strengthen program effectiveness?

Effective targeting. This study indicates that targeting of the Dinaledi program to former Bantustan schools could increase program effectiveness, at least in the short run. Former Bantustan schools had less qualified teachers, less equipment, and fewer inputs, and could gain more from any additional resources than resource-rich schools. However, they must have received more inputs from Dinaledi, so targeting former Bantustan schools may or may not increase cost-effectiveness. In addition, these schools host a greater proportion of students from poorer socioeconomic backgrounds. Going forward, it would be important to understand how school characteristics influence the effectiveness of the program and target the program accordingly.

External validity and sustainability. Eligibility criteria for access to the program gave priority to schools with outstanding performance in mathematics and physical sciences education. Whether the impact measures are representative of the rest of the schools is not clear. The validity of the impact measures depends on how similar the remaining schools are to the schools initially targeted by the Dinaledi program. Since schools with a good track record were chosen, expanding the program to schools with worse track records might change program effectiveness. Thus, the effectiveness of expansion should continue to be measured. In addition, to really understand the effects of the program, its longer-term impact should be tracked.

Fine-tuning. This study measured the average effect of schools’ assignment to the Dinaledi program. To improve program effectiveness, it would be important to understand which factors are causally linked to the results. Is it the fact that these schools received implicit recognition for their performance that made them perform better, or is it because principals and teachers knew that there was interest in their performance and that results were being monitored that they were motivated to do more? Furthermore, is schools’ performance indeed the result of the fact that they faced constraints in their access to skills, equipment, and educational inputs? If so, which input combination is most effective at improving performance? Answering these questions would help to fine-tune interventions and increase the program’s cost-effectiveness in the future.

In order to obtain answers to these questions, it is necessary to incorporate a learning strategy in the design of the next phase of the Dinaledi program—first, to continue measuring program impact and second, to test some of the program features to understand which elements of the program should be strengthened. This would provide the evidence base for improving secondary education policies on an ongoing basis.