The Dinaledi intervention programme in Eastern Cape schools: A panel data analysis

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August 12, 2015

Abstract

The study seek to examine the relationship between educational inputs, primarily the Dinaledi intervention programme and school outcomes in the Eastern Cape in a period heading into the second decade of democracy. The Dinaledi programme is one of the government's intervention programmes to redress the inequalities which provided resources to the disadvantaged Black communities, more especially in the former homeland system. The study employed a pseudo panel analysis on the attempt to answer the question of interest, of the relationship between the Dinaledi intervention programme and schooling outcomes in the Eastern Cape. Considering the random effect regression Dinaledi school/schools were less likely to increase dropout rate by 0.099% with reference to non-Dinaledi school/schools. Further extensions of the analysis were looking at the distribution of the Dinaledi programme on gender issues by using the DiNardo- Fortin-Lemieux (DFL) estimation. Gender was investigated to find out if the province still had persistent gender gaps. Eastern Cape schooling outcomes can be strongly explained by the Dinaledi intervention programme with females and Blacks becoming more responsive to dropping out than their counterparts.

Keywords: Dinaledi intervention, pseudo panel data analysis, gender gaps

'The Eastern Cape was the hub of education for black people for a long time, a province with a wonderful history of production of educated heroes and heroines of struggle; individual teachers, learners, parents and all community based organisations should play a leading and pivotal role in rebuilding the Eastern Cape Education; no individual or an organisation should be allowed to act in a manner that is against the spirit of rebuilding the Eastern Cape Education Department,' Ms Makgate.- Parliament of the Republic of South Africa: April 2012

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1 Introduction

The social peace and stability which have resulted from the two decades of democracy following a long period of colonialism and apartheid are a welcome development in South Africa. Beginning early in the 20^{th} century, the apartheid system used a Bantustan system which consisted of different education systems. The South African government transformed from a previously segregated education system to a democratic education system in 1994 that had to address high levels of inequality within provinces. Advances have been made in funding and equity in the schooling system since the advent of a democratic order in the country in 1994 (DoE 2003). Education in the Eastern Cape Province has experienced significant interventions through public expenditure, aimed at improving education access, quality and efficiency, as well as redressing the imbalances created by historical inequalities (Mancebon & Molinero 2000).

Considering that, for example in 2006, total public expenditure on education as a percentage of the GDP constituted 5.3%, it is essential that schools improve in quality, productivity and accountability (DoE 2007). The extent of productivity in education institutions can be measured by education production functions. In educational microeconomics, the education production function or frontier is an education process that transforms input indicators into outcomes (Hanushek 1989); (Hanushek et al. 1990) (Behn 2003). Education production functions in schools essentially aim to identify which education inputs such as government intervention programmes, teacher qualifications, availability of teaching materials and teaching time, have an effect on schooling outcomes (Mancebon & Molinero 2000); (Ray 1991); (Bhorat & Oosthuizen 2006); (Glewwe 2002).

The main objectives of this study were to answer a question of what constitutes the education production function of the Eastern Cape. Having tried to examine some determinants of schooling outcomes in another working paper (Ncanywa 2014), this paper examines the influences that can be attributed to the Dinaledi intervention programme. The focus is on the evaluation of the government intervention programme in Eastern Cape schools. Firstly, the paper examines the effects of the Dinaledi intervention programme on dropout rates as a measure of schooling outcomes. Secondly, there is an examination of equity in gender issues to discover how they relate to school performance. This measures the progress made by intervention programmes in strengthening the quality of education provisioning.

The Dinaledi programme is one of the government interventions for the redress of the inequalities which provided resources to disadvantaged Black communities, especially in the former homeland system. The Dinaledi programme began in 2002 as a government grant which obtained funds from both the public and private sectors. The Dinaledi programme provides extra resources for Mathematics, Physical science and Life science, where learners are provided with textbooks and mathematics kits; schools are provided with laboratories and projectors; and educators receive training on content (OECD 2008); (DoE 2011). It is interesting to investigate whether the Dinaledi intervention programme affects schooling outcomes in the Eastern Cape schools almost twenty

years into democracy. Therefore, the study sought to examine the relationship between educational inputs, primarily the Dinaledi intervention programme and school outcomes in the Eastern Cape from 2008 to 2013.

The study extends the understanding of the link between inputs and output for the education production function in the Eastern Cape using parametric and non-parametric density/ regression techniques. The Dinaledi programme evaluation adopts the education achievement production function approach by analyzing its association with schooling outcomes. Therefore; the study contributes to knowledge by finding the association of intervention programmes with schooling outcomes of the Eastern Cape education system. The national evaluation of the Dinaledi programme was done by the World Bank in the period 2005 to 2007 (DIME 2008). This study extends the analysis for the Eastern Cape to the period 2008 to 2013. Section 2 provides literature review, section 3 analytical framework which includes data issues and empirical models. Section 4 deals with results and discussions, and section 5 concludes by providing a summary of the findings and recommendations.

2 Literature review

2.1 Theoretical literature

This study adopts a production function approach for learning to understand the causal relationship between educational inputs and academic achievements (Glewwe & Kremer 2006). Due to lack of information on some characteristics of structural relationships of production functions such as learner and parent information, the structural model is not easily measured (Boardman et al. 1977). Therefore, a causal relationship which is a reduced form equation in the following form can be used:

$$A = f(SQH) \tag{1}$$

A is a scalar representing achievement which can be captured by standardized test scores, grade attainment or dropout rates. S is a vector of school characteristics usually captured by learner educator ratios, Dinaledi schools, location were the school operates (sector) and so on. Q represents learner characteristics usually captured by gender and race. H is a vector of household characteristics which act as control for socio-economic characteristics and is represented by quintile category of schools in this study. The study attempts to measure $\mathbf{A}^{'}(.)$; which provides the total derivative of A with respect to each of the individual variables defined within vectors.

According to Hanushek (1989), the production function approach which can be input-output or cost-quality approach is the most appropriate and useful approach in education studies. The production function for schools focuses on the relationship between school outcomes and measurable (observable) inputs into the educational process. Educational systems have no single defined production function, and no well-defined indicators of input and output (Hanushek 1989). In most studies of the education production function, the measure of input and

output is limited by the availability of data. Therefore, various educational outcomes can result from a variety of different combinations of inputs. Examples of output found the literature include academic performance; skills, attributes and values that favour workplace and social integration; communication and interpersonal skills, respect for the environment, physical fitness; and political, social and personal responsibility, grade repetition rates, or dropout rates (Hanushek 1989); (Ray 1991); (Giménez et al. 2006); (Schwartz & Stiefel 2004); (Thieme et al. 2011). This study measures output using the dropout rates. On the other hand, inputs which are also referred to as instructional expenditures can be grouped as school, educator; student and household characteristics (Hanushek 1989); (Borge & Naper 2006). In this paper inputs include whether a school is a Dinaledi school or not, the grade 12 pass rates, gender, race, sector and quintile category of schools.

2.2 Empirical literature

Boardman and Murnane (1979) addressed the estimation of educational attainment using cross-sectional data, achievement measures at two points and panel data. They found that the panel analysis gave more nuanced results as it addressed the bias, although they assumed that there was no measurement error (Boardman & Murnane 1979). Boardman, Davis and Sanday (1977) estimated a reduced form achievement equation in a simultaneous equations model with maximum likelihood estimation. Their model examined the determinants of pupil achievement through verbal, non-verbal, reading and mathematical skills (Boardman et al. 1977). They found that both home and school characteristics are significant determinants of achievement, however, there are substantial differences in the average achievement of racial groups. Also males are better achievers but females are better readers, and pupils who attend white schools perform better than others.

The World Bank evaluated the Dinaledi schools' performance in the South African National senior certificate examinations in Mathematics and Physical science (DIME 2008). The study used matching and the difference in difference techniques to estimate the impact of the Dinaledi programme in the period 2005 to 2007 and found that the programme improved performance. Another study by Mutsalklisana, evaluated the effects of job training on immigrants in the United States (Mutsalklisana 2011). The researcher used Random effects, Propensity Score Matching, quantile regressions and semi-parametric reweighting method to measure these effects. The results revealed the conditional effect of job training on average earnings of immigrants is less than that of natives at 7.7%. The distribution analysis showed a positive effect on wages of immigrant workers over most of the wage distribution. The DiNardo-Fortin-Lemieux (DFL) counterfactual distributions indicated that the largest proportional impact of job training is at the upper part of the wage distribution for both natives and immigrants.

On the attempt to answer the question of interest, the relationship between the Dinaledi intervention programme and school outcomes in the Eastern Cape,

the pseudo panel analysis was adopted from Boardman et al (1977) and Verbeek (2007). Further extensions of the analysis looked at the distribution of the Dinaledi programme on gender issues; hence the DFL was adopted from Johnston & DiNardo (1997). Gender was investigated to find out if the province still had persistent gender gaps.

3 Data

3.1 Data issues

Data used was obtained from the examination directorate of the Province of Eastern Cape Education. A random sample of the Eastern Cape public schools with grade 12 examination results was selected with longitudinal data for the period 2008 to 2013, almost 20 years into democracy. Data suffered some drawback within the context of estimating the education production function. For instance the data was at school level and not at learner level and constrained the validity of the estimates derived. Also data lacked educator characteristics and direct learner and parent information. This means that estimates suffered from the omitted variable bias, which could not be controlled for. The data also suffered selection bias as it did not provide variables such as grade repetition rate.

The study sought to address some of the biases by using different estimation techniques in the pseudo panels. For instance, according to Deaton (1985) and Verbeek (2007), pseudo panels are advantageous as they suffer less attrition and non-response, reduce biasing effects of measurement error, improve coverage and reduce endogeneity as the variables used are all aggregated at the cohort level. They are substantially larger in number of households and in the time period they span. There is also a reduction of the number of laborious computational problems associated with large micro data sets. However, its major limitation is not following the same individuals over time, so individual histories are not available for inclusion in the model, for constructing instruments or transferring the model to first differences.

It is advantageous, however, to undertake the study as a guide for improving on future research of this sort with better quality data. The study serves as a benchmark for evaluating the possible effects of the redress in the Eastern Cape schooling outcomes in the period heading into the second decade of democracy. The large sample of grade 12 offering schools and the estimation techniques added to the robustness of results and control for the aforementioned biases.

3.2 Descriptive statistics

Table 1 provides descriptive statistics of the Eastern Cape dropout and pass rates in grade 12 for the period from 2008 to 2013. The pseudo panel data give a mean of 0.7% for the dropout rate, our dependent variable with a standard deviation of 1.8, where these values fall between zero and 16.8%. The mean

value of 0.7% implies good performance in Eastern Cape schools as schools with zero dropout rates are an indicator that all learners who enrolled managed to write examinations. The dropout rate trend is consistent with the South African performance of 15.3% from 2008 to 2010 in National Income Dynamics Study (NIDS), although the author measured the cohort dropout rate (Branson et al. 2013). The Eastern Cape performed better than an American case, where the Mexican-American dropout rate was 35.3%, the White non-Hispanic rate was 8.9% and the African-American rate was 13.5%. The pass rate has a mean of 61.3% with a standard deviation of 29.7.

Table 2 indicates the percentages of dummies Dinaledi school/schools, gender, race and sector. There was 93.5 % of non-Dinaledi school/schools, 95% of schools were public schools, gender was almost half-half and 79% of learners were Black.

3.3 The empirical model

The dependent variable in this study is grade 12 dropout rate by school which is expected to have a negative association with explanatory variables. The explanatory variables are a range of learner, school and household characteristics drawn from repeated cross sections from 2008 to 2013. The study attempts to estimate the following equation of the generic form:

$$y_i = \alpha + \beta x_i + u_i \tag{2}$$

$'y_i'$ Refers to grade 12 dropout rate in school i being a function of $kx1$ vector, α captures the constant, x refers to relevant explanatory variables, β *is the* $kx1$ vector of parameters which describe the transformation process of inputs to output and u reflects measurement error in x and unobserved aspects of explanatory variables on output.

The dependent variable, dropout rates, is a percentage change between learner enrolment and learners who wrote examinations. In this study, the event dropout rate is measured for the period 2008 to 2013, which is a proportion of learners who dropout in a single year without completing grade 12. Explanatory variables are pass rate and dummies of whether a school is a Dinaledi or not, race is Black and non-Black, gender is female and male, school quintiles are quintile one to five schools and sector is independent and public schools.

Reduced form equations suffer endogeneity bias due to unobservable characteristics. The bias can be addressed by employing a two prong approach: the parametric and non-parametric approaches. The panel data (available for this study) of the reduced form enables us to obtain unbiased estimates of the effects of explanatory variables on output (Boardman & Murnane 1979). The study adopts a parametric technique from Verbeek (2007), pseudo panels, for the period 2008 to 2013 in the Eastern Cape grade 12 schools and estimates the following function:

$$Y_{it} = \alpha_i + x'_{it}\beta + u_{it}, t = 1, ..., T \; E[x_{it}u_{it}] = 0 \; for \; each \; t \tag{3}$$

'x_{it}' is K-dimensional vector of explanatory variables, β is the parameter vector of interest and is schools with grade 12 (Verbeek 2007). It is assumed that the data set is a series of independent cross sections (pseudo panels) meaning repeated observations on T observations. If all observations are aggregated to cohort level, like school level, we have:

$$\bar{y}_{cit} = \bar{x}^1_{cit}\beta + \bar{\alpha}_{cit},\ c = 1, ..., C\ t = 1, ..., T \tag{4}$$

'c' is cohort of schools, $\bar{y}_{cit}$ is the average value of all observed y_{it} in cohort c in period t. Cohort is defined by Deaton as 'a group with fixed membership, meaning individuals who can be identified as they show up in the sample. The main challenge with (E4) is unobservable $\bar{\alpha}_{cit}$ which is likely correlated with $\bar{x}_{cit}$ if α_i is correlated with x_{it}. Therefore treating $\bar{\alpha}_{ct}$ as part of a random error term is likely to lead to an inconsistent estimation. So, the solution is to treat $\bar{\alpha}_{ct}$ as a fixed unknown parameter and assume that variation over time is ignored (Verbeek 2007). However, the Hausman test and the Breusch-Pagan Langrangian multiplier (LM test) are performed to test for the best consistent estimator (Torres-Reyna 2007).

A linear dynamic model is measured with error and therefore an Anderson & Hsiao (1981) estimator and more efficient GMM estimator of Arellano & Bond (1991) cannot be used for pseudo panels (Verbeek 2007). This is because y at t-1 for individuals or households is unobservable but observable in true panels. Deaton (1985) suggests the use of cohorts to estimate a fixed effect model from repeated cross sections and this approach is as efficient as an instrument variable approach. The averages within cohorts are treated as if they were observations within pseudo panels (Deaton 1985).

The study is extended with the semi-parametric approach which utilizes the DiNardo- Fortin-Lemieux (DFL) decomposition to compare distributions of Dinaledi school/schools between females and males (Johnston & DiNardo 1997). It is called a semi-parametric approach because, within the parametric density approach such as DFL decomposition, we use the non-parametric approach like a probit or logit model. Parametric approaches are useful for exploratory data analysis, estimate standardized distributions to account for different characteristics and needs no specification of functional form. The following equation is estimated:

$$g^t(y) = \int \theta f_t(y \backslash x) h(x \backslash D = t) dx \text{ where } \theta = \Pr(D = t)/\Pr(D = t|x \tag{5}$$

$\prime g^t(y)'$ is the hypothetical distribution showing a full distribution of observed output for the characteristics of x, $\Pr(D = t)$ is the unconditional probability in the overall sample that an observation belongs to group t (females or males), $\Pr(D = t|x)$ is the conditional probability that can be estimated by means of a discrete choice model or non-parametrically (Johnston & DiNardo 1997), $f_t(y \backslash x) h(x \backslash D = t)$ is the joint distribution of output and characteristics for the group t.

The literature on education functions recognizes convergence, complementarities and lack of empirical evidence on proximity on parametric and non-parametric approaches (Chakraborty et al. 2001). Comparing results between

the two approaches brings stability to the production function estimates and strong policy formulation. The expected results should yield a negative relationship between the dropout rate and the Dinaledi programme, as this would mean few learners are leaving schools if there is intervention by the department. The limitations of this study are those school inputs that are not controlled for which does not allow us to assess the specific role of the Dinaledi programme, but to measure the effects of resources in general. The subsequent reference to the effects of the Dinaledi programme should be understood in this sense.

As robust check of the effects of the Dinaledi programme on schooling outcomes, the dependent variable was changed from the dropout rate to pass rates. The sign of the estimates is expected to change from negative to positive because the intervention programme is expected to influence pass rates positively.

4 Results and discussions

In an attempt to answer the research question of what is the association of the Dinaledi Intervention programme with schooling outcomes, specifically dropout rate, different models such as pooled OLS, random and fixed effects were estimated. After testing for the more consistent and efficient estimator using the Hausman and the LM test, the random effect was chosen (Torres-Reyna 2007). The Hausman test gave $x^2 = 2.48$ and $\Pr ob > chi2 = 0.9625$ therefore the preferred model for dropout rates is the random effects. The LM test for consistency between the pooled OLS and the random effect resulted into the random effect being the chosen model, with $chibar2(01) = 4.35$ and $\Pr ob > chibar2 = 0.0185$.

The results of this study indicate that dropout rates are negatively associated with whether a school is a Dinaledi school or not at the 5% significant level in pooled, random and fixed effect estimations. Considering the random effect regression as a consistent and efficient estimator, Dinaledi schools are less likely to increase dropout rate by 0.0994% with reference to non-Dinaledi schools. These results indicate a significant impact of the Dinaledi Intervention programme on schooling outcomes as measured by grade 12 event dropout rates in the period 2008 to 2013. Pittman (1991) found that dropout rates are associated with student social relationships within the school environment (Pittman 1991). McMillan and Reed (1994) found dependence on adult relationships in their conceptual model of factors influencing resilience of at-risk students (Mcmillan & Reed 1994). Analogous to these afore-mentioned researchers and looking at the resources and support provided to Dinaledi schools such as learning material to learners, training educators and laboratories, it would be beneficial to provide this intervention programme to the entire Eastern Cape schooling system targeting the previously disadvantaged schools. The Dinaledi model is needed to the entire schooling system to eradicate the legacy of inequality rooted in the Eastern Cape.

When random effect functions of females and males were estimated, it revealed that they had the expected sign and females were significant at 10% while males were insignificant. This implies that females of Dinaledi school/schools

have a significant influence on grade 12 dropout rates in relation to females of non-Dinaledi school/schools. This gender issue is further discussed below. Pass rates are negative and significant at 1% significant level in all specifications. This means that an increase in the school's grade 12 pass rate would decrease the drop out in the school.

To get more nuanced results, dropout rates were replaced with pass rates to represent schooling outcomes. The Hausman test indicated the fixed effect estimator as the more efficient and consistent estimator with a large $x^2 = 167.45$ and $\Pr ob > chi2 = 0.0000$. The pseudo panel analysis indicates a positive and significant association of the Dinaledi school/schools to pass rates, implying that they are more likely to influence performance by 9.8% with reference to non-Dinaledi schools. Interestingly, Dinaledi schools are significantly affected by both males and females by about 10% in relation to non-Dinaledi schools. The dropout rate significantly explains pass rates with the decrease in dropout rate would increase pass rates by around 3%, ceteris paribus.

Another set of variables that are very robust across the mean are the control variables such as race, gender, sector and quintile. In this study race was grouped into Blacks and non-Blacks with Blacks as the referent. Non-Blacks are less likely to drop out of school than Blacks, both among females and males. Males are less likely to drop out of school in grade 12 than females (the referent). This highlights the racial and gender inequality challenges that still exist in the province. Interestingly, public schools perform better than independent schools (the referent) with large magnitudes as represented by the sector in table 3. This is surprising because independent schools follow a model close to private schooling, which is expected to influence schooling outcomes better than public schools. However, this outcome supports the intuition of adopting the Dinaledi model at all public schools than increasing the independence of schools.

Schools in quintiles two to five are less likely to have learners dropping out than quintile one (the referent) schools. Females in quintile three to five schools show insignificant results with different signs, while males show significant and negative results in all quintiles in the dropout rate analysis. Similar results were found when pass rates were used as a dependent variable. The quintile category needs a brief explanation. Quintile one are the poorest schools and quintile five are the richest schools. Quintile one to three are declared as poor schools and provided with nutrition and allowed non-payment of fees. These results therefore, provide for a powerful policy message that the intervention is working well in the Eastern Cape except for females in quintile three to five.

A non-parametric estimation was employed to estimate the density of dropout rates between males and females. A Gaussian kernel and default bandwidth was used for the estimations. In figure 1, it was found that females influence dropout rates more than males, which is consistent with the parametric estimation results. The non-parametric distribution approach shows the area between 0 and 5 for dropout rates as an area in which females differ from males. The distribution between males and females was further explored by employing DFL decomposition, where the distribution of males was made to look like those of females (figure 2). A counterfactual distribution of dropout rates was constructed using

a probit model. It was found that if females had the characteristics of males, then the distribution would still look different in the same area. It turns out that the control variables used in the study do not explain the differences in the two distributions.

The analysis of the behaviour of females and males was extended estimating a local linear regression for Dinaledi school/schools with Gaussian kernel and the default bandwidth (figure 3). The results suggested that in both females and males the provision of Dinaledi school/schools fluctuated with the dropout rate, beginning by a decrease then increases and then decreasing again. The decreasing part suggests that Dinaledi schools are less likely to increase dropout rates for either females or males, with females having a higher probability to dropout than males. Females divert quicker than males implying high response to the effect of Dinaledi schools on dropout rates. This suggests that treating schools to the Dinaledi intervention programme influences schooling outcomes and females respond faster than males.

When a non-parametric estimation was further employed to estimate the density of pass rates between males and females, it was found that females influence pass rates more than males up to 60% of pass rates and gender roles changed thereafter (figure 4). The distribution between males and females was further explored by employing DFL decomposition, where the distribution of males was made to look like those of females (figure 5). A counterfactual distribution of pass rates was constructed using a probit model. It was found that if females had the characteristics of males, then the distribution would still look different in the same area. This endorsed the point that the control variables used in the study do not explain the differences in the two distributions.

A local linear regression for Dinaledi school/schools with Gaussian kernel and the default bandwidth was estimated using pass rates as a dependent variable (figure 6). The results suggest that in both females and males the provision of Dinaledi schools fluctuates with pass rates, but the case is indifferent and clearer after the 60^{th} percentile. This suggests that Dinaledi schools are more likely to increase pass rates for both females and males, with females having a higher probability to pass than males. This one again suggests that treating schools to the Dinaledi intervention programme influences schooling outcomes and females are more affected than males.

5 Conclusion

The research attempted to investigate how the Dinaledi intervention programme affected the schooling outcomes such as dropout rates in the Eastern Cape schools in a period almost twenty years into democracy. The study sought to examine the relationship by adopting an education production function using the Eastern Cape grade 12 examination data. Dropout rates and pass rates were used as a measure of schooling outcomes and input data included school, learner and community characteristics. The pseudo panel and the DFL decomposition as estimation techniques were used to find out the effects of the Dinaledi inter-

vention programme on dropout rates. In order for the analysis to have more robust results the dropout rates were replaced with pass rates and a similar analysis was performed.

The analysis revealed a number of interesting results. Firstly, there was a negative and significant association at 5% significant level of whether a school is a Dinaledi school or not on dropout rates. These results indicated a significant impact of the Dinaledi Intervention programme on schooling outcomes as measured by grade 12 event dropout rates in the period 2008 to 2013. Similar results with higher coefficients were found when pass rates were used as the dependent variable at 1% significant level. This indicates that pass rates represent better schooling outcomes than dropout rates. Looking at the nature of resources provided to Dinaledi school/schools, it is recommended that the Eastern Cape department of education adopt the model and apply it to the previously disadvantaged schools so as to eradicate the legacy of inequality in the province.

The inequality issue was investigated by the inclusion of gender and race as control variables in the pseudo panel analysis. It was found that Non-Blacks were less likely to drop out of school than Blacks even when females and males were estimated separately. Furthermore, the results showed that males were less likely to drop out of school in grade 12 than females. When the non-parametric estimation was employed to estimate the density of dropout rates between males and females, it was found that females influenced dropout rates more than males, even when the DFL decomposition was employed, where females had the characteristics of males. The analysis was extended between females and males by estimating a local linear regression for Dinaledi school/schools. This suggested that treating schools to the Dinaledi intervention programme influences schooling outcomes and females respond quicker than males.

Other control variables that were very robust across the mean are pass rates, sector and quintile. Pass rates were negatively associated with dropout rates. It was found that public schools performed better than independent schools. Looking at the policy context of these results, it would be beneficial to adopt the Dinaledi model in previously disadvantaged schools to iron out inequalities that exist in the province than increasing the independence of schools. Schools in quintiles two to five are less likely to have learners dropping out in relation to quintile one schools. Therefore, this provided a powerful policy message that placing schools in quintiles is working well in the Eastern Cape except for females in quintiles three to five.

Finally, it turns out that the Eastern Cape schooling outcomes can be strongly explained by the Dinaledi intervention programme with females and Blacks becoming more responsive to dropping out than their counterparts. Within the context of future research, it would be prudent to examine the effects of the Dinaledi programme and other policy intervention programmes on schooling outcomes with other methods such as difference in difference, propensity score matching, randomized trials and others. This research was limited by the unavailability of some specific data such as educator quality specific to grade 12 classes, cohort of student performance to estimate true panels, to name but

a few.

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