

Educational investment towards the ideal future: South Africa's strategic choices

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Although there has been rapid expansion of higher education around the globe, such expansion has not resulted in a more equitable system. Drawing on the work of Nancy Fraser, equity in higher education is conceptualised as 'parity of participation' and includes both equity of access and outcomes. The tensions between expansion and equity are illustrated by comparing South Africa's equity challenges with those of Brazil and the USA. Focusing on South Africa's critical choices, four scenarios or possible futures are provided to illustrate some of the trade-offs and strategic choices. The main argument is that if South Africa's higher education system continues to expand without a concomitant investment in the effectiveness of teaching and learning, it will not achieve the policy goals of equity of access and outcomes. Furthermore the investment needs to be strategically targeted to interventions that can serve as systemic levers of change for reducing drop-out rates and improving graduation rates. To this end, over the next decade the state needs to prioritise an investment in an undergraduate curriculum more 'fit for purpose'. The investment needs to be in curriculum reform that normalises different levels of foundational provision, identifies and removes curriculum obstacles that delay or impede graduation, and provides opportunities for 'breadth' for all students, not only those who come from privileged backgrounds.

Significance:

- If South Africa's higher education system continues to expand without a concomitant investment in the effectiveness of teaching and learning, it will not achieve the policy goals of equity of access and outcomes.

Introduction

Much has been written about the rapid expansion of higher education over the past 50 years, which has been characterised as a shift from elite to massified systems, and there is a great deal of commentary on the relationship between this expansion and the goals of a more equitable higher education system.¹ The assumption may be that as the system expands, it will become more accessible to groups who have traditionally been excluded. Whilst there have been some gains in 'widening participation', the overall picture is that this unprecedented global growth has not resulted in a more equitable higher education system. The gains of expansion have not translated into gains for equity. Piketty argues that unequal access to higher education is one of the most important problems that states will face in the 21st century.^{2(p.340)} I will argue, however, that access is not South Africa's most pressing problem.

The relationship between growth and equity is a tension that runs through South Africa's policy discourse across its decades of democracy where the state has advocated for the need to simultaneously address the imperatives of increasing access and improving success, particularly for those who have been historically under-represented in higher education.³⁻⁵ Meanwhile the student protests of 2015/2016 – from #RhodesMustFall to #FeesMustFall – have put immense pressure on the state to expand access through 'fee-free' education and to this end a presidential Fees Commission of Inquiry has been set up to explore the feasibility of 'fee-free higher education and training'. The outcomes of this commission could have a profound impact on the future of higher education in South Africa; once again the sector is at a critical crossroad. If equity remains a policy goal there are strategic choices that need to be made with the inevitable trade-offs.

The main argument is that if South Africa's higher education system continues to expand without a concomitant investment in the improvement of its undergraduate completion rates, it will not achieve the policy goals of equity of access and outcomes. The state needs to prioritise over the next decade an investment in an undergraduate curriculum more 'fit for purpose'. The argument proceeds in four parts. Firstly, I conceptualise what a more equitable higher education system might look like. Secondly, I briefly explore the equity challenges of two other higher education systems: those of Brazil and the USA. Thirdly, four scenarios – or possible futures – are offered to illustrate the trade-offs and strategic choices. And finally, a proposal is made for the kind of educational investment required over the next decade.

Conceptualising a more equitable higher education

I borrow from political theorist Nancy Fraser's multidimensional framework of justice⁶ to conceptualise equity in higher education: what is the goal, what are the obstacles that stand in the way of this goal, and what are the mechanisms that would enable progress towards this goal?

Fraser⁶ defines justice as 'parity of participation'. She writes: 'Justice requires social arrangements that permit all to participate as peers in social life'^{6(p.73)}. What would it mean for 'all to participate as peers' in higher education? 'Parity of participation' has a double meaning. Firstly, parity of participation means that the chances of an academically capable student gaining access to higher education are not predetermined by their background. Academic capability recognises that there are many talented school-leavers who have academic potential but because of poor educational provision will not be academically eligible. 'Background' includes prior schooling, socio-economic status, geographical location (e.g. urban or rural), language or any other feature that makes

up the relevant social and cultural capital that students bring with them to university. This 'parity of participation' points to equity of access. Secondly, parity of participation means that the same student's chances of successfully completing a degree are not primarily determined by that same set of variables. This 'parity of participation' points to equity of outcome. Thus a more equitable higher education system is one that ensures that a student's background does not predetermine their chance of gaining access to and successfully completing a qualification. This concept of equity is more far-reaching than those that focus only on access.⁷

According to Fraser⁶, full participation requires dismantling institutionalised obstacles that prevent some people from participating on a par with others. Fraser's elaborated framework identifies a number of obstacles. For the purposes of this argument I focus on the economic or more generally 'resource' obstacles (for an elaboration of Fraser's conceptual framework see Shay and Peseta⁸). Fraser argues that people can be 'impeded from full participation by structures that deny them the resources they need in order to interact with others as peers'⁶; for example, a potential student may be denied access because of the cost of the application fee or lack of Internet facilities to complete the online application form. These would be examples of 'distributive injustice' in which an academically capable student is barred from access because of a lack of resources.

There is another kind of distributive injustice – a failure to gain epistemic access or access to powerful knowledge. The notion of 'epistemological access' – a term first coined by Morrow⁹ – distinguishes between formal or physical access to higher education and *meaningful* access to the knowledge goods.¹⁰ Morrow argues that if one of the key purposes of higher education is to produce knowledgeable citizens then it follows that one of its core functions must be to give students access to disciplinary knowledge. As the South African Department of Higher Education and Training (DHET) puts it:

The true meaning of transformation [is] when all students entering the system have a reasonable chance of success and access to powerful forms of knowledge and practices that will enable them to enter the productive economy and improve their life chances and that of their families.¹¹

There are thus two kinds of resource obstacles: financial and epistemic. It is necessary to overcome both for full participation, for access and for success.

'Expansion without equity': A comparative perspective

It is instructive to compare South Africa's equity challenges with those of other higher education systems, in particular with respect to the trade-offs between expansion and equity. Brazil's system shares many common features with South Africa's: it is located in a highly unequal society and it is a middle-income economy, with a relatively low participation rate. The US system, in contrast, is situated in a developed economy with a massified, highly differentiated system.

One measure of expansion is 'participation rate', also called gross enrolment rate, which refers to the total enrolment (of all ages) expressed as a percentage of the 20–24-year-old age group in the population.¹² Measuring the success of a system is more complex. The indicator used is completion rate which measures effectiveness and efficiency, that is, producing the desired results with the optimal resources. This is the percentage of a given first-year student intake, or cohort, that graduates in minimum time.¹² The measure of equity of access is the percentage of under-represented groups of the total of those enrolled. The measure of equity of outcomes is the percentage of under-represented groups of the total of those who have completed, that is, representativity of the graduating class.^{13(p.39)} It is very difficult to obtain comparable data across all of these measures. The findings below are based on the most reliable and up-to-date data available.

Consistent with the global trend, all three of these higher education systems have expanded significantly. In South Africa, the number of

enrolments has nearly doubled from approximately half a million in 1994 to close to a million by 2014 – an increase in participation rate from 12% to 20% in 2013.¹² By 2013, Brazil's enrolments were at 7.3 million (a participation rate of 30%), with 75% of these enrolments in the private sector – a 64% increase in the public sector and a 95% increase in the private sector from 2003.¹⁴ In contrast to the massified system of the USA (with an 88% participation rate in 2013)¹⁵, Brazil's and South Africa's systems are more 'elite'. At the same time, given the high levels of inequality in public schooling, the Brazilian and South African systems are made up of a significant proportion of school-leavers who are underprepared for university level study.¹⁶

Consider South Africa's class of 2015 matriculants: of the total cohort of National Senior Certificate writers, 33% of learners wrote Mathematics and only half of those (129 481) scored above a pass of 30%; of the total cohort, 25% wrote Physical Science, of whom 59% (113 121) scored 30% or more.¹⁷ These results are of concern in terms of both the size and quality of the pool with respect to the requirements of science-based programmes such as Engineering, Health Sciences and Commerce. The National Benchmark Test (NBT) results for the 2015 writers provide further evidence of this underpreparedness: of those who wrote the 2015 NBT Mathematics (56 500) only 10% achieved a score of 'proficient' (meaning that they would be expected to cope with regular mainstream provision), whereas 45% scored 'basic' (meaning they will have serious challenges with university-level Mathematics).¹⁸ This finding provides compelling evidence that a significant proportion of South Africa's matriculants are not prepared for university-level study in the science-based fields. Put another way, the universities are not prepared for the students. Either way, there is a misalignment.

The question is, should South Africa and Brazil be aspiring to higher participation rates? The pervasive view in higher education policy discourse favours expansion, given the global shift from manufacturing to knowledge-based economies resulting in the need for more highly skilled graduates.^{19,20} Some would argue that an expanded tertiary sector – whether through government policy or market-driven – will contribute to the reduction of inequality.² However, this 'more is better' view needs to be interrogated. One of its assumptions is that there is a sufficient supply of academically prepared school-leavers to fill the enrolment pool. The data for South Africa suggest otherwise. Until such time as the output of public schooling improves, expansion will increase the proportion of underprepared students, widen the 'articulation gap' between secondary and tertiary provision and could lead to both higher drop-out rates and poorer completion rates.

What are the implications of expansion for equity of access and outcomes? The doubling of enrolments in South Africa means that historically under-represented groups now make up the overall majority (83%),^{12(fig. 3)} although, as will be discussed below, challenges to access still remain. Brazil's growth however tells a cautionary story: McCowan²¹ describes Brazil's growth as 'expansion without equity'. Its public system is no-fee but academically highly competitive (ratio of 1 to 8 acceptance) and thus remains the preserve of the 'best prepared and well-off applicants'²². The private system is less competitive (ratio of 1 to 1.5) but financially inaccessible to those of lower socio-economic status.²³ To address this ratio, the state has instituted a range of redress policies in the form of quotas and the bonus model (adding extra points to the admissions score) which have resulted in a small increase in under-represented student populations.²³ Brazil's experience provides evidence that removing financial barriers to access does not by itself result in equity of access – academic unpreparedness may remain an obstacle.¹⁶

In terms of equity of outcomes, the overall theme emerging from these accounts is a concern that the gains in equity of access have not materialised into equity of outcomes. In South Africa, about a third of those enrolled will have dropped out in the first or second year and 40–50% will not graduate at all.¹³ The inequalities are even more starkly evident in the comparison between 2008 3-year degree completion rates (for N+4) of black students (49%) and white students (68%).¹¹ Cohort completion rates are not available for Brazil but graduate rates point to a fairly inefficient system: in 2013, the public sector and private graduate rates were 10% and 14%, respectively (if all students graduate in 4 years,

the rate would be 25%).¹⁴ Cooper²⁴ describes the transformational gains of post-apartheid growth as a 'skewed' and even a 'stalled' revolution. The same could be said of Brazil.

The USA's massified and highly differentiated system is one often held up as an example, and yet it faces serious equity challenges. A 2011 report on the US 4-year university system²⁵ shows that only 40% of US students completed a degree in 4 years, 56% by the end of 5 years, with an unlikely chance of completion after 6 years. Disaggregating these data by ethnicity indicates a significantly lower completion for African-American students: 21% in 4 years and 35% in 5 years. A graph of social inequality by college degree attainment shows that, by 2013, 70% of the US families in the top income quartile had completed a degree by the age of 24 years, nearly double the graduation rate from 1970. In contrast, only 9% of those in the bottom quartile had completed a degree – up from 6% in 1970.¹⁵ As Piketty puts it, 'parents' income has become an almost perfect predictor of university access'^{2(p.339)}.

These comparisons are instructive for South Africa's key policy decisions. What are the implications of an expanding system (even if only moderate growth) for the goals of greater equity of access and outcome? Brazil's public system has expanded and has no financial obstacles to access and yet equity of access remains a challenge. As Marginson¹ argues, the USA may have the highest proportion of world-class universities but there are serious concerns about whether it is a world-class system – it is certainly not equitably serving its minority population. These comparisons illustrate some of the challenges of the equity/growth trade-offs and point to some strategic choices that need to be considered.

Future scenarios and strategic choices

Scenarios are 'stories about how the future might unfold' for a particular organisation or sector.^{26(p.7)} They are provocative and plausible stories. Scenario thinking begins by identifying a range of 'forces of change' both internal and external to the sector which may impact on its future. These forces 'combine in different ways to create a set of diverse stories about how a future could unfold'^{26(p.8)}. The goal of scenario thinking is to inform discussion and debate about strategic choices.

A range of internal and external factors contribute to South Africa's inequitable higher education system, not least of all the legacy of apartheid. There is a recognition that the inequality cannot be fully addressed until conditions both inside and outside of the education system are repaired. The state recognises the need for investment in the whole education 'pipeline': as a result there has been increased attention to early childhood development and primary and secondary schooling. There are also calls for a more differentiated post-secondary sector including strong vocational and technical training.^{5,27}

In terms of the critical forces internal to higher education, South Africa's low GDP growth suggests that there is unlikely to be substantial additional state funding for higher education. In addition to the significant funding implications emerging from the Fees Commission, the state is committing close to ZAR1 billion per annum from 2017 to 2020 as 'ear-marked' funding to support a coherent national programme for addressing transformational imperatives relating to equity and quality in the university system. All of these deliberations are happening against the backdrop of varying degrees of financial crises across the higher education sector as a result of years of decreasing block grant subsidy. This sets the stage for a highly contested set of competing choices that will profoundly impact on the next phase of higher education in South Africa.

For the purpose of scenario planning, these 'resource obstacles' are translated into continua of resource choices. The one choice is the extent to which the state increases financial aid to students. On the one end, financial aid is increased to make higher education more affordable (+), on the other end financial aid is frozen or decreased and higher education is essentially for those who can afford it (-). The other choice is the extent to which the state supports measures to improve the effectiveness of teaching and learning – what I will refer to as its 'educational investment'. On the one end, the state's investment is high (+) and on the other end the investment is low (-). These two resource continua result in a matrix of four possible future scenarios (Figure 1).

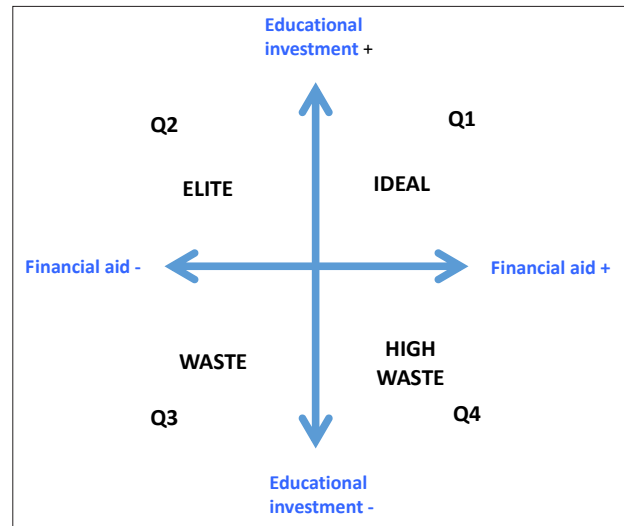


Figure 1: Possible future scenarios for South African higher education.

All of these scenarios involve assumptions. For the purposes of this exercise it is assumed that the students admitted are academically capable. It is also assumed that the state's educational investment yields improvements in the effectiveness of teaching and learning resulting in better retention and increased graduation rates. Another assumption is that there is no substantial additional state funding; that any increases come from reductions elsewhere – either from the higher education budget or from other areas of public spending. All these assumptions are debatable, as are the scenarios which they produce. This is the point of scenario thinking.

The top right quadrant (Q1) represents the 'ideal future'. In this scenario, the state increases to the extent that it can afford both its contribution to financial assistance and its investment in the effectiveness of teaching and learning. From the point of view of the students, irrespective of their socio-economic status, they are admitted and there is a high probability that they will successfully complete. From the point of view of the system, because the resource obstacles have been removed (both financial and academic) there is an increase in participation rate and there is equity of access and outcomes. This 'ideal future' is in fact South Africa's official future enshrined in policy since the 1997 White Paper³: increasing participation rates, equity of access and equity of outcomes in an efficient system.

The top left quadrant (Q2) is the 'elite future'. The state's contribution to financial aid is reduced. From the point of view of the student, if they can afford higher education, they will gain formal access. Given the likelihood of a reasonably good public or private schooling background and the state's educational investment, students are likely to successfully complete. From a system point of view, the reduced state funding for financial aid would result in a low participation rate with low equity of access and outcomes for those of socio-economically disadvantaged groups. Over time, given the demography of South Africa and the growth of the black upper-middle class, this system would be racially diverse with a black majority. The system would be reasonably efficient and increasingly dependent on private funding, which would result in a highly elite higher education system comprising the upper-middle class which, in time, would become racially diverse.

Quadrants 3 and 4 (Q3 and Q4) are both 'waste futures' with no educational investment made in improving the effectiveness of teaching and learning, and hence poor completion rates. The difference in the two quadrants is the state provision of financial aid. In Q3, the state freezes or reduces its current contribution to financial assistance. From the point of view of the students, if they can afford higher education, they will gain formal access. Their chances of succeeding will largely be determined by the quality of schooling. There is no equity of access, no equity of outcomes and poor efficiency.

In Q4, the state increases its contribution to financial aid. The participation rate increases, there is improved equity of access but completion rates do not rise (and in fact may decline), so there is virtually no equity of outcomes. From the students' point of view, irrespective of their socio-economic status, they will gain formal access. But given increased levels of under-preparedness and no investment in improving the effectiveness of teaching and learning, there is a high probability that they will not successfully complete. This is a highly inefficient system as it admits a significantly larger pool of students who are less well-prepared for university study.

Scenarios are theoretical reductions of a much more complex set of variables. Further debate requires probing and nuancing: can the state afford Q1 under the current economic climate? Unless there is substantial additional state funding, the system cannot expand, especially when this expansion is at the expense of poor students whose chance of completion is unlikely. While an extreme version of the 'elite future' scenario is, I would argue, politically and socially unacceptable, there may be possibilities at different points of the continua. Given that the system is by definition already 'elite' (with a 20% participation rate), the priority for existing state funding in Q2 is expansion not through enrolments but through graduations. As noted earlier, increasing the state's financial contribution to ensure 'fee-free' higher education is the rallying cry of the #FeesMustFall movement. There is an obvious appeal to this scenario, particularly as a political rallying cry. The pros and cons of this demand are not discussed here, but suffice it to say that a single focus on financial access will not guarantee equity of outcomes. The Brazilian case should be instructive. While these proposals are controversial, there is likely to be consensus that Q1 remains South Africa's goal and it should be evident that Q3 and Q4 are not desirable.

I would propose that South Africa's current system sits somewhere in Q3. The investment of the state in the past 20 years has produced an expanded system with greater equity of access, but is far from achieving equity of outcomes. The result is an inequitable and inefficient system. If there is an increase in financial assistance to talented but underprepared poor students, without a substantial educational investment to improve completion rates, South Africa's future trajectory is towards Q4 – a 'high waste future'. South Africa's higher education system seems to be precariously balanced between two 'future scenarios' of waste, neither of which will achieve its policy goals. Unless the state's GDP contribution to higher education is increased, it cannot afford Q1 in the short term. This expansion would be at the expense of poor students whose chance of completion is unlikely. While an extreme version of the 'elite future' scenario is, as argued, politically and socially unacceptable, a more nuanced version of the 'elite future' might be strategic in the short to medium term in order to achieve the 'ideal future': this is a capped-growth system that contributes to some improvement in equity of access but invests significantly in equity of outcomes.

What will enable the shift from Q3/Q4 to Q1? The state must invest in carefully targeted and monitored educational interventions that improve the effectiveness of teaching and learning.

Educational investment in systemic improvement

There is a significant body of scholarship on student retention. Tinto's model²⁸ for student persistence is seminal. [See Rooney²⁹ for a review of Tinto and subsequent modelling of student persistence]. These models point to a number of key determinants that influence whether students graduate or not. They recognise, on one hand, the influence of students' background variables (age, schooling, ethnicity, gender) and on the other hand, a range of variables within the institution: academic, environmental and social. These models propose a complex interplay between students' 'commitments' (including the resources they bring with them) and institutional conditions that explain the extent to which students successfully integrate and ultimately succeed.

There is an urgent need for these models to be tested in the South African context in order to better understand the causes of student drop-out/retention. A local study²⁹ in one historically advantaged institution

provides sobering evidence of the extent to which background variables still profoundly shape success. The study concluded that being white, ineligible for financial aid and proficient in English, and having attended a top public or private school and obtaining good high school grades increased the likelihood of graduating. On the other hand, men who are on financial aid, non-English speaking, who attended poorly resourced schools and achieve low school grades are more likely to be academically excluded.^{29(p.ii)} These are interesting, sobering but not surprising, findings. The challenge is: what are the enabling institutional conditions that can mitigate some of these determinants? What institutional commitment will enable the shift from Q3 to Q1?

There is no one answer or solution to this problem. There is a significant body of scholarship and practice on how to improve the quality of teaching and learning. The proposal which follows in no way denies a wide range of curricular, pedagogical and assessment interventions that can impact positively on student success. The focus here is on interventions in which state resources can be leveraged for systemic change that specifically contributes to equity of access and outcomes. While the state is to be commended for its investment in ear-marked funding to improve the effectiveness of teaching and learning, these resources need to be accompanied by a clear vision and plan – both at state and institutional level – for the optimal educational investment. It may not simply be more investment of the same or even a 'scaling up' of existing initiatives. A well-conceptualised strategy for educational change is required.

It was noted early that cohort completion data can shed light on discrepancies between curriculum intention and reality. The question must be asked: for whom is the curriculum working? I focus on completion data for the 3-year undergraduate degree obtained from DHET.^{11 (Tables 22–36)} These data were chosen given that the formative degree is the most common pathway to postgraduate/doctoral study. The minimum completion rate is 3 years (N) but an additional year (N+1) is not necessarily a problem. It may mean that a student failed a course or made some change to their curriculum (or added a major) that prolonged their degree. Beyond this additional year (N+2/3/4), a student has most likely failed multiple courses – a situation that is no longer optimal or efficient for the student or the state.

In terms of equity of access, the first observation is that, although the past two decades have seen significant achievements in terms of increasing equity of access, the data show that, with respect to the 3-year degree, black, coloured and Indian students are under-represented and white students are still over-represented. Of the total number of students who enrolled for a 3-year degree in 2008 (48 076), black students constituted 50%, coloured students 8%, Indian students 10% and white students 32%. The cohort completion data for specific qualification (e.g. Bachelor of Science) is not disaggregated by race, but it is likely that black students are even further under-represented in the science, technology, engineering and mathematics (STEM) areas. Addressing this problem will require greater intentionality in the recruitment of black students for degree studies, admission policies which are sufficiently flexible to admit talented but underprepared students and placement through sound diagnostic testing into the appropriate curriculum, including extended curriculum programmes.

In terms of equity of outcomes, two further observations can be made: one is the high drop-out rate across all the race groups including white students. Across all race groups by year 2, 20% have dropped out and by year 3, 25%. This is a significant loss in a system with a low participation. The second observation in terms of equity of outcomes is the low completion rate in N+1. Out of the total of those enrolled for 3-year degrees, only 36% graduate by N+1. Completion rate for black students by N+1 is 28%, coloured students 28%, Indian 32% and white students 50%. The evidence that half of white students and significantly more than half black, coloured and Indian students are taking 5 or more years to complete a 3-year degree and approximately one third have dropped out altogether would suggest that our current curriculum needs to be reviewed. Some educational investment needs to be made towards an undergraduate degree more fit for its purpose. The Council on Higher Education's (CHE) flexible degree¹³ was proposed to address

this problem. The National Development Plan⁵ argued for the need to extend STEM degrees to 4 years by redesigning first year to make it more accessible. The Ministry has supported neither of these proposals. I argue that the key principles informing the CHE proposal still hold and should serve to inform the priorities for educational investment.

The first proposal is that a fit-for-purpose curriculum will address the 'articulation gap' as a *systemic* problem. The 3-year degree data suggest that under-preparedness for university level study is a majority rather than a minority phenomenon. This should come as no surprise given that all the available data on the undergraduate enrolment pool – schooling background, National Senior Certificate results, NBT results and cohort performance – point to the need to reconceptualise the assumptions which inform the undergraduate entry-level 'norm', in order to cater for a more diversely prepared incoming cohort. This must be the sector's most urgent transformation priority.

In terms of addressing this gap, South African higher education has three decades of experience to draw on from both the successes and failures of its extended curriculum programmes (ECP). Overall the achievements of the ECPs have been to increase equity of access by admitting students (particularly to historically advantaged universities) who might not otherwise have been admitted, and secondly, to increase retention beyond first year. A study of nine ECP programmes across four institutions³⁰ found that seven out of nine of these programmes had year 1 to year 2 progression rates that exceeded the mainstream year 1 to year 2 progression. This suggests that these ECPs are successful in setting strong epistemic foundations for students. Over the decades staff involved in teaching on these programmes have developed a deep expertise in innovative entry-level curriculum (and pedagogical) interventions that can be drawn on and extended to 'mainstream' curriculum development.

Thus the first proposal for a more fit-for-purpose is to 'normalise' foundational provision; it should be conceptualised for the majority of South Africa's incoming students. The data suggest that approximately one third of enrolled students (those who graduate by N+1) may not need foundational provision and they could be exempted. (The racial composition of this group will vary depending on the institution but in most institutions this group would be racially diverse and in some it would be predominantly black). The rest, however, would benefit from either some foundational courses – for example, a foundational mathematics or physics or academic literacy course – or a full foundational programme. Space needs to be made in mainstream curricula for the required range of foundational provision to be offered to all who would benefit therefrom. Diagnostic instruments such as the NBTs can be used to place incoming students according to diverse levels of preparedness as is standard practice in other parts of the world.

However, these interventions alone are not enough. Expanding and normalising 'foundational provision' may not yield the desired results unless there is further curriculum change 'upstream'. Studies on ECP performance provide evidence of a general pattern of poor completion rates: despite some successes the gains of the foundational provision are not sustained through to completion.^{13,29-31} What is required is a thorough review of the 'epistemic obstacles' which students face beyond first year that result in high failure. Thus the second proposal for a curriculum 'more fit for purpose' is to identify those key 'high risk' courses or combinations of courses across the degree which delay or impede graduation for a significant proportion of the students. This curriculum development is also an opportunity to ensure that the discipline-specific academic literacies are pulled through from first year to more senior years.

The third proposal for a more 'fit-for-purpose' curriculum is one that provides opportunities for 'breadth'. The previous two proposals address disciplinary 'depth', that is, acquiring adeptness in at least one discipline. Increasingly around the globe higher education institutions are embarking on large-scale curriculum reform to produce graduates with a wider skill set than higher education has traditionally produced. The CHE proposal calls for the formation of a particular kind of graduate through 'broadening the curriculum to include learning that is professionally and socially important in the contemporary world ...

and that lays the foundations for critical citizenship'^{13(p.19)}. This 'breadth' would include key graduate attributes, opportunities for electives outside the discipline and the promotion of interdisciplinary thinking. While this may not on the surface appear to have direct impact on equity of outcomes, the reality is that students from privileged schooling do often experience curriculum breadth through additional electives, majors and extracurricular opportunities. These options have significant spin-offs for their employability opportunities. A curriculum fit-for-purpose will ensure that this breadth of experience is an expectation and outcome for all.

To summarise the main proposals: a curriculum more fit-for-purpose will address the 'articulation gap' as a *systemic* problem by normalising different levels of foundational provision to support the majority of capable students who either drop out or take unacceptable time to complete. To further support this outcome, the second proposal is to identify key 'high risk' combinations of courses across the degree that delay or impede graduation for a significant proportion of the students. The third proposal is a curriculum that provides opportunities for 'breadth' for all students, not only those who come from privileged backgrounds. The challenges of this kind of curriculum review are often more political than educational. There is extensive expertise both locally and internationally to support this curriculum development work. What is harder to find is the vision, leadership and political will for change.

Conclusion

Despite the significant gains of the past two decades South African higher education risks perpetuating or worsening its current waste scenario unless there is significant educational investment into improving the effectiveness of teaching and learning. Furthermore, the investment needs to be strategically directed at interventions that can serve as systemic levers of change that lead to reduced drop-out rates and improved graduation rates, especially for black and coloured students. It needs to be noted that this investment will have significant spin-offs on some of South Africa's other systemic challenges, such as expanding the pool of postgraduate students and the next generation of academic staff.¹⁹ Indeed these cohorts cannot increase unless there is a more fit-for-purpose undergraduate curriculum.

If these proposals have merit, a next immediate step would be to set up a national collaborative research and development project funded by the DHET. The goal of this project would be to inform a 5–10-year curriculum review starting with the Bachelor of Science. This priority is not because science is more important than the social sciences and humanities but because it is the best place to start. Science-based courses are gateways to other fields of study: commerce, engineering and health sciences. Improved performance in science-based subjects will have a positive knock-on effect on a number of other qualifications.

The collaborative project could commission, for example, some of the following areas of research – the first being research on student retention. This commission would develop a better understanding of why students fail. How many of the nearly 50% of the intake who fail to complete are academically excluded, financially excluded, or drop out in good academic and financial standing? And why? This investigation would include drilling down into the existing cohort studies for a better understanding of the obstacles to completion. The second area, emerging from findings of the 'retention' project, would be research on the 'obstacle' courses and course combinations that lead to poor completion rates or academic exclusion. There is already some momentum developing through the Kresge-funded Siyaphumelela project and its focus on data analytics and 'high risk' courses. The third area would be research on the 'articulation gap' between school exit competency and tertiary preparedness in key subjects of the Bachelor of Science, e.g. Mathematics and Physical Science. This could involve a detailed investigation of both the entry-level proficiency of the applicant pool across the sector using NBT data and the entry-level requirements for key first-year courses. The outcomes of this commissioned research – to be conducted over a 2- to 3-year period – would provide a data-informed sector-wide basis for systemic review of the Bachelor of Science that may or may not result in recommendations for a 4-year degree, but would certainly result in a more fit-for-purpose curriculum appropriate to the South African context.

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