

# A review of teacher demand and supply

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Identifying research gaps and the role of SACE

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This paper reviews selected research on teacher demand and supply, both internationally and in South Africa. It is not an exhaustive review of all the literature but key literature is reviewed to understand what the challenges are in planning for teacher demand and supply. Through this review the possible role of SACE will also be explored in tackling issues of demand and supply.

Teacher demand and supply is a complicated set of dynamics which should never be analysed in isolation. However, for the sake of analysis they are treated as if separate, and in suggesting solutions it should always be checked whether these do not contradict each other. This paper takes a planning perspective on reviewing demand and supply, as such the review emphasises data rather than other lenses through which to look at demand and supply. Only key research will be looked at rather than a complete review of international and local research. Policies affecting demand and supply will also be looked at as far as they affect demand and supply. Note though the policies are separated according to demand and supply categories, many of these policies affect demand and supply at the same time. Lastly the paper makes recommendations on the key role that SACE can play in filling research gaps on teacher supply and demand. The role of SACE is cardinal in dealing with demand and supply because of its role as a licensing structure and its role in teacher development.

Any analysis of teacher demand and supply should differentiate between the stock, the inflows and outflows of teachers. Inflow of teachers consist of new teachers from institutions of higher learning, untrained teachers who are being recruited, and former teachers who are being recruited back into the profession. The stock of teachers represents currently employed teachers in the system. The outflow is the attrition rate due to resignations, retirement, death and temporary absence. Demand and supply of teachers has to take into account teacher labour market educators operate within. However this does not mean the economic analysis captures all the dynamics that have bearing on demand and supply. There are sociological and psychological aspects of teacher demand supply that fall outside classical economic analysis that need to be included in analysis of teacher demand and supply. The sociological aspects include social perception of the profession and choices individuals make. These are discussed in the paper.

Teacher labour market does not operate in a free market per se at least in South Africa. Instead it is operating within a monopoly market with a dominant purchaser of services than multiple purchasers in a free market. As a result the purchasing of teacher services does not necessarily reflect a price that responds to demand and supply, rather it indicates the willingness of the monopoly to pay and teachers

willingness to supply the skills. As such there is always a danger that teachers are underpaid or overpaid, relative to other professions or relative to the scarcity of their service. On the other hand the choices teachers make as free agents, also affect demand and supply within the monopoly market. This means the study of demand and supply should always consider government actions and the choices individuals make.

For ease of analysis supply and demand is discussed separately though they are interrelated. Supply, firstly, is discussed as a function of choices individuals make. The choice matrix individuals constantly face includes the choice; of selecting teaching as a profession, human capital development, entry into teaching, geographical location, and whether to stay or change profession. These are dynamic choices that individual continue taking the rest of their lives and affect supply. Secondly, supply is discussed as affected by government policies on standards of who qualifies as a teacher, institutions authorised to provide training, length of courses, mode of training and policies governing promotions and compensation. Demand issues are discussed in terms of legislation affecting demand, and attrition as affecting demand. Subtopics of attrition will be discussed as affecting demand side of teachers.

### 1. Supply side issues

Choices individuals make as students on whether to become teachers are at the core of whether there is adequate supply of teachers; it also affects the quality of individuals who choose to enter the profession. Those who choose to be teachers still have to make choice on how long to stay in the profession. Supply is also affected by policies of the country on licensing matters. Lastly, inflows from individuals who are qualified to teach but not teaching are an important source of supply. This source is complicated by the introduction of OBE since these individuals are not trained in it but still represent a pool of teachers that can be brought back into the system. Another source of supply is from foreign qualified teachers, this aspect of supply is not explored in this review. However this is an important resource more especially as a quick fix in dealing with supply of teachers qualified in scarce subjects. This aspect SACE has to deal with directly in withholding or granting license for these teachers to work in South Africa.

Supply analysis is complicated by the agency of potential teachers. It is not always possible to predict how many individuals will choose teaching as a profession. Even those who study education it is not a foregone conclusion that after qualifying they will enter the profession immediately. There is no guarantee they will become teachers or opt for another profession. Even those who enter teaching planners are not guaranteed that these teachers will continue working as teachers for the rest of their working life, or work in a particular school or area. Teacher supply studies that do not seek to understand how individuals make choices will fail to comprehend the supply process.

### **1.1. Choice matrix to enter the profession**

Teacher supply is incomplete if it only focuses on current stock of teachers. It needs to understand the possible inflow arising from individuals choosing to be teachers. The analysis needs to understand the kind of human capital individuals choose to develop when they become teachers, the decision to actually teach and the decision to stay in teaching.

International research on teacher supply in many cases is underpinned by human capital, labour choice and compensation theories (Bobbit, et.al 1991, Kirby, 1991, Boyed, et.al. 2004). These theories assume that individuals are rational beings who seek to maximise the utility they derive from their work (Blakemore 1984, Gilford and Tenenbaum, 1990). This affects choices they make regarding the job they choose, human capital they invest in and geographic location of where to work (Murnane, Singer, John, 1989, Dolton 2004). Therefore whatever profession individuals choose including teaching, their derived utility is not only affected by pecuniary rewards (earnings, monetary incentives) of teaching but also its non-pecuniary rewards (status of the profession, probability of being employed, opportunity costs, more holidays). This is analysed further in the discussion below.

A decision to enter teaching or other profession has to consider the cost of developing the requisite human capital related to that particular profession. The cost is in both monetary terms and required effort in acquiring specific human capital.

However, Polacheck (1981) argues that the cost of human capital formation and its maintenance differs across various disciplines and within professions. It differs in:-

- the cost of acquiring it
- the effort required to acquire it
- its rate of depreciation
- and the cost of maintaining it

Therefore choice of profession and the kind of human capital individuals choose to invest in corresponds with their life choices (Boskin 1974, Polachek, 1981, Dolton 2004).

A simple economic function can be used to illustrate the decision process that school leavers face when they choose to be teachers or not, and for those individuals who are in the profession whether to stay in the profession (Polacheck, 1981, Stinebrickner, 2003). Like other professions the utility ( $U_{t1}$ ) in becoming a teacher is affected by financial and non-financial rewards associated with the profession.

In choosing to be a teacher all else holding constant, an individual evaluates expected wage associated with the profession ( $W_{t1}$ ). The expected wage is made up of expected income  $Y_{t1}$  and expected non-financial  $G_{t1}$  rewards associated with the profession. Therefore the choice to maximize the utility derived from choosing teaching can be represented by

$$1. \max U_{t1} = W_{t1} + \gamma_{t1}$$

Decomposing wage into its two component we get:

$$2. \max U_{t1} = Y_{t1} + G_{t1} + \gamma_{t1}$$

Note that  $G_{t1} + \gamma_{t1}$  are invisible to policy makers, but  $G_{t1}$  is known to the individual who is making the choice. Policy makers do not always see or know which non-financial rewards the individual attaches value to. Equation 1 and 2 above says salaries are important but equally important are the other factors associated with the profession. These are the non-financial rewards of selecting teaching. The random variable measures other factors which affect choice but are also not observable.

The simple model above indicates several items that need to be kept in mind if teaching is to be made attractive to increase supply. Firstly, a decrease in the non-financial rewards ( $G_{t1}$ ) has to be compensated by an increase in the salary part  $Y_{t1}$  of the equation. Otherwise the overall utility associated with teaching decreases and the choice of teaching is not favourable to the individual (Murnane, Schindler, 1989, Falch, 2005). Salaries are not the sole focus of teachers or teachers to be, non-financial rewards of teaching are also important in selecting teaching as a profession or staying in teaching. Non-financial rewards like the status of the profession, working hours, and holidays affect whether the profession is attractive enough for individuals to supply labour.

Welch (2002) identifies the challenge in South Africa as the ability of the profession to attract enough young people to supply their skills. That is current inflows into the profession are not enough to balance outflows from the profession. It is estimated that to maintain the system 15% of the current matric students will need to join the teaching profession instead of the current three percent (Crouch. 2001, JET. 2001). There is currently a mismatch between supply and demand, for example 6000 teachers graduated in 2006 while 20000 left (DOE, 2007). Adler and Reed (2002) identified one of the major reasons that young people are not attracted into teaching to be related to the decline in stature of the profession. The profession is not viewed as a profession of choice by individuals which results from the poor public perception of the profession.

Individuals are less likely to choose to invest to develop particular human capital when the market is signalling there is no demand for the skill (Frijters, Shield et. al, 2004). That is they are less likely to select a skill which has a high probability of not being in demand in the labour market. This goes with job security associated with the profession. Crouch (2001) argues that young people have reacted negatively to signals that there are surplus teachers who are unemployed in South Africa. Thus negative messages in the market have had the impact of reducing the supply of potential teachers in the form of new learners into the profession.

Secondly, even after choosing teaching as a profession, the individual has to make a choice of a geographic location to work in or not to enter the teaching profession altogether (Podgusky, Monroe, 2004, Falch, 2005, Frijters, Shield et. al, 2004). That decision is affected by both the financial and non-financial rewards of being in teaching in that particular geographic location. The limited non-financial rewards associated with certain areas with limited resources, imply the teachers' utility is decreased when compared to teachers who are in areas with abundant resources that are valued by teachers.

This is important consideration, because teacher salary in South Africa is equal regardless of the school location or resources. In terms of utility those teachers finding themselves in rural school, their derived utility is lower than those who are in schools that are resource endowed or are in areas with amenities (DOE 2006). Teachers who experience decreased utility will either exit the profession or move to schools that increase their utility by increasing the non-financial part of the utility. This would explain some of the research findings that indicates shortages in rural schools because teachers do not supply labour in these areas, more especially science, math and language teachers. The Ministerial Committee on Rural Education(2005) found rural areas were experiencing shortages of competent and qualified teachers. Similarly the HSRC (2004) found that there is a shortage in supply of educators teaching technology, economics and management sciences in rural as compared to urban schools.

Thirdly, individuals do not value current salary or non-financial rewards only in their decision matrix, they also value future salary stream. This is the salary flow throughout the lifetime of the teacher in the profession discounted into current values  $\rho$ . The discounted salary flow has to be greater than the cost of investing in the development of the specialised human capital  $\kappa$ . It implies that the expected utility from choosing a job is affected by both expected financial and no-financial rewards, less the costs of investing in acquiring human capital for the job (Preston, 1990. Zarkin 1985).

$$3. \bar{W}_{t1} < Y_{t1} = \sum \rho_{t1} - k + G_{t1} + \gamma_{t1}$$

The salary  $Y_{t1}$  cannot be negative because then the particular profession, in this case teaching, is not attractive. In fact the cost of acquiring specific teacher human capital should never be higher than the lifetime returns of teaching. This means individuals choosing to be teachers or those already in the profession are constantly comparing what they will earn in their lifetime with lifetime earnings in other professions. That means salary structures giving advantage to those entering the professions but not competitively increasing with experience are bound to see teachers exiting the profession when they gain experience. Studies by Crouch(2001) and DOE(2007) show that teacher salary advantage declines the longer the individual teacher stays in the profession. As such more experienced individuals are likely to exit the profession by the time they gain experience in the profession. The MTT (2005) actually shows that most resignations are around the 30-39 ages. These are individual teachers who choose to no longer supply their service in the teaching profession. The OSD agreements are an attempt at correcting this reality. They attempt to reward teachers who stay in the profession by increasing their salary bands and providing an alternating career path that do not necessarily lead to management (ELRC, 2008). The impact of this policy will have to be analysed in the near future whether it has reduced teacher exits among teachers who have more than 5 years of experience.

Fourthly, individuals currently in the profession continually evaluate forgone earnings from an alternative profession. Individuals choose teaching or to stay in teaching as long as teaching the total financial and non-financial rewards ( $Y_{t1}$ ) are higher than in non-teaching reward. Though individuals in deciding may take a simplistic view of comparing salaries with salaries in competing industry, policy makers have to be careful how comparison is made. Salary comparison should take into account the following characteristics; years of training, experience, gender, working hours, race and place of residence. As indicated before Crouch (2001) found with long experience teaching salaries in South Africa are lower than the alternative profession. DoE(2007) found similar result showing teachers earn less than non education professional but higher than overall employed individuals. Starting teacher salary is higher compared to starting salaries in other professions. The new

proposed salary levels have the potential of increasing supply into teaching by increasing initial salary advantage further. An analysis of alternative career mobility within teaching and its accompanying salary increases create the space for salaries to increase further instead of reaching the plateau around the age of 45 (DOE, 2007, ELRC, 2008).

Lastly, individuals in choosing a profession consider employment probability associated with the profession. That is current labour market signals on whether there is demand for skills associated with particular profession influence choices to select a particular profession. The impact of the proposed bursaries is that supply will increase as long as new teachers are able to get job placement (JET, 2001). It is not enough to supply bursaries, to attract new teachers, individuals joining teaching need an indication that probability of getting a job is high.

The individual choice matrix discussion above clearly illustrates the complexity of supply. Choice does not end when the individual chooses to be a teacher, but continues throughout their professional life. Teachers continually evaluate the utility derived from staying in the profession even after joining teaching. They are comparing the utility of staying in current school, compared to joining another school or exiting the teaching profession. New information regarding the utility of staying in current teaching post gets updated daily. Note however, that changing profession in later years of teaching may be costly because teachers cannot command premium wage associated with their school experience if they change professions. As a result, different teachers will have different level of inertia to transfers or exits out of teaching.

Therefore, choice to enter teaching, stay in current school, change school or exit teaching is a response to starting wages, their future growth, non-pecuniary rewards of the profession and consideration of the opportunity costs of staying in teaching. Individuals, who choose teaching, have certain expectations about the utility derived from the rewards of teaching. However, if teaching fails to meet their expectations, then it is optimal for the individual to change their profession or school.

## **1.2. Legislative and policy considerations**

Supply like demand is affected by legislative and policy changes in the country. Changes in policy can result in increased supply or the demand depending on the imperatives they contain.

Legislation governing:

- basic requirement for becoming a teacher (The Norms and Standards for Educators, 2000, Criteria for the Evaluation and Recognition of Qualifications for Employment in Education, National Qualifications Framework, and the Proposed Higher Education Qualifications Framework )
- institutions that are allowed to provide training (Higher Education Act, 1997)
- the length of the teacher course (National Policy Framework for Teacher Education and Development in South Africa 2007)
- the mode of teacher education delivery ((National Policy Framework for Teacher Education and Development in South Africa 2007)

During times of rapid education expansion countries have lowered the years spent in institutions of higher learning by prospective teachers (Williams, 1979). Though in the short term this increased supply, when the expansion rate decreased years later, governments were faced with a challenge of how to deal with under-qualified teachers if only four years of study is the official qualification criteria. A question that also needs to be answered is whether all phases of education system require the same amount of years of training. For example do Foundation Phase teachers become better teachers by training for four years (Adler and Reed, 2002, Welch ,2002). The answer to this question cannot be answered separately from dealing with teacher salary differentiation and whether it is desirable in the country and how it will affect supply.

The number of private and public institutions granted license to train teachers affects teacher supply. More institutions training new teachers will increase the number of

teachers coming through the system. However this increased number of institutions should never be at the expense of quality of the courses they provide. Having institutions is not enough, if no learners register for courses and those registered do not drop out of the courses. Welch identifies legislation that sought to control supply of teachers by closing down colleges as having negatively affected supply by reducing available places. It put barriers to supply through:

- the location of institutions of higher learning.

Most of the institutions of higher learning are located in urban areas or areas distant from where learners get their school education compared to universities.

- Intimidation by the urban setting.
- High expense associated with higher education.

Lastly, the mode of delivery can increase supply if residency is creatively combined with INSET. That means more teachers can be in the field while completing their courses (National Policy Framework for Teacher Education and Development, 2007, Welch, 2001). The quality of their teaching will not be compromised if there is effective teacher support and development. Also these changes in delivery modes will require a re-conceptualisation of the academic year and development of self contained courses (Welch, 2001). The move away from traditional modes of delivery will increase supply as long as the goal post of what defines qualified does move as soon as the system stabilizes. Programmes that include distance learning can also be used to increase supply.

The combination of full and part time contact in acquiring the B.Ed ensures possible increase in supply by allowing different routes into teaching. Distance education if taken up by prospective teachers will increase supply from the stock of those employed as student teachers. At the same time the proposed policy allows teachers who wish to change the phase they are qualified to teach or learning area to change by training further. It allows mobility across the system without losing teachers already in the system. Like the other options available to increase supply, the challenge is with the quality of the approved providers and their monitoring.

## **2. Demand**

Teacher demand results from number of available teachers not equal to the number of teachers required by the education system. It means there are not enough teachers to teach enrolled learners in schools at that moment. Now this shortage or demand takes many forms which will be discussed, and is caused by various factors.

Factors explored in this paper include the role of legislation, natural attrition, unplanned attrition, economic factors and cost of education. It is important that teacher demand studies move away from aggregate studies, because these fail to analyse hidden demand. Hidden demand such as teachers teaching out of their area of specialisation, or teachers moving to other schools though they are not lost to the education system (Stinebrickner, 2001, Eide, Goldharber, 2004). Aggregate demand studies fail to address issues that are related to micro demand processes. From economics perspective teacher demand is a function of prices for the purchasing of teacher services and indicates the number of teachers the monopoly (government) is willing to purchase at a particular price. This economic definition also means potential teachers may stay out of the teaching market if the current prices the monopoly is willing to pay are below teachers' reservation price thereby increasing demand. From the government perspective there is always a trade-off between demand and price which results in increased or decreased demand for teachers.

Demand can also be looked from a policy view, namely that demand results from fixed policy imperatives such as learner:educator ratio. These determine how many teachers are needed, regardless of the available budget. Stretching this will be demand by learning area, educators with skills needed for inclusive education.

### **2.1 Legislation and country policies**

The level of teacher demand is a product of two processes taking place simultaneously. First is the legislation and policy governing how the education system operates. Secondly, technology employed in the process of teaching affects demand level.

Policy and legislation governing aims and standards of the education system affect the extent of stock demand. That is policy and legislation dealing with:

- the extent of the learner coverage (gross enrolment and net enrolment),
- the age of learners who qualify to be enrolled,
- whether the education is compulsory,
- prescribed learner attendance,
- whether education is free
- learner failure policy

Note too that included in legislation and policy are international agreements the country has signed on such.

The Bill of Rights in the Constitution of the Republic of South Africa, 1996 (No. 108 of 1996) establishes the right to education in these terms:

"Everyone has the right-

- to a basic education, including adult basic education; and
- to further education, which the state, through reasonable measures' must make progressively available and accessible" (section 29(1)).

All necessary resources that will ensure quality basic education and further education are therefore to be provided including an adequate quantity and quality educators as one of the key inputs into the education system.

Similarly, the South African Schools Act, no.84 of 1996 provides for compulsory attendance and commits the MEC responsible for education in each province to ensure that there are enough school places for all learners. By implication the state as a provider of public education has an obligation to provide quality educators to implement compulsory attendance provision. The Plan of Action to Improving Access to Free and Quality Basic Education for All (2003), seeks to operationalise the provisions of both the Constitution and the SASA. It addresses all the necessary aspects or inputs required to ensure improved access to free and quality education for all. Among other things, the plan addresses certain factors that will ensure provision of quality educators to offer quality education, job satisfaction etc.

South Africa is also a signatory to the Dakar Framework, which stipulates six goals towards ensuring basic education for all by 2015. Of the six goals, two have direct implications on the provision of quality educators in that they commit countries to expanding access to free and compulsory basic education for all children. And the government is to ensure that the learning needs for all young people and adults are met. Potentially this could increase enrolment figures where school coverage is not hundred percent. It also means learners will stay longer in the education system thereby implying an increased demand for quality educators.

The above and similar policies have the potential to increase demand for teachers. However, in South Africa learner coverage is almost 100% (Statistics at a glance, 2005). Meaning these policies are not increasing general stock demand because the gross and net enrolment shows the country to effectively reaching all learners at primary phase (GER is currently 97%, 2005 Statistics at a glance).

However, initiatives such as the commitment to Education for All and the government's strategy for mathematics, science and technology point towards the prospects of increasing enrolments and thus possibly increase teacher demand in order to accommodate the many learners who for example will be enrolling in mathematical literacy at FET phase. Policy determining the level of specialisation required to teach this learning area can increase demand or not.

### **Geographic Demand**

Population growth, decline, and migration from one area to another has the effect of increasing or lowering teacher demand (MCEETYA, 2003 ). Note that demand and supply will be at equilibrium from aggregate demand analysis since teachers in this case are exiting the profession (Bobbitt, et.al 1991, Lankford, Hamillton et.al 2005). However at micro level the picture might be different, with increased demand at certain areas because of rapid urbanisation. Areas experiencing rapid population growth will experience increased demand while others experience surplus. Depending on the flexibility of the working force the government will be able to respond or fail to respond to the changes in reality (Hoxby, 1996). Inflexibility of labour and government result in the existence of shortage within an environment of surplus.

Demand is made complicated by the difficulty in defining rural and urban. What is clear, however, is that there are some geographical areas and certain schools that pose serious recruitment and retention challenges. The defining factor about these geographic areas and schools is that they present difficult working and living conditions for teachers. Note that in other countries geographical demand is related to the characteristics of learners in those schools more than geographical lack of resources. For instance recruitment and retention difficulties are also experienced in urban “schools that serve large concentrations of poor and minority students in the U.S.A ” (Prince 2002). In South Africa there is an acute shortage of qualified teachers in rural schools compared to urban areas (Report of Ministerial Committee on Rural Education, 2005) and this is related to lack of resources found in schools and surrounding areas.

## **2.1 Teaching technology**

Demand for stock is affected by technology adopted in the education system.

Teacher technology focuses on four aspect of teaching. These are:

- Equipment to be used
- What is taught and learnt
- Pedagogy
- Educational organisation

The use of computers and other forms of media has not progressed to alter what happens in the classroom. However the electronic media can be used in the future to deal with teacher demand in certain learning areas (Williams, 1979).

The focus here is on the impact that pedagogy change has on demand. Introduction of new pedagogy by implication means there is demand of teachers trained in the new pedagogy (Gilford et.al, 1990, Hanushek, Rivkin 2004). Until teachers are trained whether through inset or preset there is a shortage of teachers even though teachers are currently teaching, this is another form of hidden demand. However, it is important to note in most cases this shortage is mostly hidden, because classes have teachers who are teaching. The impact of wrong teaching or misinterpreting the new pedagogy is seen in the learner performance. The introduction of OBE meant teachers who were qualified to teach in the old methods, had to be retrained in the

use of different methods. Teachers had the subject knowledge, but had to learn new ways of teaching and new processes of learning. According to Adler and Reed (2002) this training goes beyond tips on how to manage classes. It includes training on how to use specific discipline knowledge pedagogically and how this knowledge is acquired. The process of learning new pedagogy and its new demands puts stress on teachers as shown by the HSRC (2005) study. Adler and Reed (2002) suggest that effective inset is crucial to reduce teacher demand created by change of pedagogy. Inset service will also at the deeper level have to reduce demand for quality teachers, by dealing with poor training resulting from apartheid institutions.

### **Education reorganisation**

Similarly reorganising the education system has the effect of either increasing or decreasing teacher demand. For example reorganisation of standards governing:

- class size,
- learner: teacher ratio,
- average teacher contact periods,
- average teacher load it sets as the norm
- inclusive education

will have the effect of increasing or decreasing teacher demand.

For example decreasing the learner:educator ratio increases teacher demand. Currently the learner:educator ratio stands around 32.8 on average (Statistics at glance, 2005). Classroom ratios averages have decreased from 43:1 to 38:1 in 2000(HSRC) as more teachers were brought into the profession. A push to reduce learner:educator ratios will have an impact of increasing demand which has to weighed against the budget and impact on learning.

Implementing inclusive education fully means there is an increased demand, if the policy is to be fully implemented. The demand is in the skills that teachers should have to be able to respond to the inclusive education imperatives.

## **2.2 Attrition**

Teacher demand is also affected by the educator attrition rate. The attrition rate is affected by deaths, resignations, retirement, dismissals and temporary exits out of the profession. Demand resulting from retirements can be planned for by studying teacher age distributions. Similarly mortality rates and demand resulting from it can be anticipated and planned for by modelling the death rates in the profession. The difficult rate to plan for is the rate of resignations out of the profession or intra organisation teacher resignations.

Attrition should not be studied at aggregate level but instead some micro level of attrition analysis is important (Ingersol, 2001, Imazeki, 2005). Studying general attrition has the potential of leading to solutions that fail to focus on the causes of teacher attrition, thereby formulating policies that fail to address attrition directly.

Analytical framework for analysing attrition should include the analysis of **teacher characteristics**, **school characteristics** and **organisational conditions** (Ingersol, 2001) that leads to attrition. The **teacher characteristics**, such learning area specialisation, teacher ages, and their length of experience should be analysed to understand who leaves the profession or migrates to another school. Teacher characteristics are not the complete picture; this picture should include the analysis of **school characteristics**. School characteristics such as school size, class size, learner:educator ratios, socio-economic location of the school, and poverty of community should be mapped on teacher attrition. It is important to understand school dynamics that lead teachers to leave certain schools or even the education system. Attrition studies are incomplete if they do not study **organizational conditions** such as salaries, support from school administration, input into decision-making, lack of resources and amenities. Some aspects of the above framework will be used in understanding teacher demand arising from attrition.

In many developed countries teacher resignations represent the highest contribution to overall attrition (Ingersol, 2001, Hanushek 2004, Boyd, et.al 2005). The Mobile Task Team (MTT) Study (2005) and HSRC(2005) study done for the ELRC, found similar results in South Africa, namely that a significant amount of attrition is due to

resignations. The study of data over a period of seven years (1997-2004) reveal resignations represented an average of 49% of gross attrition compared with other seven possible causes of attrition which are death, dismissal, medical, retirement, severance and transfer (Table 1). Attrition due to death was not a leading factor in attrition during this period, even though HIV infection was found to be increasing at the same rate as the population as whole among teachers.

**Table 1. Percentage Terminations by Cause for Educators 1997/98 to 2003/4**

Year	Termination Cause Excluding Contract Expiry						
	Deceased	Dismissal /Desertion	Medical Reasons	Resigned	Retirement	Severance Package	Transfer
1997/98	7.0%	9.1%	4.6%	43.1%	6.5%	28.4%	1.3%
1998/99	12.7%	3.4%	7.5%	44.3%	13.0%	15.8%	3.3%
1999/00	15.5%	4.6%	9.9%	48.2%	15.9%	4.9%	0.9%
2000/01	15.9%	3.6%	9.5%	51.1%	16.7%	2.5%	0.6%
2001/02	15.6%	3.4%	8.6%	48.3%	14.1%	9.4%	0.5%
2002/03	17.4%	3.2%	8.3%	53.6%	16.1%	0.9%	0.4%
2003/04	17.7%	2.2%	8.7%	53.1%	17.7%	0.2%	0.3%

Source: MTT study

### Age attrition

Disaggregating the above attritions by age the study found terminations were high in the age groups 30 to 39 constituting 43% of all terminations. Although the study does not reveal the proportion of resignations by age group, a comparison with the mortality rates it is safe to conclude most terminations in this age group is due to resignation. This has serious implications, as educators in this age group would be the well qualified and experienced educators. The high rate of resignations in this group of educators means there are going to be lesser experienced educators in the system as older teachers retire. Retention of this group of teachers is important in formulating policies to reduce shortage resulting from this group of educators exiting the system. Note that the above percentages represent around 5.5% of the total

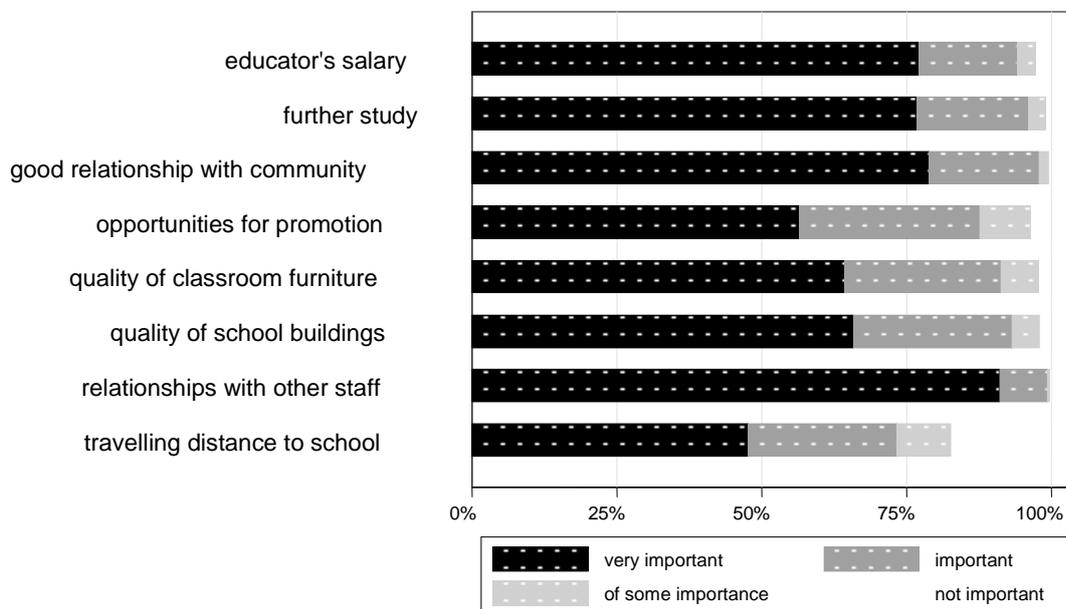
stock of teachers which is around 11500 teachers. The numbers are small if at the same time there is inflow of the same number of teachers into the system, which is not the case. However, note the above South Africa studies did not conduct micro analysis of teacher attrition in terms of subject and geographical area. This would have illuminated whether resignations are pronounced in certain geographic or learning areas.

The MTT study speculates that more opportunities, resulting from the impact of AIDS in other professions, are opening for teachers who are trained in learning areas such as English, mathematics, science and accountancy. Meaning teachers with human capital that has high premium in the market are likely to exit the system. The exits are likely to increase as the opportunity costs of staying in teaching increase and the monopoly (government) does not adjust the purchasing price of teacher services. However, the new salary and career pathways are a step in the right direction in curbing exits from this age group and older teachers (Doe, 2007).

We could not find micro attrition studies of nationally representative sample, in South Africa. In the international arena micro studies on attrition found that after controlling for teacher and school characteristics, organizational conditions are the largest contributor to teacher turnover (Boyd, et.al 2005, Dolton, 2004). These conclude that staffing problems are not as a result of a shortage of teachers but the way schools, and human resources is managed and how teachers are treated. The closest studies to micro analysis of attrition are those of the HSRC dealing with teachers' intention to the profession. Similarly to international studies, the HSRC (2005) found that the main reasons why South African teachers wanted to leave the system is mainly related to organizational conditions such as lack of career advancement, lack of job security, teaching methods and administration. Systemic evaluation analysis also shows teachers value relationships they have with other teacher and the community (

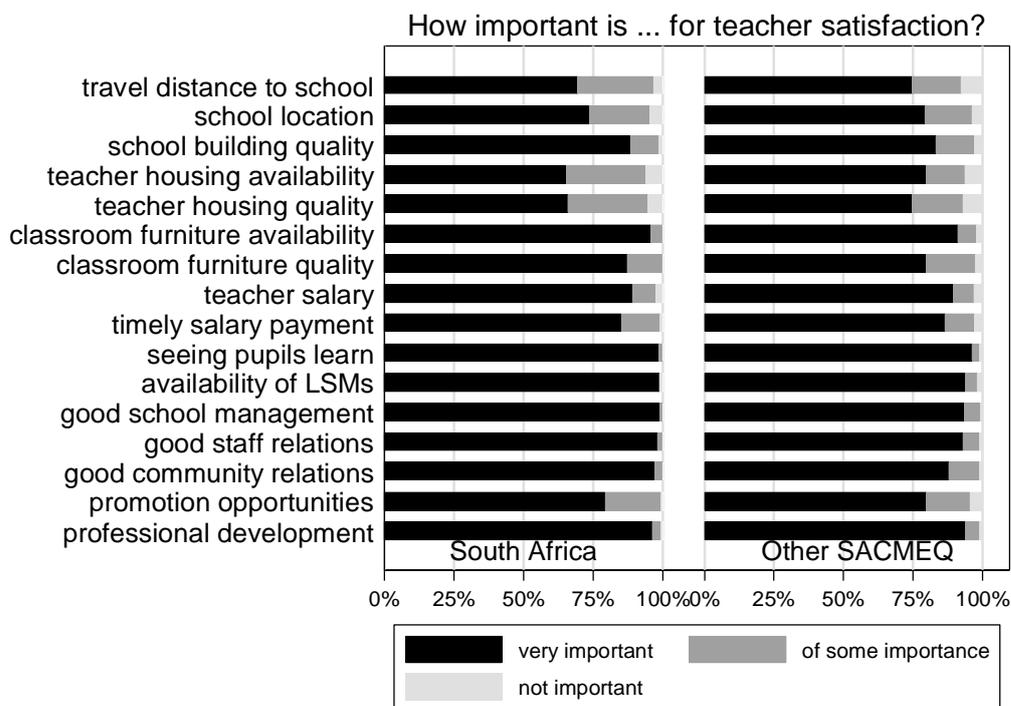
Figure 1). The data also shows teachers value opportunity to study further and their salary. Similarly, analysis of SAQMEC data reveals teachers value relations, opportunity for development and salary (SAQMEC, 200).

**Figure 1: What is important for teachers**



Source: Analysis of Systemic Evaluation dataset (2004).

**Figure 2: How important is ... for teacher satisfaction**



Similarly the Teacher Incentive Study (2006) found that teachers value the environment in the school along with teacher salaries. That means in an attempt to reduce teacher demand due to teachers leaving the profession the environment has to be conducive to retain teachers. The revising of salary scales and new career paths are a step in the correct directing in reducing demand caused by teachers exiting the profession.

The potential number of teachers who expressed their intention to leave was more than half (55%) of educators. These are mainly educators skilled in technology, natural sciences economics and management. Also important was that specific groups of educators likely to leave compared to others were characterized as non-Africans, males, those aged between 29 and 49, those earning medium to high income, those teaching technology, natural sciences economics and management.

Three key reasons educators sighted for intending to exit the professions are

- distance from school,
- low job satisfaction and
- high stress.

Further analysis of job satisfaction component found that educators were more likely to leave because of lack of career advancement and recognition) followed by lack of job security and lastly poor teaching structure (working hours/load/policies). In terms of the job stress component teacher were more likely to leave because of problems with teaching methods and administration which involves implementation of new curricula, pass requirements and reporting systems applying the OBE approach. That is teachers are more worried about the job intensification associated with administrative requirements associated with OBE.

Important note is that salary or pecuniary reward was not one of the key reasons for leaving the sector according to the report. Among the groups of teachers who are most likely to leave is the high-income group of teachers. Indicating the findings by Crouch (2001) that there was advantage in the initial years in teaching compared to other profession as having basis. However, teachers advantage declines as they stay longer in the profession.

The finding that educators in certain subject areas were more likely to leave than others may only be an indication that they perceive their skills in these categories to be more marketable than others and that given a chance educators in all subject areas may want to live. The challenge is therefore to develop a strategy that addresses all educators, as the issues raised are more organizational than inherent to certain categories of teachers. Key implications therefore are that key long-term intervention should be in the areas of career advancement and recognition, more support in terms of training and relief of workload.

The above studies show intention to exit and reasons for exiting the profession, not actual exits. They do indicate possible action the state can take to reduce these push factors out of the profession. Key to above analysis is the need to accurately identify problem areas related to turnover, in order to come up with focused policies. For example a conclusion that math and science teachers (teacher characteristics) leave the system at a higher rate than other teachers, might lead to a policy that focuses on retaining math and science teachers while ignoring the organizational conditions that led to those teachers leaving the system. In the first place organizational characteristics affects all teachers not only math and science teachers. Secondly, the observed different behavior among teachers according to learning area specialization in most cases is a reflection of differences in mobility rate. That is some teachers with particular human capital can easily find alternative opportunities than other teachers. If the conditions do not change those who remain behind but want to leave may consequently embark on less extreme behavior such as absenteeism and “passive job behavior” (Hall, A et al (2005). It is therefore important that teacher attrition be looked at in a holistic manner in order to develop appropriate retention strategies.

Another source of teacher turnover in developed countries is caused by teachers’ movement from one school to another or teacher migration (Ingersol, 2001). This aspect of turnover is ignored by aggregated studies of teacher turnover, because these teachers are not lost to the system. However, from a school’s perspective the school that is losing teachers to another school is experiencing shortage. And if migration is concentrated in certain schools, geographic area or communities, it

impacts negatively on school performance (Ingersol, 2001). In South Africa no studies on teacher mobility have been conducted, nor have micro studies on teacher turnover done to map the school characteristics from which teachers are migrating from or to. Reasons underlying the migration of teachers have also not been explored. Studies my MTT found less mobility taking place among teachers. During the years of study there was less than 2% of teachers who were transferring. This indicates inflexibility of the teacher labour force and the market. Teachers are not moving where shortage exist or the process of moving is difficult therefore discouraging movement.

Teacher content knowledge is another form of shortage that schools face. There is growing evidence of the relationship between teacher qualifications and student achievement. At the core of this relation is the correlation of teacher's subject area knowledge with student academic performance (Shen et al, 2004). In the South African context, there is consistently poor performance of learners in Mathematics and Science measured in terms of matric results. This can be attributed to the shortage of mathematics and science teachers, and where they exist the quality of they subject knowledge or pedagogic skills are pointed as problems. According to Shen et al (2004), teacher subject area knowledge is affected by the teacher's academic ability, impact of teacher preparation programmes on teacher effectiveness and certification standards which all contribute to student achievement. No studies have been made in the country to directly correlate teacher subject knowledge and learner performance. No have studies been done to correlate learner performance with institutions where teachers studied. Basically we do not know which training institutions develop effective teachers, in which learning areas, and for what kind of teaching conditions.

### **Salary**

Murnane, 2003 argues that teacher compensation structures of many countries, which is a uniform salary structure based on qualification and seniority or years of experience, are deficient in addressing staffing problems encountered by those countries. Such salary structures do not address scarcity nor able to respond to it or attract skilled teachers for mathematics and science (or scarce subjects) and attract teachers to work in rural areas Boyed, et.al 2004, Imazeki 2004).

The increased advantage in beginning salary will attract younger individuals into the profession (Imazeki, 2004). It should be noted that increased initial salary not only attracts talented individuals but also not highly talented individuals. The impact of salary on demand has not been done in South Africa. Thus we cannot with statistical certainty tell whether increased salary will attract enough individual into teaching. We are not even sure by how much the salary should be increased to reduce demand in mathematics and science. This is because we are sure of the demand elasticity of teaching.

As discussed elsewhere in this paper, there is a combination of factors that lead to a skewed supply of teachers, these factors range from economic (salary options in business and industry are more attractive for certain categories of teachers), level of participation in a subject area at school level (pool of potential teachers) and working and living conditions in certain geographical areas or schools (Murnane, et.al 1989, Murnane, 2003) This could lead to teachers being abundant in some learning areas while there is demand in others. Many countries consistently experience shortages in mathematics and science learning areas while experience oversupply in humanities and social studies (MCEEYA, 2003). Indicating that the South African challenge is not unique we just have to find innovating ways of dealing with excess demand in these learning areas.

## **SACE**

There is a critical role that SACE can play in analyzing demand and supply, as part of fulfilling its statutory role. As noted in the above review current analysis of supply and demand in South Africa is limited. Possible analyses by SACE will better clarify where the country is in terms of teacher demand and supply. The suggested analyses below are constrained by the mandate governing SACE but also recognizing its central role in dealing with demand and supply. SACE occupies a strategic position in providing systematic information on supply and demand of teachers that takes us beyond cardinal work that the HSRC has conducted. Otherwise, the picture of teacher demand and supply will continue to remain in the

realm of conjecture not specific data. That means policy makers will continue with planning that is not always based on real educational needs.

Firstly, SACE with other stakeholders will have to develop key teacher quality indicators. These should go beyond overall qualification, and specialization and other measures that indicate teacher quality. Currently, research on supply and demand does not factor the impact of quality and the distribution of this quality. Additional information needed is what the quality indicators reveal with respect to quantity-quality tradeoff, quality-price relation and projections on quality and quantity of teacher supply.

Secondly, since SACE is the licensing body the impact of teacher credentials it approves has to be analyzed. Which credentials, from which institutions are more likely to be employed by which province, school. The training that higher institutions provide continues not to be critiqued by independent bodies, and SACE is in a good position to start analyzing the content of higher education institutions. Are these institutions producing and attracting the kind of teachers the South African education system needs. For those teachers who are employed, are their qualifications matching the post they are employed in. This kind of analysis helps in analyzing how demand is being met by the supplied skills, or whether posts are filled by teachers not necessarily specializing in the learning area. Lastly, SACE will have to analyze how its licensing policy affects the attractiveness of the teaching profession therefore supply.

Third, SACE is concerned with teacher professionalism, it is therefore important that SACE analyses teacher attitudes about the many teacher development processes taking place. That is an analysis of the value teachers attach to different development strategies and courses and which are not relevant. Included in this is which programs in institutions of learning make a difference in the quality of educators.

Fourth, SACE will also have to track the professions that are competing with teaching. That what professions do individuals with teaching qualifications end up in. An analysis of these is more likely to give reasons why teachers are attracted into

these besides salary in these profession. Similarly, SACE will have to track the difference between individuals who register with SACE but do not enter formal teaching. These form of analysis function to understand the pool of teachers.

Fifth, SACE will have to analyze the quality of individuals entering for the first time into teaching. That is besides the learning area specialization, what marks did the individual attain while at university. These help in understanding the quality of individuals who stay in teaching.

The five suggested areas of analysis are likely to help in understanding of the current supply and demand for teachers. Tracking the above information over time will make it possible o model future demand and supply. Information from the above studies should make it possible to develop projection models that take into account policy in modeling demand and supply.

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