Teacher Wages in South Africa: How Attractive is the Teaching Profession?

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"Attracting qualified individuals into the teaching profession, retaining those qualified teachers, providing them with the necessary skills and knowledge, and motivating them to work hard and to do the best job they can is arguably *the* key education challenge" (Vegas and Umansky, 2005).

The above statement was written in the context of Latin American schools and opens the first chapter entitled "Improving Teaching and Learning through Effective Incentives". It is clear that the question of effective teachers and their role in educational performance is therefore considered pertinent internationally, and becomes increasingly important as the level of resources in communities decrease. A substantial amount of literature exists on policies designed to improve teacher quality. Such policies are broadly grouped into three categories: i) policies that aim to improve teacher preparation and the professional development of teachers; ii) policies designed to affect who enters the teaching profession and how long these individuals remain in the teaching profession; and iii) policies designed to affect the work that teachers carry out in the classroom (Vegas and Umansky, 2005). Although this paper looks at some of the literature on policies aimed at improving teacher quality, it serves more as a labour market overview of the wage structure facing teachers and how this compares to that faced by their non-teaching counterparts with similar levels of education and labour market experience, therefore focussing on the second of these possible explanations. The question this paper seeks to answer is" how attractive is the teaching profession from a labour market perspective?

1. The importance of teachers in achieving quality education: a case for effective incentives

It is widely believed by both teacher and non-teachers in South Africa that teachers are under-paid. Indeed, evidence exists that well-performing teachers are under-paid, and so at the upper end of the teacher skills distribution, the aforementioned sentiment may well be founded. However, considering mean student performance and mean teacher pay, it is very easily argued that teachers may in fact be over-paid, given the apparent lack of productivity associated with their work. One of the fundamental problems underlying this apparent lack of productivity is the fact that South Africa's teacher pay system barely differentiates between well- and badly-performing teachers. This largely results from the fact that data on teacher quality is rare, if it exists at all (Taylor et. al., 2011)

Internationally teachers are generally found to be under-paid relative to those employed in non-teaching professions, given their level of educational attainment and experience in the teaching force. It is often argued that this is the case because of the poor productivity of the profession relative to other professions. In the South African context, one is hard-pressed to argue that teachers should be paid more. Between 2007 and 2009, teachers experienced a 15percent increase in real terms in average pay, despite the financial crisis. In fact, even before this substantial increase, teacher pay in South Africa was exceptionally high relative to

per capita GDP. The question therefore becomes how teacher pay should be adjusted in order to attain higher performance within South African schools. What is required is a pay system designed to incentivise good teaching as well as one that links salary increments to experience in a way that disincentivises good teachers from leaving the profession. Indeed, top-performing teachers are often attracted out of the teaching profession and into private sector jobs with far more attractive wages (Taylor et. al., 2011).

The importance of teachers in the South African education system should not be underestimated. In terms of the distribution of public resources, the proportion spent on teachers is immense. Gustafsson and Patel (2008) point out that approximately 3.0percent of economically active South Africans are educators (although this is limited to educators who are publicly employed; this proportion increases to 4.5percent if all individuals classifying themselves as educators are counted), and the educator wage bill is roughly 3.5percent of GDP. In 2009, some 17.9percent of government spending was spent on education, and 81.5percent of that education spending was spent on teacher salaries (UNESCO, 2011) – a clear indication that an immense proportion of public spending on education is spending on personnel. It is therefore important to investigate and understand the performance of teachers as they constitute a considerable expenditure item in the government's budget.

Low teacher effort and low levels of teacher skills present a sizeable challenge in the South African education system. Many argue that low teacher effort is a greater challenge to educational performance than low level of teacher skills, which suggest that policy response in terms of teachers should be focused more on designed attractive incentive rather than on in-service training "solutions". Indeed, high levels of absence from classrooms, poor lesson preparation and very low levels of interest in the progress of learners are key signs that teacher effort is critically low in South Africa. It is often reported that such low levels of effort result from weak incentive systems. Furthermore, the structure of the teacher workforce, in particular the exceptionally strong influence that teacher unions have in the structuring of the workforce, make it impossible to even discuss changes to the status quo (Taylor, Spaull, Gustafsson and Armstrong, 2011).

In terms of teacher incentives, three key areas of empirical enquiry exist, namely the time that teachers actually spend teaching, whether or not teacher pay is considered adequate (as well as the structure of teacher salary scales), and the number of new teachers that are taken in annually. This paper is an attempt to clarify the situation with regards to the adequacy of teacher pay. It takes a look at the earnings of teacher in comparison to those of their nonteaching counterparts in the South African labour force (Taylor et. al., 2011), investigating whether the profession is considered attractive from a labour market perspective.

The paper tackles the question of the adequacy of teacher pay and the attractiveness of the profession as follows: Section 2 provides international examples of education systems that have done exceptionally well in attracting and retaining top-performing students to the teaching profession. It is acknowledged that the economic context of these education systems is completely different to the context in which the South African education system functions

and therefore the intention of the overview of these system is not a prescription for South Africa. However, it is nonetheless valuable to examine characteristics of the teaching profession in countries where teachers perform exceptionally well. Section 3 focuses on pay-for-performance systems in developing countries. The section also includes an analysis of the Chilean SNED system of evaluation – a system considered to be very well-planned and successfully implemented and one which South African researchers consider a useful and plausible template for the design of teacher incentives in this country. Section 4 presents the empirical wage analysis in which the wages of teacher are compared to those of non-teachers and non-teaching professionals, while section 5 provides a brief analysis of the academic performance of students enrolled for education degrees in comparison to those enrolled in other areas of study.

2. Attracting and retaining top-performing teachers

A key challenge in any education system is ensuring the quality of the teaching force. Countries differ in their approach to facing this challenge, with varying levels of success. This section briefly describes the approaches followed by various countries in which teaching is considered a prestigious profession.

An important question in assessing how countries ensure high quality teaching is whether they go out to recruit top performers for the teaching force, or whether once they are in the teaching force effort is made to enhance and improve their productivity. Finland, Singapore and South Korea are three countries who follow the strategy of employing academically superior candidates as teachers.

"MODEL" SYSTEMS: RECRUITING TOP-PERFORMERS TO TRAIN AS TEACHERS

In some of the world's best performing education systems, it is widely believed that "the quality of an education system cannot exceed the quality of its teachers". As a result, these systems have developed a strategic, systematic approach to convincing top academic performers to join the teaching force (Auguste, Kihn and Miller, 2010). Despite differences in the exact approach taken to achieve such academically superior teaching forces, all of these systems share the objective of ensuring that every student, regardless of their socioeconomic status is taught by an effective teacher, and that once individuals have entered the teaching force, they remain in the profession and establish a career (Auguste, Kihn and Miller, 2010).

Education systems achieving marked success internationally ensure that the best candidates enter the teaching profession right from the beginning rather than attempt to improve the performance of teachers once they have already entered the teaching profession (McKinsey,

2010). Teaching in these countries is also a highly selective profession, and recruitment of best performing academic candidates is crucial in their education strategy (McKinsey, 2010).

These countries are described as following a "top third +" recruitment strategy, according to which the best academic candidates are selected to enter the teaching profession. Candidates are subject to a rigorous selection process, and upon selection (based on academic criteria), they are screened for qualities that would render them well-adapted to the teaching profession, such a perseverance, communication and organizational skills, love of children. It is these "soft skills" that account for the "plus" in the top third + idea. It is therefore acknowledged that academic ability may not necessarily translate into pedagogical skill or classroom effectiveness. A large investment is therefore made in the training of the candidates selected to become teachers. Academic ability is however considered to be a minimum threshold for entry into the teaching profession as a combination of high order skills are involved in becoming an effective teacher (McKinsey, 2010).

Three education systems considered to be particularly successful are those of Finland, Singapore and South Korea. Finland was ranked first for Science and second for both reading and mathematics on the Program for International Student Assessment (PISA) of 2006. Importantly, there was a very little difference between the best and worst performing Finnish schools on the tests. South Korea was ranked first for mathematics and forth for reading on the 2006 PISA tests. Singapore performed exceptionally well in the Trends in Mathematics and Science Studies (TIMMS), ranking first for both subjects in 1995, 1999 and 2003, and ranking within the top three in both subjects in 2007. A common characteristic in all three education systems is the superior quality of their teachers. Although each education system has a different approach to attracting and retaining high quality candidates to the teaching profession, common to all of them is the recruitment and retention of these top third + candidates (McKinsey, 2010).

SINGAPORE

Director of Singapore's National Institute of Education (NIE) Sing Kong Lee explains that developing a high quality teaching force depends on both attracting top candidates to the teaching profession and on ensuring that they receive the best possible training.

The NIE is the only institute in the country that provides teacher training, guaranteeing high quality training for candidate teachers. The number of vacancies at the institute is limited to the predicted number of vacancies in the teaching profession in Singapore, therefore guaranteeing teachers a job in the teaching force (Sclafani, 2008)..

Compensation plays a key role in attracting top candidates to the profession, and it is widely acknowledged that candidates of the academic calibre that is required to enter the teaching profession are likely to have a wide range of options in terms of career choice. Labour market salary trends are monitored to ensure that teacher compensation remains competitive. Teachers' salaries are generally equal to that received by their nonteaching peers by the time

they reach about 40 or 50 years of age. Retention bonuses are paid at set intervals, resulting in exceptionally low attrition rates (1 percent to 2 percent). Teachers also receive performance bonuses (in a number of forms) equivalent to between 10 percent and 30 percent of teachers' base salaries.

Evaluation is central to the awarding of bonuses and performance incentives. A year round system is in place according to which teachers are evaluated on a large range of indicators. Importantly, teacher value the evaluation process and consider it to be beneficial to them. The system becomes a template for mentoring and coaching of teachers.

Tuition and fees are paid for by the Singaporean government and candidate teachers receive a salary for the duration of their teacher training. Candidates enrolled at a graduate level receive a salary equivalent to what they would have received had they been employed in the civil service. Upon completion of the teacher training program, candidates are expected to serve in the Singaporean education system to avoid having to repay the cost of their teacher training. Importantly, teacher training is confined to one institution nationwide,

Selection into teaching is very prestigious and criteria to enter the profession are very high. Candidates must fall within the top 30 percent of their academic cohort judged by their performance on school grades, national examinations and their performance on the teacher entrance proficiency exam. Following academic qualification, candidates are evaluated qualitatively through interviews and observations in order to evaluate their pedagogical skills, their professional values and whether they are equipped with the necessary skills to perform well in a classroom environment.

Professional development is taken very seriously amongst teachers in Singapore, with three career paths being offered to teachers. Teachers interested in running schools or groups of schools are encouraged to pursue a "leadership" path. A "teaching" is also offered for students who have a passion for the actual teaching of students in the classroom, enabling them to move from the rank of "beginner" teacher to a "senior" or "master" teacher. Finally, the "specialist" track is a post-graduate track for students interested in working as assessment and curriculum specialists. Indeed, a large amount of support and cooperation exists between teachers at different levels of their careers. Teachers that are relatively further along their career paths provide mentorship for candidates entering the teaching profession, and time is allocated on a weekly basis for collaboration in the area of professional development. 100 hours of paid professional development is received by teachers each year. This emphasis on professional development does much to enhance the status of the teaching profession in Singapore.

FINLAND

The Finish education system is characterised by a very high level of equality, with schools performing in the lowest decile achieving average marks higher than the OECD median. It is therefore clear that educational quality is high throughout the Finish education system.

Selection into the teaching profession in Finland is highly competitive, and once candidates have been selected to enter the profession, they are required to obtain a master's degree in a five-year program. Students must fall within the top 20 percent of their secondary school academic cohort. Students qualifying to apply to teach are examined in the first round of screening, after which only the top performers are invited to write an exam based on education literature. This is a further round of selection, after which top performers on the second exam are interviewed and screened on "softer" skills in order to ascertain whether or not they are likely to excel in the teaching profession. This third round of screening also includes a "micro-teaching exam", in which students are evaluated in a classroom-like setting so that examiners are able to observe whether or not students work well with children (August, Kihn and Miller, 2010).

Compensation for Finnish teachers is surprisingly modest, with teachers earning approximately 81 percent of per capita GDP. Performance pay and bonuses are no rewarded to teachers. Graduate level training for teachers is paid for by the Finnish government, and students receive a living stipend. Interestingly, the complete absence of union politics within the Finnish teaching profession differentiates it quite substantially from the profession in other countries (Simola, 2005).

Prestige is widely believed to account for the popularity of the teaching profession amongst top-perfomring students. Indeed, the traditionally favoured professions like lawyers, psychologists, physicians, engineers and journalists all trail teaching in terms of applications at Finnish universities (Simola, 2005). It is said that "people know that if you've been trained as a teacher you must be something really special" (Pasi Sahlberg in August, Kihn and Miller, 2010). As a result of this signal of high quality emanating from the teaching profession, teachers have a substantial amount of autonomy in their work and are well-trusted by the public and the political and economic elite (Simola, 2005). Teachers have a significant amount of authority in school policy and school management, textbook selection, course content, student assessment and budget allocations within schools and importantly, are left to teach the prescribed curriculum in the way that they see fit (August, Kihn and Miller, 2010).

SOUTH KOREA

Interestingly, elementary teaching in South Korea is considered considerably more prestigious that secondary teaching. The reason for this uncommon trend is that severe shortages in secondary level teachers existed in South Korea in the 1960s and 1970s, resulting in the creation of many new training institutions for secondary teachers. As a result, later decades were characterised by a huge oversupply of secondary school teachers which has rendered this area of the teaching profession considerably less attractive to top performing students (August, Kihn and Miller, 2010).

Selectivity into the teaching profession is considerable in South Korea, with the minimum entry requirement being achievement in the 95^{th} percentile on the college entrance exam (the equivalent of US SAT exams).

Compensation is a very attractive characteristic of the teaching profession in South Korea. Although students are expected to pay their own tuition fees for teacher training, they are guaranteed job placement upon graduation since the availability of openings for primary school training is closely monitored by the South Korean government and it is ensured that the number of available slots matches the education system's demand for primary school teachers. Furthermore, Korean teachers are guaranteed teaching positions for life. In terms of salaries, primary school teachers in South Korea rank between doctors and engineers, with the starting salary for teachers at 1.2 times per capita GDP and the maximum teacher salary reaching 3.4 times per capita GDP (August, Kihn and Miller, 2010).

Finland, South Korea and Singapore are interesting and inspiring examples of "getting it right" in terms of ensuring the quality of teachers. Indeed the idea of a "top third plus" recruitment strategy seems highly attractive. However, the South African context differs greatly from these 3 countries both economically and from an educational perspective. While it is useful to examine the possibilities and realities in countries that perform exceptionally well, it is also important to understand how countries that are more similar to South Africa tackle the challenge of quality education and more specifically, a quality teaching force. This is examined in the next section.

3. Pay-for-Performance – evidence from developing countries

Internationally, teacher salary scales are highly compressed and it is only very rarely that movements along salary scales are linked to individual performances. There is also very little consistent evidence internationally pertaining to whether teacher salaries are high enough to offer competitive average remuneration for high-capacity individuals to enter the teaching profession. However, it is widely observed that the stringent linkage of teacher salaries to seniority and the relatively flat salary progression over teachers' careers combine to produce relatively weak incentives for teachers to perform as best they can. Indeed, Hoxby and Leigh (2004) observe that the large-scale move of high-ability women from the teaching profession to other professions was motivated more by the "push" factor of compressed salary scales than by the "pull" factors of more lucrative and therefore more attractive jobs in non-teaching professions. Attempts to remedy this situation by introducing systems in which teacher pay is adjusted according to some indicator of performance have been introduced throughout the world. Such schemes all aim to introduce some measure of variable annual remuneration dictated by the level of performance of teachers or teams of teachers, generally at the level of the school (Bruns, Patrinos and Filmer, 2010).

Performance pay systems differ according to what they reward and whether the rewards are awarded to individuals or groups. In terms of the what is rewarded, performance pay may be based on student learning outcomes, student outcomes separate from learning outcomes, teacher input measures or a combination of these (Bruns et. al., 2010).

Individual bonuses based on student learning outcomes

1. Andhra Pradesh (Muraldiharan and Sundararaman, 2009)

An example of performance pay on an individual level based on student learning outcomes can be found in an experiment conducted in India. In this study, individual teacher bonuses were awarded in 100 schools, bonuses were awarded to groups of teachers in 100 schools, an extra contract teacher was provided in 100 schools and a school grant was awarded to 100 schools. 100 schools were also included as a comparison group. The study was conducted over 2 years, and performance bonuses were promised to teachers at the beginning of the following school year. Bonuses were awarded to any teacher or school managing to increase student test scores by at least 5 percentage points, with higher increases being awarded with larger bonuses. Individual- and group-level bonuses were paid at the beginning of the next school year, and block grants and extra contract teachers were provided unconditionally at the beginning of the school year.

Following 2 years of the program, both group- and individual-level bonuses were effective in increasing student test scores, with students in these schools performing considerably better than their counterparts in other schools. Importantly, it appears that the improvement in student performance was driven by enhanced teacher effort rather than decreased absenteeism, with teachers appearing more likely to have assigned class work and homework, provided extra classes after regular school hours, paid extra attention to weaker learners and provided practice tests.

Importantly, at the end of the 2 year programme, significant differences existed between individual- and group-level bonuses, as well as between schools receiving teacher bonuses and those receiving either block grants or extra contracted teachers. Individual incentives increase student performance on tests by 0.27 standard deviations in comparison with an increase of 0.16 for group incentives. Input strategies (block grants and extra contracted teachers) also improved student performance, but by a substantially smaller amount – 0.08 standard deviations.

2. Israel (Lavy, 2009)

A tournament-type bonus programme in Israel ranked teachers based on their value-added contributions to matriculation marks of their students after controlling for socioeconomic characteristics, grade level, their level of study and school-level fixed effects. The design of the incentive program allowed for an approximate randomized trial of the offer. Significant positive effects on student achievement were observed, with increases being observed in test-taking amongst high school seniors, average scores and average pass rates in both mathematics and English. Teachers in school for which the incentives were offered reported interesting modifications in their behaviour compared to teachers in control schools. Teachers in treatment schools were significantly more likely to track students by ability in the classroom, offer extra classes after school and to adjust their methods of instruction to the

individual needs of students. As a result, an increased proportion of students took the mathematics exam relative to what the proportion would have been had the incentives not been offered. All test takers also showed higher pass rates and higher average scores.

Interestingly, it was observed that teacher effectiveness (as measured by their success in obtaining the bonus on offer) was uncorrelated with their observable characteristics (such as education level, gender, age, years of experience or certification level) but was correlated rather with the calibre of university that the teacher attended. A significantly higher level of effectiveness was observed amongst teachers who graduated from top-ranked Israeli universities in comparison to those who attended teacher colleges or less-prestigious universities.

3. Kenya (Glewwe, Ilian and Kremer, 2010)

The incentive program run in 50 rural schools (with a control group of 50 schools) in Kenya awarded in-kind prizes (such a bicycles) which were valued at a significant proportion of a typical forth- to- eighth grade teacher salary, for improvements in average student performance over 2 years. The prizes were awarded as group incentives, and performance was measured as improvement from baseline test scores obtained on Kenya's district-wide government exams. Prizes were awarded for "top-performing" schools and for "most-improved" schools, with schools being eligible for awards from only one category. Three prizes each were awarded for first, second, third and forth place, resulting in 24 out of 50 schools receiving prizes. Teachers therefore felt that the reward was obtainable. A higher proportion of students in schools for which rewards were offered compared to control schools, achieved gains in test scores. By the second year, an average gain of 1.4 standard deviations was observed in treatment schools, with the largest effects being observed in geography, religion and history (roughly 0.34 standard deviations in the first year, and 0.2 standard deviations in the second year of the program), followed by mathematics and science (with improvements of 0.2 and 0.15 standard deviations, respectively). However, these improvements did not persist. Differences in test performance had disappeared a year after the program had ended. Glewwe, Ilias and Kremer (2010) speculate that the introduction of rewards resulted in a short-run focus for improving test performance. So, for example, they suspect that teachers may have focused more on short-run approaches such as increased coaching in test-taking techniques rather than an increased focus on pedagogical adjustments that may have resulted in longer-term learning gains. No evidence of behavioural changes was observed, with teacher absenteeism failing to decline over the period for which the rewards were offered. There was also no evidence that more homework was assigned relative to the baseline year. However, during the second year of the program, schools that were eligible for rewards were more likely (by 7.4 percentage points) to conduct extra exam preparation classes. Interestingly, when researchers changed the format of the exam written by students from the format in which the government exams were presented, there was no difference in the performance of schools who were eligible for performance bonuses and

control schools, suggesting that the benefits of increased exam preparation classes was limited.

Bonuses based on learning improvement plus other outcomes (Group-Based)

1. **Pernambuco, Brazil (Bruns et. al., 2010)**

The Brazilian government's establishment in 2007 of the Index of Basic Education development (IDEB) is central to Brazil's incentive structure that awards schools for improvements in student performance as well as other characteristics. IDEB captures school performance on Prova Brasil test results (national assessment conducted every two years for all fifth, ninth and twelfth grade students in maths and language) with administrative data on enrolment, repetition and grade promotion. Importantly, IDEB results are reported widely in the Brazilian media and targets for each school within the 26 state and 5564 municipal school systems have been established by the federal government.

The state of Pernambuco implemented an incentive system in 2008 which rewarded school staff for the attainment of school improvement targets. All schools achieving at least 50percent of the target set by the federal government received bonuses proportional to their level of achievement, up to a maximum of 100percent. The size of the bonus is substantial by international standards since state education departments budget an additional month's payroll for the program each year, and so if less than 100percent of schools achieve the bonus, the mean bonus will be greater than an additional month's salary. Schools achieving less than 50 percent of their target receive nothing. School directors have no say in the distribution of the bonus, with each teacher in the school receiving equal percentage bonuses on their monthly salary.

The initial targets are established according to which quartile of the performance distribution into which schools fall, with performance targets being more or less ambitious according to the quartile. The differentiation of targets allows for a analysis of how achieving targets in one year impacts on the likelihood of achievement in subsequent years, as well as analysis of how the achievement of targets and receiving a bonus is likely to impact on teacher behaviour.

The program was widely accepted by schools in Pernambuco, where 64 percent of school principals indicated that the program was appropriate and 66 percent indicated that they experienced the policy as having a positive impact on their schools, regardless of whether or not they received the bonus. Furthermore, schools for whom targets were more ambitious achieved greater student progress than those with less ambitious targets. Indeed, learning levels across the state increased substantially, with language score improving for the eighth and eleventh grade by 0.44 and 0.57 standard deviations, respectively (although it must be noted that because the program was applicable across the entire state, these gains are raw score gains and not gains relative to any comparison group). Interestingly, schools that narrowly missed achieving the bonus in 2008 improved by a greater amount in 2009 than did

schools who barely achieved it. It therefore appears that not receiving the bonus improved school motivation and performance. Finally, schools in which teachers spent a larger proportion of time on instruction had a much greater likelihood of achieving the bonus.

In terms of the effect that the bonus system had on teacher behaviour, it was found that in schools in which there was high prevalence of the teacher being off-task, the impact of this on student performance was significantly larger in schools that did not receive the bonus in subsequent years than on schools that did. Overall, teachers in schools achieving bonuses spent considerably less time on activities other than teaching and were also observed (in unannounced visits to the school) to make greater use of classroom resources. The causality of "better" teacher behaviour cannot be inferred from the analysis conducted on the schools in Pernambuco, and it is not clear whether the disparity in teacher behaviour reflects greater incentive to perform well or whether students in schools achieving the bonus are better students and easier to teach and manage. However, the fact that bonus-achievers came from all parts of the performance distribution, including a substantial number of low-performing and low-income schools suggests evidence that the performance bonus may well induce improved teacher behaviour.

2. Israel (Lavy, 2002).

A tournament-type incentive structure put in place in 1995 amongst 62 non-randomly selected secondary schools was designed to improve academic achievement and reduce dropout rates. Three performance measures were used to evaluate the program: the proportion of students receiving a matriculation certificate, the average number of credits per student and the dropout rate of the school. School average outcomes were normalized relative to an expected score (obtained by regressing the performance measures on measures of students' socioeconomic status). Schools were then ranked according to their level of improvement in mean outcomes, with awards being given to all teachers within the top third. 75 percent of the awarded bonus is received by teachers, while the remaining 25 percent was allowed to be used for school improvements. The size of the bonus received by teachers was substantial, amounting to between 10 and 40 percent of mean monthly salaries, depending on the size of the award received.

It was observed that the monetary incentive put in place had some impact on student performance in the first year of the program, but that by the second year significant gains in student performance were observed in all schools. Indeed, the award increased both average test scores in matriculation exams and the number of credits taken by students. By the second year of the program, average exam scores in treated schools had increased by 2.4 points more than in comparison schools – an increase of 1.2 standard deviations. Furthermore, treatment schools also increased the number of student gaining matriculation certificates and reduced the dropout rate in the middle- to high-school (grades 7-9 to grades 10-12) transition.

This monetary intervention was compared to a similar intervention in which schools achieving improvements were rewarded with in-kind resources like teacher training courses

with the same monetary value rewarded in the former intervention. This resource intervention also resulted in statistically significant improvement in the performance of students, but the size of the gain was substantially smaller than it had been in the case of the monetary reward. Given that both interventions had equal cost, it was concluded that the school bonus program was somewhat more cost-effective than the resource program.

Bonus based on teacher input

1. **Kenya: pre-school teacher bonus programme (Kremer, Glewwe, Chen and Moulin, 2001)**

   A program in rural Kenya was evaluated in which individual pre-school teachers were awarded bonus pay for regular attendance. The bonus was large – the equivalent of three months' wages if the teacher was not absent at all. Using unannounced random visits to monitor the impact on teacher attendance, it was found that the program had no impact on actual teacher attendance. Furthermore, no evidence existed of changes in teachers' pedagogical practices, student test scores or student attendance (although the argument exists that teacher pedagogy and student test scores are noisy indicators at a pre-school level).

   It was found that school principals merely distributed the full bonus to all teachers irrespective of their attendance levels. It was therefore clearly difficult for school principals to fulfil a strict monitoring role at the school level.

2. **Rajastahn, India: "Camera" program (Duflo, Hanna and Ryan, 2010):**

   A randomly selected group of rural NGO-run schools in Rajasthan were selected to measure the effects of a schedule of monthly bonuses and fines for teachers awarded on the basis of attendance using daily date- and time-stamped photographs. Photographs were taken of the teacher with their class at the beginning and the end of each day, and teacher salaries were adjusted according to the number of "valid school days" (in which the school was open for a minimum of five hours and at least eight students were in each picture). Teacher activity was also observed by unannounced visits to "camera" schools and to control schools.

   The maximum bonus possible (received by teachers with zero absenteeism) was worth 25 percent on teachers' monthly salary. The program spanned three years and had a substantial effect on teacher absenteeism which diminished from 42 percent in treatment schools to 23 percent. Although classroom behaviour and pedagogy didn't appear to experience any changes, student test scores increased by 0.17 standard deviations and there was a significant rise in the graduation rate of students to the next level of schooling. On average, children in treatment schools experienced significantly more time in school each month: 2.7 more days of schooling per month were recorded.

From this example and the one before it, it is seen that it is indeed possible to encourage higher teacher attendance with bonus pay, but fundamental to the success of the strategy is the credibility of the system used to monitor teacher attendance.

Overall evaluation of the evidence

Robust evidence from developing countries suggests that learning outcomes can in fact be improved using pay-for-performance incentive structures. However, no study has analysed the long-term effects of performance-pay. Experience and theory in the field of performance-based rewards in other areas highlight the scope for gaming, cheating or teaching to the test to arise once teachers have become familiar with the "rules of the game". Indeed, as performance pay becomes more closely linked to student test results (as it logically should be) internationally, the validity of the tests upon which teacher performance is measured becomes increasingly challenged as a valid measure.

Finally, pay-for-performance bonus systems in developing countries share some overarching characteristics that are worth mentioning. These include:

- Weak performance monitoring and accountability systems
- Relatively weak teacher professionalism
- Relatively large teacher bonus size
- Focused performance metrics, with greater emphasis being place on a smaller number of measurable results that can be easily observed
- "Fair" performance metrics in which rewards are allocated on a value-added basis and schools are compared to other schools with similar geographic and student socioeconomic characteristics and not on the basis of absolute level of performance
- Rewards are linked to results from the prior periods.

Teacher incentives in Chile: a potential template for South Africa

A country that may serve as a good comparator for South Africa is Chile. A middle-income and democratic country, Chile like South Africa experienced political transition from the military dictatorship of Pinochet in 1990. Since then, Chile has performed above average economically amongst developing countries, achieving economic growth of 5.6 percent between 1992 and 2003 (World Bank, 2005). Chile embarked on extensive education reforms prior to its transformation to a democracy. The objectives of these reforms were largely similar to those of the education transformation process in South Africa, namely greater

equity in the quantity and quality of education received by learners from different socioeconomic backgrounds, improving learning outcomes in a way that is pro-poor and strengthening the relationship between teacher trade unions and government (Gustafsson, 2006*). Education governance in Chile is considered to be very strong and South Africa may stand to learn much from the policies that have been put in place there.

An essential part of teacher incentivization in Chile is the measurement of learner performance. The System for Measuring the Quality of Education (SIMCE) was introduced under the government of Pinochet but has been adapted and retained since democracy in 1990. The objective of SIMCE is the identification of schools in special need of interventions. It is conducted yearly and involves the testing of an entire grade (approximately 300 000 learners), either grade 4, 8 or 10 (alternated cyclically), therefore ensuring that each grade is tested every three years (Gustafsson, 2006). Importantly, the tests are marked a at a single national centre and reports on the performance of schools (down to the level of individual school) are made available to the public (Delannoy, 2000). Importantly, schools are divided and compared to school that fall within the same socioeconomic category as them. However, this forms the ground for an important criticism of SIMCE – it encourages and permits school principals to over-state the school's poverty level, therefore enabling the school to compete against weaker performing schools. Furthermore, weak performing learners may be discouraged from attending school on the day that the testing takes place (Delannoy, 2000). SIMCE is generally considered to be successful, however.

Teacher incentives in the Chilean education system have been introduced in phases. Importantly, the different phases of incentives were designed to improve and enhance those introduced in the previous phases, introducing new elements as teachers were deemed to ready to cope with the new levels of incentives to be introduced by each phase.

Phase 1 (1991): Incentives not linked to performance. The 1991 Teacher Statute introduced a system designed to reward continued service as a teacher. Part of the monetary incentives introduced in Chile in 1991 are those directed towards teachers in difficult-to-teach urban schools and remote rural areas – an aspect that may be interesting for South African planner to consider, given the great need for quality teachers in very unattractive teaching areas (Gustafsson, 2006). The introduction of the Minimum Basic Pay benchmark according to which calculations for the majority of incentives are done in the Chilean education system was a particularly useful stipulation. A 2003 regulation of the 1991 Teacher Statute details a 12 point index of school remoteness or difficulty, attaching various values to each indicator in order to ascertain the size of the incentive necessary to compensate for the remoteness and difficulty of the school. Provincial authorities then distribute earmarked funds as incentives through teacher salaries to those teaching in the most remote, rural and difficult schools.

Phase 2 (1996): Collective performance incentives were introduced with the 1996 Full School Day reform programme. As part of this programme, the National Performance Evaluation System (SNED) was introduced, according to which all teachers in a well-

performing school are rewarded. SNED was designed according to lessons learned from teacher incentive systems internationally, including:

- Rewards for teachers are more effective when an entire teaching team are rewarded, as this promotes a degree of collaboration and team work;
- Merit-pay systems must take account of differences in socioeconomic status amongst schools and learners;
- Desired school characteristics and teacher behaviour should be reflected in the eligibility criteria and evaluation system of the incentive system;
- Fairness, transparency and social acceptability are very important in the public's perception of the evaluation and reward system (McMeekin, 2000).

SNED is conducted biannually and is heavily reliant on learner performance data provided by SIMCE. Schools are compared within regions (of which there are 13) and within socioeconomic groups (of which there are 5), resulting in 65 groups in which SNED comparisons are done. The top 20 percent (approximately) of performers in each group are considered to be outstanding performers and receive additional funding for 2 years, 90 percent of which is paid to teachers as a monetary incentive, and 10 percent of which is allocated to school and which may be spent according to the schools own development plan. The money rewarded to teachers in outstanding schools amounts to approximately a month's salary, effectively providing a 13th pay check for them.

SNED is based on a number of indicators and not entirely on the learner performance data gained from SIMCE. Gustafsson (2006) provides a breakdown of the weights and data type used for SNED.

Table 1: Weights in SNED evaluation

Quality	Weight	Type of data
Effectiveness	37percent	Raw SIMCE school score
Value added	**28percent**	**Improvement in SIMCE score since previous SIMCE**
Capacity for initiative	6percent	School governance features
Improvements in working conditions	**2percent**	
Equality of opportunities	22percent	E.g. learner retention and graduation rates

Source: Gustaffson, 2006.

Importantly, it is reported that roughly half of school have received SNED incentives at some stage.

Phase 3 (2000): Individual performance incentives not tied to the evaluation system. The Teacher Evaluation System was put in place in 2000. A substantial amount of time passed between its initial proposition in 1991 and its actual implementation because the Ministry of Education and teacher labour unions did not agree on the design of the system. Evaluation are intended to happen every 4 years, and involve four items: documentation from the teacher related to assessment of learners, a series of the teacher's lesson plans, reflective notes produced by the teachers and a 40 minute video recording of a lesson. University-based evaluators then assess the material and classify teachers as either excellent, competent, basic or unsatisfactory (Gustafsson, 2006). A number of non-monetary incentives exists for good performance in the Teacher Evaluation System, namely the eligibility of good performers to participate in the Ministry's overseas experiential learning programme.

The Pedagogical Excellence Award (AEP) was also introduced during this phase. This award is a monetary incentive and it is relatively independent of the Teacher Evaluation System. Teachers are divided into four segments according to their years of education, with teachers in the first segment having between 2 and 12 years of teaching experience, teachers in the second segment having between 12 and 21 years of experience, and so on. A quota of AEP is established for each region, and the competition involves teachers submitting a portfolio of their methodology and writing a test covering both subject content knowledge and methodology. Winners receive a monetary award roughly equal to a month's salary for all the years in which they remain in their segment. Importantly, although some 6 000 awards are provided for by the Ministry, only a small group of teachers actually receive the award – 1500 received it in 2004 and 722 teachers received it in 2005. It is clear, therefore, that the AEP has a very small reach. Teachers do not seem to consider it worthwhile to enter the competition. In addition to its role as an incentive program, the AEP serves as a selection system into the Network for Teachers' Mentors – a remunerated programme. AEP recipients may therefore be seen to have a double monetary incentive, with the financial award received for good performance and with the opportunity to earn additional money as part of the Network for Teachers' Mentors (Gustafsson, 2006).

Phase 4 (2004): Individual performance incentives tied to the evaluation system. As from 2005, teacher who achieved an "excellent" or "competent" rating on the Teacher Evaluation System are able to take a test administered on one day of the year at a national level (held on the same day as the AEP evaluations are held), according to which the Variable Allocation for Individual Performance (AVDI) is awarded for good performance (Gustafsson, 2006). The AVDI amounts to between approximately 15 percent and 25 percent of the Minimum Basic National Pay. Importantly, teachers who are not yet eligible to be evaluated for AVDI may still apply for AEP (Gustafsson, 2006).

Finally, a very interesting and controversial incentive in place in Chile is the Demerit List system. According to this system, a teacher receiving unsatisfactory ratings in the Teacher Evaluation System for three consecutive years, despite receiving rigorous profession support

and the assistance of an assigned tutor, will be dismissed and will receive a dismissal package. Importantly, teacher unions have agreed to this (Gustafsson, 2006).

Lessons for South Africa: Chile's incentive system provides potentially valuable lessons for South Africa. The first of these is the extent of the reach of incentive systems in Chile. SNED reaches roughly 20percent of teachers at any one time in Chile, while AEP is confined to a much smaller group of high quality elite. This may prove quite useful in the sense that incentives are not based on unattainably high standards of excellence, but a method to distinguish exceptional performance exists. A second aspect of the Chilean school level incentive system is that it explicitly controls for the socio-economic background of schools. However, the more exclusive individual level incentive system does not control for socio-economic status. This may be useful in a South African context, given the massive disparity in poverty levels amongst South African schools. Indeed, student performance in South Africa is largely delineated along socio-economic lines and so it would be perfectly justified to take this into consideration in the allocation of financial rewards. However, there is no apparent reason why the socio-economic background of a school should be taken into consideration in the allocation of individual teacher awards. In the Chilean case, this is made possible by the fact that student evaluation data is used to award school level incentives, while teacher level incentives are based purely on evaluations conducted for teachers – a further aspect that may prove successful in South Africa (Gustafsson, 2006).

Developed and developing countries: different strategies for different settings

Sections 2 and 3 have illustrated an important difference in the strategy between developed and developing countries in terms of ensuring adequate performance by teachers in the education system: developed countries (or developed countries in which educational performance is considered exemplary) go to great lengths to ensure that the quality of individuals employed as teachers is exceptionally high, therefore placing considerable efforts in ensuring that the ability of the individuals entrusted with the responsibility of educating students is never in question. The teaching profession is therefore "incentivised" from the time that individuals join the profession. Developing countries, on the other hand, do not have the capacity to offer top-performing candidates a "competitive" wage in comparison to what they would receive, given their ability in non-teaching professions. It is therefore necessary for these countries to intervene once teachers have entered the profession. As a result, it is fair to say that the importance of incentives for teachers in developing countries may prove exceptionally important in determining the level of performance of teachers in the education system.

3. Wage analysis

Hernani-Limarino (2005) points out that arguably the most important determinant of the recruitment, performance and retention of effective teachers is whether or not they are well-paid. He points out, however, that although wages are the central point of the employment contract, there are important aspects of employment aside from wages that determine the attractiveness of employment. It is argued that the recruitment, performance and retention of teachers is directly related to the opportunity cost of being a teacher and that in most cases, the opportunity cost of being a teacher is restricted to the wage that an individual entering the teaching profession might have received in a profession other than teaching. However, this idea of the opportunity cost of teaching ignores some very important factors that may impact on how an individual performs their role as a teacher, the incentives that teachers face to perform well and importantly, the probability that well-performing teachers (and high-ability individuals) will remain in the teaching profession.

Some of the characteristics of employment that affect its attractiveness include the hours individuals are expected to work in a particular job, the stability of the job, the flexibility of schedules and non-monetary benefits (such as in-kind payments and holidays) that may not be easily captured by survey data collection (Hernani-Limarino, 2005). However, as we broaden the definition of the opportunity cost of being a teacher, so too do we increase the information requirement regarding the nonwage aspects of the labour contract, and although this information is useful and contributes to our understanding of the attractiveness of the teaching profession, it complicates the analysis somewhat. The difficulties involved with the assignment of values to nonmonetary benefits and other employment characteristics is somewhat subjective and may lead to inaccuracies in the calculation of teaching's opportunity cost.

For that purpose, the analysis conducted in this section focuses primarily on the wage aspect of teaching in comparison to other professions.

This section makes use of data from the March and September rounds of the Labour Force Surveys (LFS) from 2000 to 2007. The analysis is conducted only for employed workers in the South African labour market. Workers reporting real monthly earnings in excess of R200 000, workers employed in the informal sector agricultural sector, domestic workers and the self-employed are excluded from the analysis.

Table 2 below presents the number of teachers and non-teachers in each year for which data is available.

Table 2: Number of Teachers and Non-Teachers by Year (unweighted)

Year	Teachers	Non-Teachers	Percentage of Sample that are Teachers	Total
2000	355	36 048	1percent	36 403
2001	591	51 605	1percent	52 196
2002	635	49 130	1percent	49 765
2003	585	45 158	1percent	45 743
2004	580	45 661	1percent	46 241
2005	640	37 437	2percent	38 077
2006	673	39 121	2percent	39 794
2007	763	28 117	3percent	28 880

Source: LFS 2000 - 2007

VARIABLES INCLUDED IN THE MODEL

The variables included in the Mincerian wage function are presented in table 3 below.

Table 3: Variables Included in Augmented Mincerian wage Function

VARIABLE	DESCRIPTION
Educ	A continuous variable reflecting the number of years of education an individual has completed.
$Educ^2$	A quadratic term (number of years of education squared) included to control for the possibility of non-linearities in the returns to education.
Exp	A continuous variable reflecting the number of years the worker has been employed in the labour market (calculated as [age – 6 – years of educational attainment])
Exp^2	A quadratic term (number of years of experience squared) included to control for the possibility of non-linearities in the returns to experience.
Union	A dummy variable taking the value of 1 if the workers is a union member and 0 otherwise.
Female	A dummy variable taking the value of 1 if a worker is female and 0 otherwise.
Tenure	A continuous variable controlling for the number of years a worker has worked for their current employer.
Teacher	A dummy variable taking the value of 1 if the worker is a teacher and 0 otherwise.
Black	A dummy variable taking the value of 1 if the worker is black and 0 otherwise.
Coloured	A dummy variable taking the value of 1 if the worker is coloured and 0 otherwise.
Indian	A dummy variable taking the value of 1 if the worker is Indian and 0 otherwise.
White	A dummy variable taking the value of 1if the worker is white and 0 otherwise.
Industry 1	A dummy variable taking the value of 1 if the worker is employed in the agriculture, hunting, forestry and fishing industry and 0 otherwise.
Industry 2	A dummy variable taking the value of 1 if the workers is employed in the mining and quarrying industry and 0 otherwise.
Industry 3	A dummy variable taking the value of 1 if the worker is employed in the manufacturing industry and 0 otherwise.
Industry 4	A dummy variable taking the value of 1 if the worker is employed in the electricity, gas and water supply industry.
Industry 5	A dummy variable taking the value of 1 if the worker is

	employed in the construction industry and 0 if otherwise.
Industry 6	A dummy variable taking the value of 1 if the worker is employed in the wholesale and retail industry and 0 if otherwise.
Industry 7	A dummy variable taking the value of 1 if the worker is employed in the transport, storage and communication industry and 0 if otherwise.
Industry 8	A dummy variable taking the value of 1 if the worker is employed in the financial, insurance and business services industry and 0 otherwise.
Industry 9	A dummy variable taking the value of 1 if the worker is employed in the community, social and personal services industry.
Industry 10	A dummy variable taking the value of 1 if the worker is employed in the private households industry.
Western Cape	A dummy variable taking the value of 1 if the worker is employed in the Western Cape and 0 otherwise.
Eastern Cape	A dummy variable taking the value of 1 if the worker is employed in the Eastern Cape and 0 otherwise.
Northern Cape	A dummy variable taking the value of 1 if the worker is employed in the Northern Cape and 0 otherwise.
Free State	A dummy variable taking the value of 1 if the worker is employed in the Free State and 0 otherwise.
KwaZulu Natal	A dummy variable taking the value of 1 if the worker is employed in KwaZulu Natal and 0 otherwise.
Northwest	A dummy variable taking the value of 1 if the worker is employed in Northwest and 0 otherwise.
Gauteng	A dummy variable taking the value of 1 if the worker is employed in Gauteng and 0 otherwise.
Mpumalanga	A dummy variable taking the value of 1 if the worker is employed in Mpumalanga and 0 otherwise.
Limpopo	A dummy variable taking the value of 1 if the worker is employed in Limpopo and 0 otherwise.

Source: LFS 2000 - 2007

Table 4 provides the summary statistics for the variables explained in table 3. The means and standard deviations for each of these variables are presented for teachers and non-teachers across the sample.

Table 4: Means (and standard deviations) of Variables

VARIABLE	GROUP	
	Teachers (N = 6 274)	**Non-Teachers (N = 439 551)**
Log Hourly Wage	3.35	1.93
	(1.18)	(0.63)
Educ	13.71	8.99
	(1.45)	(3.91)
$Educ^2$	190.14	96.21
	(40.55)	(60.56)
Exp	18.79	21.96
	(8.51)	(12.59)
Exp^2	425.62	640.87
	(362.21)	(660.47)
Union	0.76	0.27
	(0.43)	(0.44)
Female	0.64	0.41
	(0.48)	(0.49)
Tenure	11.68	7.10

	(8.43)	(7.75)
Teacher	1	0
	(0)	(0)
Black	0.65	0.68
	(0.48	(0.47)
Coloured	0.06	0.11
	(0.24)	(0.32)
Indian	0.04	0.04
	(0.20)	(0.19)
White	0.24	0.16
	(0.43)	(0.37)
Industry 1	0.00	0.12
	(0.04)	(0.31)
Industry 2	0.00	0.05
	(0.00)	(0.21)
Industry 3	0.00	0.15
	(0.02)	(0.36)
Industry 4	0.00	0.01
	(0.03)	(0.10)
Industry 5	0.00	0.06
	(0.01)	(0.24)
Industry 6	0.00	0.21
	(0.03)	(0.41)
Industry 7	0.00	0.05
	(0.04)	(0.22)
Industry 8	0.00	0.09
	(0.01)	(0.29)
Industry 9	0.99	0.19
	(0.07)	(0.39)
Industry 10	0.00	0.08
	(0.01)	(0.28)
Western Cape	0.10	0.14
	(0.30)	(0.35)
Eastern Cape	0.15	0.11
	(0.35)	(0.31)
Northern Cape	0.01	0.02
	(0.11)	(0.15)
Free State	0.07	0.07
	(0.25)	(0.26)
KwaZulu Natal	0.20	0.18
	(0.40)	(0.39)
Northwest	0.07	0.07
	(0.26)	(0.26)
Gauteng	0.19	0.26
	(0.39)	(0.44)
Mpumalanga	0.06	0.07
	(0.24)	(0.25)
Limpopo	0.16	0.07
	(0.36)	(0.25)

Note: Own calculations from LFS 2000 – 2007

The summary statistics indicate that teachers have also acquired higher levels of education than their counterparts in non-teaching professions. The values of experience (and therefore experience squared) are slightly lower for teachers than for non-teacher (18.79 years and 21.96 years, respectively), and some 76 percent of teacher are union members compared to just 27 percent of non-teachers. The teaching force is considerably more female that non-teaching professions, with 64 percent of teachers being female versus just 41 percent of non-teaching professions. Teachers have on average also remained with the same employer for longer than have non-teachers, with teachers having an average tenure of 11.68 years in

comparison to 7.10 years for non-teachers. In terms of the racial composition of the two groups for which data is presented, the black and Indian component is almost identical for both teachers and non-teachers, with non-teachers having a slightly higher coloured component than teachers (11 percent of non-teachers are coloured compared to 6 percent of teachers), and teachers having a slightly higher white component than non-teachers (24 percent of teachers are white versus just 16 percent of non-teachers).

WAGE DIFFERENTIALS

In order to determine whether or not teachers are well-paid, one possibility is to investigate the wages that teachers receive relative to the wages that they might have received in non-teaching professions. The gross (unadjusted) wage differential is a very basic measure of this relationship and reflects differences in wages that result from differences in both the remuneration structures faced by teachers and non-teachers, as well as differences in the productive endowments of members of both groups (Hernani-Limarino, 2005). The gross wage differential is calculated as

—

where is the mean hourly wage of teacher and is the mean hourly wage of non-teachers. Equation one is approximately equal to the mean log wage differential:

In order for the gross wage differential to provide any substantial meaning, the group to whom teachers are compared should share similar productive characteristics.

Under the assumption of competitive labour markets, wages are understood to reflect the marginal product of labour. Wages are therefore a function of the worker's productive characteristics and the returns that those characteristics fetch in the labour market. If we let and reflect the mean wages received by teachers and non-teachers, respectively, if they both face the same return structure for their productive characteristics, then the mean ***productivity wage differential*** is given by

—

Therefore, the part of the wage differential that can be attributed to differences in the structure of returns faced by teachers and non-teachers – the ***conditional mean wage differential*** – will be calculated by the difference between the gross mean wage differential and the productivity wage differential:

— — / —

It is therefore possible to decompose the gross wage differential into

In other words, it is possible to decompose the gross wage differential into a part that is explained by differences in productive characteristics and a part that is explained by differences in the way that productive characteristics are remunerated for teachers and non-teachers.

The ***teacher wage premium*** can be thought of as the "advantage" associated with being a teacher in the labour market. In order to isolate this teacher wage premium, the relationship between wages, endowments and returns to those endowments (prices) can be modelled as

where X is vector of productive characteristics, β is the prices associated with those endowments, T is a dummy variable taking a value of 1 if an individual is a teacher, and δ is the conditional mean wage differential between teachers and non-teachers. In order to highlight the value of δ more clearly,

Consistent estimation of δ requires that

That is, the unobserved characteristics captured by the error term must be unrelated to the decision to join the teaching force as well as to the productive characteristics of individuals.

Table 5 presents wage differentials for teachers and non-teachers and for teachers and non-teaching professionals, respectively.

Table 5: Wage differentials between teachers, non-teachers and non-teaching professionals (2000 – 2007)

	Gross gap (1)	Productivity gap (2)	Conditional gap (3)	Teacher Premium (4)
Teachers and non-teachers	0.5267265	0.3117687	0.2909134	0.2553499
Teachers and non-teaching professionals	-0.3778615	-0.0367996	-0.2884913	-0.3403678

Source: Own calculations from LFS (March and September) 2000 – 2007, Stats SA

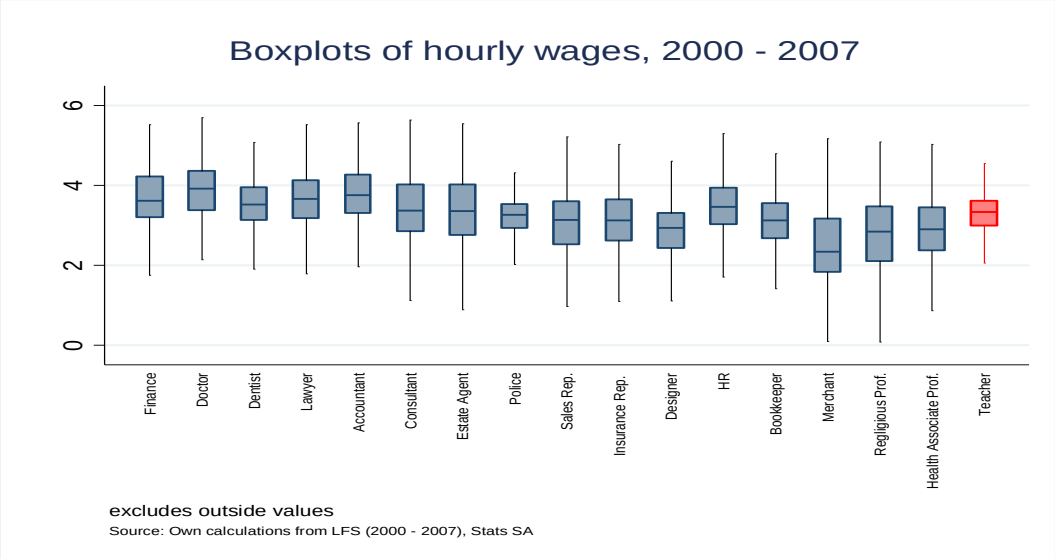
From table 5, we see that wage differentials favour teachers when compared to all non-teachers in the South African labour market. However, when teachers are compared to non-teaching professionals, teachers perform worse for all measures of wage differentials. As explained earlier, the conditional gap represents the portion of the overall wage differential

that is attributable to differences in the remuneration structures faced by teachers and non-teachers. The negative conditional gap in favour of non-teaching professionals suggests that these professionals face a more attractive remuneration structure in the sense that the price they receive for their productive characteristics are higher than those received by teachers.

Comparing teachers to all other non-teachers, we observe a positive productivity gap that clearly favours teachers, indicating that teachers have higher levels of human capital endowments realtive to this larger sample (of non-teachers, rather than non-teaching professionals).

While examining wage differentials is useful to understand what is happening at the mean, it may be useful to investigate how the distribution of teacher wages compares to that of non-teachers in the labour market. Following Gustafsson and Patel (2009), boxplots for real hourly wages have been plotted for teachers and some non-teaching professionals, allowing for an (admittedly superficial) investigation into how teachers' earnings compare with those of others in the labour market. Figure 1 presents the boxplots.

Figure 1



Interesting to observe is that the range of real hourly wages for teachers is largely comparable to what may be thought of as "lower order" professions. Indeed, in comparison to professions that are considered "prestigious" in the South African context (and largely internationally, too), teachers' hourly wage rate is slightly lower. We also see that the range of hourly wages for teachers is smaller than for all other professions, with the exception of members of the police force. This may well have to do with the extent of unionisation in the teaching force, but even so highlights the absence of large wage returns in the teaching profession. Indeed, again with the exception of individuals employed in the police force and potentially designers, teachers being paid the greatest wage on an hourly basis (excluding outliers) still receive hourly wages below that of all other professions included in the figure.

This raises an interesting question when thinking about the adequacy of teacher pay: who SHOULD teacher be compared to if deciding whether or not teachers receive adequate pay? How would teachers classify themselves in terms of where they sit on the spectrum of professionals, and is this reflected in the remuneration structure they experience?

MINCERIAN WAGE FUNCTIONS

The analysis is extended from looking at wage differentials to basic Mincerian wage regression in which the log of hourly wages are regressed on productive and personal characteristics in the labour force. The wage function takes the form

in which β_1, β_2 and β_3 indicate the impact that education, experience and its squared term have on hourly wages. X is a vector of worker characteristics, and δ is a vector of the impact that these characteristics have on hourly wages.

Table 6 presents the coefficient obtained for regressions run for teachers, non-teachers and non-teaching professionals for labour force participants between 2000 and 2007.

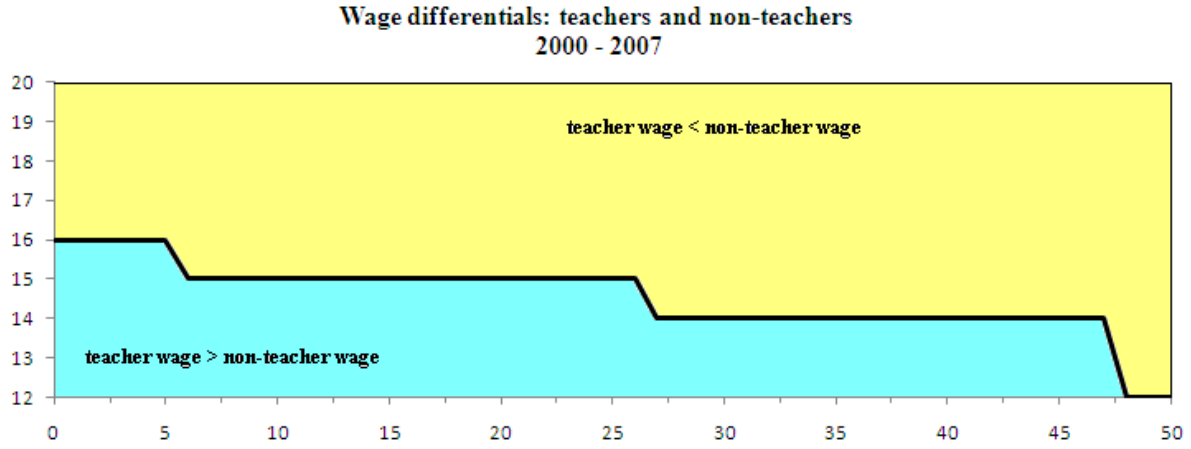
Table 6: Regression estimates for augmented Mincerian wage function on log hourly wages (2000 – 2007)[1]

Variable	Sub-Sample		
	Teachers	**Non-teachers (all levels of education)**	**Non-teachers (at least 10 years of education)**
Education	0.074	0.111	0.254
	(20.11)***	(187.39)***	(165.36)***
Experience	0.018	0.014	0.029
	(6.74)***	(28.17)***	(35.89)***
Experience^2	0.000	0.000	0.000
	(-5.92)***	(-7.09)***	(-23.64)***
Female	-0.066	-0.162	-0.152
	(-5.67)***	(-48.57)***	-35.46)***
Married	0.008	0.144	0.141
	(0.67)	(42.75)***	(30.55)***
Union	0.259	0.276	0.227
	(18.06)***	(76.11)***	(48.52)***
Tenure	0.007	0.016	0.018
	(8.33)***	(68.53)***	(49.27)***
Constant	0.767	-0.039	-1.817
	(3.22)***	(-4.04)***	-78.74)***
Adjusted R-Squared	0.1106	0.5421	0.4929
No. Of Observations	12142	252697	139040

Source: Own calculations from LFS (March and September) 2000 – 2007, Stats SA. Race, province and industry are controlled for in these regressions.

From the results obtained in table 6, a "profile" of teacher and non-teacher earnings is drawn for different combinations of education and experience. This profile is drawn for the entire labour force, regardless of their level of educational attainment, as well as for individuals with at least 10 years of education. The profiles are presented in figures 2 and 3.

Figure 2



From figure 2, it may be seen that for all individuals with at least 16 years of education, teacher wages are lower than those of non-teachers in the South African labour market. At higher levels of labour market experience, teacher wages become relatively less attractive at lower levels of educational attainment until roughly 48 years of experience, after which teacher wages are always lower than non-teacher wages. This highlights the unattractiveness of the experience-earnings profile associated with the teaching profession. Furthermore, the fact that teacher wages are higher than non-teacher wages at lower levels of education attainment suggest somewhat perverse incentives in terms of attracting top performers to the teaching force.

Figure 3

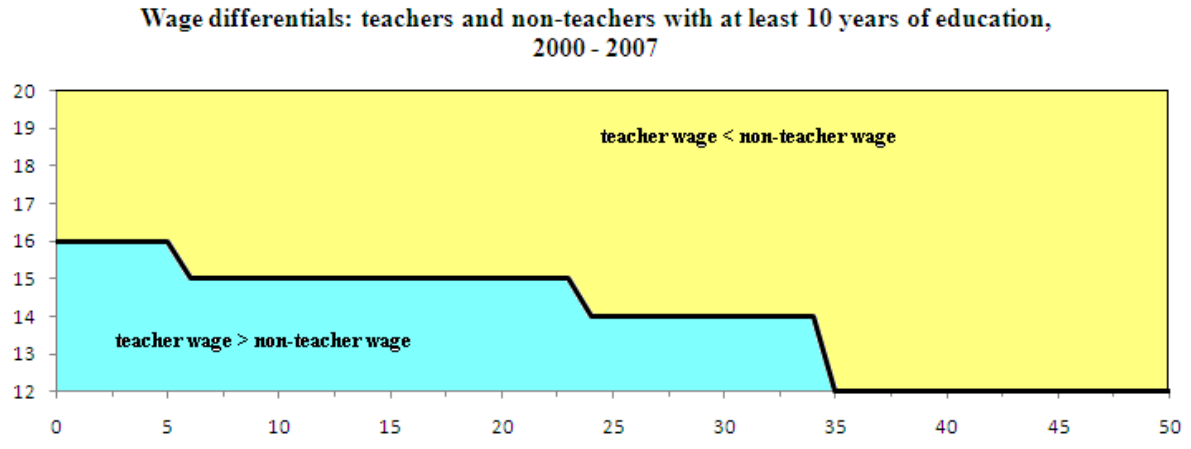


Figure 3 presents the profile for non-teachers with a minimum of 10 years of educational attainment. Although the general profile is similar to that presented in figure 1, it is seen that the level at which teacher wages are lower than non-teacher wages regardless of the level of education attained by an individual occurs at 35 years of experience, indicating that for a sample of better-educated non-teachers in the labour market, the attractiveness of the teaching profession (with regards to the experience-earnings profile) disappears somewhat earlier than for their counterparts with lower level of education – again pointing to the disincentive for the best-educated members of the labour force to enter the teaching profession.

It must be noted that the coefficients used to simulate the profiles in figures 1 and 2 controlled for workers' gender, union member, tenure at their current place of work, the province in which they were employed and their industry of employment

LOCAL POLYNOMIAL SMOOTHED LINES

A very useful technique that may aid in the understanding of the differences in remuneration structures between teachers and non-teachers is local polynomial smoothed lines. The local polynomial smoothed line is a line fitted to the data using weighted least squares, in which more weight is given to the points nearest to the point for whom the response is being estimated, and "weighting down" points further away from that point.

They therefore enable us to observe the relationship between education and wages or experience and wages without imposing any functional form on it, we can therefore observe whether or not the remuneration structure of teachers is fundamentally different to that of non-teachers and non-teaching professionals. Figure 4 presents the local polynomial smoothed lines for the relationship between wages and educational attainment.

Figure 4 : Local polynomial smoothed line

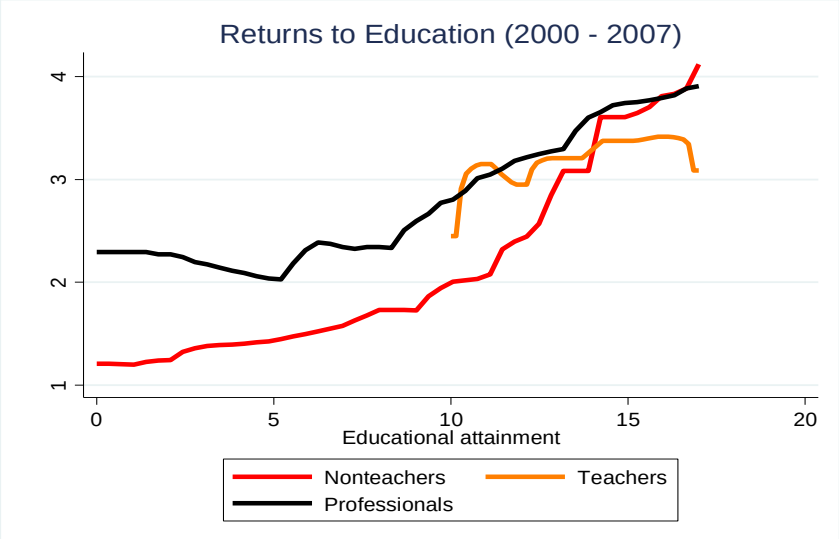
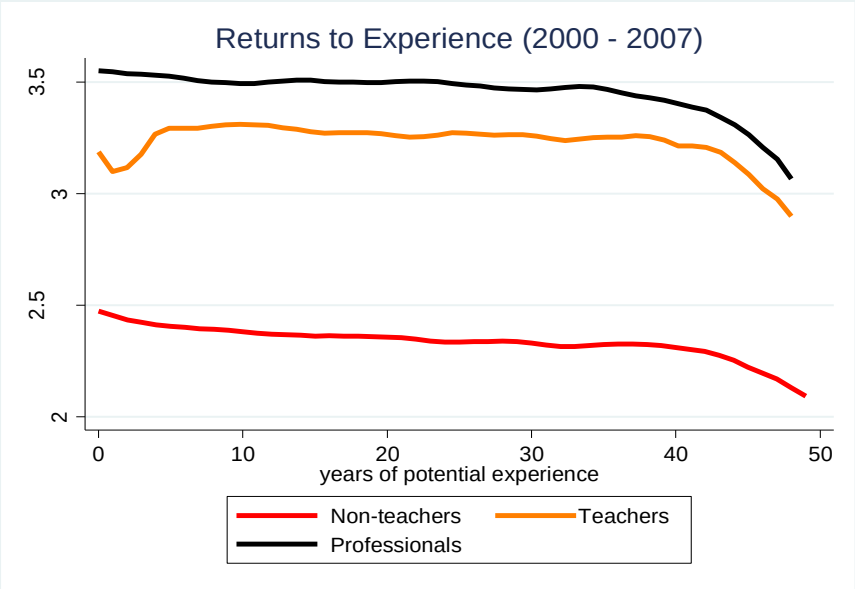


Figure 4 indicates that at higher levels of education, teacher remuneration is decidedly less attractive than non-teachers and non-teaching professionals in the labour market. Up until roughly 14 years of education, returns to educational attainment for teachers appear to be higher for teachers than for non-teachers, but lower for teachers than for non-teaching professionals. After 14 years of education, returns for teachers fall below those of all non-teachers in the labour market. Figure 5 examines the relationship in terms of labour market experience.

Figure 5: Local polynomial smoothed line



In terms of returns to labour market experience, figure 5 indicates that the shape of the experience-earnings profile is largely similar for teachers, non-teacher and non-teaching professionals. However, the level of returns to experience for professionals is slightly higher than it is for teachers, while the gap between the return for teachers and for non-teachers (which is in favour of teachers) is somewhat larger. So interestingly, we observe that at all levels of experience teachers receive lower hourly wage than other professionals. This is an important observation and it must be recognised as being likely to underpin the perspective of teachers themselves.

LEMIEUX DECOMPOSITION

Finally, a decomposition technique is used to create a counterfactual wage distribution for teachers and non-teachers in the South African labour force. The Lemiuex decomposition used in this paper may be understood to be a generalization of the decomposition technique first introduced by Oaxaca and Blinder in 1973 (Lemieux, 2002). The Oaxaca-Blinder decomposition decomposes the difference in the mean wage between two groups into the component explained by differences in productive characteristics and into an “unexplained”

component (i.e. a component resulting from differences in how productive characteristics are remunerated between the two groups in question, or "discrimination").

Decomposing the wage gap at the mean involves estimating the Ordinary Least Squares (OLS) wage regression

$$y_{it} = b_t x_{it} + u_{it} \quad \textbf{(8)}$$

where y_{it} is the log hourly wage of individual i belonging to group t (in this case to the group *teachers*), x_{it} is a vector of covariates, b_t is vector of parameters and u_{it} is an error term constructed to have a mean of 0 and to be uncorrelated with the covariates in the vector x_{it} (Lemieux, 2002). The sample average outcome y for teachers is therefore

(9)

where

and .

The outcome for individuals belonging to the second ground in the sample (in this case *non-teachers*) is estimated by

$$y_{in} = b_t x_{in} + u_{in} \quad \textbf{(11)}$$

where y_{in} is the log hourly wage of individual i belonging to group n (i.e. non-teachers), x_{is} is a vector of covariates, b_s is vector of parameters and u_{is} is an error term constructed to have a mean of 0 and to be uncorrelated with the covariates in the vector x_{is}. The sample average outcome y for teachers is therefore

(12)

where

and .

Calculating the difference between the mean outcomes of teachers and non-teachers therefore yields

(13)

where is the difference in wages arising from differences in the remuneration structures faced by teachers and non-teachers (i.e. the "unexplained" component) and is the difference in wages arising from differences in productive characteristics between teachers and non-teachers (Lemieux, 2002). may therefore be seen as the counterfactual mean value of y that would result if the remuneration structure of teachers was replaced with that of non-teachers. In other words, would be the wage prevalent for

teachers if the "price" of human capital amongst teachers was equal to that experienced by non-teachers in the labour market.

The counterfactual wage for teachers is therefore

(14)

which may be used to rewrite equation 12 as

–) +

Individual counterfactual wages are therefore calculated are denoted and is calculated as

may also be calculated by computing a sample mean of :

(15)

In order to estimate what the entire distribution of teacher wages would look like (as opposed to just the mean wage), the probit for the probability of being a teacher is estimated on the pooled sample of teachers and non-teachers. The probit model produces the probability of being a member of the teaching force conditional on individual worker characteristics, or individual x's:

| .

The reweighting function is then calculated using the estimated probability of being a teacher as

where P_t is the unconditional probability of an observation being a member of the teaching force, or the weighted share of the pooled sample who are teachers (Lemieux, 2002). The reweighted distribution or the counterfactual distribution is therefore

(16)

where – (Lemieux, 2002).

This technique therefore compares the labour market prospects of teachers to those of non-teachers in the South African labour market. It may be seen to present the point of view of labour market participants in deciding on the attractiveness of the teaching profession.

The results obtained for teachers and non-teachers using this composition are presented in figures 6 and 7 below.

Figure 6: Teachers and Non-teachers[1], 2000 – 2007

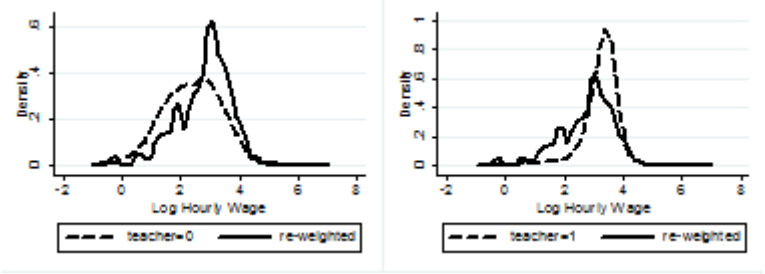


Figure 7: Teachers and Non-teaching professionals, 2000 – 2007

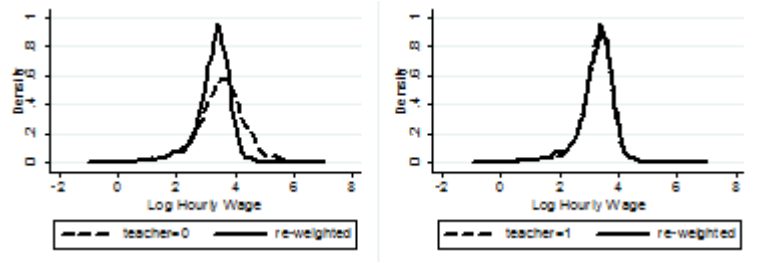


Figure 6 indicates in the left hand panel that non-teachers, given their productive endowments, if remunerated according to the same structure as teachers, would experience somewhat higher wages. Teachers, given their productive characteristics, remunerated according to the salary structure of non-teachers in the South African labour market, would experience a wage distribution that is roughly similar to what they experience if they were remunerated according to their current structure. If anything, the distribution of teacher wages shifts ever so slightly to the left, indicating a slight diminishing of wages if teachers were remunerated according to a non-teaching salary structure. This suggests a relative attractiveness of the teaching profession in terms of wages – a result which contradicts findings regarding the returns to educational attainment.

When compared to non-teaching professionals, as in figure 7, we can see from the left-hand panel that non-teaching professionals would earn slightly less if remunerated according to the same structure as teachers in the South African labour market. The right-hand panel indicates that teachers remunerated according to the same salary scale as non-teaching professionals would face a largely similar distribution of hourly wages.

[1] At least 10 years of educational attainment

CONCLUSION

From the wage analysis conducted, we can see that teacher wages are more similar to the wages of "lower order" professionals than they are to wages of individuals working in what might be considered "prestigious" professions. This is confirmed by the negative teacher premium for teachers when compared to non-teaching professionals. Furthermore, the level of returns to education and experience for teachers are considerably lower than they are for professionals in the labour market. However, when teachers are compared to all non-teachers in the labour market, the remuneration received is somewhat attractive. Indeed, the Lemieux decompositions conducted indicate that were non-teachers remunerated according to the same scale as teachers, the wage distribution for teachers would shift to the right.

So how does one interpret the results obtained in the wage analysis? The fact that teacher receive relatively unattractive remuneration in comparison to non-teaching professionals may be explained by various situations. First of all, it may be the case that individuals who choose to become teachers may have higher preferences for non-wage benefits implied by the teaching profession. For example, they may be attracted by the job security, shorter working hours or perhaps simply a love of children and the actual activity of teaching. A second possibility explaining the difference between the earnings of teachers and non-teaching professionals in the South African labour market is the potential realisation amongst individuals entering the teaching force that private sector wages are likely to be driven by productivity, inducing individuals with lower levels of unobservable productivity to enter the teaching profession. Finally, we may find that impatient individuals enter the teaching force as a result of the fact that teaching yields higher returns earlier in the life cycle. If the second of these explanations is in fact what is driving individuals to enter the teaching force, we have reason for concern. The following section is dedicated to investigating whether we are able to observe differences in the "productive potential" of individuals training to become teachers compared to those who are educating themselves in a different direction.

5.Academic performance of future teachers

A considerable amount of attention has been dedicated to motivating the importance of employing top-performers in the teaching force and the types of systems that may induces teachers to perform to the best of their ability, if this is not feasible (in terms of providing wages competitive enough to attract top-performers to the teaching profession).

This section provides a brief analysis of the academic ability (as measured by performance in matric exams) of students enrolled for first year studies in Education (Bachelor of Education, or BEd) and in other fields. The overall objective is to ascertain whether or not a notable difference in performance is observed for BEd students in comparison to students enrolled in other degrees, and if so, how BEd students perform relative to other students.

DATA

The data used for this analysis were obtained from the University of Stellenbosch and contain information on the mark obtained for each subject written by students enrolled in first year programs at the university. For the purpose of this analysis, first language and mathematics scores were used to gauge student performance and to assess the extent to which BEd students differed from others.

In terms of handling differences in performance on the basis of higher grade (HG) and standard grade (SG), the marks students who wrote standard grade mathematics were weighted down by 0.25. Simkins[2] (2010) explains that in terms of the National Senior Certificate (NSC) introduced in 2008, the department of education envisaged a mark of 40 percent for higher grade mathematics prior to 2008 to be equivalent to 50 percent for the NSC mathematics. Similarly, a mark of 72 percent for mathematics literacy was deemed equivalent to 50 percent for mathematics under the National Senior Certificate.

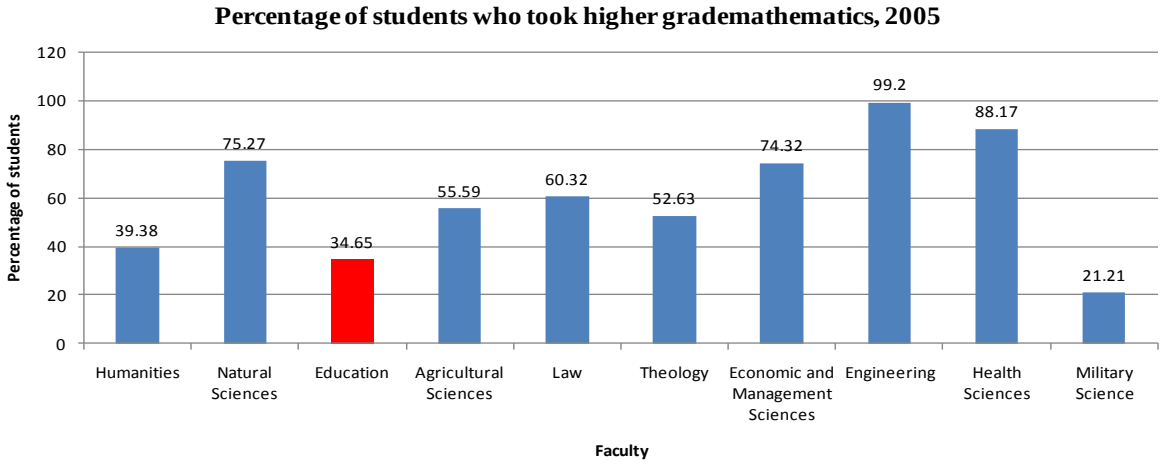
Mathematics marks were therefore adjusted according to the following formulas:

- *SG mathematics = 0.75 x HG mathematics*
- *NSC mathematics = 0.8 x HG mathematics*
- *Mathematics literacy = 0.44 x HG mathematics*

For students who took more than one language as a first language, the marks for all of the languages were averaged over the total number of languages.

An additional, although less objective measure of academic ability is the proportion of students enrolled in each degree who wrote higher grade mathematics. These data are presented in figures 8, 9 and 10 for 2005, 2006 and 2007, respectively.

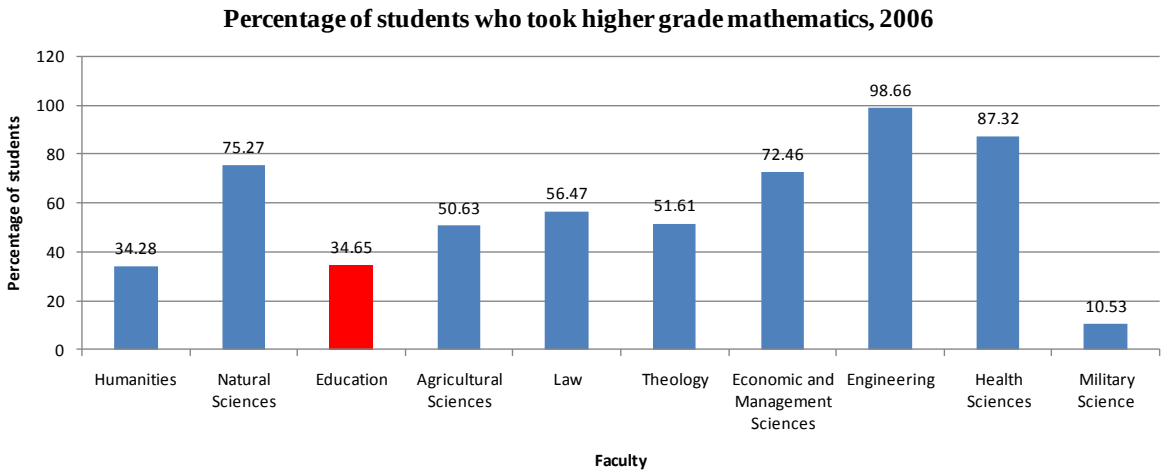
Figure 8



[2] Prof. Simkins was commissioned to conduct a study comparing the Senior Certificate exams written prior to 2008 and the National Certificate introduced in 2008.

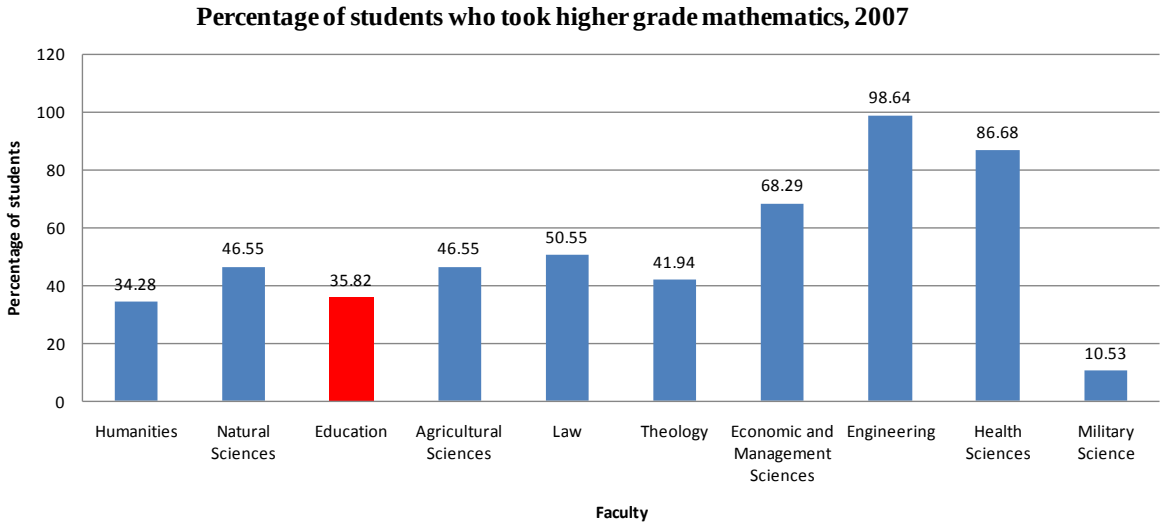
From figure 8, it is observed that in 2005, with the exception of Military Science, the lowest proportion of students who wrote mathematics higher grade were those enrolled for in the faculty of Education.

Figure 9



A similar pattern is observed in 2006 from figure 9, with the proportion of students taking higher grade mathematics in the Humanities faculty dropping marginally below that of the Education faculty. The same is observed for 2007 in figure 10.

Figure 10



If we assume that higher-ability individuals are more likely to take higher grade mathematics than individuals with lower levels of ability, the data from figures 8, 9 and 10 suggest the possibility of lower levels of academic ability amongst individuals enrolling for degrees in the Education faculty.

An analysis of the distribution of marks for students enrolled in different faculties is represented in figure 11 and 12 for mathematics and language, respectively.

Figure 11

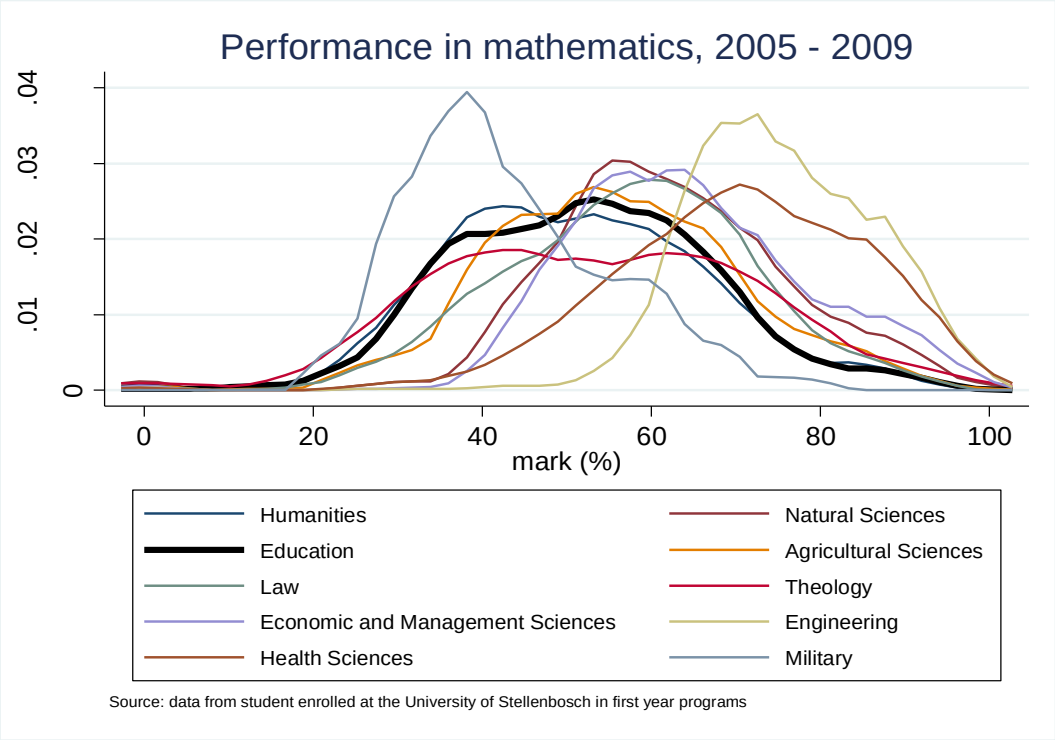
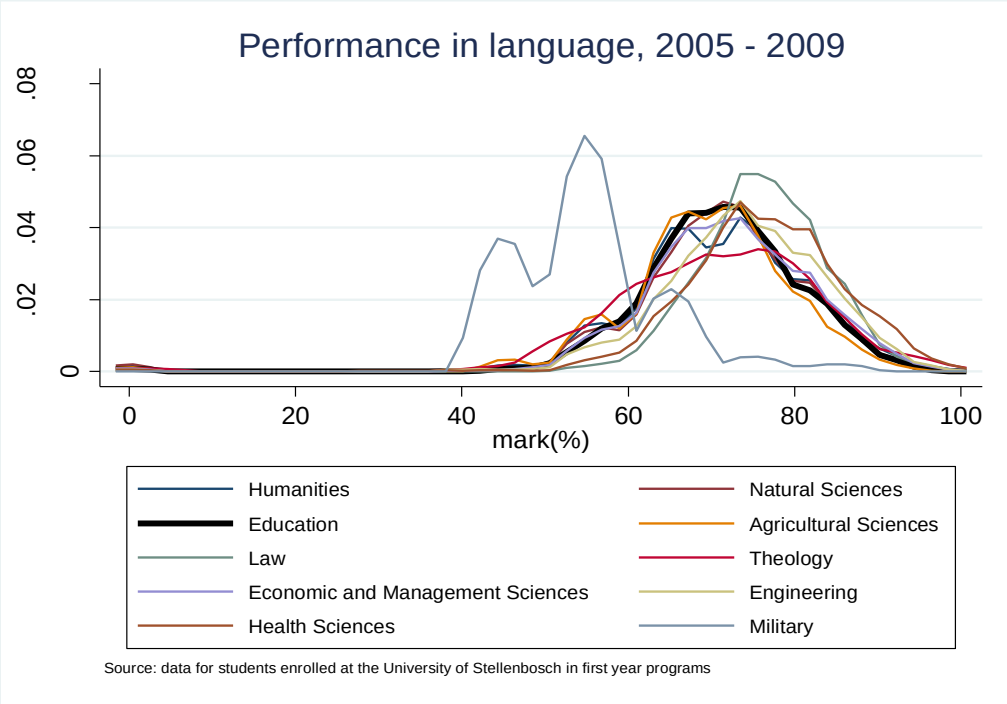


Figure 11 shows that the distribution of mathematics marks for students enrolled in the Education faculty lies to the left of the distributions for students enrolled in other faculties. Indeed, at higher levels of achievement (roughly 75 percent and upwards), with the exception of Military Science students, the distribution of education students lies below that of all other students. Similarly, at low levels of achievement (40 percent and lower), the distribution of Education students lies above those of students enrolled in most other faculties (with the exception of Military Science, Theology and Humanities at very low levels of achievement).

Figure 12 presents the distribution of marks for first language scores.

Figure 12



The distribution of marks for first language performance for Education students does not lie as far to the left as it does for mathematics. However, we see that the distribution for Education students at higher levels of achievement is below those of students enrolled in other faculties. However, the difference in performance does not appear to be as stark as it is for mathematics.

There is, therefore some evidence of weaker academic performance amongst students enrolled in the faculty of Education relative to students enrolled in other faculties. It must, however be acknowledged that the data used to obtain this result came from one university and the generalizability of this result is therefore questionable. It does, however, lean towards the conclusion that it may well be individuals with lower levels of productivity who are entering the teaching force – a worrisome prospect for a country facing such low levels of educational performance.

6.Conclusion

This paper has provided an overview of different strategies to ensure teacher performance in education systems: employing high-ability individuals as teachers or creating incentives for good performance. It looked at the remuneration structure facing teachers in the South African labour force and how this compares to all non-teachers as well as non-teaching professionals, concluding that teachers face a somewhat less attractive remuneration structure compared to (better educated) non-teaching professionals but a relatively more attractive

remuneration structure when compared to all non-teachers in the South African labour mark, leaving room to speculate as to why this may be the case. As it stands at the moment, teacher wages in the South African labour market are attractive to individuals with lower levels of educational attainment, with profession becoming less attractive as individuals enhance their level of educational attainment and as labour market experience increases. Section 5 conducted a short but informative analysis about the academic quality of students enrolled for first year studies at the University of Stellenbosch, drawing the conclusion that students enrolled to study in the faculty of Education perform somewhat worse than their counterparts in other faculties in Mathematics, and to a lesser degree in language, too.

Further research along the lines of what motivates individuals to become teachers would prove extremely useful in understanding first of all who is drawn to the teaching profession, and potentially also how high-ability individuals can be attracted to the profession. The current remuneration structure relative to that of non-teaching professions seems unlikely on its own to ensure that top-ability individuals would follow a career in teaching.

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