

HUMAN SCIENCES RESEARCH COUNCIL

Assessment Technology and Education Evaluation

SCHOOLS OUT.....OR IS IT?
*Out of school interventions for mathematics, science and
computer studies for secondary school learners*

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EXECUTIVE SUMMARY

The Department of Science and Technology (DST) commissioned the Human Sciences Research Council to conduct research to assess the extent, nature and cost of out of school (or supplementary tuition) interventions in mathematics, science and computer studies for secondary school learners.

International research on out-of-school programmes have argued that supplementary tuition exists side by side with formal public schooling. Recent studies view supplementary tuition as a shadow of the public education system that exists independently though closely linked to the formal system. Its existence results out of a deficient formal system and/or parents wanting to create comparative advantages for their children. Supplementary tuition is varied in its types and mode of instruction. Some modes are highly localised and others offer opportunities to learners who would not otherwise have had such opportunities either because of geographical location and/or lack of facilities. Providers of supplementary tuition offer prospects for enhancing the understanding of respective subjects; yet ironically it could also create dual conditions for increasing inequality within the education system and improving the income earning capacities of those who render the services. There is not much literature in South Africa about this sector.

In this research we used newspaper adverts to solicit information about the extent of the sector. In addition to the advert call, letters were sent to known providers. This drew 65 responses. There was then telephone interviews with all providers who had submitted information. The telephone interview probed further on the issues of extent, nature and cost of their programmes.

The key findings from this research are that providers of supplementary tuition range from individuals offering supplementary tuition to big organisations with a client base of about 18 000. Individuals that offer supplementary tuition are either retired or practising teachers who render their services on a one-on-one basis. The type of organisations who offer out of schools programmes include private sector organisations who offer their

services for profit, franchises who offer tuition to a large client base; online instruction for learners with access to computer facilities; instruction on learning channels of the television; non-governmental and community based organisations; supplementary tuition driven by the department of education in partnership with service providers and outreach programmes attached to universities and technikons.

Most initiatives generally operate from urban areas and are largely found in the metropolitan areas of Gauteng, KwaZuluNatal and the Western Cape. Initiatives in Limpopo province are associated with rural schools. There are some national programmes.

There are more mathematics and science initiatives than there are computer studies initiatives and instruction is mostly linked to the school curricula. At least 70 000 learners utilise the services of supplementary tuition providers. The enrolment per programme tends to vary from 30 for the smaller ones to around 18 000 for the bigger franchise centres. While we cannot say how many learners participate in this sector we can say that it is a fast expanding sector.

Most centres offer tuition after school hours and measure their success in terms of their contribution to passing the matric examinations. The bigger programmes, in addition to focussing on the curricula have added other components like working through past exam questions. Smaller programmes offer similar services but of a ‘help desk’ nature. There are costs involved in participating in the bigger out of school programmes.

The Department of Science and Technology commissioned this research so that they could have information of how best to support the sector. The report ends with questions and suggestions to the Department of Science and Technology for providing support to this sector.

1. There are out of school providers who have formed partnerships with some of the provincial departments of education. This partnership is especially to provide supplementary tuition to matric learners so that they have a better chance of

- passing the examinations. The DST should encourage other provincial departments of education to form these partnerships and provide this input to the matriculants.
2. Most programmes operate in urban settings and this does not promote equity. The DST needs to develop structures and mechanisms to facilitate provision in areas away from metropolitan centers.
 3. There is a cost associated for access to out of school providers. To facilitate access to poorer learners, the DST must develop mechanisms to subsidise these costs.
 4. There are large established programmes and smaller initiatives that have started and operate on shoestring budgets and need support to ensure development. The DST needs to support both types of initiatives.
 5. The DST needs to find ways to encourage established programmes to expand to excluded areas and at the same time needs to seed new programmes to operate in areas that are excluded.
 6. Some programmes offer supplementary tuition to top students and some to struggling students. The DST needs to consider whether to support all students or to choose a particular group to focus on.
 7. University programmes target top school learners and provide out of school instruction so that learners could increase conceptual understanding in mathematics and science. Access to these programmes is limited to learners who live in close proximity to the university. The DST may have to set up innovative arrangements with these institutions to ensure that other high achieving learners also have access to the programme.
 8. There needs to be decision whether to offer single subjects or to offer a package of subjects to learners to ensure higher success rates in school examinations.
 9. With a growing number of service providers there needs to be some form of regulation and quality control to ensure that learners receive quality instruction and are not exploited.

10. While this research has concentrated on provision of tuition to learners, a number of learners purchase study guides and learning material to assist them to pass the examination. Is there a way that the DST could subsidise costs for poorer learners.

SCHOOLS OUT.....OR IS IT?

Out of school interventions¹ (supplementary tuition) for mathematics, science and computer studies for secondary school learners

1. BACKGROUND AND RATIONALE FOR THE STUDY

The concern about the state of mathematics and science performance at the secondary school level is well documented. The outcome of the poor state of science and mathematics education is poor achievement scores at the last year (matric) of schooling. The low number of matriculants, especially the low number of African matriculants with the requisite scores to enter into tertiary institutions is serious a concern for the country.

One of the responses to the concerns about in-school programmes has been the setting up, by different organisations and institutions, of out of school programmes with learners as the clients. Many learners and parents, concerned about the quality of input from the formal schooling system have participated in these programmes. This means that learners attend these programmes after the regular schooling hours. These programmes may have a cost associated with it and would be accessible to those who can pay the added amount of money.

There are many mathematics, physical science and computer studies programmes directed to learners at the secondary level of schooling. But what are these programmes? How much do they cost? What value do they add to the students' learning repertoire? Are there lessons that can be learnt from the operation of these programmes, which could inform the setting up of future programmes? If there is a massification of these programmes to ensure access to the poorer students, then what resources are needed to support the programmes?

The purpose of this research is to assess the extent, nature, and cost of out of school mathematics, science and computer studies programmes, which cater for secondary school learners (grades 10 –12).

¹ In this study the terms out of school programmes and supplementary tuition will be used interchangeably.

In conducting this research we need to declare that we are not assuming that out of school programmes replace in-school programmes. It is recognized that the school is the primary institution in which learning is taking place. However there is also concern with the cycle of factors that causes poor learning. In order to break the cycle, there has to be many different out of school initiatives, and the in-school programmes have to be strengthened.

2. THE RESEARCH OBJECTIVES

This research is a sub-study of a major research project, which seeks to achieve the following objectives:

- To assess the extent, nature and cost of the out of school interventions which cater for secondary school learners (in mathematics, physical science and computer studies).
- To evaluate the usefulness (quality, impact and cost) of the different types of interventions.
- To develop a model of an out of school programme which can be replicated in different parts of the country.
- To present a strategy document (including resource implications) to DST to massify the programmes to allow access to a greater number of learners.

3. THE EXPECTED OUTCOMES

- Develop a database of programmes, projects, organizations, individuals and institutions that offer mathematics, science and computer studies out of school programmes to learners at the FET level.
- Develop a typology of different types of out of school programmes and a cost-benefit analysis of the different typologies.
- Develop a lesson learnt document of best practices for after programmes.
- Develop a strategy and implementation plan to massify these programmes.

4. PROJECT DESIGN

PHASE ONE: SCAN OF THE SECTOR

- **First component:** Literature review on the theme of out of school programmes. The literature review will include the trends and issues around out of school programmes both internationally and in the country. It will also include similar studies that have been done in South Africa. [Literature review]
- **Second component:** Develop a database of programmes, projects, organizations, individuals and institutions that offer mathematics and science programmes to learners at the FET level. This will be done by placing adverts in newspapers around the country calling for providers to send in contact information, seeking information from tertiary institutions, funders, present providers. [Database]
- **Third component:** A questionnaire will be sent to the various providers of the out of school programmes to develop a profile of the programmes. The profile will access information on size, target groups, curriculum, and cost. [Profile of the sector].
- **Fourth component:** Develop a preliminary description and typology of the sector of providers of out of school programmes in mathematics, science and computer studies.
- **Fifth component:** To provide a summary argument of the key issues arising from Phase One and then to develop a detailed research design for further research to evaluate the usefulness of out of school programmes and provide suggestions of how DST could strengthen this sector.

PHASE TWO: EVALUATION OF THE SECTOR WITH THE VIEW TO DEVELOP LESSONS OF BEST PRACTICES AND IMPLICATIONS FOR MASSIFICATION.

- **Sixth component:** Conduct an in-depth analysis/ evaluation of the sector to determine the usefulness of the different types of programmes.
- **Seventh component:** Present a strategy document (including resource implications to DST) to massify the programme to allow access to a greater number of learners.

This report focuses on Phase One of the study.

LITERATURE REVIEW

1. INTRODUCTION

The literature review for this study draws largely on the work of Bray (1999) because there is very little written about this sector. Supplementary tuition as an area of study has received little attention from both researchers and policy makers. Information on the mainstream² education system is readily available hence subject to easier monitoring than that of supplementary tuition providers.

2. WHAT IS SUPPLEMENTARY TUITION?

Supplementary tuition may be viewed as a “mechanism through which pupils extend their learning and gain additional human capital, which benefits not only themselves but also wider societies of which they are part” (Bray, 1999:18). Supplementary tuition has also been referred to by some as a ‘shadow’ education system. It exists because the mainstream education does. The nature and extent of supplementary tuition is related to the nature and quality of the mainstream system. The reason for the existence of the supplementary education sector may be because of the poor service delivery in the formal system and because of parent’s aspirations for their children. The growth of the supplementary tuition sector is also dependant on changing objectives of people as they gain access to previously denied facilities.

Current international literature views the two systems of education (mainstream and shadow) as separate entities that have no interactions. Mainstream education is driven by the state whilst the shadow education occurs outside state structures. The term supplementary tuition denotes extra tuition provided by independent entities and outside normal school hours. Supplementary tuition means different things in different contexts. For example, in Japan tutoring centers which supplement the school system are referred to as *Juku* whilst the term *crammers* is more common in the United Kingdom. Whilst *crammers* primarily serve those who have left school (in order to gain higher grades for

² Mainstream education is the equivalent of formal education normally sponsored by the state.

entrance to universities) they also give extra tuition to those learners still attending school (Bray, 1999).

An area of concern relates to pedagogic merit of conceptual learning versus cramming. Is there a trade-off between these variables? A focus on cramming inevitably promotes “monolithic education which acts like an industry that produces a commodity for mass consumption and obviously does not promote diversity.” (Lee, 2002). But is this the right type of learning we want to promote? This research will not seek to debate these issues but in the evaluation of the programmes will consider these as variables.

3. WHY SUPPLEMENTARY TUITION?

Internationally, the emergence and continued existence of supplementary tuition (also referred to as ‘private tuition’) is explained by the increasing need of countries to develop a globally competitive labour force. Inevitably, countries compete on the basis of the quality of their workforce. The quality of the labour force relates to productivity, which among other things is linked to the level of education of respective employees. Higher levels of education are ever more associated with better chances of securing a job. In Korea “the learned are held in esteem, which leads to their being paid more” (Lee, 2002). Education though necessary is not a sufficient condition against unemployment.

Parents who feel that the mainstream system is inadequate and deficient willingly invest large sums of money to gain access to higher grades in an effort to give their children “the best preparation for and facilitate access to higher level of studies” (Bray, 1999:9). Lee (2002) notes “30% of parents in Korea hire private tutors or become tutors themselves to give their children a head start in college bound (tertiary) competition”. How such investments work and ultimately impact on academic performance remain unknown. A case study of Korea revealed that a few exceptional students do finish middle school on their own without getting outside academic help. This seems to suggest that supplementary tuition is necessary for finishing middle school. In the same country if one compares the in and out of school learning it is an alarming 30% from in school

activities and 70% from out of school provision (Lee, 2002). In many African countries, supplementary tuition is perceived to significantly contribute towards learners' passing of their examinations otherwise parents would not continue investing such huge sums of money. The present education system is structured in a manner that those who fail cannot be absorbed in the economic system. It is increasingly easier for holders of school leaving certificates to participate in economic activities. Commerce and industry absorbs only those with passes hence the goal of most parents and learners is passing of examinations. Though passing examinations is not the ideal way of developing human capital, it nevertheless remains a reality that continues to shape the scope of supplementary tuition in most countries. The 'education pyramid' in a number of SADC countries (except South Africa) gets narrower at the higher grades. This limited supply of places and increased demand for the qualification for access to a better life may explain why parents and learners engage in supplementary tuition and strive to pass at whatever cost.

Entrepreneurial teachers and/or individuals within and outside the mainstream education system also drive the provision of supplementary tuition. Classroom teachers in Bangladesh, Cambodia and Egypt deliberately teach at a slower pace in an attempt to create a market for out of school supplementary tuition. According to Bray (1999:10) this could undermine the mainstream education system as teachers could only teach the most important topics in the private sessions. In light of the increasing number of tuition providers the effective demand commanded by respective programmes also relies on marketing strategies utilized by individual providers and their ability to penetrate new markets.

Another dimension of supplementary tuition is that it may be driven by benevolence. Individuals who have attained high education standards 'plough back' into the community by way of providing supplementary tuition on selected subjects. This is normally done out of goodwill upon realizing that education can significantly contribute towards more justice and equality for all.

4. TYPES OF SUPPLEMENTARY TUITION

Bray (1999) like other writers focuses on face-to-face tuition as the main type of supplementary tuition. However there are other types of supplementary tuition. Face-to-face instruction could be classified on a continuum from home-based one-to-one contact to large classroom situations with many students. The main forms of supplementary tuition include individualized services between learner and tutor at the home of the learner or tutor to small group formations in classrooms. In addition to this are television programmes that cater for large groups in dispersed locations or in some cases just large groups in open spaces. Supplementary tuition may also be provided through computer-based instruction. E-learning is gradually gaining importance. Other forms of tuition, which could enhance learning and/or passing examinations, include study guides which focus on study skills and working of past examination questions. All these types of tuition inevitable augment the learning process and form part of supplementary tuition.

5. WHICH ARE THE POPULAR SUBJECTS?

Supplementary tuition providers include academic and non-academic subjects. Non-academic subjects include skills “which are learnt primarily for pleasure and/or for a more rounded form of personal development” (Lee, 2002). Non-academic subjects like physical education and swimming do not have external examinations. Academic subjects on the other hand include external examinations and entail a significant amount of cramming if one is to pass the examinations and gain entry into tertiary institutions. This research focuses on supplementary tuition typologies for academic subjects taught in mainstream schools namely mathematics, science and computer studies.

Subjects taken by students in supplementary tuition sessions are driven by individual choices unlike those in the mainstream system. The number and type of subjects is presumably a function of learner choice (i.e. market needs) and community perception of the value of subject. Supplementary tuition subjects offered in Asia emphasize those skills “needed for educational and therefore socio-economic advancement” like languages, mathematics and science (Bray1999:34). According to Kwan-Terry (1991) as cited in Bray (1999:34) English is essential for advancement in Singapore. Fifty-five

(55%) of primary students and 29% of secondary students were receiving tutoring in English or a second language because second languages are deemed essential for advancement. Conversely, science, mathematics and then languages dominate the Sri Lankan case. A Sri Lankan study of 934 learners shows that among science students in Year 13, every student in the sample received tutoring for pure and applied mathematics, but 84 per cent received it for chemistry and 83 per cent for physics. Mathematics was also the most popular subject among Year 6 students, followed by science (Bray, 1999).

6. NATURE, SCALE AND FORM OF SUPPLEMENTARY TUTORING IN DIFFERENT PARTS OF THE WORLD

The previous decades have generally seen an increase in scale of supplementary tutoring provision across different parts of the world. Attendance at Japanese centers doubled between 1976 and 1993. In Mauritius a countrywide survey in 1991 “showed that 56% of the students were receiving tutoring in secondary form 2. Proportions rose to 98% in forms 3³ and 4, and 100% in forms 5 and 6” (Bray 1999). According to UNICEF (1998) the collapse of communism in Eastern Europe led to an increase in the number of parents investing in private tutoring. Economic transitions in China and Vietnam towards a market based economy saw an increase in the demand for tutoring services to a scale never seen before. The same may be said of South Africa after apartheid ended. Previously segregated parents now seek quality educational opportunities for their children in contrast to the former Bantu education they received.

Differences in scale and nature obtained across different world regions are explained by a number of factors: namely culture (the way education is perceived across and within population groups), the efficiency and effectiveness of the mainstream education system and the structure of the economy in terms of income distribution (Bray, 1999). The interplay of these factors determines the range of academic options available to scholars. Archer and Yamashita (2003) quoting Reay et al (2001) note that “differentially classed

³ Form 6 is equivalent to the 13th year in school where learners write the GCE Advanced level examinations prior to entering university. A Form 4 certificate (GCE Ordinary Level) qualifies one for a technical college only.

patterns of educational routes and choices reflect unequal access to cultural, social and economic capital". Inevitably, structural inequalities circumscribe the diversity of academic options open to scholars [Bail et al (2000) in Archer and Yamashita (2003)]. Socially privileged groups have a strong incentive to use their material and cultural power to ensure their children gain access to private tuition outside normal school hours. According to Whitty (2001:290) in Lloyd and Payne (2003) such groups do so in an effort to "ensure their children secure access to the 'glittering prize' associated with elite universities and elite occupations". The question then becomes: what level of inequality can such a system perpetuate since it apparently seeks to create a different educational playing field where only those with higher incomes survive. Lee (2002) notes "when a society as a whole has a bias in favour of the educated and when only the relatively well-off can afford higher education, the chance for a kid from a poor family to move up the social ladder through education is bound to be severely limited". All things equal, education should be perceived as a machinery for advancing equity as compared to blocking social mobility (ibid).

7. GEOGRAPHIC SPREAD

Asia apparently has more tuition providers than any other region followed by Africa (Bray, 1999). The provision of supplementary tuition of a face-to-face nature is not that prevalent in developed countries of Western Europe, North America and Australasia. Bray (1999) focuses on face-to-face tuition. However supplementary tuition could be equally high in developed countries yet occurring in different forms e.g. computer based online tuition. Supplementary tuition in Africa is generally associated with secondary schooling because passing at this level is the only route to any career in the formal economy.

Education systems that are intolerant of slow learners and emphasize success in examinations generally dominate the field of supplementary tuition. Closely associated with this is the remuneration that accrues to respective tuition providers. As the earnings realized from private tutoring increase so do the number of suppliers. In those countries where standards of living are closely linked to the level of education, rewards associated

with additional schooling, like supplementary tuition, are more significant than in those countries where differentials are minimal. Providing extra tuition is therefore more rewarding in developing countries (African, Asian and Latin American countries) than Western Europe where the band of inequality is less significant.

By virtue of the technological development, computer based online instruction could equally be rewarding in developed countries. The utility derived from supplementary tuition is however linked more to issues of inequality and desire to close the gap than technology per se.

8. INTENSITY

The intensity of tutoring is measured by the number of hours that scholars spend per day or week on a particular subject. The number of subjects in which scholars receive supplementary tuition may also be used as an alternative to measure intensity. The intensity of tutoring is closely associated with time of examination writing especially in those education systems where passing is the only option. According to Bray (1999) a Malaysian study indicated “70 percent of students sampled who were receiving tutoring did so throughout the year, while the others only received tutoring prior to important examinations”. In the Sri Lankan case, learners attended more than one tutoring session per subject depending on the topics discussed. For science subjects the average number of hours spent per subject was 11.5 per week. Bray (1999) quoting Leong (1995) notes that more than half the students received tutoring in one or two subjects.

9. CONSUMERS AND PROVIDERS

Consumers of private tuition are driven by a number of factors and range from the academically poor to good performers. High performing students attend tutorials in order to further improve their grades and maintain a competitive edge. Tseng (1998) notes that Hong Kong and China had a higher proportion of learners from high-ranking schools attending tutorial sessions than those from low ranking schools. Learners whose academic performance is not very good also attend tutorial sessions as a way of

enhancing their grades. Such performance measures are however relative since they do not extend beyond comparisons with class peers.

Mainstream teachers, retirees, individuals and university students who offer their services on a voluntary or paid basis generally characterize tutors. A study of Malaysia “indicated that 72% of a sample of tutors whose qualifications were known by their students had university degrees, 18% had college qualifications, 7% had higher school certificate qualifications and 3% school certificate qualifications”. Tutors generally occur at the ends of the age spectrum either as older or relatively younger individuals.

By and large, the provision of supplementary tuition is not related to the level of per capita GDP. In 1994, the per capita GNP of the Republic of Korea was measured at US\$8 260 and that of Sri Lanka was US\$640. Evidently, both had a high proportion of supplementary tuition providers. The use of per capita income is not the best indicator of supplementary tuition since it overlooks distributional issues. On the face of it, seeking supplementary tuition would seem like a highly uncomfortable drain on household income for poorer households. Bray (1999) however notes that even the poor significantly participate in private tuition despite their low-income levels. Todaro (1994) argues that in the short-term the poor view education as an escape route out of poverty and hence they invest in all forms of activities that endeavor to improve their education in spite of the high opportunity costs involved. In the long term⁴ they however realize that education is not a panacea out of poverty. Subsequently, they reduce their expenditure on education especially in those countries with high levels of unemployment where university graduates roam the streets in search of employment. To this end, countries like South Africa and Brazil with relatively high levels of per capita incomes coupled with the world’s highest levels of inequality (as measured by the Gini coefficient) increasingly render the analysis of supplementary tuition vis-à-vis per capita income even more difficult. The size of the supplementary tuition sector in these countries could be more related to parents aspirations and marketing strategies of tuition providers than to per capita income.

⁴ At the point when recipients with substantial education levels like university degrees remain unemployed for considerable periods of time.

10. IMPACT OF SUPPLEMENTARY TUITION

The impact of private tutoring is largely context specific. One cannot establish with certainty that private tutoring will causally result in an improvement in academic performance or not. Research carried out in Egypt found no statistically significant correlation between private tutoring and achievement (Fergany (1994) in Bray (1999:50). Conversely a study of the Japanese *Juku* revealed that private tutoring actually gave learners increased opportunities to learn and resulted in higher scores for arithmetic and algebra. By and large supplementary tuition in mathematics and science subjects increases awareness in science based and technological careers as a result of learners being exposed to industry through field visits for example. The success of private tutoring largely depends on “the content and mode of delivery of the tutoring, the motivation of the tutors and tutees, the intensity, duration and timing of tutoring and the types of pupils who receive tutoring”. (Bray, 1999)

Private tutoring also results in increased educational and social opportunities as learners gain access to better delivered education. Supplementary tuition is however riddled with its own ills as both tutors and learners are likely to suffer fatigue due to continuous learning. This inevitably denies them participation in other social events and recreation. As working conditions in the ‘shadow education’ become more attractive than those in the mainstream system teachers may prefer the former hence denying the mainstream system of talented educators. There is also a possibility that teachers in the mainstream system may deliberately fail to complete respective syllabi in an effort to induce learners to attend their private sessions. Generally it is difficult to measure the impact of supplementary tuition as how does one give attribution to supplementary tuition for learner. The performance of respective learners is largely a function of many factors some of which fall outside the immediate learning environment.

11. CONSTRAINTS, COSTS AND CRITIQUE OF SUPPLEMENTARY TUITION

The major constraints confronting private tuition relate to cost, access for different geographic regions, the double use of teachers, quality of service, regulation mechanism and impact on inequality. Of concern is the quality of service delivery in both systems (mainstream and supplementary). Are teachers in a position to deliver with the same effectiveness and efficiency in the two systems?

Another question arises in relation to the regulation of supplementary tuition. In as much as it contributes to learners' passing their exams there exists a need for regulation as a way of ensuring that learners receive quality instruction. Unscrupulous tutors driven by a money making desire than learner interests should be controlled. In those countries where household income disparities are high, private tuition may actually promote inequality as learners from low-income households increasingly fail to afford the service. Private tuition hence becomes commodified and a benefit to the few, yet education is a basic human right that should be accessible to all.

The cost of supplementary tuition may be viewed as real or as an opportunity cost. The cost is real as indicated by the costs that learners incur through fees payment, the purchase of stationery and travel related expenses among other things. On the other hand it is an opportunity cost as both learners and supplementary tuition tutors are denied the chance to engage in other social activities during that time. The costs are largely hidden and not easily captured in mainstream accounting.

The place of operation, be it an urban or rural setting, influences access to supplementary tuition services. Generally, service provision is readily available in urban areas as compared to rural areas. Closely associated with the issues of urban/rural settings is income. Not so well off families in urban areas have greater access to supplementary tuition than their rural counterparts who may be worse off. The ease of movement and

availability of formal and informal advertising facilities further enhances the provision of supplementary tuition in urban areas.

12. SUPPLEMENTARY TUITION IN SOUTH AFRICA

South Africa is living with the legacy of a poor quality education system for most of the African learners. There have been many strategies to try to improve the state of education. The major thrust for an improved education system came after 1976. There were many private sector and non-governmental initiative to improve education, especially mathematics and science education. Many of these initiatives saw the teacher as the key agent of change and hence focused on teacher development. There were a few initiatives that focused on interfacing directly with learners. While there has been some provision there has not been any major study of the supplementary sector or available evaluation reports of these initiatives in the public domain. The compilation *Projects Speak for Themselves* (1995) provides a description of educational projects in the non-governmental and private sector. The majority of the projects described deal with programmes that interface with teachers while very few interface with learners.

However the provision of supplementary tuition to learners is increasing. Reasons explaining the emergence and re-emergence of supplementary tuition in various parts of the country include a growing middle class, changing aspirations across social strata, a poor mainstream education system, increased marketers and enhanced marketing strategies of the providers. It is against this backdrop that the demand for private tuition has continued to rise over time as a way of complementing those subjects offered in mainstream education. The popular subjects are mathematics and science. These subjects are pursued on the understanding that they need special attention if aspirants in technology and engineering fields are to maintain a competitive edge.

Providers of supplementary tuition include individual entrepreneurs, and organizations that register themselves either as not for profit (NPO), for profit or section 21 organizations. According to the Non Profit Organizations (NPO) Act number 71 of 1997, an NPO is defined as “a trust company or other association of persons (a) established for a public purpose and (b) the income and property of which are not distributable to its

members or office bearers except as reasonable compensation for services rendered". NPOs have three different options for constituting themselves: namely trusts, voluntary associations or section 21 companies. The NPO Act promotes values of transparency and accountability by way of encouraging such organizations to register with the Department of Social Welfare voluntarily and subsequently produce their books of accounts for donor and general public scrutiny. Benefits associated with registering as an NPO include exemption from tax on the part of the organization or tax reduction in relation to gifts to specified NPOs under the auspices of Section 18A of the Act. Some individuals and for-profit organizations render extra/supplementary tuition for purposes of profit making though many still face financial constraints and are yet to operate at financially sustainable levels.

A substantial number of supplementary tuition providers also remain unregistered and exist outside the formal system of legally constituted organizations. To this day, their activities remain concealed and are only observed at a glimpse, through adverts on street corners and through interviewing learners. The 'shadow education system' therefore operates in both the formal and informal economies. In light of the above, what then is supplementary tuition in South Africa? Basically, supplementary tuition should be viewed as all those mechanisms outside formal schooling that enhance learning and occur in both the private and public domains.

METHODOLOGY

1. INTRODUCTION

As indicated before there has been very little written about supplementary tuition and providers exist both within and outside the formal sector. This research also had to be conducted in a short period of time. Thus it was decided to use a newspaper advert soliciting information on supplementary tuition providers in two national papers (Sunday Times and Mail and Guardian) across the country. In addition to the newspaper adverts letters were sent to known providers, there was a review of the telephone directory and classified sections of the newspapers and opportunistic information was used. After gaining the initial information, each service provider was then telephoned and an interview was conducted. The following sections describe what was done and the pros and cons of each data collection strategy.

2. NEWSPAPER ADVERTS

Newspaper adverts are one of the many channels used for promoting business and relaying information to a diverse range of people especially the literate. Adverts function on the assumption that people read and hence take action based on how they perceive the message. The newspaper adverts for this research were placed on the assumption that providers of supplementary tuition would read and subsequently respond.

Pros and cons of newspaper adverts

Newspaper adverts are associated with fast information dissemination since adverts created today find themselves in the hands of readers within the next day or so. The size and shape of the advert can be made as large as necessary hence communicate as much information as required.

The disadvantage of newspaper adverts is that they compete for attention against one another. People also have a tendency to flick past adverts missing even the important ones. The short shelf life of newspapers also means that adverts are likely to be thrown away within a short space of time. The fact that newspaper adverts do not allow one to narrow the target market implies that costs for relaying the message are paid even for those who are not interested in the message.

Data collection

An advert (Appendix 1) was placed in national newspapers around the country calling for providers to send information to the HSRC. The providers were asked to send the following information:

- contact details
- type of programme offered to grades 10 to 12 learners
- number of learners serviced

The advert was placed under the auspices of the DST logo with an incentive to send information because the DST was considering funding this sector. At least 60 responses conforming to the initial five questions were received from a geographically diverse range of providers ranging from private individuals to tertiary institutions. The information received was subsequently entered into an EXCEL spreadsheet. The response rate was considered acceptable given the limited time frame. To a great extent, the responses gave a better understanding of who is involved in the field of mathematics and science supplementary tuition hence a template for further probing. Not all who provided the information dealt directly with learners and we had to eliminate some entries from the database.

3. CLASSIFIED SECTION OF NEWSPAPERS

The tuition and/or education column in the classified sections of provincial and national newspaper was reviewed in an effort to capture those providers that had not responded to the DST advert. Added to this was the possibility of capturing different typologies of providers that utilize public domain facilities.

Pros and cons of classified section

Print advertising is a relatively expensive exercise that is utilized by a few, especially those who can afford it. A reliance on adverts largely excludes those supplementary tuition providers operating in the informal economy. In spite of the costs involved, newspapers give a broader picture in terms of the scale and intensity of the industry.

Data collection

Adverts placed over the period May and June 2003 were reviewed from a stock of 17 (daily and weekly) newspapers the HSRC library subscribes to (see appendix 2). The

newspapers cover a wide geographic area with a relatively wide readership. Out of the 17 newspapers only 4 had a tuition advertisement for Friday or the weekend. Apparently, the months October to November are likely to have more adverts as public examinations get closer.

4. YELLOW PAGES

Information from the yellow pages was solicited to augment that from the newspapers. Supplementary tuition providers listed on the yellow pages were identified and contacted for further information through telephone interviews.

Pros and cons of yellow pages

Adverts placed in the yellow pages are reasonably inexpensive. The other advantage is that consumers generally keep the yellow pages for a considerable period of time of up to a year hence ease of reference.

The disadvantages are that adverts in the yellow pages have to adhere to a certain format. This limits the creativity of individuals who would otherwise capture a wider market when given the opportunity. One other disadvantage is that some people just do not use the yellow pages but rather check up the number for the desired business in the white pages.

5. OUTDOOR ADVERTISING/BILLBOARDS

Billboards mainly characterize outdoor advertising. Bill boards range from the electronic and still types associated with up market advertising to those casually placed in street corners in an ad hoc manner.

The major advantage of billboards is the low cost per people reached. Billboards are displayed 24 hours a day, 7 days a week hence have a high reach and frequency for general audiences. Billboards are also generally hard to ignore. Disadvantages associated with bill boards include the extremely limited message length and the fact that they are not usually targeted.

Those providers not captured either through the adverts or print media were obtained from street adverts on an ad hoc basis. Such adverts are largely of an informal nature and were captured as and when seen by the researcher.

6. TELEPHONE INTERVIEWS

Telephone interviews are increasingly gaining popularity especially when a rapid response is required. According to Harvey (1998) as cited in Cohen et al (2000) “telephone interviews need careful arrangements for timing and duration (typically that they shorter and quicker than face to face interviews)”. A prerequisite for telephone interviews is that the “interviewer will need to have ready careful prompts and probes, including more than usual closed questions and less complex questions, in case the respondent ‘dries up’ on the telephone” (ibid). Telephone interviews also need the quick establishment of rapport and empathy in case the respondent loses interest. Like tele-sales, telephone interviews need good manners so that people listen and take time to respond. The response rate for telephone interviews is generally higher than that of questionnaires. It is for this reason that telephone interviews were conducted in this research.

Pros and cons of telephone interviews

Babbie and Mouton (2001) note that telephone interviews are less expensive to conduct than face-face to face interviews. Through telephone interviews savings are made on time and money associated with traveling to dispersed locations. Frequent callbacks are relatively inexpensive hence improved reliability and contact (Cohen et al, 2000). To a large extent, the response rate is not only high but the responses received are unaffected by the physical attributes of either the interviewer or interviewee. By virtue of being distant from one another and lack of physical contact respondents are likely to be more honest and give even those answers that are socially disapproved. The interviewer on the other hand has the advantage of probing into more sensitive areas.

One disadvantage of telephone interviews is that respondents can simply hang up. There is also a likelihood of interviewees postponing the interview on the basis of

inconvenience. Telephone interviews also present a bias in terms of class since it is only those with telephones who can respond.

Data collection

Telephone introductions were made in reference to the previously submitted information and respondents asked if they could be asked more questions. An independent person simultaneously typed in the respondent's answers into an EXCEL spreadsheet. Through this strategy, there was greater quality control over data collection. Cross referencing and checking for consistency was made possible after each interview.

The telephone interview schedule included questions about geographic coverage, type of programme, type of organization, cost, admission criteria, type of learning, and community reached among other things. The database is indicated in appendix 3.

7. DATA ANALYSIS

The purpose of this part of the research study was to comment on the extent, nature and cost of the provision of supplementary tuition in mathematics, science and computer studies. The themes from the literature review and the data provided a framework to develop a typology of this sector.

KEY FINDINGS AND POLICY IMPLICATIONS

We created a database with 65 supplementary tuition service providers. Of these 53 were service providers who dealt directly with learners. The other organizations interacted with teachers or were about to start, and therefore not included for analysis.

It is apparent from the number of responses and the response to our question ‘When did you start this initiative?’ that this is a sector which is expanding. The number of initiatives is increasing on a yearly basis.

The purpose of this research is to develop a typology for the initiatives that provide supplementary tuition to secondary learners. We will categorise the typology under the headings of NATURE, EXTENT, and COST. Thereafter we will raise some policy questions for the Department of Science and Technology.

TYPOLGY OF INITIATIVES

1. NATURE

1.1. Who offers out of school tuition

A range of individuals and organizations provide supplementary tuition. They are varied in terms of how they are legally constituted but also with regards to how they conduct their business. The types of service providers offering out of school programmes may be classified as:

- Non-Governmental Organization. These include organizations like Protec and SEASA who have been in the development field since the late 1970s and early 1980s.
- Community Based Organisation. There are organizations, especially in small towns that are concerned with the math and science results and have started localized initiatives. These initiatives are fairly new and recent.

- Individuals who have started up organizations, mostly in a township and/or city offering tuition to a localized community. These are fairly recent.
- Private sector organizations that offer the tuition on a profit basis. These could range from more business-like organizations to organizations, which have been started by ex-teachers and are developing this growing business.
- Franchises who offer tuition on a large scale. These are usually international initiatives operating at a national level (e. Kumon Math, Master Math). They have their own philosophy, materials, attempt to support the national curriculum and operate mostly in urban areas. They advertise aggressively and are market driven.
- On-line instruction available to learners who have access to internet and actively seek them.
- Instruction on learning channels of the television. For example the Liberty Life/ Learning Channel programmes on SABC and the MINDSET programme which would operate with DSTV.
- Supplementary tuition, which has been initiated by provincial departments of education and offered in partnership with service providers. While the international literature separates the main and shadow education systems there are initiatives (e.g. KwaZulu Department of Education with Pulse Education Service), which is a collaboration between the two sectors to provide out of school tuition to matriculants.
- Tertiary institutions (especially universities) that offer enrichment for the top students: These may consist of a three-year programme with the purpose being to target the top students and prepare them for a university programme (e.g. University of Pretoria). These programmes are very thorough but target a small group of learners.

- Programmes (especially technikons) who offer second chances to matriculants to improve their symbols in mathematics and science so that they could enter tertiary level science and mathematics studies;
- One-on-one tutorship. This could range from the retired or practicing science/math teacher who offers one on one tuition for a fee, to organisations who have set up a database of tutors and who are able to link learners with tutors. There are private schools, where their teachers are available for one-on-one tutorship and the programme is co-ordinated by the school.

1.2. Type of Programme offered

Most programmes are strongly linked to the school curriculum and they measure their success in terms of their ability to assist with the pass rate of the matric examination. The bigger non-profit programmes often have a redesigned curriculum whose instruction is based on conceptual development of school curriculum coupled with techniques for working through past examination question papers. Some programmes may include aspects of career guidance or links with industry but it seems that the ‘marketplace’ wants assistance in gaining a better pass in the matriculation examination.

The smaller programmes, which operate mostly after school, operate more as a ‘help desk’ scenario with tutors being available to answer learners’ questions regarding work that had been covered during class or help with homework exercises.

The organizations, which offer supplementary tuition programmes, generally offer a range of other programmes as well (i.e. may have a teacher development though workshops, training sessions or ABET programme).

Some programmes offer team teaching (e.g Taung programme) in classes. This is the grey area of out of school programmes, and consists of an outside agency working with teachers and going to their schools to teach (or co-teach) difficult areas of the curriculum.

Some programmes offer peer tutoring on a cascade model (e.g Phambili and University of Port Elizabeth). In this model the service provider works with a few learners and these learners are then provided an incentive to work with peer learners.

1.3. Intensity of Learning

The majority of programmes offer tuition as Saturday classes combined with vacation classes. The smaller programmes offer their contact time after school.

Most tuition classes are offered for 45-60 minute per subject (ranging from 20-30min for Kumon Maths to 2 hours per class with another provider).

There are a few service providers who offer once-off Winter School programmes during the school holidays.

1.4. Who are the Tutors

The tutors on most programmes are practicing schoolteachers. Some providers use science graduates, university students or workplace professionals (especially engineers and accountants), while university based programmes use tertiary institution lecturers.

The smaller, recent initiatives use unemployed teachers or volunteers with math/science background.

The franchise operations use tutors who do not necessarily have mathematics or teaching background. They prefer tutors who have good business acumen and have a good ability to facilitate.

A small number of initiatives includes professionals as serve as role-models to the learners.

The more-established programmes pay their tutors (varying amounts) while for smaller providers the tutors volunteer their time, are paid only travel costs or are given a stipend if and when learners pay and money is available.

1.5. Admission criteria

Most initiatives do not have admission criteria and students who are able to pay are able to attend. In some programmes students are selected by teacher recommendation, class performance or enthusiasm for math/science. An embedded criteria would be proximity to a service provider. Some programmes, university preparatory programmes, select high performing learners.

2. EXTENT

2.1. Number of learners

Because of the different modes of out of school programmes it is difficult to say how many learners are involved in this sector. The number of learners utilizing the different programmes varies. The individual who tutors privately may have 5 learners, while other initiatives may have small localized programmes with around 30 learners, and the big franchises could reach up to 15 000 learners in 250 centres (Kumon Math) around the country. It is not possible to estimate the number of learners who use the Learning Channels.

The franchises (Kumon Math, Master Math, Kip McGrath) account for at least 22 000 learners – Kip McGrath does not keep numbers. The other programmes indicated in this survey account for at least 50 000 learners. In these figures the number of learners who use the TV programmes or computer-based programmes are unknown.

While we cannot say exactly how many learners are involved in this sector we can confidently say that the sector is expanding.

2.2. Geographical coverage

Most programmes operate at places of high population density. Clearly there is an inequity in terms of the coverage throughout the country. Of those who responded and were included in the database, the number of initiatives by province are:

- Gauteng (15), either sub-urban or township based.

- KwaZuluNatal (8),
- Limpopo (8),
- Western Cape (7),
- 2-3 initiatives in Eastern Cape, Mpumalanga and North-West Province.
- 6 national initiatives, with most having centers around the country but strongly focused on metropolitan areas.

2.3. Subjects

There are more mathematics supplementary programmes than there are science programmes. Most learners who registered for supplementary tuition for science also took mathematics. Science tuition was primarily focused on physical science and/or chemistry with minimal inclusion of biology, earth science or environmental science. There are very few computer studies programmes that are linked to the school curriculum. There are a larger number of computer general skills programmes.

The majority of initiatives focused on Grade 12 learners, so there is a general trend of increased number of learners as one goes from Grade 10 to grade 12.

While this study focused on mathematics and science, it was noted that there is an increasing demand on providers to include business-orientated and English-for-communication courses as part of supplementary tuition.

2.4. When Started

There are some programmes that started in the 1980s as non-governmental programmes. However most of the programmes are fairly recent, with most beginning in the late 1990s. There are a significant number of providers that started in the last two years but these are still relatively small with a handful of learners, and are still establishing themselves. The majority stated that cost was the limiting factor to expansion and development.

3. COST

The cost for attendance to the programmes varies. Some are free to learners but may have various sponsors (e.g. big business, tertiary institutions, banks or foreign donors). Although some programmes are free they are mostly available to learners in urban areas. The majority of small-medium size programmes struggle with funding and are often limited in their services (subjects available, students they can accommodate, teaching tools and number of tutors) by the resources available.

The majority of programmes have some cost attached, paid by the learner. The higher cost programmes are the private sector initiatives (franchises or private tuition), which range from R35-100 per hour.

4. SOME POLICY QUESTIONS/ IMPLICATION

Supplementary tuition is an expanding sector and therefore a need exists for strategic thinking of how this sector can be utilized to improve the state of mathematics and science education in South Africa. Education within the schools is the responsibility of the Department of Education. The Department of Science and Technology has a mandate to improve the state of math and science education in the country and wants to intervene in the out of school sector. From the research we raise the following questions for the involvement of the Department of Science and Technology in this sector:

1. There are out of school providers who have formed partnerships with some of the provincial departments of education. This is unlike other countries where these two sectors are separate. This partnership is especially to provide supplementary tuition to matric learners so that they have a better chance of passing the examinations. The DST should encourage other provincial departments of education to form these partnerships and provide this input to the matriculants.
2. Most programmes operate in urban settings and this is explained by the availability of associated ancillary facilities like infrastructure and equipment, which make provision of supplementary tuition possible and a client base which

- could pay for services. However this does not promote equity. The DST needs to develop structures and mechanisms to facilitate provision in areas away from metropolitan centers.
3. There is a cost associated for access to out of school providers. To facilitate access to poorer learners, the DST must develop mechanisms to subsidise these costs.
 4. There are large established programmes and smaller initiatives that have started and operate on shoestring budgets and need support to ensure development. The DST needs to support both types of initiatives.
 5. The DST needs to find ways to encourage established programmes to expand to excluded areas and at the same time needs to seed new programmes to operate in areas that are excluded.
 6. Some programmes offer supplementary tuition to top students and some to struggling students. The DST needs to consider whether to support all students or to choose a particular group to focus on.
 7. University programmes target top school learners and provide out of school instruction so that learners could increase conceptual understanding in mathematics and science. The purpose of the programme is to improve matriculation performance and then gain success in university science programmes. However access to these programmes is limited to learners who live in close proximity to the university. It is important to ensure that learners who do not live in close proximity to these institutions also have a chance at accessing these programmes. The DST may have to set up innovative arrangements with these institutions to ensure that other high achieving learners also have access to the programme.

8. There needs to be decision whether to offer single subjects or to offer a package of subjects to learners to ensure higher success rates in school examinations.

9. With a growing number of service providers there needs to be some form of regulation and quality control to ensure that learners receive quality instruction and are not exploited.

10. While this research has concentrated on provision of tuition to learners, a number of learners purchase study guides and learning material to assist them to pass the examination. Is there a way that the DST could subsidise costs for poorer learners.

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