Full Length Research Paper

Coping with quality assurance challenges faced by secondary schools' headteachers in Gucha district, Kenya

Florence Osiri Mobegi¹* and Benjamin A. Ondigi²

¹Eregi Teachers College, Kenya. ²Department of Educational Management and Foundations, Maseno University, Kenya.

Accepted 9 September, 2011

Since independence, the Kenyan government has demonstrated its commitment to the provision of quality secondary school education through allocation of financial resources, provision of trained teachers and establishment of quality assurance department. However, despite the substantial allocation of resources, secondary schools still face major challenges. Some of these challenges are: financial constraints, shortage of teachers, lack of basic facilities, community interferences and irregular visits by quality assurance officers. The purpose of the current study was to examine ways on how head teachers can cope with these challenges in order to provide quality education. The study also investigated possible opportunities at the disposal of head-teachers which could be utilized for the improvement of quality education. The research design used was descriptive survey. The study population consisted of 120 public secondary schools with a total of 120 head-teachers and 120 curriculum masters. Stratified random sampling technique was used to select a sample of the study, whereby five girls' and four boys' schools were selected through saturated sampling technique and 37 co-educational schools were selected by using simple random sampling. Questionnaire, interview schedule and observations were used to obtain data. The findings of the study showed that head teachers employed untrained teachers to cover up for teachers' shortages, devised school income generating projects to improve on financial problems and improvised science facilities. The researchers concluded that ways of coping with the challenges faced by head-teachers were inadequate and insufficient for provision of quality education. The researchers recommended that school headteachers should step-up/ improve fee collection so that they do not involve themselves in borrowing of finance and purchasing items on credit. They should also provide adequate and comprehensive information to financial sources, for example constituency development fund (CDF) and government bursaries so that the needy cases are adequately covered. Given the expansive and productive land in most schools, the study recommends that head-teachers should embark on horticultural farming where fast maturing farm products are produced to generate cumulatively more money and ensure selfsustenance of the schools in farm produce needs. Head-teachers needed support in form of finance, equipment, and facilities from the government and other stakeholders in order to improve the quality of education in their schools.

Key words: Quality education, challenges, opportunities, head-teachers, coping with, remedial teaching.

INTRODUCTION

Low quality of schools is widely recognized as a serious problem in the developing countries. There are substan-

*Corresponding author. E-mail: fosiri@yahoo.com.

tial evidence of decline in quality of education in many developing countries even at a time when donor assistance has been directed towards the improvement of education (Psacharopolous and Woodhall, 1985; Fuller, 1986; Carrier, 1990). Atkinson (1987) observes that the problem of poor performance in examinations is costly for any country since education is a major contributor to economic growth. Possible challenges in which headteachers had to look for ways of coping with are subsequently discussed.

Shortage of teachers

The teacher resource is one of the most important inputs into the education system and, therefore, efficient management and utilization of teachers is critical to the quality of learning outcomes. Continuous improvement in the quality of education services should entail continuous skills upgrading for teachers. However, this has not been the case as lack of adequate opportunities for in-service training has denied most of practicing teachers the chance to enhance their skills beyond those acquired during pre-service basic training (Republic of Kenya, 2004).

Many schools in rural areas, especially in semi- arid lands, suffer from shortage of trained teachers, as the majority want to move to and stay in or around the urban areas (Zulu, 1998; Gray, 1998). The few teachers that are in these schools handle huge classes (UNICEF, 1997), and in areas where there is low enrolment, teachers are often loaded with different classes in addition to other school responsibilities (Ulster, 1998). In such situations, one teacher could easily teach a class of between 40 and 60 pupils or teach mathematics and or science from class 5 to 8 and the same time acting as a class teacher, deputy or head-teacher of the school. Besides, teachers are neither adequately prepared in science subject content nor on strategies that stimulate learning and application methods (Zulu, 1998).

Hadad (1985) and Hendriks (1986) suggest that trained teachers were particularly important in the management of instruction and teacher centered activities given that most educational institutions in developing countries are lacking textbooks. It was also noted that the guality of education provided highly depended on the quality of instructions that teachers provide (Anderson, 1991). The author also argues that one reason for teacher emphasis is that there is an increasing awareness that teachers have immense power over innovations and changes even in the most highly centralized system of education. A study by Maundu (1986) found out that teacher's qualification had a significant effect on student performance. In addition, Ayodo (2003) singled out the teacher as the most influential factor affecting the learning characteristics of the pupils, followed by textbooks.

The science teachers in the rural areas have to face problems of pupils being distracted and not participating because of lack of motivation from content that they feel are alien to their experience of life. As a result of this, pupils engage in rote learning and memorization (Zulu, 1998). The teaching is dominated by the teachers who adopts a chalk- and -talk -style of teaching (Ulster, 1998). Learning therefore becomes ineffective as it is memory based (FAO, 1995).

Unplanned teacher recruitment for public schools has affected deployment of teachers and thus distorted their distribution. Consequently, there exists an unbalanced distribution of teachers, as most teachers prefer to work in urban, peri- urban and high potential areas where amenities are available. As a result, difficult and most remote areas continue to suffer shortages of teacher (Republic of Kenya, 2004).

Teaching and learning facilities

Facility construction and availability is not a major vehicle to quality enhancement but of critical importance is the utilization of such facilities. The quality of instructional process, availability of textbook, teacher quality, classroom organization, school management and structures also contribute to the provision of quality education. It was noted that schools with adequate facilities such as laboratories and textbooks stand a better chance of performing well in examinations than poorly equipped schools. Low performance could be attributed to lack of adequate finance which resulted to inadequate supply of teaching and learning materials and equipment (Fuller, 1985; Gogo, 2002; Mwiria, 1985). Omariba (2003) in trying to find out the relationship between various variables affecting performance, concluded that school's size, expenditure on library, expenditure on school equipment and teacher gualification accounted for 68.1% change in performance.

Eshiwani (1983) noted that the few schools that have laboratories may not have enough or appropriate science apparatus. Moreover, disadvantaged rural schools usually have large classes, poor facilities and lack of basic instructional materials. Most rural schools lack basic facilities such as science rooms, science equipment, electricity supply, water supply and secure storerooms. The decline in quality of education is highly experienced in rural areas due to the evident lack of basic facilities such as buildings, furniture, educational equipment, instructional materials and teachers (Oliveira and Farrell, 1993; Gray, 1998).

The general poor provision of complimentary inputs means that the effectiveness of teachers is reduced significantly. Instead of teaching, teachers spend their time copying the material from the textbooks to the chalkboard, and students waste time in copying the material to their exercise books. This is hardly the proper environment in which learning can take place (Republic of Kenya, 2004). The purpose of this study is to examine ways head-teacher coped with the challenges that faced them in their efforts to provide quality education. It also focused on investigating the opportunities at the disposal of head-teacher that could be utilized for quality improvement.

RESEARCH DESIGN

The study examined ways of coping with challenges faced by secondary schools' head-teachers in the provision of quality education. The study also investigated possible opportunities at the disposal of the head teachers which could be utilized for the provision of quality education. Descriptive survey research design was used. This was to allow for an in-depth study of the relevant variables. In order to establish existing conditions in the schools, this design was found to be ideal. Studies that are interested in what people think and what they do, and different types of educational facts finding, can be done using this research design (Frankel and Wallen, 1993).

Area of study

This study was conducted in Gucha District in Nyanza Province. The district is located between latitude 0° 22 and 0° 43 South and Longitude 34°42 and 34° 58 East. It is bordered by the following districts: Nyamira District to the North, Kisii Central to the East, Trans-Mara to the South and Migori to the West. The whole district covers approximately 1,393 km². Administratively the district is divided into seven divisions and twenty two locations. The climate of the district is of a highland Equatorial type which enables the district to receive high and reliable rainfall that is well distributed throughout the year (averaging 1850 mm annually). It receives moderate temperature which is approximately between 21 and 27 °C. It has fertile loam soil while some parts have patches of sandy and clay soil. According to the 1999 national census, the district had a total population of 438,123 persons and a population density of about 1000 persons per km². The number of poor individuals in the district was estimated to be 269,252. This makes 61% of the population to be living below the poverty line. Poverty index range per division is between 51 to 69% (Republic of Kenya, 2003). The economic activities practiced here are: crop farming, dairy farming, soapstone carvings, brick making and small scale businesses. There are few tea processing factories which offer employment to the people. The inhabitants of the area attach great importance to better quality education for their children but this has not been achieved.

Sample and sampling techniques

Stratified random sampling technique was used to select the schools and the category of respondents to be included in the sample. According to Gall (1996) stratified random sampling ensures that satisfactory representation of the categories of the population is included in the sample. In this study the population strata include boys' schools, girls' schools and mixed schools. Mixed schools were selected randomly whereby the researcher gave each school a serial number. The researcher then used Table of random numbers to select 37 schools from a total of 111 schools. From single sex schools, the four boys' schools and the five girls' schools were selected through saturated sampling technique. The 37 mixed schools together with 4 boys' and 5 girls' schools formed a sample of 46 public schools from a total of 120 public schools. This accounted for 38.3% of the total public schools in Gucha District.

Instrumentation

Data for this study was obtained through questionnaires, interview schedules and participatory observation that sought for general information on how head-teachers coped with the challenges they faced in their effort to provide quality education.

Questionnaire

Two questionnaires were designed for the study; one for headteachers and the other for the curriculum masters. The two questionnaires sought for information on the ways by which headteachers cope with challenges that face them. The questionnaires and interview schedules also sought for information on possible opportunities in secondary schools which could be utilized for quality education.

Interview schedule

There were five items which were used in interview schedule. Interviews helped to clarify responses collected from the questionnaire and also gathered information that was not assessed by the questionnaire items.

Observation checklist

Information was also gathered through observation of physical facilities and other visible school equipment. This observation helped to verify the responses received through questionnaire and interviews. The researchers prepared observation checklist which contained observable school factors related to quality education in secondary schools. The checklist was filled by the researchers during the period each school in the sample was visited.

Validity and reliability

To ascertain the validity of the research instruments, the researchers presented questionnaire and interview schedule guide, and observation checklist to experts for examination and verification. Validity was further ascertained through piloting. The pilot study helped first to establish which relevant data would be collected using the questionnaire developed. Secondly the pilot study helped identify problems likely to occur when administering the questionnaire.

Testing the instrument items by actual administration removes possible errors in the instruments (Grinnel, 1993). To ensure reliability of the instruments, the researchers conducted a pilot study in nine schools. Questionnaires were administered after intervals of two weeks and information obtained was used to remove or clarify the vague and ambiguous questions in the instrument.

RESULTS AND DISCUSSION

Ways of coping with the challenges faced by headteachers in their efforts to provide quality education

From Table 1, it is evident that over 50% of the boys' mixed and girls' schools HTs and CMs indicated that HTS coped with the challenge of shortage of teachers by employing boards of governors (BOG) teachers. It was reported that BOG teachers who were employed comprised of form 4 leavers and undergraduates who were out for vacation who did not teach for a continuous period of time. During interviews, over 62% of head-teachers from mixed and girls' schools reported that they employed untrained teachers and left graduates who

	Mixed schools N=37		Boys schools (n=4)		Girls school (n=4)	
Responses	HTs	CMs	HTs	CMs	HTs	CMs
	f (%)		f (%)		f (%)	
Employment of BOG teachers	28(76.6)	20(54)	3(75)	5(50)	3(60)	2(40)
Fund raising and donations	30(81.1)	26(70.2)	2(50)	2(50)	3(60)	3(60)
Utilization of school land	11(29.1)	5(13.5)	4(100)	3(75)	1(20)	1(20)
Improvisation of facilities	15(40.5)	12(32.5)	3(75)	2(50)	2(40)	(360)
Relying on credits and borrowing	22(59.5)	19(57.3)	2(50)	3(75)	4(80)	3(60)
Sending student home frequently	25(67.5)	16(43.2)	2(50)	2(50)	3(60)	3(60)
Punishing undisciplined students	25(67.6)	18(48.6)	2(50)	2(50))	2(40)	3(60)
Guidance and counseling services	18(48.6)	13(35.1)	4(100)	3(75)	4(80)	2(40)
Introduction of lunch programme	36(97.3)	30(81.1)	0(0)	0(0)	0(0)	0(0)

 Table 1. Head-teachers' responses on how they coped with the challenges.

were a waiting for employment because those one could be paid as low as Ksh.3000 a month. However they argued that employment of untrained teachers had seriously affected the quality of education provided due to inconsistency in the syllabus coverage. The nature of could be due to the reason that headteachers did not give accurate returns to the Teachers Service Commission (TSC) or the process of deployment by the same commission was slow. It could also be as a result of inadequate school finances. Another reason could be due to the nature of head-teachers and BOG members who were not conversant with quality parameters. This finding was inline with the views of Kahaviza (2003) who reported that members of the boards found in schools were illiterate and lacked managerial skills.

To cope with financial constraints, over 41.2% HTs and CMs of the three categories of schools indicated that schools relied on fund raisings, donations, purchasing items on credit, borrowing and transfer of vote heads. In addition 100% HTs from boys' schools reported that they relied on utilization of school land for crop growing, brick making, tree planting and dairy farming in contrast to 29.7 and 20% from mixed and girls' schools, respectively. The study revealed that most HTs relied on external sources of finance which were unreliable and hence affected the supply of instructional facilities. However, with all these efforts in place, schools' performance was still poor. This could be due to inadequate finances in schools as a result of non-payment of fees and accumulated fees arrears. This could also be due to head-teachers lacking financial management skills and hence misappropriated and mismanaged school funds. This same argument was given by Rosalind and Downes (2004) that school leaders trained in academic progression and pedagogical practices find themselves intimately engaged in financial procedures for which they might not have the experience necessary. Schools often recruit governors without teachers employed depended on various factors. This background in accountancy and thus give way for mismanagement of school funds.

The obtained results further indicated that over 35.1, 48.6 and 35% HTs and CMs from the three categories of schools, respectively, coped with indiscipline cases by punishing the culprits, establishing guidance and counseling services at schools. However, they indicated that guidance and counseling services were inadequate since they were lacking trained counselors. Students also viewed referral to guidance and counseling services as a punishment. This could be due to school having locally appointed counselors who lacked skills, necessary competencies and morale to work. Over 50% of HTs and CMs from both boys' and girls' schools compared to 40.5% HTs and 32.4% CMs in mixed schools indicated that head-teachers improvised some facilities such as converting classrooms to serve as laboratories and cooking fat containers to serve as beakers. Facilities were inadequate such that at times candidates only used laboratory facilities for the first time during their final examination. Head-teachers from the three categories of schools were of the opinion that despite the efforts to improvise facilities, their performances were affected greatly due to inadequate science equipment. This finding was in line with that of Gray (1998) who suggested that the decline in quality of education is highly experienced in rural areas due to lack of basic facilities such as buildings, furniture, and instructional materials.

Opportunities at the head-teachers' disposal

The results indicated that there were several opportunities in public secondary schools (Table 2). However, over 50% of CMs from boys', over 40% of CMs from girls' and over 24.3% of CMs from mixed schools indicated that some opportunities had been utilized and others not. During the interviews, 78.2% of HTs from mixed, 50% from boys and girls reported that the available opportunities had not been fully utilized because of financial constraints. HTs from these schools

Opportunity	Mixed (N=37)		Boys (N=4)		Girls (N=5)	
	f	%	f	%	f	%
Timely syllabus coverage	14	37.8	2	50	3	60
Utilization of school land	11	29.7	2	50	3	60
Guidance and counseling	23	62.2	4	100	4	80
Financial assistance	34	91.9	4	100	3	60
Employment of teachers	16	43.2	3	75	4	80
Support from parents	32	86.4	4	100	4	80
School textbook policy	4	10.8	3	75	2	40
Lunch programme	23	62.1	Х	Х	Х	Х
Field trips	8	8.1	3	75	3	60

Table 2. Head-teachers' response on the opportunities available in their schools for the provision of quality education.

"X" Lunch was provided in boarding schools.

argued that parental support was positive but the fee charged was little and poorly paid. Those from mixed schools reported that their schools were most affected since they owned inadequate land which could not be utilized for any economic purposes. Underutilization of school land could be as a result of HTs committing themselves to administrative affairs and concentrate on fees collection instead of looking for other initiatives which could help to supplement it. This finding was unlike what other schools did as reported by Johnson (1991) that technical schools in Mozambique and Zambia produced items which provided income, in the course of practical training. On the other hand Ogbu and Gallagher (1999) discussed production activities in school in Ethiopia. In their discussion, they revealed that many schools produced their own teaching aids as well as some crafts and garden crops for local sale. Those internally generated resources by schools were used to supplement government and community efforts in meeting the costs of education.

Utilization of opportunities fully depended on the financial status of schools. Non-payment of fees and dependence on external support could be some of the reasons why schools' opportunities had not been fully utilized. For provision of quality education to be achieved, it is apparent that school opportunities should be utilized fully for academic purposes. This finding was in line with the views of Fuller (1986) who noted that facility construction and availability were not major vehicles to quality enhancement but of critical importance was the utilization of such facilities.

Quality measures employed by head-teachers in public schools

From Table 3, it is evident that all CMs (100) and 50% CMs from boys' schools reported that their HTs employed frequent testing, early syllabus coverage, good entry marks and remedial teaching respectively. On the other

hand the situation in mixed and girls' schools were different whereby less than 45.9% had employed quality improvement measures with an exception of checking of teachers' and students' work which was indicated by 89.2 and 100% respectively. During interviews, over 70% HTs from mixed, 50% HTs from girls' and 20% HTs from boys' schools reported that remedial teaching was crucial in helping the poor students to improve their performance. This strategy received resistance from teachers who were not ready to implement it due to lack of motivation. They also reported that parents were not ready to support it as it involved some payment as a motivation to teachers. This could be due to the management strategies employed by school head-teachers. According to Andrews as reported by Brandt (1987) effective principals are perceived as those who were involved in proper tuition and revision, proper testing policy, syllabus coverage and teachers' induction courses and providing resources for instruction.

Head-teachers from mixed schools argued that frequent testing was hindered by the issue of sending students home for fee and due to lack of secretarial facilities and also because of that tests were written on the board which was against the teachers wish. HTs from mixed and girls' schools reported that they had a problem with admissions. This was because they did their form one admissions after National and Provincial schools. They further reported that due to that, they received students with low marks and this had really affected their Kenya Certificate of Secondary Education (KCSE) results. The major factor underlying all this was inadequate finance as testing, remedial teaching, teacher motivation and student learning materials provision all centered at the financial strength of the schools.

Conclusions

The head-teachers coped with the challenges they faced in different ways such as employing untrained teachers,

	Mixed schools		Boys' schools		Girls' schools	
Quality measures	F	%	F	%	F	%
Frequent testing	17	45.9	4	100	2	40
Remedial teaching	13	35.1	2	50	1	20
Checking of students and teachers' work	33	89.2	4	100	5	100
Early syllabus coverage	15	40.5	4	100	2	40
Good entry marks	5	13.5	4	100	2	40

Table 3. Summary of response on quality improvement measures.

searching for financial assistance from external sources, utilization of school land, punishing indiscipline students, establishing guidance and counseling services in schools, improving on admission criteria, motivating teachers and students, use of extra time and introduction of lunch programme especially in mixed secondary schools. However, with all those strategies put in place, performance had still remained poor and therefore the researcher concluded that head-teachers' ways of coping with challenges were inadequate and insufficient to improve on quality of education. The research further concluded that head-teachers needed support in form of finance, equipment, and facilities from the government and other stakeholders in order to improve the quality of education in their schools.

Public schools had several opportunities identified such as timely syllabus coverage, motivation of teachers and students, utilization of school land, improvisation of facilities, guidance and counseling services, financial assistance, employment of teachers, in-service of teachers, support from parents, admission criteria and introduction of lunch programme in mixed schools. However, most of these opportunities have not been utilized for academic purposes. It was therefore concluded that unutilized school opportunities have contributed to poor performance in public schools.

RECOMMENDATIONS

Based on the findings of this study, it was therefore recommended that:

1. School head-teachers should step-up/improve fee collection so that they do not involve themselves in borrowing of finance and purchasing items on credit. They should also provide adequate and comprehensive information to financial sources, for example CDF and government bursaries so that the needy cases are adequately covered.

2. On student discipline, the study recommends that an all-inclusive approach to be used to reduce indiscipline cases.

3. Given the shortage of teaching staff in schools, head-teachers should create voluntary scheme which ensures

that the qualified teachers give more than what they are officially assigned. This shall yield maximum utilization of available staff.

4. Despite the challenges generally faced, the study established that there are several opportunities for headteachers. Given the expansive and productive land in most schools the study recommends that head-teachers should embark on horticultural farming where fast maturing farm products are produced to generate cumulatively more money and ensure self-sustenance of the schools in farm produce needs.

5. The head-teachers should seek and relay information on training opportunities to their teaching staff to upgrade them and improve on their production within the school.

6. To enhance guidance and counseling in schools, the study recommends that head-teachers should design a cost-sharing and sponsorship programmes to enable as many teachers as possible and particularly in guidance and counseling committee to undertake training on current methods and approaches. There is also need for the Teachers Service Commission to post to schools full time professional counselors to enhance guidance and counseling services in schools.

7. Head-teachers should be strict on quality improvement measures employed in schools and call for support from parents and cooperation from Parents Teachers Association (PTA), BOG, the community and the teachers. This means that improving the quality of education should be an integrated effort between school factors and outside agencies.

REFERENCES

- Anderson LW (1991). Increasing teacher effectiveness. Foundation of Education Planning , 39. Paris: UNESCO-IIEP.
- Atkinson GBJ (1987). The Economics of Education. London: Hodderand Stoughton Educational.
- Ayodo TMO (2003). Efficiency in Kenyan secondary schools- paper presented at the Annual secondary school Heads' Association conference in Uasin Gishu District on 2nd May 2002.
- Carrier CA (1990). Improving Educational quality: A Global perspective. New York: Greenwood Press.
- Eshiwani GS (1983). The access of Women to Higher Education in Kenya with special Reference to Mathematics and Sciences Education. Mimeo: Bureau of Education Research, Kenyatta University.
- Fraenkel RJ, Wallen EN (1993). How to design and evaluate Research in Education. 4th Edition. Illinois: F. E. Peacock Publishers, Inc.

Fuller B (1986). Raising school quality in Developing countries: What investment Boost learning. Washington DC: The World Bank.

Gall MD (1996). Educ. Res . Intro. 5th Ed. New York: Longman.

- Gogo JO (2002). "The impact of cost sharing on access, equity and quality of secondary education in Rachuonyo District Kenya." Unpublished M.Ed. Thesis. Maseno University.
- Gray B (1998). Towards accessible science for pupils in rural areas. Issues of curriculum, technologg and In-service Support for teachers. In M.B. Ogunniyi promoting public understanding of science and technology in Southern Africa. Bellville: SSME, University of the Western Cape.
- Grinnell MRJR (1993). Social Work Research and Evaluation. 4th ed. Illinois: F.E. Peacock Publishers, Inc.
- Hadad W (1985). Education Effects of class-size. Washington DC, World Bank Staff working paper No.280.
- Hendrikz E (1986). Introduction to Education Psychology. London: Macmillan Publishers.
- Johnson A (1991). Education and Economic Crisis; The case for Mosambique & Zambia 1975-1985. World Bank, Washington D.C.
- Kahaviza RK (2003). "Financial Management in public secondary schools in Kenya: A case of Municipality and Lurambi Divisions of Kakamega District". Unpublished M.Ed. Thesis. University of Eastern Africa Baraton.
- Makinde O (1984). Foundations of Guidance and Counselling. London: Macmillan Publishers Ltd.
- Maundu J (1986). "A student achievement in Sciences and Mathematics: A case study of extra-provincial, provincial and Harambee secondary schools in Kenya". Unpublished Ph. D. Thesis Montreal McGill University.
- Mwiria K (1985). "The Harambee school movement: A historical perspective". Unpublished Ph. D.Thesis. University of Wisconsin.

- Ogbu OM, Gallagher M (1999). "On public expenditures and Delivery of Education in Sub-Sahara Africa." Comparative Educ. Rev., 35(2): 295-318.
- Oliveira J, Farrell JP (1993). Teacher costs and Teacher Effectiveness in Developing countries. In JP Farrell et al. (Eds). Teachers in Developing countries: Improving Effectiveness and managing costs. Washington D.C.: World Bank.
- Omariba NJ (2003). "Factors that contribute to performance in public Examinations in Rural Secondary Schools in Kisii District".Unpublished M.Ed. Thesis, Maseno University.
- Psacharopoulos G,Woodhall M (1985). Education for Development: An Analysis of Investment Choices. New York: Oxford University Press.
- Republic of Kenya (2003). Report for the sector review and development. Nairobi: Government Printer.
- Rosalind L, Downes P (2004). Formular funding of schools, decentralization and corruption: A comparative Analysis. Paris: International Institute for Educational Planning (IIEP).
- Ulster J (1998). Access to Science and Technology in Rural Areas. In M.B. Ogunniyi (Ed), promoting public understanding of science and technology in Southern Africa. Bellville: SSME, University of the Western Cape.
- UNICEF (1997). The state of the World's children 1997. Oxford: Oxford University press.
- Zulu J (1998). Comments Ulster's Paper: Access to Science and technology in Rural Areas. In M.B. Ogunniyi (Ed), promoting public understanding of science and technology in Southern Africa. Cape Town, Wynland.