

THE ROLE AND FUNCTIONS OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

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NSTA	-	National Science and Technology Association
NWED	-	North West Education Department
OBE	-	Outcomes Based Education
OFSTED	-	Office of Standards in Education
PAM	-	Personnel Administration and Management
PRESET	-	Pre-service training
PU for CHE	-	Potchefstroom University for Christian Higher Education
SEP	-	Science Education Project
SET	-	Science Engineering and Technology
SWOT	-	Strengths, Weaknesses, Opportunities and Threats
SYSTEM	-	Students and Youth into Science, Technology, Engineering and Mathematics
TED/TOD	-	Transvaal Education Department/Transvaal Onderwys-departement
UK	-	United Kingdom
UNIWEST	-	University of the North West
USA	-	United States of America

EXECUTIVE SUMMARY

The aim of this study was to investigate the role and functions of the physical science subject advisors in the North West Province. In order to establish these, a historical study of their role and functions has been undertaken in the following chapters through a literature survey. In chapter 1, the rationale for the study, research strategy and empirical research strategy is presented. A brief study of the history of the inspectorate/advisory service in South Africa, the United Kingdom and the United States of America is discussed in chapter 2.

Discussions in chapter 3 focus on specific roles and functions of the physical science subject advisors in the North West Province. The study focuses on whether there are any specific and strict requirements pertaining to entry of the service, training, accreditation, registration, experience, induction and job description for subject advisors of physical science. Roles with regard to their hierarchical structure will also be determined.

This study can also assist in dealing with the problem about whether to refer to such officials as advisors, inspectors, subject inspectors, academic inspectors or advisory teachers. Chapter 4 deals with the empirical study whereby data was collected from physical science subject advisors, senior subject advisors and teachers in middle and secondary schools in the North West Province and the North West Education Department. The results of the empirical survey are discussed in chapter 5 and a model is formulated. Findings and recommendations are discussed in chapter 6.

It is hoped that this research will contribute towards the formulation of a model for the optimal functioning of physical science subject advisors in the North West Province which will hopefully be useful in other parts of the country too. This survey is also expected to prompt further research into role theory, role conflict and role consensus with regard to the physical science subject advisors. This is expected to optimise their role and functions to enable them to make a positive contribution towards the implementation of Curriculum 2005 in the North West Province.

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CHAPTER 1

INTRODUCTION

1.1 RATIONALE

This study is intended to describe and analyse the situation regarding the role and functions of the general/physical science subject advisors in the North West Province. The study will mainly focus on the specialist guidance that they give to general/physical science teachers. In the new dispensation in the North West Province (NWP), the subject advisory service and in-service and training (INSET) centers previously governed by the Department of Education and Training (DET), Transvaal Education Department (TED), Bophuthatswana Education Department (BOP) and House of Delegates (HOD) were integrated into one department, the North West Education Department (NWED).

A major priority for the new Provincial Department is to establish a subject advisory service as distinct from the inspectorate and to develop a program for the reorientation and professional development of existing incumbents in the inspectorate and supervisory services in line with the aims and objectives of a transformed teacher management system (ANC, 1994:54-55). Such services should aim at providing a more liberating, professionally challenging and invigorating experience for teachers. Another goal should be to encourage the involvement of all school personnel in a co-operative attempt to deal with new curricula. In South Africa an Outcomes Based approach has been adopted by the National Department of Education (NDE). This approach moves away from a focus on input (content based) "towards the specification of what a learner is able to do at the end of a learning experience. This includes skills, knowledge and values which inform the demonstration of the achievement of an outcome or a set of outcomes" (South Africa: NDE, 1997:40).

The ultimate aim is to contribute, through the data collected in this survey, to the improvement in the quality of services rendered by the general/physical science subject advisors. This research was conducted in 1998 and the information gathered was utilised to devise strategies for the in-service training (INSET) of general/physical

science subject advisors. Recommendations with regard to the system of subject advisory services and specific on physical science are made.

Kahn (1994(a):25-29) attributes the crisis facing science education in South Africa to the following questions or concerns: What is taught? Who is being taught? Who are the teachers? What are the outcomes? How is infrastructure and support? In dealing with these questions/concerns, he observed that many African pupils do not take science beyond Std 7 (grade 9). In the ex-DET schools, home language is the medium of instruction up to Std 2 (grade 4), though most African secondary schools opt for English. Very few students achieve fluency in English by the time they reach secondary school and their learning difficulties are exacerbated by the under-trained teachers, inappropriate text books and the culture of rote learning. The sciences have a language of their own, worsened by the language demand of the syllabi. Kahn (1994(a):25-29) further argues that one factor leading to poor performance is that enrollment by African students is heavily skewed towards the higher-grade level in science and mathematics. This choice is probably motivated by the desire to proceed to university, which in most cases is never realised.

A study of the 1997 Std 10 physical science results indicates that the National pass rate in physical science higher grade is 59.1% and for standard grade is 71.0%. In the North West Province (NWP) the pass rates are 58% and 70.6% respectively (South Africa: NDE, 1998: graph 3, Table 12). Reasons that could have directly affected the results were cited as a lack of confidence which is evident in mathematics, biology and physical science teachers and under-resourced libraries which prevent pupils from doing projects and assignments (NWED, Undated:4-5). These results indicate the broader problem of student retention, teacher preparation, inadequate facilities and materials, inadequate guidance on curriculum choice and examination strategy. The consequence is a dearth of students with physical science qualifying for normal entry to higher education.

Colleges of education and universities therefore have a perennial shortage of high quality candidates in physical science. The number of teachers graduating from the colleges and universities is far too small to make an impression on the need in schools. Their subject knowledge and professional confidence is generally poor. A "cycle of mediocrity" perpetuates itself through their efforts in the classroom (South Africa: NDE,

1995:29). This “cycle” is reinforced by the unsuitable nature of the science and mathematics curriculum which is academic, outmoded and overloaded (ANC, 1994:84). However, the Government has initiated intervention strategies like Students and Youth into Science, Technology, Engineering and Mathematics (SYSTEM). It has been designed to deal with the ongoing problems which characterise science and mathematics education in South Africa and it is also linked to teacher development. It seeks to address this challenge through recovering large numbers of senior certificate candidates who have under-performed in these subjects (CEPD, 1995:3). The other program referred to as MASTEC (The Mathematics, Science and Technology College), is based in the Northern Province. It focuses on producing mathematics and science teachers at pre-service (PRESET) level as well as providing INSET programs for teachers in local schools (Arnott, Khubeka, Rice & Hall, 1997:55).

The question, “Who are the teachers?” may be answered by analysing the quality of science teachers generally in South Africa and in the North West Province. Despite the fact that most science teachers are trained as teachers, an insufficient proportion of them are trained in the subject they are teaching. In addition they are largely newcomers to the field and have not yet acquired experience through training (Arnott & Chabane, 1995:21). The average age of physical science teachers in the North West Province is 32,4 years (PU for CHE, 1997:5), which confirms the above statement. In 1995, 72% of the physical science teachers in the North West Province had less than six years experience, while 12% had over 10 years (Arnott & Chabane, 1995:3). According to research done by the PU for CHE (1997:5-6), the average experience of physical science teachers in 1996 was 2,1 years and that of general science was 4,1 years. The average total teaching experience of 8,0 years has been used to teach mainly other subjects. It is also interesting to note that physical science teachers in the NWP devote 41% of their teaching time to the teaching of other subjects (PU for CHE, 1997:11). A study conducted by Arnott & Chabane (1995:19) indicates that 42% of science teachers across seven provinces in South Africa have been teaching for two or less years and 65% for five or less years hence the need for INSET which can be provided by the subject advisors.

Various studies (Arnott & Chabane; Howie, 1997:53) conducted recently in South Africa indicate that there is a severe shortage of properly qualified science teachers at secondary school level. Unfortunately the shortage has been masked by the well-published surplus of teachers in other areas of education. The problem is exacerbated by the fact that many trained science teachers at colleges of education have chosen the course as a second or third option, having failed to be selected for their first choice of career.

The demand and supply of general/physical science teachers in the North West Province, studied by Arnott and Chabane (1995:28), indicates that there is an undersupply of secondary school science teachers. At least 40% of these teachers are un(der)qualified. A survey conducted by PU for CHE in 1996 indicates that for about 660 general/physical science teachers (54% of the physical science teacher provincial population), their highest qualification is matriculation physics and chemistry. Some do not even have this qualification. Only 53 teachers have as their highest qualification third year university physics and only 69 have third year university chemistry. 17 have as their highest qualification fourth year physics and are essentially B. Sc. (Education) graduates. The same is true for the 20 whose highest qualification is fourth year university training in physics and four have a similar training in chemistry. All these teachers have M.Sc degrees (PU for CHE, 1997:6-9).

These studies have a commonality in that they highlight the recent trends in the quality of general/physical science teachers in the North West Province and generally in South Africa. This raises the question on the quality of science teachers generally, and in the North West Province, access to science subjects, the quality of INSET offered to the teachers and the infrastructure for teaching and learning the said subjects at school, college and university level.

Another factor, which is a matter of concern, is the high attrition rate of science teachers. According to Arnott & Chabane (1995:19-20), Science Education Project (SEP), a national science NGO, observed that a large majority of science teachers did not stay in the profession longer than two years and that the attrition rate of science teachers is, relative to the national norm, very high. According to the PU for CHE (1997:44), the attrition rate of science teachers in the North West Province is estimated at 15%.

From the above discussion it is clear that the training in practical work at colleges of education needs to be strengthened to deal with the situation observed by the FRD (1994:96-97) that most of the laboratories at colleges of education are not suitable for the practical work required by the new syllabuses. Colleges within the traditionally "Black" education system, especially those in the ex-DET, have severe problems in adequately preparing high school physical science teachers.

According to Arnott and Chabane (1995:29) there is an obvious need for INSET in the sciences. The subject advisor for physical science, as the name implies, may play an important role in this regard in the North West Province. The need will in future become more prominent with the introduction of the so called outcomes based education (OBE) from 1998 onwards.

Curriculum 2005 was announced on 30th July 1996 by the National Department of Education with a view to have the first learning programs for implementation in 1998. At the center of OBE lies a paradigm shift from content to outcomes (South Africa: NDE, 1997:13). While paying attention to OBE and new curriculum initiatives in science and technology, it is imperative to take stock of the state of facilities in schools. For example in North West province according to the PU for CHE (1997:24) general/physical science teachers experience the following difficulties:

- Lack of laboratory equipment - 60%
- A poor library - 54%
- Lack of laboratory - 42%
- Insufficient text books - 40%

24% of the teachers identified insufficient training as the principal problem in their teaching.

The FRD (1993:73) indicated that most of the laboratories are too small, lack essential facilities like gas, fume cupboards, water and electricity. Some are used as staff rooms, lecture rooms, store rooms and media centers. These circumstances are far from ideal for the teaching of physical/general science.

One of the six key priorities for education recommended by the World Bank is paying attention to outcomes (Oxtoby, 1995:104-105) and that concern has been growing around the world since the 1960's that investments in education need to be related to outcomes of education, which in turn are seen as being able to make a contribution to a country's economy. Teachers particularly need to undergo intensive INSET, within the context of whole school development, in order to equip them with skills for dealing with OBE and other innovations in science and technology. Regular school focused INSET programs must be integrated into the continuous education of teachers with follow up school based workshops and the supply of adequate resources. The Centre for Educational Policy Development (CEPD, 1995:14) states that it is a common fact that no curriculum development takes place without teacher development. A reciprocal approach to facilitating and promoting teacher and curriculum development is essential hence the need for intensive INSET. INSET could be provided by the subject advisors of physical/general science. The new OBE approach poses challenges to the science teacher's methodologies, resources for learners and teachers and support system to the teachers to deal with the challenge.

1.2 AIM OF THE STUDY

The aim of this study is to investigate the role that the subject advisor of physical/general science can play in the new dispensation as it is evident that there is no clear description of their task. This study sets out to determine what the functions of the subject advisor of physical/general science should be, analyse the present situation with respect to professional and special guidance given by subject advisors to physical science teachers in the North West Province and to suggest improvements to optimise the functions of the subject advisor. A World Bank study of teaching in Sub-Saharan Africa by Oxtoby (1996:104) identified six areas that affect quality in education and of these six, paying attention to outcomes is singled out as it coincides with the recent developments towards OBE in South Africa.

Under-qualified teachers in urban grades 11-12 classes have for many years been struggling to “survive”, and the symptoms of this “survival teaching” were in truth dependence on text books, rote learning, note taking, prescriptive methods of teaching and avoidance of free discussion of any but the most carefully controlled questions (Hartshorne, 1992:244). As INSET programmes in particular, and Non-Government Organisations (NGOs) in general move into the 1990’s and prepare for the new habitat in which they will have to live and survive, they are being required to reassess their positions and question many assumptions that have underlain their previous policies and practices. In the past, by conscious decision, most of their activities took place outside the state system of schooling or on the periphery of that system. There has to be a shift from the principled (ideological) oppositional and even confrontational stance that has been the hallmark of most NGO programmes (Hartshorne, 1992:282).

These NGOs have attracted to their ranks some of the best teachers out of school classrooms. The typical pattern is for these teachers, as NGO operatives, to work with their peers through course-based INSET, and in some cases, school-based INSET. On termination of the service with the NGO, it is rare for these teachers to return to classroom duty. They are lost to the system. The difficulties with such privatisation are thus manifold: departments are further discredited, there is no clear career pathing and the actual gains through INSET are difficult to quantify. For these reasons, the subject advisory service (and the inspectorate) require urgent reconceptualisation. Education departments, tertiary institutions, NGOs, teacher organisations and schools will need to re-assess all the relationships characterising the service and expectations of the service. Alternative models where experienced teachers serve as part-time advisors to a cluster of schools should be investigated. A programme of INSET for subject advisors and inspectors requires immediate development (CEPD, 1994:19).

1.3 METHOD OF RESEARCH

1.3.1 LITERATURE STUDY

Study material and recent publications on the topic of the study were obtained from:

- A DIALOG search in the Eric-Data Base of the Ferdinand Postma library at PU for CHE.

- In addition, recent governmental publications e.g. the COTEP document, White Paper on Education, documents from previous education systems and the North West Education Department.
- A search on international publications was also conducted and the UK and USA publications were consulted in order to gain insight into the role and functions of the physical science subject advisors in different countries with a view to develop a model for the North West Province.

1.3.2 EMPIRICAL SURVEY

Situational analysis

The empirical survey was conducted from July to September 1998. Questionnaires were administered to 7 out of 8 physical science subject advisors who have been functioning in the North West Province since 1994. A total of 70 teachers completed the questionnaires. Structured interviews were conducted with the 2 senior subject advisors and the Deputy Director for Subject Advisory Services and Professional Support. Both questionnaires completed by subject advisors and teachers were completed anonymously. The questionnaires completed by teachers were analysed by computer and those subject advisors by hand.

1.3.3 Population

The following target groups were identified for the study:

- All senior subject advisors (natural sciences) for secondary schools in the North West Province
- All subject advisors (physical/general science) in the North West Province
- 70 teachers in middle and high schools in the 12 districts of the North West Province
- The Directorate: Subject Advisory Services and Professional Support in the North West Province.

1.3.4 Statistical techniques

The most appropriate techniques were discussed with the supervisors and the statistical consultation services of the PU for CHE assisted with the analysis of data.

1.4 CONTENTS OF CHAPTERS

- ◇ Chapter 1 offers an introduction and rationale for the study, aims of the study, method of research and the empirical survey.
- ◇ Chapter 2 provides a literature review on the role and functions of the subject advisors in general and those of physical science in particular: a historical perspective of South Africa, the United Kingdom and the United States of America.
- ◇ Chapter 3 focuses on the task description of subject advisors of physical science and specifically, their task related to specialised subject advice and guidance to teachers.
- ◇ Chapter 4 presents the data from: physical science subject advisors, physical science teachers, senior subject advisors and the Directorate Subject Advisory Services and Professional Support in the North West Province.
- ◇ Chapter 5 discusses the results of the empirical survey and an analysis thereof. A model for the optimal functioning of the physical science subject advisors in the North West Province is suggested.
- ◇ Chapter 6 discusses general conclusions and recommendations of the research.

CHAPTER 2

LITERATURE REVIEW ON THE ROLE AND FUNCTIONS OF SUBJECT ADVISORS IN GENERAL AND THOSE OF PHYSICAL SCIENCE IN PARTICULAR: A HISTORICAL PERSPECTIVE OF SOUTH AFRICA, THE UNITED KINGDOM AND THE UNITED STATES OF AMERICA

2.1 INTRODUCTION

This chapter deals with the historic role of the subject advisors' predecessors in South Africa, in the United Kingdom (UK) and the United States of America (USA). It will be concluded with common core functions/roles identified in the literature.

Little attention has been given to science supervision in the science education literature, even though the science supervisor is a very important person in the science education enterprise (Voss, 1983; Madrazo & Hounshell, 1987:9). Anderson (1972) indicated that the supervisors' role is and will be perceived differently by different people.

2.2 SOUTH AFRICA

According to the ANC (1994:53-54), under the apartheid educational administration, teacher management and support were conceived as two separate processes. Teacher management in reality meant the administration and control of teachers. The system of teacher appraisal has been largely inspectorial and bureaucratic. Its approach has been largely summative in that it aimed at rewarding excellent and punishing incompetent performance, rather than formative in the sense of assisting teachers to identify and overcome their shortcomings. It shared together with all other aspects of the education bureaucracy, a top-down, closed, hierarchical and authoritarian character. In the case of black teachers in particular, it has been concerned with bureaucratic efficiency and social control, rather than effective management and professional development at school level. Supervision was oriented towards the narrow objective of improving Grade 12 examination results rather than improving educational processes generally. Inspection was focused on assessing teachers with a view to monetary rewards and promotion and it was overwhelmingly about compliance with departmental regulations rather than

engaging educators about their work. Loyalty to officials and their departments outweighed the interest and needs of teachers. In the ex-TED a different scenario presented itself whereby the inspectors of education (academic) were responsible for subjects in secondary education. Their main role was to take the lead in the subject for which they were responsible as set out in the common functions (South Africa: TED, 1979:8).

The inspectors of education (academic) had clearly spelt out functions stipulated in the manual for inspectors of education. Their roles and functions were specified and differentiated under common functions of inspectors of education (academic) (South Africa: TED, 1979:5) and specific functions of inspectors of education (academic) (South Africa: TED, 1979:7). An assumption can be made that their role specification optimised their functions. The inspectors of education (academic) were also responsible for determining the grading and promotability of teachers in their subject to the level of a senior teacher (South Africa: TED, 1979:14). This is in contrast to the ex-DET subject advisors who did not have such authority but only offered advice and assistance to teachers in their subject. This statement is made from the researcher's experience as a physical science subject advisor in the ex-DET. The majority of teachers in the ex-TED were in favour of the involvement of the academic inspector, later referred to as superintendents (academic) in their professional development, particularly in INSET programmes (Prinsloo, 1988:304).

Brighouse and Moon (1995:vii) indicate that changes in the political mood and educational aspirations inevitably influence attitudes to inspection. Teachers, particularly in the ex-DET have made specific criticisms of the subject advisory services and the appraisal system. One teacher union's criticisms included: political bias in the system, political victimisation of teachers, unchecked and abuse of patronage which inspectors and subject advisors wield (ANC, 1994:54). The researcher from her experience as a physical science subject advisor differs with the latter part on unchecked power. Subject advisors in the ex-DET had no powers but only rendered an advisory service to teachers. Incompetence, one-off visits, irregular criteria, secrecy, absence of contextual factors and arbitrariness in appraisal processes were amongst the criticisms leveled against inspectors and subject advisors (ANC, 1994:53-54).

Unfortunately, in the ex-DET schools, in some areas, there has been a total breakdown of trust between teachers and subject advisors which needs to be

restored (FRD, 1993:29). Despite the negative attitude portrayed towards subject advisors, the teachers at Ipelegeng school in Schweizer-Reneke, in the North West Province felt that a solution to their problems in the teaching of physical science lies in the formation of study groups to share expertise and to call on subject advisors and university specialists for guidance (FRD, 1994(a):88). This is an indication that subject advisors were not completely rejected but may be, a clarification of their role and function can change the attitudes of teachers.

According to the FRD (1994(b):28) the ex-TED teachers had the same experience as the ex-DET teachers which were as follows: there were virtually no support and monitoring mechanisms for teachers at grade 8 and grade 9 levels. The subject advisors/academic inspectors were too stretched to pay much attention to these levels. The Natal Education Department (NED) subject advisor for example, covered between 80 to 90 high schools. He/she got to see a school just once a year. Focus was mainly on Grade 12 teachers. The researchers' experience is that the area/district manager decided on a focus area that was mainly Grade 12 teachers and the teachers in the lower classes were not visited regularly.

INSET programs were conducted mainly for Grade 12 teachers. Despite numerous criticisms leveled at the subject advisors generally, the ex-DET physical science subject advisors together with their principal subject advisor conceptualised their roles in 1992 (South Africa: DET, 1993:1-2). The main emphasis was the fact that the subject advisor is not an inspector, his/her role is to advise and not to criticise. The following main areas were identified: knowledge of the subject(s), innovation, community involvement on science issues, writing skills, confidence, upgrading of unqualified teachers, field and administrative work, identification of good teachers, communicating and establishing good relations with teachers and curriculum development. The researcher believes that a lot could be drawn from these roles which could be refined to suit the present set-up. In 1994, the Deputy Director-General (DDG) for the provision of education in the ex-DET opened the annual subject advisory services conference by stating that it had begun to distinguish itself as a gathering, which determines to a large extent what occurs, or does not occur in the classroom. He mentioned that no other group of officials can influence the course of events in our schools to the degree in which they can.

According to the minutes of the science advisors' conference held in 1993 and the researcher's experience, the ex-DET had principal subject advisors based in Pretoria who monitored the activities of the regional subject advisors. They visited subject advisors once or twice a year to guide them on their role and functions.

According to a communication by the ex-director of INSET, Mr. S.J. Hlongwa (1998), a slightly different system of supervision of subject specialists was in place in ex-BOP. There were subject inspectors who were based at Head Office (then Mmabatho) and visited all schools in the homeland. They checked on teachers in the specific subject areas. They had powers to demand preparation, punish badly performing teachers and reward those with good performance. There was another wing called INSET which had academics of good standing who were called "lecturers", most of them with a second degree in their subject as compared to the subject inspectors who were mostly without junior degrees but have diplomas and certificates in their field. The INSET lecturers covered a wide area of ex-BOP schools by either visiting the teachers in an area for a block period or conducting INSET courses at their center, which was well equipped. The center has several laboratories and lecture rooms. The subject inspectors and lecturers operated independently.

All the ex-departments had an inspectorate service which had a role of supervising school managers in their circuits. Based on the researcher's experience in the ex-DET model, subject advisors had to lean on inspectors for authority. Reports were forwarded to them for action against a non-performer or appraisal of good performance. The only stumbling block was that they were not obliged to do it as there were no specified relationships between them and the subject advisors. This is contrary to the situation in the ex-TED model whereby the circuit inspectors, regional inspectors and academic inspectors were operating as a team (South Africa: TED, 1979:3-12).

2.3 THE UNITED KINGDOM

According to Brighouse (1995:1) the Local Education Authorities (LEAs) in the UK employed a group of professional staff in 1992 with a concern for quality in education and it was named "The Advisory Service, the Inspectorate or the Inspection and Advisory Service". In general they were called upon to provide professional educational advice over the deployment of those education resources which did not

belong to any one school. Their advice was also sought on matters where individual schools were not judged fully competent.

The question "When is an inspector not an advisor?" raised by Gerald Haigh, (1989:22) is more than relevant here. International trends indicate how this question was answered. In Warwickshire both inspectors and advisors operated in LEA's. Presently only inspectors are functioning though they still want to be thought of as advisors. Oxfordshire only has advisors. Under the 1988 Act, the Department of Education and Science clearly sees the local authority advisors and inspectors in the "no-nonsense role of making the national curriculum stick". They had a national association of inspectors and educational advisors. An education support grant was introduced with the specific aim of helping authorities develop their machinery for monitoring the quality of education and the delivery of the national curriculum (Haigh, 1989:22).

According to Mark Lear (Haigh, 1989:27), principal advisor in Devon "on the spectrum from advice to inspection you cannot actually separate them out". Bill Laar, chief inspector for the new London authority of Westminster indicated that advisory services in an inspectorial role must make the criteria upon which they are basing their investigation explicit to schools (Haigh, 1989:27).

What he is asking for is the kind of partnership in which school and inspector agree on what the criteria of inspection are going to be. Mark Lear also mentions a process in which the school's own evaluation plan involves, periodically, an "external view" by the advisory service. This is called the "shared criteria" model of inspection/monitoring whereby the inspector/advisor is involved in the formulation of the school's development plan. According to Bill Laar, it might not be a bad rule of thumb to follow that inspection reports should not provide any awkward surprise for schools. Equally, inspectors should not be overwhelmed by unexpected discoveries when they visit schools (Haigh, 1989:27).

The above statements somehow indicate the rapport that has to exist between the inspectorate/advisory service and the schools service and the schools serviced by the two groups of officials. However, in South Africa and in particular the North West Province, the inspectorate and the advisory service are two different services with separate directorates. The situation of mistrust between subject advisors and educators is not unique to South Africa. According to Haigh (1989:27), in the UK,

most heads and teachers see advisors, despite the cynical jokes, as friends. This statement indicates that at some point advisors were not taken seriously. They felt that if the present process of restructuring leaves them with inspectors and advisors who visit schools more often, armed with understandable and agreed terms of reference, then the partnerships can only be strengthened.

According to Brighouse and Moon (1995:1), international trends indicate that inspection in Britain dates back to the Industrial Revolution. The first inspectors of schools were not appointed under educational legislation but under the Factory Act. Around 1839 and thirty years thereafter the inspectorate was developed along denominational lines with separate inspectors for the church of England, non conformists and Catholic schools.

Initially it was not a requirement that inspectors should have taught or had experience of schools they were to inspect. They found themselves inspecting schools and subjects of which they had no previous practical experience, for example the outstanding science teacher from Malborough or Harrow may find himself Her Majesty's Inspector (HMI) staff inspector on truancy among teenage girls. The 1870 Act discontinued the denominational split of the inspectorate and by 1980 parliament debated the need for some kind of training for inspectors (Brighouse & Moon, 1995:5).

By 1911 countries tended to have "organisers" who increasingly advised and organised for schools about matters of health, safety and the latest advances in available equipment.

Advisors in mathematics, science, humanities and modern languages followed the concept of "organiser" in 1911. This structure compares fairly well with that of the advisory service in the North West Province where each subject/phase has an advisor (Brighouse & Moon, 1995:8). The LEA inspectorate/advisory activity expanded in 1986. Grants were availed for mathematics and science teachers and LEAs were also involved in curriculum development. Some of the countries were beginning to refer to their advisors as inspectors.

The period from the 1980s to 1992 witnessed the most remarkable growth of advisory and inspectorial activity on the part of LEAs. Particular inspection/advisory posts were created for INSET training for teachers which were non-existent before

1985. In September 1992 the Office of Standards in Education (OFSTED) gave direction to the new inspection system through training and accreditation of inspectors, lay inspectors and team members (Kennedy, 1995:121).

A conclusion can be drawn that the advisors in the UK, through their "shared criteria model", and their team work with inspectors were acceptable to schools because they conducted the inspection on agreed terms of reference. This is believed to have boosted their image which was also strengthened by the support from the government through legislation passed to govern their activities.

2.4 THE UNITED STATES OF AMERICA

In the USA, the National Commission on excellence in education in 1980 observed a steady decline in science achievement scales of 17 year olds as measured in 1969, 1973 and 1977. This steady decline in achievement was simultaneous with the steady elimination of science co-ordinators. In the opinion of teachers, the loss of these co-ordinators has seriously contributed to the reduction of science study at least in the elementary schools. According to Stronck (1987:21), in 1978 the National Science Teachers Association (NSTA) explained that during the 1960's the number of positions for science consultants increased. The trend to reduce them was not well received by elementary school teachers who, according to Stronck (1987:21) reported that they rated "lack of adequate consultant services" as their greatest barrier to effective science teaching among thirteen listed barriers.

However, Stronck (1987:22) indicated that in 1978 the British Columbia science assessment (Sieben & Hobbs, 1979) recommended an increase in district-level co-ordination for the province. The results of the survey indicate that there was an increase in designated science coordination between 1978 and 1982 (Stronck, 1987:25 (table 1)).

In the USA, the results of the two national surveys on the roles of the science supervisor were found to be exactly the same. The first survey was conducted in 1978 by the NSTA Committee on the Supervision of Science Teachers (Madrado & Motz, 1982:42). The second survey was directed through the NSTA's Division of Supervision. The participants in the first survey were teachers, administrators and other professionals and in the second one it was teachers and administrators. The participants were asked to rank the roles of the science supervisor in the order that

would most closely fit their needs. The seven perceived roles in order of preference in both surveys were:

- **Instruction-assistance** in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction.
- **Curriculum-facilitation** of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.
- **Staff development** - initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.
- **Implementation** - initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.
- **Management** - requisition of supplies; coordination of information about laws, liabilities district policies, safety regulations, financial status, and budgets.
- **Assessment** - analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.
- **Assignment, transfer, load** - assistance in assignment, equalisation of teaching load, resolution of conflict, selection of staff (Madrazo & Motz, 1982:42; Madrazo & Hounshell, 1987:9).

One of the most significant findings in the literature is that a lack of clear role definition seemed to limit the effectiveness of the position. Several investigators have suggested the development of a clearly defined set of expectations for the position (Madrazo & Hounshell, 1987:10).

While there is agreement on the roles of the science supervisors by different participants, it is imperative that these supervisors should examine carefully the role expectations of the various groups of individuals in their school systems. A clear definition of the requirements and role description for the position should serve as a basis for the training of supervisors in general and science supervisors in particular. It is recommended that the role function of the science supervisor be continuously evaluated. Only through reassessment of the role expectancy of the various groups involved in surveys will science supervisors and other educational leaders keep abreast of changing attitudes and perceptions concerning their roles (Madrazo & Hounshell, 1987:13-14).

2.5 CONCLUSION

The sources used to review the roles and functions of the physical science subject advisors in South Africa, the UK and the USA indicate some common features which are basic to the role of these officials.

The most common role is that of staff development, commonly referred to as INSET. Although the approach differs in the three countries, the basic fact is that the whole idea of INSET is to upgrade the teachers in their subject and to provide professional support. A major difference pertaining to the role and function of the physical science subject advisors is that their training and induction differ a lot. In South Africa, it is evident from the literature that there seems to be very little attention given to this aspect of their work. In the UK it is taken very seriously. Choices can be made from a long list of induction and training courses which are offered in this country. The most popular courses are those offered by the Centre for Advisor and Inspector Development (CAID) and those compulsory courses provided by the LEA (Dean, 1992:164). In the USA, a lot of emphasis is placed on research into the role expectancy of the science supervisor which is hoped to help in pre-service education of supervisors. The findings of such research is also expected to bring about a clear definition of the requirements and the role description for the position which should serve as a basis for the training of supervisors in general and science supervisors in particular (Madrazo & Hounshell, 1987:13-14).

The conclusion by Yager (1980) that science education is in a "crisis" is a fact which is true for many countries and it is hoped that science supervisors can alleviate this problem by developing and supporting the science teachers. Voss (1983:375)

pointed out that more research is needed in the area of science supervision. Recent studies in science supervision relate to teacher and supervisory perceptions of elementary science supervision (Perrine, 1984), science supervisor role perception (Madrazo & Motz, 1983) and the effectiveness of science supervisors and their membership status within a faculty (Ritz, Cashell and Felsen, 1981). The above statements on research into science supervision are necessary for the North West Province in order to optimise the role and functions of the physical science subject advisor.

It is evident from the literature that the advisory teams are organised differently in the various countries. In South Africa it is clear that the role of the physical science subject advisor is generally to assist and support the teachers in the teaching of the subject, the main task being INSET. The advisory team for example in the North West Province is mostly made up of the individual physical science subject advisor, occasionally accompanied by the physical science senior subject advisor. In the UK, the advisors were mainly concerned with provision of professional educational advice in the subject, on the deployment of education resources which did not belong to any school and they also provided advice on schools which were not judged fully competent (Brighouse & Moon, 1995:1). The advisory team comprises of the specialist advisor, the inspector and the advisory teachers, each with a specific role to play during inspections (Dean, 1992:198-219).

In the USA, a lot of research has been done on the role of the science supervisor. The seven perceived roles highlighted in section 2.3 of this chapter are presently the actual roles of the science supervisor in order of preference by different participants in the two surveys conducted on this issue. The advisory team is made up of the science supervisor and the "coordinator as a supervisor of science" who usually observes science teachers with the science supervisors and also conducts follow-up visitations to schools (Madrazo & Hounshell, 1987:12).

In order to optimise the role and function of the physical science subject advisor in the North West Province, it is essential to realise that a lot of research needs to be done on the aspects of role definition, role expectancy and role conflict. Participants of the surveys should be carefully identified in order to include key people affected by their service. Best practices from other countries like the UK and the USA on the role and function of the science supervisor, the organisation of the advisory team and training and induction of the science supervisors should be taken into account.

CHAPTER 3

TASK DESCRIPTION OF SUBJECT ADVISORS OF PHYSICAL SCIENCE AND SPECIFICALLY, THEIR TASK RELATED TO SPECIALISED SUBJECT ADVICE AND GUIDANCE TO TEACHERS

3.1 INTRODUCTION

The purpose of this chapter is to describe the role and functions of the physical science subject advisor in the North West Province. It is apparent that in the new dispensation much development is needed to optimise the professional duties of general/physical science subject advisors. It is expected that subject advisors will play a key role in the introduction of Curriculum 2005 in the province with regard to general/physical science (PU for CHE, 1997:51-52).

A significant problem in many parts of the world is that most teachers, especially those in rural areas, have little or no opportunity for enhancing their discipline knowledge while they serve as teachers. There are many complex reasons for these pervasive but limiting realities, but if teachers are to grow professionally they must have access throughout their careers to education in science and science pedagogy. That access must be easily available to them in informal or formal settings (Van den Berg, Vincent & Finegold, 1993:187). Subject advisors have the potential to make a substantial contribution to the development of teachers through INSET. It was, however, clear from the teacher's responses that this service, at present, is not very significant (PU for CHE, 1997:75).

The introduction of Curriculum 2005 and the strategy of OBE is posing a challenge to the North West Province to revisit the functioning of the physical science subject advisors. Fensham and Gunstone (1993:235) assent that when a country embarks on a major reform of its school science curriculum it is also faced with the substantial issue of professional development. Extensive and intensive INSET in mathematics and physical science linking colleges of education with schools, with follow-up programmes linked to classroom practice should be established (Arnott, Khubeka, Graham & Rice Undated:24). This approach is probably the most critical factor for successful implementation of Curriculum 2005.

3.2 THE DEVELOPMENT OF THE ROLE OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

3.2.1 THE PAST

Circumstances typically faced by science educators vary greatly within most developing countries, and differences are especially great from one country to another. Variations are especially dependent upon the economics and the level of development of the country and region. State education systems are complete amalgamations of socio-cultural and idiosyncratic historical and political factors that make understanding difficult (Van den Berg, Vincent & Finegold, 1993:175). While the above is true for science educators it can be equally true for physical science subject advisors in the North West Province as South Africa is a typical developing country.

When all South Africans won equal citizenship on the 27th of April 1994, their past was not erased. The complex legacies live on in the present. The history of Subject Advisory Services is one of uncertainties and it is wrought with misconceptions. Possible reasons for these misconceptions could be:

- The role that Subject Advisory Services had to play in the upgrading of teachers was not clearly defined;
- Old traditional methods were used;
- Selection criteria for Subject Advisors; and
- Subject advisors were not teacher friendly and therefore they met with resistance and suspicion (Makodi, 1996:1).

The present North West Provincial advisory service is an integration of the services of ex-BOP, ex-TED, ex-DET, ex-HOR and ex-HOD. The physical science subject advisors are mainly from the ex-TED, ex-DET and ex-Bop. Since the integration of these departments, the role and the function of the Subject Advisory Service has been revised and upgraded to become a teacher friendly service that renders quality service aimed at producing a winning nation (Makodi, 1996:1).

The researcher believes that the above statement based on the revised advisory service can only be an absolute truth if subjected to a test by those affected by the service, namely the subject advisors themselves, the physical science teachers, the

senior subject advisors and senior managers in the directorate. It is only through a scientific investigation that the validity of this statement can be tested.

The officials responsible for advising physical science teachers were referred to as Superintendents of Education (academic) in the ex-TED (Prinsloo, 1988:88), as Subject Advisors in the ex-DET (South Africa: DET, 1993:6). According to a communication by a Mr. J. Dolo (1998), they were referred to as Lecturers in the ex-BOP.

The role and function of the physical science subject advisor will be discussed, as it was in the three main previous education systems in the North West Province in order to establish the system that has emerged after 1994.

3.2.1.1 THE ROLE OF THE SUPERINTENDENT (ACADEMIC) IN THE EX-TED

In the historic Transvaal Education Department the superintendent (academic) played an important role in the in-service development of physical service teachers (Prinsloo, 1988:88). Aspects that were regarded as important were:

- The development of the teacher's academic subject knowledge;
- Assistance with the interpretation and implementation of syllabus content;
- The refinement of didactic skills; and
- Guidance in management skills.

According to South Africa: TED (1979:5-6) some of the roles of the superintendent (academic) included:

- Being a chairman of the study committee of his subject;
- Planning and presenting pilot, orientation, local or any other relevant courses;
- Control of tuition of his subject(s); and
- Compilation of study guides and newsletters for study in schools in order to furnish replies to questions and problems put forward, explain aspects of method that present problems and interpret components of the syllabus.

The inspection programme was normally arranged beforehand. They could also be requested by the inspector of education (circuit) through the Education Department, or directly by the Department to visit schools.

In an empirical survey conducted by Prinsloo it was found that the majority of teachers in the ex-TED were in favour of the superintendent's involvement in in-service programmes for science teachers (Prinsloo, 1988:304).

3.2.1.2 THE ROLE OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE EX-DET

In the historic Department of Education and Training the physical science subject advisor played a major role in the following Key Performance Areas (KPAs) identified by the department in their job description in terms of the OUTPUT-INPUT MODEL (South Africa: DET, 1993:56):

- Subject planning and organisation;
- Guidance and support;
- Subject development; and
- Monitoring, control and evaluation of teachers' and learners' performance and progress.

In addition to the above-mentioned KPAs the physical science subject advisors and the principal subject advisor at their conference held on 6-7 October 1992 in Giyani (South Africa: DET, 1993:33) discussed and agreed upon other roles that they can play which are as follows:

- Their role is to advise and not to inspect;
- A subject advisor must have drive and be innovative;
- He must be knowledgeable in general (including all aspects and areas of science);
- He should be involved in the community, in Expo for Young Scientists, olympiads, organise excursions and write newsletters;
- He should write his own notes and make his own cassettes;
- He must have the confidence of the principal, community, etc, so that he can be acceptable;
- He should be involved in upgrading unqualified teachers;
- He should also do administrative work in addition to field work; and
- He should be involved in curriculum development.

The following roles were added and stressed by the Principal Subject Advisor:

- He should have a target to improve the examination results by communication with the teachers, listening to their problems, getting to know them by name and identifying the good teachers (South Africa: DET, 1993:34).

3.2.1.3 THE ROLE OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN EX-BOP

According to a communication by a Mr. J. Dolo (1998) in the ex-Bop, the physical science lecturers were stationed at the INSET Centre in Mmabatho. They used to present residential workshops and coaching sessions at the centre. In 1994 the whole system was decentralised. The lecturers visited the teachers at their own schools to get an idea of the conditions under which they operate. Laboratory and classroom visits were conducted. It was referred to as the Science Teacher Support Service from 1994. This situation prevailed until the integration of the historical education departments in the North West Province.

3.2.1.4 SUMMARY

The development of the Subject Advisory Service in the North West Province, as discussed, confirms the statement that all organisations are a product of their history and the advisory service is no exception. The pace of change has accelerated and the service has been particularly affected by these changes (Dean, 1992:1).

According to PU for CHE (1997:13) it was evident to the FRD investigation team which collected data on the general/physical science teachers that some teachers, with the worry of right-sizing in mind, did not respond objectively and honestly concerning their training and competence in teaching skills. The researcher believes that this can have a ripple effect on the Subject Advisors who may not enjoy full participation of teachers in the planned activities. However, it was reported by PU for CHE (1997:51) that the attitudes of teachers are described as positive to very positive and the cooperation as good to very good, but the poor matriculation (Grade 12) results raise a question.

Another challenge is the introduction of Curriculum 2005 and OBE. From interviews held with Subject Advisors in 1996 and with the directorate, Subject Advisors will play

a key role in the introduction of Curriculum 2005 and OBE in the province with regard to duties related to general/physical science (PU for CHE, 1997:51).

The above-mentioned challenges highlight the importance of the physical science subject advisor as Voss (1981:374) states that a very important person in science education is the science supervisor and the fact that more research needs to be done on science supervision.

The role of the science supervisor underwent radical reappraisal due to the 1988 Education Reform Act in the UK. As the inspectorial functions demanded of advisors and inspectors by the legislation came increasingly to the fore, it is vital that schools continue to have access to professional colleagues to whom they can turn for advice (Dean, 1992:ix).

The need to redefine the roles of the physical science subject advisor is urgent otherwise lack of response to it will perpetuate the condition whereby the burden for redress still rests firmly on the shoulders of the Non-Governmental Organisation (NGO) sector (Kahn & Levy, 1995:421). Because there are so few appropriately qualified science teachers, ongoing INSET of teachers is essential (Kahn & Levy, 1995:422).

In the North West Province Policy Document (undated), the role of the physical science subject advisor is not clearly defined but from the above discussion it is a very important role in the reform of science education.

Although supervision is one of the oldest forms of educational leaderships, it is one of the most confusing and controversial roles. While the role of the supervisor has not been clearly defined, it is generally agreed that his/her function is to help teachers to improve, with the ultimate goal being the improvement of the teaching-learning situation (Perrine, 1984:3).

3.2.2 THE PRESENT SITUATION IN THE NORTH WEST PROVINCE REGARDING THE ROLE OF THE PHYSICAL SCIENCE SUBJECT ADVISOR

The role of the physical science subject advisor in the North West province cannot be described without a reminder of the history of the Subject Advisory Service in this province.

Makodi (1996:1) highlighted the fact that the history of the Subject Advisory Service is one of uncertainties and misconceptions, one of which being that the role that the Subject Advisory Service had to play in upgrading teachers was not clearly defined. However, in the same text it is highlighted that presently the service has been revised and upgraded.

The Subject Advisory Services is governed by the Directorate Subject Advisory Services and Professional Support. The North West Province is divided into educational districts. A subject advisor is appointed in every district. Eight subject advisors served general/physical science in 1996 (PU for CHE, 1996:51).

Having sketched the past and the present scenario, it is imperative at this stage to describe the role and function of the physical science advisor in the North West Province.

According to the North West Education Department (NWED, undated:1) the roles and functions of subject advisors are (to):

- Provide subject guidance;
- Improvement of subject performance/management/teacher/pupil performance and general quality of education;
- Arrange/conduct courses/seminars, attend workshops, subject committee meetings;
- Help to establish a culture of learning and teaching, tolerance and positive relationships; and
- Guidance/coaching to be conducted with extreme sensitivity.

An observation is made by the researcher that there are no specific roles and functions of the physical science subject advisor unlike in the ex-TED, and ex-DET or in the USA and UK where science supervisors and specialist advisors/science specialists have a specific job description or role related to their area of expertise which will be dealt with later in this chapter.

3.2.2.2 THE ROLE OF THE SENIOR SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

Another important position in the Science Advisory Services is that of a senior subject advisor. The NWED (undated:1) outlines the functions of the senior subject advisor as follows:

Senior Subject Advisors are expected to:

- Accompany all appointed District Subject Advisors on school visits and orientate them in professional aspects;
- Initiate and intensively be involved with Subject Advisors and teachers during subject courses, seminars and workshops;
- Accompany Subject Advisors to class visits where and when applicable, with a view to the standardisation and uniformity of the approach to and interpretation of syllabuses and subject policies;
- Communicate and meet regularly with all district managers, Circuit managers and Subject Advisors with regard to district planning, needs and the general state of education;
- Report meaningfully to the director with regard to the standard of Subject Advisory Services concerning each subject in every district by completing reports in detail; and
- All Senior subject Advisors will interact with Subject Advisors in terms of subject related and professional activities and the co-ordinators will interact through all the administrative co-ordinating work.

3.2.2.3 DISCUSSION AND COMPARATIVE ANALYSIS OF THE ROLE OF THE SENIOR SUBJECT ADVISOR IN THE NORTH WEST PROVINCE, THE CHIEF ADVISOR IN THE UK AND THE COORDINATOR IN THE USA

The position of the Senior Subject Advisor is an equivalent of that of the chief advisor in the UK (Dean, 1992:204). The task of the chief advisor, common to most LEAs according to Dean (1992:204-208) are:

- To give overall direction which involves, goal setting, policy making, setting priorities, organising the team, deploying staff and team discipline;
- To develop the programme of monitoring inspection by ensuring the involvement of all members of the team from programme development to implementation and to see to it that the quality of reports is adequate;
- Organising professional support by ensuring that the time devoted to it is properly used and also to check that there is enough time allocated to this once the monitoring programme has been arranged;
- Training and development of members of the team and to ensure that plans are put into action and to monitor effectiveness. He/she is also directly responsible for the development of senior members of the team, for their appraisal and for creating opportunities to discuss with them their work and ways in which they could develop further;
- Evaluation of work of the advisory team by defining of performance indicators and a variety of ways of assessing what is happening;
- The maintenance of channels of communication because the advisory service needs to communicate with a large number of people and needs good systems for ensuring that information is properly distributed;
- The provision of advice to the chief executive officer and elected members;
- Ensure that advice is provided by the service for those who need it;
- Anticipate the advice that may be called for and see that it is available when needed; and
- Collect advice needed urgently when it is not immediately available.

Other management roles are difficult to streamline since they vary from one LEA to another.

A comparison of the roles of the senior subject advisor in the North West Province and of the chief advisor in the UK brings about the observations that there are common factors like maintenance of channels of communication with those affected by the service, giving overall direction to the team members, monitoring of inspection/school visits, training and development of members of the team which involves actualisation of planning, monitoring and effectiveness, reporting to the senior education officials and training and orientation of team members.

Differences in the roles are that in the North West Province, the senior subject advisor does not seem to be involved in evaluation of work of the advisory team, and that the individual senior subject advisor accompanies the Subject Advisor on school visits and class visits whereas the chief advisors' roles do not highlight this aspect. Another aspect that is not clearly spelt out in the North West Province senior advisor's roles is the issue of team discipline which is left to the parties involved (NWED, undated:3) as compared to the chief advisor who has a role to play in disciplining the team.

In the USA, "the coordinator as a supervisor of science" has to make regular visitations to schools, follow-up school visits with meetings and written reports, participate in administrative planning with supervisors, visit and observe science teachers with supervisors, and participate in disseminating the science programs in the community (Madrado & Hounshell, 1986:12). In the North West Province, coordinators are responsible for the management of a team of subject advisors in a district as compared to the coordinator in the USA who is mainly concerned with science supervisors.

The three sets of roles appear to be more at managerial and general level rather than highlighting the role of the senior advisor, chief advisor and coordinator in more specific subject related issues. However, the roles discussed in this section do shed light onto the role of the senior subject advisor, chief advisor and coordinator in the North West Province, the UK and the USA respectively.

3.3 A COMPARISON OF THE ROLES AND FUNCTIONS OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE WITH SIMILAR PROFESSIONALS IN OTHER COUNTRIES

3.3.1 INTRODUCTION

This section deals with the role and function of the physical science subject advisor in the North West Province, the USA and the UK in a comparative way. This topic is sparsely reported in literature and the only sources that could be accessed refer to physical science advisors in the USA and UK. The approach in dealing with the role and function of the physical science subject advisor will be one whereby a USA framework of roles, established from the literature will be used as a reference point for comparison. In the North West Province, the officer in charge of giving support to

physical science teachers is referred to as the physical science subject advisor. Such an officer is referred to as a science supervisor and science consultant in the USA and as a specialist advisor in the UK.

3.3.2 THE ROLE OF THE SCIENCE SUPERVISOR IN THE USA

The question “what is a science supervisor” was posed by Barnard (1965) who states that there is no simple answer to this question. In the same text Ploutz (1961:411) based upon the findings of his survey concluded that “Due to differing conditions within school systems through the USA, there is probably no such thing as the model supervisor.” Among the 100 supervisors of schools included in his study he found four different models. There was the K-8 or elementary school model, the 9-12 or secondary school model, the K-12 or total curriculum model, and finally the state department model. He also found a variety of titles given to persons who assumed a supervisory role in schools for example science helping teacher, science resource person, science consultant, science coordinator, departmental chairman and director of science.

Three questions relating to the role and function of the science supervisor were raised by Madrazo and Motz (1982:42) with a view to address the above-mentioned issue. The questions are:

- What is a science supervisor?
- What role does he or she play in the district?
- How do teachers perceive the role?

To answer these questions, the National Science Teachers Association's (NSTA) division of Supervision in the USA initiated a nationwide study in 1978 on the perceived role of the science supervisor. The participants were asked to rank the roles of the science supervisor in the order that would most closely fit their needs. The seven perceived roles in order of preference were instruction, curriculum, staff development, implementation, management, assessment, assignment, transfer and load (Madrazo & Motz, 1982:42). A more detailed account of the roles is given in section 2.4 (page 17).

Madrazo and Hounshell (1987:3) also reported the same roles in the same order emerging from an NSTA nationwide survey. This USA framework of the seven perceived roles of science supervisors will be used as a reference point in this discussion. Madrazo and Hounshell (1987:12) elaborate on the role expectations of the science supervisor as follows: The science supervisor is expected to:

- Participate in the INSET training of science teachers at the school and district level.
- Orient teacher in the preparation of daily plans;
- Help in the preparation of demonstration lessons;
- Provide assistance to beginning teachers;
- Discuss science lessons and course plans with teachers;
- Organise and administer science orientation programs; and
- Orient teachers on the use of science materials and equipment at school district level.

A conclusion that can be drawn from the results of the two surveys on the role of science supervisors is that the instrument was reliable and valid.

Perrine (1984:7) published the results of a study conducted in New Jersey to study the views held by elementary school teachers concerning the science supervisor's role, the views held by supervisors concerning their role with elementary teachers, the difference between the viewpoints of both groups concerning the ideal and the actual role (performance) of the supervisor and the influence of demographic variables on elementary teachers' perceptions of the science supervisors. Most teachers (92%) added written comments concerning their supervisors and approximately 30% identified more than one characteristic. The teachers' comments were grouped into four major areas namely suggestive supervisory techniques, subject expertise, positive personality traits and human respect and understanding. While the study was conducted on elementary school teachers the researcher feels that the viewpoints may not necessarily differ much from those of secondary school teachers.

According to the study there were two main factors of variance to be found in the instrument which were identified as “providing technical expertise and assistance” and “how the supervisor interacts with teachers as a person.” Although the study was limited to New Jersey, nothing suggests that this state has unique characteristics concerning science teaching or science supervision.

Perrine (1984:3) maintains that while the role of the science supervisor has not been clearly defined, it is generally agreed that his/her function is to help teachers to improve with the ultimate goal being the improvement of the teaching-learning situation.

3.3.2.1 THE ROLE OF THE SCIENCE COORDINATOR IN THE USA

Additional to the science supervisor is another official called the coordinator. According to Madrazo and Hounshell (1987:12) “the coordinator as a supervisor of science” is expected to:

- Make regular visitations to schools;
- Follow-up school visitations with meetings or conferences;
- Follow-up school visitations with written reports;
- Participate in administrative planning with the supervisor;
- Visit and observe science teachers with supervisors; and
- Participate in disseminating the science programs in the community.

The roles of the coordinator appear more or less similar to those of the senior subject advisor in the North West Province, and the chief advisor in the UK whose roles were mentioned earlier in this chapter in paragraph 3.2.2.3.

3.3.2.2 THE ROLE OF THE STATE SCIENCE CONSULTANT IN THE USA

Dowling & Yager (1983:771-774) reported on a study conducted in 50 states in the period 1960-1980 concerning the professional preparation of state science consultants. The findings of this survey indicate that science consultants in the state department of education work in local schools, write proposals, assist with other administrative duties, work as members of evaluation teams and spend two-thirds of their time in science education per se. The duties have become more general with less time spent exclusively on science education duties. The positions have become

more involved with regulations, evaluations, and the consultants enjoying less flexibility in their jobs. The survey also indicates national trends for the position. The most critical are the trends from being highly specialised in science education to an emphasis on general education and from a supportive consultant role to a directive supervisory role.

The position of state science supervisors has changed to become not as responsive to local need, not as flexible/not as developmental. Despite this development towards being generalists, consultants used to offer services such as: developing in-service educational programs, developing science curriculum, visiting classrooms, establishing and implementing educational goals, planning demonstration lessons, coordinating services, suggesting and supplying resource materials, and helping in the selection and purchase of text books and equipment (Victor & Lerner, 1970:289).

3.3.2.3 THE ROLE OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

In the North West Province the role of the physical science subject advisor has not been clearly specified in the policy documents of the Directorate Subject Advisory Services and Professional Support. The policy documents only specify general roles for all subject advisors. A comparison of the role and function of the subject advisor (NWED, undated:1), with the USA framework of the seven roles becomes a difficult task as the roles are stated in very broad terms. However, a policy of the Natural Sciences emanating from the commission of the natural sciences during the Subject Advisor's Seminar in 1996, identifies the following policy matters which are assumed to be "roles" by the researcher: school visits, inputs on evaluation, dealing with content and method, attending conferences (subject related), moderating and standardisation of end of the year papers, liaison with examiners to discuss problem areas (Grade 12 examinations), marking of Grade 12 examinations, analysis of Grade 12 results, providing guidance on control of pupil's work, preparations and to check on progress (NWED, 1996:1-2).

Additional to the above policy matters, nine other focus areas are identified in the (NWED, undated:1-6) which are: planning, subject guidance, guidance/support, reports, stock and teaching media, improvement of achievements, liaison and renewal accomplished by the introduction of new syllabi and the accompanying work programmes. The above discussion based on focus areas from the 1996 seminar

and the policy document of the NWED gives an idea of the expectations of the Directorate from the subject advisors generally. However, there are no specific and clear expectations for the physical science subject advisor. Despite this limitation a brief account of the roles as stated in the NWED documents will be compared with the US framework of the role and functions of the physical science subject advisor.

The following common factors are found in the USA and the North West Province with regard to the role of the physical science advisor: Instruction which involves assistance in the development of instructional materials, implementation of the curriculum changes, encouragement of student involvement in extra curricular programs, review and refinement of methods of instruction. In the North West Province instruction compares with stock and teaching media, improvement of achievement and renewal. Staff development falls with guidance, specific subjects guidance. Staff development deals mainly with INSET programs. Implementation is related to renewal, planning and the curriculum e.g. implementation of Curriculum 2005 in the North West Province.

According to a communication by the Deputy Director, Subject Advisory Services, North West Province, Mr. A. Engelbrecht (1998), management tasks are mainly carried out by the senior subject advisor for example budgeting, but subject advisors also do a bit on reporting on their activities in the districts following school visits. Subject advisors in the North West Province are involved in examinations, promotion requirements and analysis of Grade 12 results. These activities correspond with assessment in the USA framework. The last role on assignment, transfer and load involves assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff. This role is not very clear if the nine focus areas of the North West Province are studied closely.

According to Phage (1996:1-2) in his address to all subject advisors, at a seminar held in 1996, the task of the subject advisor is to advise and offer guidance to those who teach the subject, and also those who are relatively young and inexperienced. Subject advisors are also expected to be unquestionable experts in their fields of operation and should be viewed as such by the teachers they work with. They should advise circuit managers via the district manager on the strong and weak points they discovered on their visits to schools. Finally they should be initiators and innovators. He stated clearly that subject advisors are not in the field to take over the role of the circuit managers.

While there are no specific roles and functions of the physical science subject advisor, it is assumed that they use the general roles as guidelines. This indicates an obvious need to describe clearly the roles and functions of the physical science advisor in the North West Province. Madrazo and Hounshell (1987:410) echoed the same sentiments about the science supervisors in the USA when they stated that in general, the literature on science supervision can be considered meager. However, some fifty sources were analysed in the review on related literature for the study mentioned earlier on the role expectancy of the science supervisor.

The problem related to role expectations for a position engendered considerable research in the educational enterprise. One of the most significant findings is that a lack of clear role definition seemed to limit the effectiveness of the position (Madrazo & Hounshell, 1987:10). Perrine (1984:3) assents that the role of the science supervisor has not been clearly defined, however, it is generally agreed that his/her role is to help teachers to improve, with the ultimate goal being the improvement of the teaching-learning situation. The role of the science supervisor is to improve both the program and the staff, and to serve more as a resource person than an administrator.

While the above authors indicated a lack of clear role definition for science supervisors, surveys were conducted in the USA and seven roles of the science supervisor were identified in order of preference by those who receive the service. It is clear from the literature that results of such surveys raise important questions such as: How do successful science supervisors survive? What method does the successful science supervisor use? Do they see their role in a different way than expressed by other professions in the surveys? (Madrazo & Motz, 1982:42).

Madrazo and Hounshell (1987:13-14) indicate that a clear definition of the requirements and role description for the position should serve as a basis for the training of supervisors in general and science supervisors in particular. A further recommendation is that the role and function of the science supervisor be continuously evaluated. It is only through reassessment of the role expectancy of the various groups involved that the science supervisors and other educational leaders will keep abreast of changing attitudes and perceptions concerning their roles. With information from reassessment, role functions will be changed or re-emphasised and the job description of the science supervisor be classified.

These issues, relating to the role of the physical science subject advisor in the North West Province will be addressed in chapter 4 of this study.

3.3.2.4 THE ROLE OF THE SPECIALIST ADVISOR IN THE UK

The specialist advisor's role is privileged in a different way. The specialist sees many schools and a great variety of works. This places him or her in a strong position to advise schools and to keep others informed about the state of the specialism in establishments across the country (Dean, 1992:26).

According to Dean (1992:19-20) the specialist advisor should:

- Be involved in inspection according to the arrangements agreed locally and by the advisory/inspectorate team;
- Know the state of the specialism for which he/she is responsible including knowledge of: overall philosophy, the national curriculum and other curriculum guidelines, appropriate teaching approaches, work organisation in the schools and other institutions, the standards being achieved, the methods of evaluation, appropriate methods of inspection and current developments at a national and international level;
- Advise teachers and particularly the head, on the items above.
- Advise LEAs and governors on: education in the specialist area of curriculum or other work, appropriate forms of approach and organisation, the requirements of the national curriculum where appropriate, the work of their teachers in this area of curriculum or other work, the standards being achieved, current developments nationally and internationally, the selection and appointment of staff, their particular needs and specific problems concerning them;
- Encourage continuity between phases and cooperation between establishments; and
- Supervise the planning of the staff development programme in this area of work.

Some specialist advisors also serve as general advisors. It was indicated in paragraph 3.3.2 that the seven roles of the science supervisor in the USA will be used as a yardstick for comparison. In analysing the roles of the science specialist in the UK and comparing that to the physical science advisor in the North West, a cross reference will be made to the seven roles of the USA science supervisor. The common factors in the science supervisor's and the science specialist's roles and

functions are curriculum, staff development, assessment, instruction, assignment, transfer and load. The roles of the science supervisor and science specialist, which seem to vary are management and assignment, transfer and load. As far as management is concerned the specialist advisor only deals with management issues in detail when he/she is also a general advisor. With regard to assignment transfer and load the only aspect handled by the specialist advisor is selection of staff as compared to the science supervisor who assists with assignments, equalisation of teaching load, resolution of conflict and selection of staff. The roles of the science supervisor and those of the specialist advisor are in harmony except the two issues highlighted above.

The role of the physical science advisor in the North West has been compared to the USA framework, which is relatively in harmony with that of the UK specialist advisor. A further comparison is therefore unnecessary at this stage as it was done earlier in the chapter using the USA framework of roles.

It is worth mentioning that in the UK there is an officer called the Advisory teacher. Dean (1992:28) describes six roles of the advisory teachers. He/she has to be a: class teacher trainer, promoting staff development by working alongside the classroom teacher, presenter of INSET sessions and workshops, researcher, undertaking surveys of practice in schools in aspects of curriculum or management, developer of curriculum of related activity, coordinator of teams of advisory teachers and administrator for specific tasks for example, training requirements for GCSE appraisal. The advisory teacher in the UK can be equated to the “master” teacher in the USA who is used in the “train teachers to train others” approach in the INSET training program for physical science teachers in the state of Arizona in the USA (Lawrenz, 1987:251). The state of affairs in the North West Province hinders the development of science teachers into specialist teachers (PU for CHE, 1997:75), who could play the role of the advisory or master teacher. The researcher views that as a way of enhancing the role of the physical science subject advisor and also a way to empower teachers.

3.4 CONCLUSION

A study of the roles of the physical science subject advisor, the science supervisor, the science consultant and the specialist advisor indicate important focus areas.

Teachers should be empowered in those areas by the above-mentioned officials in order to resolve the perceived crisis in science education. In the USA, four major reports on the condition of education were published in 1983. The reports concluded that serious deficiencies exist and recommended actions to effect improvements. Efforts to improve science education focused on science teaching, which has, not surprisingly been identified as the key determinant of the quality of science education (Champagne, 1987:57). The most persistent problems identified by elementary science teachers are: insecurity in science, poor preparation, and the need for continuous INSET education (Sterning, 1960). The researcher concluded that the science supervisor could play a significant role in the improvement of science teaching.

Effective supervision can do much to help the elementary teachers and improve learning in the science area (Perrine, 1984:3). In the North West Province a major activity of subject advisors in 1996 was workshops for teachers. Topics of the workshops were on subject content, evaluation and syllabus discussions. Advise and guidance seem to be other important functions of most subject advisors. Advice and guidance are given on a variety of aspects of physical/general science teaching like organisation of classroom activities, practical work, preparation, subject and personal files, evaluation, information on Expo for Young Scientists and subject content (PU for CHE, 1997:51).

Other services rendered by subject advisors include the moderation of tests set by teachers, the marking of Grade 12 examination papers, distribution and collection of Grade 12 papers and assistance with the organisation of Expo for Young Scientists. From information gathered from sources other than subject advisors themselves (e.g. science teachers), it can be concluded that teachers expect subject advisors to take the lead in the informal development of teachers and guidance with respect to teaching practice (PU for CHE, 1997:51-52).

The above findings suggest that in the new dispensation much development is needed to optimise the professional duties of general/physical science subject advisors. It is expected that subject advisors will play a key role in the introduction of Curriculum 2005 and OBE in the province (PU for CHE, 1997:52). The findings of PU for CHE can be compared with those of the National Commission on Excellence in Education (1983) in the USA which observed a steady decline in science achievement scores of USA 17 years olds as measured by national assessments of science in 1969, 1973 and 1977. This steady decline in achievement was simultaneous with the steady elimination of many science coordinators. In the opinion of teachers, the loss of these coordinators has seriously contributed to the reduction of science teaching at least in the elementary schools (Stronck, 1987:25-27).

These findings clearly indicate the importance of the science supervisor or coordinator to meet the current needs of science education. The British Columbia Science assessments encouraged all school districts to designate a science coordinator to meet the current needs of improved science instruction (Stronck, 1987:26). It is quite clear from the literature that the role of the subject advisor is a significant one in the improvement of science education in various countries. The titles of officials doing the job of assisting teachers with science instruction vary according to countries but the literature and a comparative study of the roles indicate minor deviations from the USA framework of roles which were used as a point of reference. In the North West Province and in the UK the roles are not ranked according to preferences as it is the case with the USA.

The findings of the PU for CHE (1997:51) indicate that in the North West Province a major activity of the subject advisors was workshops for teachers. This tallies with the situation in the UK where Dean (1992:116) indicates that traditionally LEA advisors and inspectors have played a large role in INSET work. Stillman and Grant (1989) cite INSET as the only activity common to all members of the advisory service in the UK. Advisors and advisory teachers are based in their own professional centre and they are responsible for initiatives in curriculum development working alongside teachers in schools (Haigh, 1989:27). While INSET seems to be a common factor as mentioned above, Haigh further indicates that perhaps the most obvious area from which advisors/inspectors might withdraw is INSET, because the organisation and delivery of courses can be inefficiently time consuming for an

advisor. The growth of the advisory teacher arm of the service, and the use of seconded teachers and “bought” in courses will help with the withdrawal process.

The common questions in the literature are: Are science supervisors becoming an extinct species? (Hounshell, 1987:21). Science supervisors - An endangered species? What is a science supervisor? What role does he or she play in the district? How is this role perceived by teachers? (Madrazo & Motz, 1982:42). To answer these questions, particularly on the role and functions of the physical science subject advisor in the North West Province, there is a need to analyse the data of the empirical study which will be presented in chapter four of this research.

CHAPTER 4

EMPIRICAL SURVEY

4.1 INTRODUCTION

The information in this chapter was obtained from questionnaires 1 and 2 (appendices 1 and 2) and interview schedules 1 and 2 (appendices 3 and 4). Questionnaire 1 was completed by six out of seven physical science subject advisors in the North West Province. Questionnaire 2 was completed by 70 middle and high school general/physical science teachers in the North West Province. A total of 84 questionnaires was distributed (i.e. seven teachers per district in the twelve districts of the North West Province). The two physical science senior subject advisors were interviewed using interview schedule 1 (appendix 3) and the Deputy Director for Subject Advisory Services was interviewed using interview schedule 2 (appendix 4).

The results of the survey are discussed in the following sections of this chapter.

4.2 INFORMATION FROM PHYSICAL SCIENCE SUBJECT ADVISORS IN THE NORTH WEST PROVINCE

4.2.1 INTRODUCTION

This information was obtained from questionnaire 1 (appendix 1) which was distributed to all eight physical science subject advisors in the North West Province. Seven subject advisors responded as one of them was on study leave at the time of distribution of the questionnaires.

4.2.2 DISCUSSION

Tables 4.2 and 4.3 give information on the academic and professional qualifications of physical science subject advisors. It is evident that only one of the six responding physical science subject advisors has an honours degree in the science field. The information indicates that all the subject advisors have a professional qualification.

According to a communication by the Deputy Director, Mr. A. Engelbrecht (1998), all the physical science subject advisors are adequately qualified for the post which requires a junior degree in the science field or an equivalent. A second or third degree is an added advantage.

Table 4.2: Academic qualifications (degrees) of physical science subject advisors

Qualification Degree	B Sc	B Sc (Hons)
Number of subject advisors	3	1

Table 4.3: Professional and higher academic qualifications (educational degrees and diplomas) of physical science subject advisors

Qualifications (degrees)	Number of subject advisors	Qualification (diplomas)	Number of subject advisors
B Sc (Ed)	1	FDE	1
B Ed	3	HED	2
D Ed	1	THED	1

Table 4.4: Experience as a science teacher

EXPERIENCE AS A SCIENCE TEACHER	
YEARS	NUMBER OF SUBJECT ADVISORS
5	2
10	1
12	1
21	1
30	1

Table 4.5: Experience as a subject advisor

EXPERIENCE AS SUBJECT ADVISOR	
YEARS	NUMBER OF SUBJECT ADVISORS
2	2
3	3
6	1

Table 4.4 reveals that all subject advisors are experienced as science teachers. It is, however, clear from table 4.5 that all of them are on the average inexperienced as subject advisors. There is only one subject advisor with six years experience.

Table 4.6: Ranking of the seven USA perceived roles of subject advisors

ROLES	RANKING OF ROLES BY SUBJECT ADVISORS				
	1 (highest)	2	3	4	5 (lowest)
Instruction	1		4	1	
Curriculum	1	2	2	1	
Staff development	1	2	2	1	
Implementation	1	3	1		1
Management	1	1		2	1
Assessment	1	2	2	1	
Assignment, transfer and load			3	2	

From Table 4.6 the roles have been ranked as follows:

<u>ROLE</u>	<u>WEIGHTED RANKING</u>
Instruction	2,7
Curriculum	2,5
Staff development	2,5
Implementation	2,5
Management	3,2
Assessment	2,5
Assignment, transfer and load	3,4

From the weighted ranking of the seven roles it is clear that subject advisors rated the roles from highest to lowest as curriculum, staff development, implementation and assessment. The above 4 roles were equally ranked and followed by instruction. The lowest ranked are management and assignment, transfer and load. The ranking of the management role by subject advisors almost tallies with the Deputy Director's ranking which he ranked 5 according to table 4.50. The senior subject advisors (1) and (2) ranked management at 5 and 4 respectively. It is clear from the data that subject advisors should spend very little time on management issues. The ranking of roles by senior subject advisors is at tables 4.46 – 4.47.

Table 4.7: Other functions performed by physical science subject advisors

FUNCTIONS PERFORMED BY PHYSICAL SCIENCE SUBJECT ADVISORS	NUMBER OF SUBJECT ADVISORS
Staff development programmes	1
Policy making and interpretation	1
Self evaluation and empowerment	1
Coordination with staff members outside and inside	2
Coordination of learning areas	1
Compilation of support materials	1
Establishment of subject clubs in circuits	1
Assistance with NGO projects	2
Moderation of examination papers	1
Compilation of catalogues at provincial level	2
Motivation of teachers and students about the importance of science	1
Arrangement of educational tours	1
Conducting workshops	2
Setting of common examination papers	1
Monitoring of Grade 12 examinations	2
Encouraging teachers to upgrade themselves	1
School visits	1
Special projects e.g. Expo and community service	1

According to Table 4.7 subject advisors do spend time on a number of activities which can be classified under policy issues, OBE, subject clubs, compilation of support materials and catalogues, workshops, motivation of teachers, school visits and special projects like Expo for Young Scientists and NGO projects, examinations and school visits.

Table 4.8: Other functions/duties performed by physical science subject advisors which are not related to physical/general science.

FUNCTIONS	NUMBER OF SUBJECT ADVISORS
Monitoring of Grade 12 examinations	2
Introduction of Grade 1 OBE Curriculum 2005	1
Science Expo, Olympiads	2
Encouraging teachers to attend Telkom, Eskom and AIDS workshops	2
Career guidance	2
Winter school and Saturday school	1
Training of principals - promotion requirements	1
Monitoring of admissions	1
Checking of promotion schedules	1
Coordination of district appraisal team	1
Training of invigilators	1
Telmast project	2
Community service – remedial classes	1

The time devoted to each activity was not quantified by the subject advisors and therefore left out.

Table 4.9: Job description

A response to whether subject advisors received a job description on appointment.

RESPONSE	NUMBER OF SUBJECT ADVISORS
No	4
Yes	2

According to Table 4.9, 4 out of 6 (66,6%) subject advisors did not receive a job description on appointment. The two (33,3%) subject advisors who indicated that they received a job description stated that the duties/roles were not clearly spelt out.

Table 4.10: Training/Induction

An indication whether physical science subject advisors were trained/inducted on appointment

RESPONSES	NUMBER OF SUBJECT ADVISORS
No	5
Yes	1 by coordinator – all relevant issues

Table 4.11: Support from Senior Subject Advisors

The kind of support received by subject advisors from the Senior Subject Advisor

SUPPORT FROM SENIOR SUBJECT ADVISOR	NUMBER OF SUBJECT ADVISORS
Management e.g. compilation of reports	1
Motivational support	1
Moral support – only speaks about expo and expo meetings and the unwillingness to use her own car	1
No effective support – Senior Subject Advisors doesn't have a subsidised vehicle and initially there was no one who has specialised in physical science	1
Almost none	2
They meet once a quarter if transport is available/meet once per semester	2
Under the Ex-DET he visited once in 3 years	1

From Tables 4.10 and 4.11 it is evident that the subject advisors did not receive any form of training or induction on appointment except one who received the kind of service from the coordinator. It is also clear from the subject advisors' responses that there is minimal support from the senior subject advisor and that the meetings are not regular due to transport problems. It is also evident that two out of six subject advisors indicated that they have not received any support from their senior. The other problem which seems to have been sorted out was the post of the senior subject advisor which was vacant for a long time.

Table 4.12: INSET training initiated by Subject Advisors during 1997-1998 in the North West Province

SUBJECT ADVISOR NUMBER	1	2	3	4	5
	NUMBER OF WORKSHOPS	NUMBER OF TEACHERS WHO ATTENDED	WHO INITIATED THE WORKSHOPS	LENGTH OF WORKSHOPS	TOPICS COVERED
1	20	188	Self	3-4 hours	Whole of Grade 11-12 syllabi; Identified topics/requests, Grade 11/12 learning problems
2	4	80	Telkom, (Uniwest) PU for CHE Eskom	2 days each	Mechanics Electricity Inorganic Chemistry
3	24	212	Self	3-4 hours	Electrochemistry Ticker timer, Acids and Bases, light, Setting of Examination papers
4	1997:8 1998:4	Differs from center to center and purpose of workshop	Mostly self and some teachers	2-3 hours	1997: Expo, Grade 12 memorandum discussion, Science olympiad, practical workshop, trolleys experiments, ordering of equipment, safety etc (3 different venues) Klerksdorp, Wolmaranstad and Christiana 1998: Expo and Year of Science and Technology workshop, Grade 6 & 7, acids and bases Grade 12 examination format Grade 6 & 7 – only 2 out of 5 venues were covered, 3 were cancelled by the department
5	1997:4 1998:4	±50	Self	2½ hours	1997: Light 1998: Inorganic Chemistry
6	15	120	Teachers and advisors	2½ hours	Content, Evaluation School policy

Table 4.12 indicates that an important activity of the subject advisors during 1997 – 1998 was workshops initiated by the subject advisors themselves. However, it is evident that the number of workshops varies from one subject advisor to another, ranging from 4 to 24 workshops in 1997 to 1998. Topics of the workshops were on subject content e.g. mechanics, electricity with more emphasis on grades 11 and 12, setting of examination papers and compilation of memoranda, science expo and olympiad, practical work, methodology, ordering of equipment, evaluation and school policy.

Some of the time was devoted to the Year of Science and Technology activities (1998). This information does not differ much from the findings of PU for CHE (1996:51) about subject advisors in the North West Province and the tasks they performed in 1996.

It is also evident that one of the subject advisors empowered teachers through workshops organised by the two universities in the province, with financial assistance from Telkom and Eskom. The average duration of the workshops is 2-4 hours.

Table 4.13: INSET
Individual training of teachers

SUBJECT ADVISOR NUMBER	6	7	8	9
	NUMBER OF TEACHERS WHO RECEIVED GUIDANCE	TIME OF CONTACT WITH TEACHERS	TYPICAL TOPICS OF DISCUSSION WITH TEACHERS	OTHER SERVICES TO PHYSICAL SCIENCE TEACHERS
1	60	20 minutes – 1 hour	Problem solving Organic Chemistry Inorganic Chemistry	Handouts on question papers and memoranda, notes, etc
2	Attend to groups (±8 per cluster)	2-3 hours if travelling alone and in groups not more than 2 hours	Methodology and assessment	Organising cluster schools to work together to have a common year plan, sharing ideas and resources, cross teaching, etc Some of the goals were never reached due to cancellation of courses

Table 4.13 (Continued)

SUBJECT ADVISOR NUMBER	6	7	8	9
	NUMBER OF TEACHERS WHO RECEIVED GUIDANCE	TIME OF CONTACT WITH TEACHERS	TYPICAL TOPICS OF DISCUSSION WITH TEACHERS	OTHER SERVICES TO PHYSICAL SCIENCE TEACHERS
3	149	3-4 hours per visit	Interpretation of syllabi, planning, assessment, management, practicals, projects, etc	Handle general enquiries
4	30	1 hour 30 minutes each	Subject content and methodology	Motivational, organisational, laboratories, setting of question papers,
5	28	1-1½ hours	Motion laws and concepts, Electricity, Chemistry	Always available as far as possible
6	180	2½ hours	Academic Administration	No response

Table 4.13 indicates that the number of teachers from the subject advisors differs from one subject advisor to another. The approach also appears to differ because one of the subject advisors indicated that he/she attends to groups of ± 8 teachers per cluster. The contact time ranges from 20 minutes to four hours. The duration of the sessions also appears to be dependent on whether subject advisors travel individually, or in groups. If the latter is the case, then the session is never more than 2 hours.

Topics of the individual sessions are similar to those indicated in Table 4.12, except academic and administrative issues. Other services rendered by the physical science subject advisors to the physical science teachers include: handouts, question papers and memoranda, notes, clustering of schools to prepare a common year plan, sharing ideas and resources and cross teaching, general enquiries, practical work, and being available as far as possible.

Table 4.14: Main problems experienced by subject advisors in carrying out their duties

MAIN PROBLEMS	NUMBER OF SUBJECT ADVISORS
Budgetary constraints	1
Communication (poor)	2
No transport (government or subsidised)	5
No mobile laboratories or kits for demonstrations	1
Time for workshoping teachers (little)	1
Demotivated teachers	1
Inadequately qualified/trained to teach the subject (teachers)	1
Serious lack of basic skills and knowledge (teachers)	1
Inadequate resources e.g. paper to prepare manuals for teachers	2
Poor attendance of workshops especially after 14h00	1

Table 4.15.1: Organisational and logistical problems experienced by subject advisors

ORGANISATIONAL AND LOGISTICAL PROBLEMS	NUMBER OF SUBJECT ADVISORS
Vast area to be serviced e.g. 153 schools	1
Lack of communication with schools e.g. no telephone	2
Lack of transport for senior subject advisors	5
Very bad roads	1
No clear laid out policy for subject advisors	1
Extra unnecessary jobs given to subject advisors	1
Future of subject advisors is uncertain	1
Difficulty to form clusters/especially in rural areas	1
Headmasters do not send information through, as well as circuit managers	1
Lack of text books	1

According to Table 4.14, the main problems experienced by subject advisors in carrying out their duties are transport (both pool cars and subsided vehicles). This fact was indicated by 5 out of six subject advisors (83,3%), followed by poor communication and inadequate resources. The rest of the problems are related to budget cuts, little time for workshops, poor attendance of workshops especially after 14h00, demotivated and inadequately trained/qualified teachers and a serious lack of basic skills. A lack of mobile laboratories or science kits makes demonstrations impossible. These constraints evidently impact negatively on the functioning of subject advisors.

Table 4.15.1 deals with organisational and logistical problems experienced by subject advisors. It is once more evident that a lack of transport for senior subject advisors and teachers has been rated as the worst problem by five out of six subject advisors (83,3%). It is followed by a lack of communication with schools (e.g. no telephones as indicated in Table 4.15.1). Other problems which relate directly to the role and functions of the subject advisor are the absence of a clearly laid out policy for subject advisors, the extra unnecessary jobs given to subject advisors. The latter relates with information given on Table 4.8 on other functions performed by subject advisors which are not related to physical/general science. Another fact mentioned is the uncertainty about the future of the subject advisory service.

Table 4.15.2: Cooperation and attitude of teachers

COOPERATION/ATTITUDE OF TEACHERS	NUMBER OF SUBJECT ADVISORS
Unwillingness of teachers to share ideas and resources with those from disadvantaged schools	1
Lack of commitment from teachers	2
No culture of teaching	2
No managerial skills	1
Interference of teachers' unions	1
Teachers have negative attitude because of appraisal document	1
Overcrowding of students	1
No problem	1
Commitment varies from area to area	1
No clear budgeting guidelines for apparatus for physical science	1
Negative attitude - never have so called "problems"	1
Good attitude	1
Bad standard of examinations in primary schools which feed middle schools	1

From the responses in Table 4.15.2 there are two top statements that highlight the attitude of teachers namely a lack of commitment and no culture of teaching. The responses in Table 4.15.2 indicate a negative attitude from the teachers although there are two subject advisors who indicated that they have no problem and teachers have a positive attitude.

Table 4.15.3: Financial problems/responses

PROBLEM	NATURE OF PROBLEMS	NUMBER OF SUBJECT ADVISORS
No money	No transport for subject advisors	1
	No ordering of equipment for physical science laboratories	3
	No money for workshops – catering for teachers and transport	3
	No petrol cards for pool cars, repairs and maintenance	2
	No funds for text books	1
	No problems	1

Table 4.15.4: Other problems

OTHER PROBLEMS	NUMBER OF SUBJECT ADVISORS
Communication with schools/teachers	1
Lack of cooperation from teachers	1
No provincial meetings, conferences, seminars leading to no empowerment of subject advisors	1
No clear policy, no clear direction even from senior management level	1
No equipment in schools	1
Attitude problems especially from former TED schools with regard to sharing ideas with other schools	1
Schools take time to settle down after admission/registration	1
No inventory in schools	1
Storeroom for chemicals and apparatus is the same	1
Subject advisors are not allowed to do class visits unless invited by the teacher	1

Table 4.15.3 highlights the extent of the financial problems expressed by subject advisors. It is evident that the two prominent problems are a lack of funds for workshops (catering and transport for teachers) and no money for ordering physical science equipment for laboratories. The two other problems mentioned are a lack of transport for subject advisors and no petrol cards for pool cars, repairs and maintenance.

According to Table 4.12 a major activity of the subject advisors in 1997 - 1998 was workshops and if such problems mentioned in Table 4.15.3 are in existence, they impact negatively on their functioning.

Table 4.15.4 contains information on other problems experienced by subject advisors in carrying out their tasks. The problems can be categorised under those that need the attention of the senior officials in the directorate, provisioning section of the department, schools, unions and the attitude of teachers. Those that affect the subject advisors' role directly are a lack of clear policy and direction, even from senior management and the absence of provincial meetings, conferences and seminars which leads to a lack of empowerment of subject advisors.

Table 4.16.1: Own training and experience (subject advisors)
Response to whether training and experience are adequate/inadequate for their task - (by the 6 subject advisors who responded out of a total of 7)

NUMBER OF SUBJECT ADVISORS	ADEQUATE FOR TASK	INADEQUATE FOR TASK
1	X	-
2	X	-
3	X	-
4	X	-
5	X	-
6	X	-

Table 4.16.2: Comments on own training and experience (subject advisors)

COMMENTS ON OWN TRAINING AND EXPERIENCE	NUMBER OF SUBJECT ADVISORS
Underwent training (self) workshops/seminars/ Conferences	3
Read several books on running workshops and teacher empowerment, science education by NGOs, universities to keep abreast of developments	2
Training and experience are more than adequate	3
Giving tuition to Grade 12 pupils keeps subject advisor on her/his toes	1
Assist in facilitation during workshops	1
Help teachers with those parts of the syllabus they do not understand	1

All the subject advisors rated their own training and experience as adequate for their task. In Table 4.35, 60% of the teachers who completed questionnaire 2 stated that they received assistance from subject advisors and 43% give highest priority assistance from a subject advisor. It is evident from Table 4.16.2 that 50% of the subject advisors indicated that they underwent training (self) through attending workshops, seminars and conferences. All considered themselves to be adequately trained and experienced for their task (Table 4.16.1) and 50% feel that their training and experience are more than adequate for their task, although Table 4.5 indicates that the most experienced subject advisor has 6 years in the service, three have 3 years and 2 have 2 years experience.

Table 4.17: Problems experienced by teachers in relation to the role of the subject advisors (Information obtained from subject advisors)

THE MOST PROMINENT PROBLEMS	NUMBER OF RESPONSES
Delivery of subject matter	4
Setting standard question papers	2
Assessment – informal and formal - strategies	1
Under-qualified/unqualified to teach science (majority)	6
Superiority complex - teachers don't accept advice	1
Claim that there is no equipment only to find that there is plenty	1
Recipients of notes and syllabi (teachers), schemes, plans etc and file them	1
Non-completion of syllabi	1
Teachers want quick solutions to problems	1
View subject advisor as inspectors	1
No apparatus	6
Lack of practical skills	5
Lack of text books	4
Lack of understanding of the roles and functions of subject advisors	1
Expectations like provision of textbooks and equipment, setting of papers and quarterly visits	1
Time management	1
Organisation of their work	1
Total commitment	1
Overcrowding of learners	6
Poor discipline and no parent involvement	1
No efficient management	1
Lack of water and electricity	1
Lack of funds	1
No transport in many rural areas	1
The higher grade problem in Grade 12	1

Table 4.17 (Continued)

THE MOST PROMINENT PROBLEMS	NUMBER OF RESPONSES
Lack of interest in experiments	1
Reliance on text book	1
Misconception about some topics e.g. electricity	1
Low salaries – demotivated teachers	1
Collapse of teaching and learning	1
Corruption by senior government officials	1

It is evident from Table 4.17 that in their dealings with physical science teachers, subject advisors have noticed a number of problems experienced by these teachers. The most prominent of the problems highlighted are teachers who are unqualified/under-qualified to teach science (majority), lack of apparatus, overcrowding of learners. Each of these problems had six respondents. The next high ranking problem is a lack of practical skills on the side of teachers, with five respondents. The third two high ranking problems with four respondents are the inability of teachers to deliver the subject matter and a lack of text books.

Other problems indicated can be clustered under collapse of teaching and learning as a result of low salaries, demotivated teachers, misconceptions about some topics, e.g. electricity, lack of physical and financial resources. The second cluster is the attitude of teachers towards their work which is indicated by a lack of total commitment, reliance on text books, reliance on notes and schemes provided by the subject advisors, non-completion of syllabi, poor discipline, teachers wanting quick solutions to problems, poor time management and organisation of work and lack of efficient management, lack of transport in rural areas and corruption by senior government officials. The third cluster is that of the attitude of teachers towards subject advisors. It is indicated that teachers have a superiority complex and do not accept advice, a lack of an understanding of the role of the subject advisor which leads to expectations like provision of text books and equipment and setting of question papers. Some teachers view subject advisors as inspectors and some teachers tend to claim that there is no equipment while there is sufficient available at the school.

Table 4.18: Suggestions for improvements made by subject advisors

SUGGESTIONS FOR IMPROVEMENTS	NUMBER OF RESPONSES
More funds for workshops on problem topics	4
Individual visits – follow up to check implementation	2
Clustering of schools	1
Six weekly discussions	1
Motivation	1
Assistance with experiments	1
Schools without apparatus must get some	1
The role and function of the subject advisor should be clearly defined by the department	1
Address logistical problems with all stakeholders	1
Subject advisors should start writing material for teachers, presenting papers at seminars and conferences – more should be done on action research	1
Establish subject policy	1
Provide resources e.g. computers	1

Table 4.18 highlights suggestions for improvement of which the two top ones are provision of more funds for workshops indicated by four respondents. Two respondents indicated the importance of individual visits to teachers to follow up on implementation.

Another important suggestion is that the role and function of the subject advisors should be clearly defined by the department. Other suggestions are, provision of apparatus and resources like computers to schools, establishment of subject policy, motivation of teachers, discussions every six weeks, assisting teachers with practical work and addressing logistical problems with all stakeholders. Another suggestion which relates to the subject advisors is that they should start writing material for teachers, presenting papers at conferences and seminars and focussing more on action research.

Table 4.19: Subject advisor's problems relating to their role

PROBLEMS	NUMBER OF RESPONSES
Clearly outlining duties of subject advisor	1
Lack of equipment and resources	1
Lack of servicing of subject advisors by seniors	1
Involvement in management problems	1
Involvement in provisioning	1
Should have more authority	1
Transport	2
Restrictions on travelling	1
Lack of preparation on the side of teachers	1
Focus on grades 11-12	1
Lack of mobile laboratories for demonstrations	1
Lack of coverage of middle schools where the real problems originate	1
Policy documents – urgent need	1
More money	1
More support from senior subject advisor who must coordinate their activities to encourage uniformity in the province	1
Subsidised vehicle for each advisor	1
Lack of resources e.g. computers	1
Lack of understanding of methodology and assessment due to lack of training	3
Lack of practical skills	2
Existence of many misconceptions	1
Large classes	3
Shortage of text books	3
Students who don't qualify to register for higher grade do so	1
No science equipment	3
Poor discipline and no parent involvement	1
No efficient management	1
Lack of funds	1
Lack of water and electricity	1
No transport available in many rural areas	1

According to Table 4.19 subject advisors experience the following problems that make their role difficult: the highly ranked ones by three respondents are a lack of science equipment, shortage of text books, large classes and lack of understanding of methodology and assessment due to lack of training on the side of teachers. The next highly ranked problems are lack of transport and lack of practical skills. Other problems can be clustered as subject advisory orientated for example duties of subject advisors which are not clearly defined, lack of servicing of subject advisors by seniors, a lack of subsidised vehicles, restrictions on travelling, lack of policy documents, lack of resources, e.g. computers and lack of funds. More support is needed from senior subject advisors who must coordinate the activities of the subject advisors to encourage uniformity in the province and also the non-coverage of middle schools where the real problems originate, lack of more authority and involvement in management and provisioning issues/problems and a lack of mobile laboratories and science kits for demonstrations.

Other problems are teacher-related and school-related and they involve issues like unpreparedness, focus on grades 11 and 12, lack of resources like computers, electricity, water, transport especially in rural areas, lack of efficient management, existence of many misconceptions and lack of guidance on choice of higher grade or standard grade. The problems mentioned in Table 4.19 relate very closely to the teachers' problems mentioned in Table 4.17.

Table 4.20.1: Subject advisor evaluation – A response to the question: How do you see yourself as an advisor?

ASPECTS OF EVALUATION	RATINGS OF SUBJECT ADVISORS				
	++	+	Average	-	--
General educational knowledge	5	1			
Knowledge of school management	4	1			
Availability	2	3		1	
Approachability	3	3			
General helpfulness to teachers	3	3			
Skills in observing and assessing work in schools	4	1	1		
Skills in counselling teachers	3	2	1		
In-service skills – planning and organising	2	3	1		

Table 4.20.1 (Continued)

ASPECTS OF EVALUATION	RATINGS OF SUBJECT ADVISORS				
How do you see yourself advisor?	++	+	Average	-	--
In-service skills – knowledge of different strategies	3	1	2		
In-service skills – presentation	3	3			
In-service skills leading discussion	3	1	2		
Skill in persuading and negotiating	2	2	2		

Table 4.20.2: Responses of subject advisors to the question: How do you think teachers see you?

ASPECTS OF EVALUATION	RATINGS OF SUBJECT ADVISORS				
How do you think teaches see you?	++	+	Average	-	--
General educational knowledge	3	2			
Knowledge of school management	3	1			
Availability		1	2	2	
Approachability	1	1	2		
General helpfulness to teachers	1	4			
Skills in observing and assessing work in schools	3	1	1		
Skills counselling teachers	1	3	1		
In-service skills – planning and organising		3	2		
In-service skills – knowledge of different strategies	1	1	3		
In-service skills – presentation	3	1	1		
In-service skills leading discussion	1	2	2		
Skill in persuading and negotiating	1	2	1	1	

From the information in Table 4.20.1 it is evident that subject advisors (5 out of 6) rate themselves as highly knowledgeable (educationally), have knowledge of school management and are able to assess work in schools (4 out of 6 each). These were highly rated in the ++ column amongst others. However, it is interesting to note from Table 4.20.2 that the subject advisors do not think that teachers rate them as high as themselves for example only 3 out of six think teachers rate them under ++ for general educational knowledge. A general comparative study of the tables 4.20.1 and 4.20.2 shows a decline in ratings in particular the ++ column when it comes to the question "How do you think teachers see you". This information can be related to the information given in Table 4.15.2 on the cooperation and attitude of teachers which seems relatively negative in view of the responses given by subject advisors.

Table 4.21: Assessment form for advisor appointment

QUALITIES	RATING		
	Most important	Important	Less Important
Teaching experience	4	1	
Senior management experience	2	4	
Experience of working with adults	2	1	3
Knowledge of current developments	4	2	
Specialist knowledge, expertise and enthusiasm	5	1	
Skill as a problem solver	3	2	1
Ability to look critically at work in the classroom	4	2	
Skill in presentation orally and in writing	1	5	
Ability to form relationships with adults	4	2	
Ability to cope with pressure and stress	2	3	

Table 4.21 indicates that the most important qualities of a subject advisor for appointment should be specialist knowledge of the subject, ranked most important by five subject advisors, followed by a tie between teaching experience, knowledge of current developments ability to look critically at work in the classroom and ability to form relationships with adults. All these were rated most important by four subject advisors each.

The next most important quality rated by 3 subject advisors is skill as a problem solver. Three qualities, namely senior management experience, experience of working with adults and ability to cope with pressure were each rated as most important by two subject advisors each. Skill in presentation orally and in writing was rated as the most important quality by one subject advisor.

Under the rating of important, skill in presenting orally and in writing has the highest rating by five subject advisors followed by senior management experience by four subject advisors and ability to cope with pressure by three subject advisors. Knowledge of current events, skill as a problem solver, ability to look critically at work in the classroom and ability to form relationships with adults were rated important by

two subject advisors each. Specialist knowledge, expertise and enthusiasm have been rated as important by one subject advisor.

Three subject advisors indicate experience of working with adults as less important and one indicates skill as a problem solver as less important.

Table 4.22: Expectations of subject advisors when they visit physical science teachers

EXPECTATIONS	NUMBER OF RESPONSES
They must mention problems/complaints they have with content, and students	2
Mention positive developments in their work	1
To follow up on previous advice and usage of materials and handouts	1
Check on subject file and general organisation of the subject	1
Check on commitment of the side of management team, educators and learners	1
Check on thorough preparation	1
To hand out materials to the teachers	1
Appreciation of visit from teachers	1

According to Table 4.22 subject advisors have some expectations when they visit physical science teachers and these include problems and complaints about subject content and students, to check on implementation of previous advice and usage of materials, preparation, subject file and general organisation of the subject. The subject advisors also expect teachers to appreciate their visits.

Table 4.23: Expectations of subject advisors after visiting the physical science teachers

EXPECTATIONS	NUMBER OF RESPONSES
More dedicated and committed teachers in physical science	1
Problem solvers	1
Active teachers in the real sense of the word	1
Teachers that want to do experiments even if there is no laboratory	1
Teachers to do follow up of visit telephonically or return visit	1
Difficult to map out expectations because of lack of job description (what the subject advisor can and cannot do)	1
Teacher must feel he/she has an approachable friend	1
Recommendations should be implemented	3
Support material provided should be used to the maximum	1
Teachers should feel empowered and enthusiastic	2

From Table 4.23 it is evident that subject advisors, after visiting the physical science teachers expect that their recommendations should be implemented. This fact has the highest number of responses (3). The second highest expectation is that teachers should feel empowered and enthusiastic. The last expectations are that support materials should be used to the maximum and generally active, dedicated, committed, teachers who are eager to do experiments even if there are no laboratories. They should be able to solve problems facing them in the subject. The teachers are also expected to view subject advisors as approachable friends and to follow up visits telephonically or personally. One response is that it is difficult to map out expectations because of a lack of job description (what the subject advisor can and cannot do). This last point is very important in view of the response in Table 4.9 where four out of six subject advisors stated that they did not receive a job description on appointment and the two who received it stated that their duties/roles were not clearly spelt out.

Table 4.24: The role played by subject advisors during and after INSET

ROLES DURING INSET	NUMBER OF RESPONSES
Facilitation	4
Monitoring the usage of materials and participation	1
ROLES AFTER INSET	NUMBER OF RESPONSES
Follow-up (visits/implementation)	5
Evaluation	3
Follow-up on those who did not attend courses	2
Dealing with feedback from teachers	1
Reporting qualitatively	1
Continuous assessment	1
Act as a shoulder to cry on for teachers	1

It is evident from Table 4.24 that four out of six subject advisors consider facilitation as a major role that they should play during INSET. Subject advisors (five out of six) consider follow-up (visits and implementation) as a major role after INSET. This tallies with information from Table 4.6 wherein implementation as a role was ranked highest by one subject advisor and second highest by three subject advisors.

The second highly rated role by three out of six subject advisors is evaluation. The third role is follow-up on those who did not attend INSET courses. The lowly rated ones deal mainly with feedback from teachers, reporting, continuous assessment and support.

4.2.3 CONCLUSION

From information gathered through questionnaire 1, it can be concluded that subject advisors have experience as science teachers, consider the seven roles outlined to them as an important part of their job, that workshops were their main activity in 1997-1998. Of utmost importance is that they need clarification of their roles as they have to perform a number of other tasks not related to physical science/general science. It is also evident that in carrying out their tasks, they come across a lot of obstacles, mainly transport, funds, support from senior subject advisors and lack of

cooperation from teachers. They feel confident that their training and experience are adequate for their task although their actual experience as subject advisors is very low with the highest being six years experience. Despite all the above problems, subject advisors seem to agree that if their role and functions are optimised they can lead in the informal development of physical science teachers and guidance with respect to the teaching of the subject.

4.3 INFORMATION ON PHYSICAL SCIENCE TEACHERS IN THE NORTH WEST PROVINCE

4.3.1 INTRODUCTION

This section deals with information on physical science teachers in the North West Province. The information was gathered through questionnaire 2. A total of 84 questionnaires were distributed in 12 districts and 70 teachers responded from 8 districts. 91% of the teachers who responded are high school physical science teachers and 6% teach at middle schools. These teachers are serviced by the 8 physical science subject advisors in the province. The results of this part of the investigation are given in Tables 4.25 – 4.45.

4.3.2 DISCUSSION

Tables 4.27 – 4.28 give information on schools and districts at which the teachers are working. The number of teachers per district varies as 16 of the questionnaires were distributed to the SEDIBA physical science teachers while they were attending INSET courses at PU for CHE and 13 were returned.

The following two tables deal with information on physical science teachers, namely the type of school and district where teachers are based.

Table 4.25: Type of school where teachers are based

TYPE OF SCHOOL	NUMBER OF TEACHERS	PERCENTAGE
High	64	91
Middle	6	9

Table 4.26: Districts where teachers are based

DISTRICT	NUMBER OF TEACHERS	PERCENTAGE
Brits	17	25
Vryburg	14	20
Rustenburg	10	15
Lichtenburg	8	12
Mafikeng	7	11
Klerksdorp	7	11
Potchefstroom	5	7
Mabopane	1	1

According to Tables 4.25 – 4.26, teachers who responded to questionnaire 2 (appendix 2) are from high and middle schools. 64 (91%) teach at high schools and 6 (9%) teach at middle schools. The teachers are from 8 out of 12 education districts of the North West Province.

Table 4.27: Experience (full years) of general/physical science teachers

YEARS	NUMBER OF TEACHERS
1	1
2	5
3	8
4	4
5	3
6	6
7	8
8	3
9	1
10	3
11	4
12	4
15	4
16	2

Table 4.27 (Continued)

YEARS	NUMBER OF TEACHERS
18	3
22	1
24	4
25	3
26	1
27	1
34	1

From the data in Table 4.27 it is clear that teachers are on the average relatively inexperienced in view of the fact that the average teaching experience is 10,4 years.

Table 4.28: Experience of teachers in general/physical science teaching

EXPERIENCE (YEARS)	NUMBER OF TEACHERS
1	2
2	6
3	10
4	5
5	5
6	4
7	6
8	2
9	2
10	1
11	3
12	4
13	1
15	3
16	2
17	1
18	3

Table 4.28 (Continued)

EXPERIENCE (YEARS)	NUMBER OF TEACHERS
20	1
24	2
25	2
26	1
34	1

Table 4.29: Number of teachers who taught grades 8– 12

GRADE	NUMBER OF TEACHERS
8	12
9	21
10	41
11	44
12	49

Table 4.28 gives information on the experience of teachers in general/physical science teaching. The average experience of the teachers is 4,4 years. Like general teaching experience they are generally inexperienced in teaching science. Table 4.29 gives information on the number of teachers who taught various grades in 1998.

Table 4.30: Degrees held by general/physical science teachers

DEGREE	NUMBER OF TEACHERS
B Sc	18
B Sc Hons	1
BA	2
BA Ed	2
B Sc Ed	8
M Sc	5

Table 4.31: Diplomas held by general/physical science teachers

DIPLOMA	NUMBER OF TEACHERS
HED	19
ACP	3
UDE(S)	22
STD	10
SED	4
SPTD	3
PGDE	3
FDE	1

Table 4.32: Highest qualifications in physics and chemistry held by teachers

PHYSICS	NUMBER OF TEACHERS	CHEMISTRY	NUMBER OF TEACHERS
No response	30	No response	25
Grade 12	3	Grade 12	5
1 st year college	1	1 st year college	1
2 nd year college	1	2 nd year college	-
3 rd year college	13	3 rd year college	15
1 st year university	7	1 st year university	7
2 nd year university	7	2 nd year university	5
3 rd year university	6	3 rd year university	6
Hons	1	Hons	3
M Sc	1	M Sc	3

Table 4.33: Institutions at which teachers studied

INSTITUTIONS	NUMBER OF TEACHERS	PERCENTAGE
1. University of Pretoria	4	5,9
2. OKSA	-	-
3. Calient (India)	2	2,9
4. Lehurutshe College	2	2,9
5. University of Fort Hare	1	1,5
6. University of Kesla (India)	4	5,9
7. UNISA	3	4,4
8. Mankwe College	6	8,8
9. Hebron College	2	2,9
10. University of North West	6	8,8
11. Medunsa	1	1,5
12. Moretele College	2	2,9
13. Vista	4	5,9
14. Marapyane College	3	4,4
15. Tlhabane College	1	1,5
16. Mokopane College	1	1,5
17. Transvaal College of Education	3	4,4
18. Mphohadi College	1	1,5
19. PU for CHE	6	8,8
20. Stellenbosch University	2	2,9
21. Transvaal Education	-	-
22. University of the Western Cape	1	1,5
23. Kenya	1	1,5
24. Taung College	6	8,8
25. Tribulon	-	-
26. University of the North	1	1,5
27. University of London	1	1,5
28. Thabanchu College	1	1,5
29. Tshiya College	1	1,5
30. Sebokeng College	1	1,5
31. RAU	1	1,5

Particulars of the qualifications of this sample of teachers are summarised in Tables 4.30 – 4.33. 36 teachers out of the 70 have the following science degrees: 18 B Sc, 8 B Sc Ed, 5 M Sc and 1 B Sc (Hons). Of the diplomated teachers 22 possess UDE(S), 19 and HED (postgraduate) and 10 have STD. The degrees and diplomas held by these teachers were obtained at institutions in the RSA, India, Kenya and the UK. 30 (43%) of the teachers studied at 14 colleges of education in South Africa, 24 (34,2%) studied at 11 universities in South Africa and 8 (11,4%) studied at 4 institutions outside South Africa. It is evident that their qualifications in physics and chemistry are rather low. 13 (18,5%) of the teachers have third year college physics as their highest qualification and 15 (21,4%) have third year college chemistry as their highest qualification.

Table 4.34: Information on teachers who were assisted in their professional development

Information on teachers who were assisted in their professional development is reflected in Tables 4.35 – 4.36.

ASSISTANCE FROM	NO (%) ASSISTED	PRIORITY* AND NUMBERS (%) ** OF TEACHERS' RATING OF ASSISTANCE					
		1	2	3	4	5	6
Teachers Centre	36 (51,4%)	11 (15,7%)	13 (18,5%)	3 (4,2%)	-	2 (2,8%)	7 (10%)
University	38 (54,2%)	10 (14,2%)	12 (17,1%)	9 (12,8%)	4 (5,7%)	2 (2,8%)	1 (1,4%)
NGO	33 (47,1%)	3 (4,2%)	7 (10%)	3 (4,2%)	6 (8,5%)	3 (4,2%)	11 (15,7%)
Subject advisor	42 (60%)	30 (42,8%)	3 (4,2%)	3 (4,2%)	3 (4,2%)	1 (1,4%)	2 (2,8%)
College	23 (32,8%)	7 (10%)	2 (2,8%)	4 (5,7%)	8 (11,4%)	4 (5,7%)	4 (5,7%)
Other/friends/ Colleagues	30 (42,8%)	6 (8,5%)	5 (7,1%)	5 (7,1%)	6 (8,5%)	-	8 (11,4%)

* Highest priority is 1. Teachers were requested (in questionnaire 2) to rate the importance of the various types of assistance.

** Explanation: for example the numbers 11 (15,7%) in the column priority 1 signifies that 11 teachers (15,7%) of the population rated the assistance by a teachers centre as priority no. 1.

According to Table 4.34, 30 teachers who received assistance from subject advisors gave the highest priority to the subject advisors.

Teachers centres, universities and other sources/centres also assisted teachers, but to a lesser extent.

Table 4.35: Number of times teachers received help in 1997/1998

NUMBER OF TIMES	NUMBER OF TEACHERS	PERCENTAGE
0	13	18,6
1	6	8,6
2	15	21,4
3	5	7,1
4	7	10,0
5	8	11,4
6	1	1,4
8	5	7,1
10	9	12,9
12	1	1,4

It is evident from Table 4.35 that nearly half of the group of 70 teachers (34) received help two times or less than two times during 1997/1998. A small number of teachers received regular help.

Table 4.36: Type of INSET courses attended by general/physical science teachers in 1997 and 1998

TYPE OF INSET	NUMBER OF TEACHERS WHO ATTENDED	PERCENTAGE
None	35	50
College of Education	9	12,8
Workshops	9	12,8
Subject advisor	6	8,5
Sediba project	2	2,8
RAU	1	1,4
Courses on OBE	1	1,4
INSET (Mafikeng)	1	1,4

From Table 4.36 it is clear that 35 teachers (50%) did not attend INSET courses in 1997/1998. 6 (8,5%) attended INSET courses initiated by subject advisors. The rest of the courses were attended at other centres. While Table 4.12 indicates that a major activity of subject advisors is INSET, it is not the case with the information from Table 4.36.

Table 4.37: Career guidance to pupils concerning careers in Science, Engineering and Technology (SET)

HOW TEACHERS RATE CAREER GUIDANCE	NUMBER OF TEACHERS	PERCENTAGE
Adequate	14	20
Inadequate	42	60
Unable to judge	14	20

Table 4.38: Person responsible for career guidance in schools

TEACHERS RESPONSIBLE	NUMBER OF TEACHERS	PERCENTAGE
Science teacher	15	21,4
Career guidance teacher	48	68,5

Tables 4.37 – 4.38 deal with career guidance to pupils in SET. A high percentage of teachers (60%) rate guidance presently given at their schools as inadequate. 20% rated it adequate and 14% indicated that they were unable to judge. Table 4.38 indicates that some science teachers 15 (21,4%) are responsible for SET career guidance. Although they are fewer, this may somehow have a bearing on the role of the subject advisor regarding this aspect of SET career guidance who may be of assistance to these teachers.

Table 4.39: Teachers' recommendations concerning the improvement of SET career guidance

RECOMMENDATION	NUMBER OF TEACHERS	PERCENTAGE
Periods for guidance	13	18,5
Tours (universities, Expo)	12	17
Teacher appointed	11	15,7
Workshops attended by teachers (science)	8	11,4
No response	7	10
To visit schools	6	8,5
Department of Education must give priority to career guidance	4	5,7
Bursaries to pupils as motivation	4	5,7
Guidance teacher should attend INSET	3	4,2
Supply information to schools	2	2,8

Table 4.39 gives information on recommendations by teachers concerning the improvement of SET career guidance. In Table 4.37 the teachers rated SET career guidance as inadequate and in Table 4,39 they suggest a number of ways to improve it. Two recommendations emerge which affect the role of subject advisors namely that workshops should be attended by science teachers and there must be tours to universities and Expo.

Table 4.40: Assistance received from subject advisors regarding the seven US perceived roles of subject advisors in their order of preference

TYPE OF ASSISTANCE	NUMBER OF TEACHERS ASSISTED	NUMBER AND TIME OF ASSISTANCE
Instruction	43	7 one afternoon/month 6 one/quarter 1 twice/quarter 1 twice days/year 9 one day/year 1 during workshops 1 3 x the year 1 afternoon/month 6 few hours/year 1 one/six months 1 2-3/month times
Curriculum	33	3 one afternoon/month 6 1/quarter 1 15-20 minutes 3 2 days/year 4 1 day/year 2 3 x /year 1 afternoon/2 months 2 few hours/year 1 2-3 times/month
Staff development	25	5 afternoons/month 1 1/quarter 2 2/quarter 1 2 days/year 3 1 day/year 2 3 x /year 2 afternoon/2 months 1 1/6 months 1 2-3/month

Table 4.40 (Continued)

TYPE OF ASSISTANCE	NUMBER OF TEACHERS ASSISTED	NUMBER AND TIME OF ASSISTANCE
Implementation	17	3 afternoons/month 1 1/quarter 1 2 days/year 5 1 day/year 1 few hours/year 1 2-3/month
Management	17	2 afternoons/month 1 1/quarter 6 one day/year 1 one/6 months 1 2-3/month
Assessment	38	6 afternoons/month 11 1/quarter 1 2/quarter 1 15-20 minutes 3 2 days/year 6 1 day/year 1 during workshop 1 few hours/year
Assignment, transfer and load	14	3 afternoons/month 4 1/quarter 1 2 days/year 1 1 day/year 1 few hours/year

Table 4.40 deals with the response of teachers to the request to study the roles of the subject advisors and indicate areas where they received assistance or support in 1997 – 1998 and to state how much time was devoted to each role (questionnaire 2, number 6). From the information gathered teachers received assistance as follows: The areas/roles where the teachers received most assistance are instruction (43 teachers), assessment (38 teachers), curriculum (33 teachers), staff development (25 teachers), implementation (17 teachers), management (17 teachers) and

assignment, transfer and load (14 teachers). The time devoted to each role varies and it is as follows: Instruction (one day per year, assessment (once a quarter/once a year), curriculum (once a quarter), staff development (once a quarter), staff development (one afternoon per month), implementation (one day per year), management (one day per year), assignment, transfer and load (once a quarter). The highest response was considered in each case. While this was done, it is clear that there is no stipulated period to be spent on a particular role when looking at the responses on time devoted to each role. This suggests a need for INSET programmes for subject advisors.

Table 4.41: Assessment for subject advisor appointment

The most important, important and less important qualities of subject advisors on appointment as viewed by teachers

ASSESSMENT FOR SUBJECT ADVISOR APPOINTMENT			
QUALITIES	RATING		
	Most important	Important	Less important
Teaching experience	62	5	2
Senior management experience	30	31	7
Experience of working with adults	19	33	17
Knowledge of current developments	50	15	2
Specialist knowledge, expertise, enthusiasm	60	9	-
Skill as a problem solver	51	18	-
Ability to look critically at work in the classroom	41	23	4
Skill in presentation orally and in writing	35	27	6
Ability to form relationships with adults	28	32	7
Ability to cope with pressure and stress	39	26	4

From the information in Table 4.41 it is clear that teachers ranked the following qualities as most important amongst others: Teaching experience (62 teachers), specialist knowledge and expertise (60 teachers), skill as a problem solver (51 teachers), knowledge of current developments (50 teachers), ability to look critically at work in schools (41 teachers). Rated as important are experience of working with

adults (33 teachers), senior management experience (31 teachers) and the ability to form relationships with adults (28 teachers).

Table 4.42.1: Physical science teacher evaluation

A. A response to the question: How do you see yourself as a physical science teacher?

ASPECTS OF EVALUATION	RATING (Number of teachers)				
	++	+	Average	-	--
A. How do you see yourself as a physical science teacher?					
General educational knowledge	27	25	9		
Knowledge of school management	22	24	16	3	
Availability	41	17	6	2	
Approachability	43	19	2	2	
General helpfulness to teachers	30	21	14	1	
Skills in observing and assessing work in schools	32	17	14	1	
Skills counselling teachers	14	25	21	5	1
In-service skills – planning and organising	19	20	21	5	
In-service skills – knowledge of different strategies	12	24	19	6	2
In-service skills – presentation	17	19	20	4	1
In-service skills leading discussion	16	22	17	5	1
Skill in persuading and negotiating	18	25	18	3	

From Table 4.42.1 it is clear that approachability, availability, skill in observing and assessing work in schools and general helpfulness appear as top most in the ++ rating column. As far as INSET skills are concerned teachers seem to rate themselves as + and average. This aspect is interesting if peer training is considered as an INSET option.

Table 4.42.2: Physical science teacher evaluation (continued)**B. A response to the question: How do you think subject advisors see you?**

ASPECTS OF EVALUATION	RATING (Number of teachers)				
	++	+	Average	-	--
B. How do you think subject advisors see you?					
General educational knowledge	13	22	6	1	
Knowledge of school management	10	21	6	2	
Availability	22	14	4	1	
Approachability	20	13	3	1	
General helpfulness to schools and teachers	16	9	12	2	
Skills in observing and assessing work in schools	13	12	10	2	
Skills counselling teachers	9	8	12	7	1
In-service skills – planning and organising	9	11	16	2	
In-service skills – knowledge of different strategies	9	9	13	6	1
In-service skills – presentation	12	12	14	4	1
In-service skills leading discussion	11	16	11	1	2
Skill in persuading and negotiating	12	14	10	2	1

Table 4.42.2 gives information as how teachers think subject advisors see them and they think that they are available, approachable and helpful to other teachers in the ++ rating. As far as skills in counselling teachers, INSET skills (planning, organising, knowledge of different strategies and presentation) are concerned, they think subject advisors rate them as average. This rating can be exploited to train them into advisory teachers or master teachers as they are called in the UK and US respectively.

Table 4.43: Expectations by teachers when subject advisors visit schools

EXPECTATIONS	NUMBER OF RESPONSES	PERCENTAGE
Best advice and guidance on problems in the subject	50	71,4
Evaluate the teacher	16	22,8
Motivation and acknowledgement of good work	11	15,7
Information	8	11,4
Evaluate students	5	7,1
Report back on teaching matters	1	1,4
Changes and improvements	1	1,4
None	1	1,4

According to Table 4.43 50 (71,4%) of the teachers value the services of the subject advisors and if their role is optimised they can be easily accepted by the teachers. 16 (22,8%) feel that evaluation of the teacher is important as a role, followed by motivation and acknowledgement of good work, provision of information and report back.

Table 4.44: What teachers expect after the subject advisor's visit (n=70)

EXPECTATIONS	NUMBER OF RESPONSES	PERCENTAGE
Follow up on problems	25	35,7
Conclusions on implementation	19	27,1
Improved teaching and learning	18	25,7
None	6	8,5
Teacher more enthusiastic	5	7,1
Guidance	3	4,2
Report and necessary materials	1	1,4

According to Table 4.44, teachers expect the following actions after the subject advisor's visit: 25 (35,7%) expect follow-up, 19 (27,1%) expect conclusions on implementation, 18 (25,7%) expect improved teaching and learning. The information on Tables 4.43 and 4.44 indicate that the teachers value the services of subject advisors and they think they have a role to play in improving the teaching of physical science.

Table 4.45: Roles expected from subject advisors by teachers, during and after INSET

EXPECTED ROLE DURING INSET	NUMBER OF RESPONSES	PERCENTAGE
Facilitator	29	41,4
Guidance and encouragement	22	31,4
None	7	10,0
To update the teacher	6	8,5
Expert knowledge	5	7,1
Evaluate	5	7,1
Relevance to what teachers do	1	1,4
EXPECTED ROLE AFTER INSET		
Visits to schools (follow-up)	37	52,8
Evaluate (assessment)	18	25,7
None	7	10,0
Implement	7	10,0
A friend in need	4	5,7
More equipment	1	1,4
Exchange programmes	1	1,4

It is evident from Table 4.45 that 29 (41,4%) teachers expect the subject advisor to play a role of facilitator and this information tallies with that in Table 4.2 about the same question to the subject, advisors. 4 (66,6%) out of 6 subject advisors indicated facilitation as a role during INSET. Another important role mentioned by 22 (31,4%) teachers is that of guidance and encouragement followed by expert knowledge and evaluation. 37 (52,8%) teachers indicated that follow-up visits to schools, evaluation – 18 (25,7%), implementation – 7 (10%) are of utmost importance as roles after INSET. Others include more equipment and exchange programmes.

4.3.3 CONCLUSION

It is clear from the information gathered from physical science teachers that the subject advisors can play a major role in supporting them in the teaching of the subject. This was indicated by their responses to where they get assistance with professional development, the number of teachers who got assistance with regard to the seven roles given and the roles that teachers expect them to play when they visit their schools, after the visit, during and after INSET.

4.4 INFORMATION FROM THE NORTH WEST EDUCATION DEPARTMENT

4.4.1 INTRODUCTION

The subject advisors in the North West Province are managed by the Directorate Subject Advisory Services and Professional Support. The North West Province is divided into twelve educational districts and eight subject advisors are appointed to support teachers in physical science. The remaining five districts are coupled with others due to the fact that some districts do not have the subject advisory service, namely Mabopane, Atamelang, Zeerust and Kuruman.

The eight subject advisors are supported by the senior subject advisor. Initially the mathematics senior subject advisor assisted with this task as the physical science senior subject advisor is a recent appointee. Information from the two senior subject advisors was obtained through formal interviews (appendix 3). The second interview was conducted with the Deputy Director of Subject Advisory Service and professional support (appendix 4). The aim of the interviews was to gather as much information as possible concerning the role and functions of the physical science senior subject advisors and subject advisors in the North West Province.

The results of the interviews with senior subject advisors will be discussed in paragraphs 4.4.2 – 4.4.24. (1) indicates the responses of the first senior subject advisor and (2) indicates those of the second one. The first senior subject advisor assisted physical science subject advisors before the second one was appointed and she indicated that she is a mathematics specialist.

4.4.2 MISSION OF THE SECTION ON PHYSICAL SCIENCE

The senior subject advisor stated that the section does not have a mission statement. (1)

The second one stated that there is a mission statement which is to support all physical science teachers with regard to academic, professional and administrative services efficiently and effectively. (2)

4.4.3 THE ROLE OF THE SENIOR SUBJECT ADVISOR IN THE NORTH WEST PROVINCE WITH REGARD TO PHYSICAL SCIENCE

The senior subject advisor (1) indicated her roles as coordination of the activities of physical science advisory service within the Potchefstroom, Klerksdorp and Rustenburg districts, induction of newly appointed physical science subject advisors in the above-mentioned districts, to accompany subject advisors on school visits to establish whether any advice is given to the teachers, to check on the kind of problems encountered by subject advisors when they visit schools and to ensure that the standard of teaching physical science is maintained throughout the three districts.

The senior subject advisor (2) mentioned that he is in charge of all physical science advisors in the province, he assists them with their professional duties, compile their reports and accompanies them to their class/school visits and conducts workshops.

Common duties of senior subject advisors from the above data are coordination of activities of subject advisors in the province and to accompany them on school visits.

4.4.4 NUMBER OF PHYSICAL SCIENCE SUBJECT ADVISORS MANAGED BY THE SENIOR SUBJECT ADVISOR

Three physical science advisors are managed by senior subject advisor (1) who is essentially a mathematics senior subject advisor and only assisted with physical science before senior subject advisor (2) was appointed. Ideally seven (including the three above) physical science advisors should be managed by senior subject advisor (2), but due to transport problems senior subject advisors (1) usually assists him.

Number of teachers managed by each subject advisor (according to the two senior subject advisors). According to senior subject advisor (1) ± 57 teachers are managed by each subject advisor and ± 35 to 40 teachers, according to the second senior subject advisor.

The information given by the two senior subject advisors is totally different with regard to the number of subject advisors they manage and the teachers managed by the subject advisors.

4.4.5 KEY PERFORMANCE AREAS FOR PHYSICAL SCIENCE SUBJECT ADVISORS

Response of senior subject advisor (1)

- To render training, coaching and guidance.
- To apply professional authority.
- To determine whether teachers effect changes and make significant difference in the quality of teaching of physical science and students' performance in physical science.
- Purposeful management of subject groupings.
- Action research/active research.

Response of senior subject advisor (2)

- To visit schools in order to help teachers with content problem areas.
- To conduct workshops on difficult topics and examination related matters.
- To engage in extra-curricula duties for example Expo for Young Scientists, Year of Science and Technology (1998), FEST, etc.

In this part of the survey again there are different responses to the same question by the senior subject advisors.

4.4.6 RESPONSES TO WHETHER THERE IS ANY SYSTEMATIC PROCEDURE USED FOR VISITING PHYSICAL SCIENCE TEACHERS IN SCHOOLS

Senior subject advisor (1): No

Senior subject advisor (2): Yes

- All principals receive the itinerary/program for a semester.
- All subject advisors discuss objectives of the visit with both teacher and the principal.
- The subject advisor will address teachers on appraisal forms.

4.4.7 WHAT HAPPENS AFTER THE SCHOOL VISIT AND WHAT IS THE SENIOR SUBJECT ADVISORS' ROLE

Senior subject advisor (1):

- Should there be any advice needed in as far as standards are concerned the senior subject advisor revisits the subject advisor to apply professional assistance.
- Should there be any problem during the visit the senior subject advisor will rectify it with the advisors concerned.

Senior subject advisor (2):

- A follow-up is made in the next semester as to whether issues such as master file have been implemented and also to administer the subject advisors; reports and/or accompany them to schools.

4.4.8 A RESPONSE TO WHETHER THERE IS ANY INDUCTION PROCESS AND STAFF DEVELOPMENT PROGRAMME FOR THE NEWLY APPOINTED PHYSICAL SCIENCE SUBJECT ADVISORS

Senior subject advisor (1): Yes

Senior subject advisor (2): Yes

The two seniors agree that there is an induction and staff development programme for the newly appointed advisors.

4.4.9 A RESPONSE TO THE QUESTION: IF YES, HOW IS IT CARRIED OUT?

Senior subject advisor (1):

- There is a discussion on administrative materials needed when visiting schools and a workshop on the importance of the physical science senior subject advisor and his/her role in the subject advisory service and human relations.

Senior subject advisor (2):

- An orientation workshop during the first two weeks of assumption of duty. The discussion centres around duties of the physical science subject advisor, policy of the Directorate as a whole in detail and administrative issues such as monthly reports, cars, itinerary, appraisal, etc.

4.4.10 IS THERE ANY SYSTEM IN PLACE TO EVALUATE AND REVIEW THE ROLES OF SUBJECT ADVISORS

Senior subject advisor (1):

- No. It is the senior subject advisor's own initiative.

Senior subject advisor (2):

- Yes. From the quarterly and annual report, a SWOT analysis and evaluation is carried out every year in January. The report is then forwarded to the director with recommendations. These recommendations have not been implemented yet.

4.4.11 THE KIND OF SYSTEM IN PLACE TO ENSURE THAT PHYSICAL SCIENCE SUBJECT ADVISORS FUNCTION UNIFORMLY IN THE PROVINCE

- (1). During provincial physical science advisor meetings held quarterly the senior subject advisor reports on the activities of the districts and each individual activity is discussed.
- (2). Provincial meetings are held once a semester and each member will report on his or her program. The senior subject advisor will consolidate and compile recommendations and extra inputs by each member.

4.4.12 OBSTACLES THAT THE SENIOR SUBJECT ADVISOR THINKS PHYSICAL SCIENCE SUBJECT ADVISORS COME ACROSS IN THEIR DUTIES

- (1). Teachers who are not qualified to teach the subject, demotivated teachers and teachers who are not aware that they need help and negative and closed teachers. Most of the time they are allocated duties outside their job description. Transport problem to schools hampers their planning.
- (2). They come across problematic administrative issues such as budget, transport, phone systems or communication channels, lack of coordination and cooperation with senior management in the department and no follow-up on issues on senior management's side.

4.4.13 HOW DO THE SENIOR SUBJECT ADVISORS ASSIST THE PHYSICAL SCIENCE SUBJECT ADVISORS TO OVERCOME THE ABOVE-MENTIONED OBSTACLES

Senior subject advisor (1):

- The obstacles are discussed with senior management to exclude them from other duties. Motivate them to encourage schools to cooperate by sharing resources.

Senior subject advisor (2):

- No assistance is rendered because the senior subject advisor has the same obstacles, especially transport.

4.4.14 RANKING OF ROLES OF SUBJECT ADVISORS FROM HIGHEST (1) TO LOWEST (7) AND THE TIME (%) DEVOTED TO EACH

Table 4.46: Senior subject advisor (1) decided to rank them from one to seven as follows:

ROLES	RANKING
Curriculum	1
Staff development	2
Instruction	3
Implementation	4
Management	5
Assessment	6
Assignment, transfer and load	7

According to senior subject advisor (1), the ranking tallies with the time devoted to each.

Table 4.47: Ranking of the roles of subject advisors and the time devoted to each role. (According to the USA seven perceived roles of subject advisors in order of preference.)

ROLE	RANKING					TIME DEVOTED TO EACH %
	Highest (1) - Lowest (5)					
	1	2	3	4	5	
Instruction		X				40
Curriculum			X			20
Staff development	X					60
Implementation		X				40
Management				X		10
Assessment		X				40
Assignment, transfer and load			X			20

According to senior subject advisor (2), as indicated in Table 4.47, the ranking can be finalised as follows:

ROLES	RANKING
Staff development	1
Instruction	2
Implementation	2
Assessment	2
Curriculum	3
Assignment, transfer and load	3
Management	4

Table 4.48: A response to the question: When subject advisors are appointed, which of the following qualities do you think are of great importance by marking most important, important or less important in the space provided (x).

ASSESSMENT FOR SUBJECT ADVISOR APPOINTMENT				
QUALITIES	NUMBER FOR SENIOR SUBJECT ADVISOR	RATING		
		Most important	Important	Less important
Teaching experience	1			X
	2	X		
Senior management experience	1			X
	2	X		
Experience of working with adults	1		X	
	2	X		
Knowledge of current developments	1	X		
	2	X		
Specialist knowledge, expertise and enthusiasm	1	X		
	2		X	
Skill as a problem solver	1	X		
	2	X		
Ability to look critically at work in the classroom	1	X		
	2	X		
Skill in presentation orally and in writing	1		X	
	2	X		
Ability to form relationships with adults	1		X	
	2	X		
Ability to cope with pressure and stress	1			X
	2	X		

4.4.15 Assessment for subject advisor appointment

The two subject advisors agree that knowledge of current developments, skill as a problem solver and the ability to look critically at work in the classroom are the most important qualities of a subject advisor. It is interesting to note that subject advisor number 2 has rated 9 out of 10 qualities as most important. He rated specialist knowledge, expertise and enthusiasm as important. Subject advisor number 1 rated 4 out of 10 qualities as most important. Of less importance to her are teaching experience, senior management experience and ability to cope with pressure. She indicated that these qualities have nothing to do with subject expertise.

4.4.16 OTHER FUNCTIONS PERFORMED BY SUBJECT ADVISORS

Senior subject advisor (1):

- Organisation of Expo for Young Scientists which is problematic at this stage, especially the time spent on its organisation.

Senior subject advisor (2):

- Expo for Young Scientists, FEST, Year of Science and Technology (1998), OBE. The senior subject advisor feels that physical science subject advisors should not get involved in OBE at the expense of their main task as some are already highly involved in it.

4.4.17 OTHER FUNCTIONS PERFORMED BY PHYSICAL SCIENCE SUBJECT ADVISORS, NOT RELATED TO PHYSICAL/GENERAL SCIENCE ADVISORY SERVICE

In this paragraph (1) will be used to indicate the responses of the first senior subject advisor and (2) for the second senior subject advisor.

(1). Senior subject advisor:

- Organisation of science expo in their districts
- Assisting in running examinations.
- Involvement in teacher appraisal.
- Involvement in elections of governing bodies.
- Taking statistics at the beginning of the year.

(2) . Senior subject advisor:

- Not applicable

Estimated time devoted to each duty above.

1st quarter – admission and statistics

4th quarter – monitoring and running examinations.

This affects planning during these quarter for example induction of new subject advisors and reflecting on the previous year.

4.4.18 A RESPONSE TO WHETHER SENIOR SUBJECT ADVISORS RECEIVED A JOB DESCRIPTION ON APPOINTMENT

(1). Yes

(2). Yes

4.4.19 A RESPONSE TO WHETHER THEIR ROLES WERE CLEARLY SPELT OUT

(1). Yes

(2). Yes

4.4.20 A RESPONSE TO WHETHER THE SENIOR SUBJECT ADVISORS RECEIVED/UNDERWENT ANY TRAINING OR INDUCTION AFTER APPOINTMENT

- (1). No.
The official stated that she had to be innovative, interpret policy documents and do a bit of research and this empowered her to carry out her tasks.
- (2). Yes

4.4.21 A RESPONSE TO WHAT THE TRAINING ENTAILED IF THE ANSWER TO 4.4.20 IS YES

- (1). Not applicable
- (2). The training entailed all duties and functions of the senior subject advisor. Management and administrative issues such as programmes, reports, transport/cars, etc. were discussed.

4.4.22 A RESPONSE TO WHETHER ANY EVALUATION HAS BEEN CONDUCTED TO FIND OUT ABOUT THE EFFECTIVENESS OF THE PHYSICAL SCIENCE SUBJECT ADVISORS IN THE NORTH WEST PROVINCE

- (1). No
If it is/has being/been done, the senior subject advisor claims that she is unaware.
- (2). Yes

4.4.23 DETAILS OF THE EVALUATION OF THE EFFECTIVENESS OF SUBJECT ADVISORS OF PHYSICAL SCIENCE AS INDICATED BY SENIOR SUBJECT ADVISOR NUMBER 2

- (1). Not applicable
- (2). It is done in the form of a SWOT analysis report and a performance audit report. All recommendations are forwarded to the Director and DDG of the NWED. For example, a study was conducted in April 1998 but the results have not yet been published.

4.4.24 SELF EVALUATION BY THE SENIOR SUBJECT ADVISORS

Table 4.48.1: Self evaluation by senior subject advisor (1): How do you see yourself as an advisor (A) and how do you think subject advisors see you (B)?

QUESTIONS AND ASPECTS OF EVALUATION	RATING				
	++	+	Average	-	--
General educational knowledge		A	B		
Knowledge of school management		A B			
Availability	A B				
Approachability	A B				
General helpfulness to schools and teachers	A B				
Skills in observing and assessing work in schools			A B		
Skills counselling teachers	A B				
In-service skills – planning and organising	B	A			
In-service skills – knowledge of different strategies		A B			
In-service skills – presentation		A B			
In-service skills leading discussion	A B				
Skill in persuading and negotiating		A B			

Table 4.48.2: Self evaluation by senior subject advisor (2): How do you see yourself as an advisor (A) and how do you think subject advisors see you (B)?

QUESTIONS AND ASPECTS OF EVALUATION	RATING				
	++	+	Average	-	--
General educational knowledge	A B				
Knowledge of school management		A B			
Availability		A B			
Approachability	A B				
General helpfulness to schools and teachers	A B				
Skills in observing and assessing work in schools		A B			
Skills counselling teachers	A B				
In-service skills – planning and organising	A B				
In-service skills – knowledge of different strategies	A B				
In-service skills – presentation		A B			
In-service skills leading discussion		A B			
Skill in persuading and negotiating	A B				

From Tables 4.481 and 4.482 it is clear that both senior subject advisors give themselves strong positive (++) to positive (+) evaluations on their professional abilities.

INFORMATION FROM THE DEPUTY DIRECTOR OF SUBJECT ADVISORY SERVICES AND PROFESSIONAL SUPPORT

4.4.25 INTRODUCTION

Information was obtained from the Deputy Director of Subject Advisory Services and Professional Support by means of an interview. The results of this interview are discussed in paragraphs 4.2.26 – 4.4.51. The subdirectorate caters for the needs of subject advisors for all phases in the North West Province. The Deputy Director reports to the Director on developments in the subject advisory service.

4.4.26 INTERVIEW WITH DEPUTY DIRECTOR OF SUBJECT ADVISORY SERVICES AND PROFESSIONAL SUPPORT

A response to what is the mission of the subdirectorate with regard to the role of the physical science subject advisors was:

The mission is to support all physical science teachers with regard to academic, professional and administrative services efficiently and effectively.

4.4.27 A RESPONSE TO WHETHER THERE IS ANY REFERENCE IN THE EDUCATIONAL LAW(S)/POLICY TO THE APPOINTMENT, ROLES/TASKS, ETC. OF SUBJECT ADVISORS

No. Reasons advanced are crisis management, lack of strategic management system in place, lack of funds, doing work of other directorates for example monitoring of examinations, provisioning, catalogues of equipment, curriculum development, coordination, personnel, finance and motivation. The view is that such activities distract officials from being creative and focus on their work and what affects them in their daily tasks which can assist in developments like legislation regarding their functioning which will be discussed in 4.4.31 in this part of the survey.

4.4.28 A RESPONSE TO WHETHER THERE IS A JOB DESCRIPTION FOR PHYSICAL SCIENCE SUBJECT ADVISORS, BE IT FROM THE NDE OR PROVINCIAL EDUCATION DEPARTMENT WHICH IS A WORKING DOCUMENT TO GUIDE THEM IN THEIR DAILY TASKS

No. It was mentioned by the acting DDG that the budget will dictate what the job descriptions will be. There is no organogram. There was a question from the premier's office whether there is a need for subject advisors or subject specialists in the North West Province.

4.4.29 MINIMUM QUALIFICATION REQUIREMENT FOR PHYSICAL SCIENCE SUBJECT ADVISORS ON APPOINTMENT

Matric plus a four year qualification, that means a degree or equivalent. The deputy director mentioned that beggars cannot be choosers. He referred to the latest appointment of well qualified, but inexperienced subject advisors in the science cluster.

4.4.30 EXPERIENCE REQUIREMENTS (E.G. NUMBER OF YEARS IN SCIENCE TEACHING) OF PHYSICAL SCIENCE SUBJECT ADVISORS

Laws were relaxed by the National Department in 1996 due to shortages. This has led to the appointment of young and inexperienced, but well qualified physical science subject advisors. The appointments were done according to the PAM regulation. This response tallies with the information in Tables 4.2 – 4.5 on the qualifications (academic and professional), experience as science teachers and experience as subject advisors. They are reasonably experienced as science teachers, but not as subject advisors, with the most experienced having 6 years in the field.

4.4.31 A RESPONSE TO WHETHER THERE IS ANY LEGISLATION UNDER WHICH THE SUBJECT ADVISORS CARRY OUT THEIR TASKS, E.G. IN THE UK – THE EDUCATION REFORM ACT OF 1988

No. There is an urgent need to have such an act formulated because subject advisors are misused by other directorates for example coordination, curriculum and examinations. This, according to the Deputy Director, compromises the activities of the subject advisors.

4.4.32 A RESPONSE OF THE DEPUTY DIRECTOR TO THE QUESTION: WHEN SUBJECT ADVISORS ARE APPOINTED, WHICH QUALITIES DO YOU THINK ARE OF GREAT IMPORTANCE BY MARKING MOST IMPORTANT, IMPORTANT OR LESS IMPORTANT IN THE SPACE PROVIDED (X)

Table 4.49: Assessment form for advisor appointment

ASSESSMENT FORM FOR ADVISOR APPOINTMENT			
QUALITIES	RATING		
	Most important	Important	Less important
Teaching experience	X		
Senior management experience	X		
Experience of working with adults	X		
Knowledge of current developments	X		
Specialist knowledge, expertise and enthusiasm	X		
Skill as a problem solver	X		
Ability to look critically at work in the classroom	X		
Skill in presentation orally and in writing	X		
Ability to form relationships with adults	X		
Ability to cope with pressure and stress		X	

According to the Deputy Director, all the above qualities are most important except the ability to cope with pressure. He feels that if there is proper planning, then there is no need to operate under pressure.

While the Deputy Director rated nine out of ten qualities as most important, the two senior subject advisors are both agreeable to the fact that knowledge of current developments, skill as a problem solver and ability to look critically at work in the classroom (e.g. 3 out of ten qualities) are the most important. However, senior subject advisor (2), when looking at his rating, is in agreement with the Deputy Director that nine out of ten qualities are most important for advisor appointment. They only differ as far as ability to cope with pressure is concerned. Senior subject advisor (1) only rates four out of ten qualities as most important. Her argument for example concerning teaching experience is that it may be 20 years but meaning in real terms one year 20 times without innovation and improvement. Her other argument is that senior management experience has no correlation with subject expertise. Ability to cope with pressure and stress is once more associated with lack of planning and therefore rated as less important by the same senior subject advisor.

4.4.33 A RESPONSE TO WHAT ARE THE KPAs IN AN INTERVIEW FOR THE POST OF PHYSICAL SCIENCE SUBJECT ADVISOR

They are as follows:

- Experience
- Qualifications
- Insight into the job
- Relationships
- Knowledge of the subject
- Managerial skills
- Ability to cope with pressure
- Ability to delegate
- Weak and strong points

They are not in any order of priority.

4.4.34 A RESPONSE TO WHETHER THERE IS ANY TRAINING PROGRAMME SPECIFICALLY FOR PHYSICAL SCIENCE SUBJECT ADVISORS ON APPOINTMENT

It occurs through orientation by the coordinator and it entails issues such as school visits, report writing and functioning of the unit. The senior subject advisor trains them in the subject, although at this stage some posts are vacant. The post for the

senior subject advisor for physical science was vacant for a while but there is a recent appointment. The mathematics senior subject advisor assisted during the period when there was no physical science senior subject advisor. Very little of the training has materialised because of transport problems. Science expo and compilation of the science equipment catalogue took a lot of time.

4.4.35 A RESPONSE TO WHAT IS THE ROLE OF THE SENIOR SUBJECT ADVISOR FOR PHYSICAL SCIENCE

The senior subject advisor is expected to:

- Accompany all appointed district subject advisors on school visits and orientate them in professional aspects.
- Initiate and intensively be involved with subject advisors and teachers during subject courses, seminars and workshops.
- Accompany subject advisors to class visits where and when applicable, with a view to the standardisation and uniformity of the approach to an interpretation of syllabuses and subject policies.
- Communicate and meet regularly with all district managers, circuit managers and subject advisors with regards to district planning, needs and the general state of education.
- Report meaningfully to the Director with regard to the standard subject advisory services concerning each subject in every district by completing reports in detail.
- All senior subject advisors will interact with subject advisors in terms of subject related and professional activities and the coordinators will interact through all the administrative coordinating work.

4.4.36 THE NUMBER OF PHYSICAL SCIENCE SUBJECT ADVISORS IN THE NORTH WEST PROVINCE

There are eight physical science subject advisors in the North West Province.

4.4.37 THE NUMBER OF SENIOR SUBJECT ADVISORS OF PHYSICAL SCIENCE IN THE PROVINCE

There is one senior subject advisor for physical science. The second one is actually in mathematics, but she assisted in physical science when the post was vacant.

4.4.38 THE NUMBER OF SCHOOLS ASSIGNED TO EACH SUBJECT ADVISOR

325 schools are assigned to each subject advisor.

4.4.39 THE NUMBER OF TEACHERS ASSIGNED TO EACH SUBJECT ADVISOR

425 teachers are assigned to each subject advisor.

4.4.40 INSET PROGRAMMES WHICH ARE IN PLACE TO BE IMPLEMENTED BY SUBJECT ADVISORS

SEDIBA Programme implemented by PU for CHE: The SEDIBA programme upgrades science and mathematics teachers with a three year teachers diploma through INSET to a four year diploma. Courses and workshops are dependent on transport. Funds for paying subsistence and travel costs of teachers to and from courses have been cancelled.

4.4.41 A RESPONSE TO WHETHER THERE IS A SYSTEM WHEREBY TEACHERS GIVE FEEDBACK TO THE SUBJECT ADVISORS ABOUT INSET PROGRAMMES.

There is an old evaluation form which was used in the ex-DET. Each subject advisor can develop his or her own form with guidelines from the old one mentioned above. Some subject advisors are afraid to use it. The Labour Relations Act (LRA) also poses some restrictions. There is also no support structure to follow-up the usage of the form.

4.4.42 A RESPONSE TO WHO DESIGNS THE PROGRAMMES AND WHAT GUIDES THIS PROCESS?

The provincial subject advisors of physical science have formed a subject committee which is responsible for the INSET programmes.

There are budget constraints for expansion of the programmes.

4.4.43 A RESPONSE TO WHETHER THERE IS AN APPRAISAL SYSTEM FOR SUBJECT ADVISORS

No

4.4.44 A RESPONSE TO WHETHER THERE IS ANY SYSTEM OF REGISTRATION AND ACCREDITATION OF SUBJECT ADVISORS IN THE NORTH WEST PROVINCE/NATIONALLY

Such a system is not available but the Deputy Director considers it as a very important issue. He mentioned an example of privatisation to ensure quality assurance and gave the Netherlands as an example of a country where it is practiced and the subject advisory team visited this country to study the system.

4.4.45 RANKING OF SEVEN ROLES OF SUBJECT ADVISORS ON A 1 (HIGHEST) TO 5 (LOWEST) SCALE AND THE TIME (%) DEVOTED TO EACH

A sheet of seven roles of subject advisors was provided to the Deputy Director to rank them from the highest (1) to the lowest (5), and to indicate the time (%) devoted to each role by the subject advisors. The roles have been adopted from the US and they are in order of preference.

Table 4.50: Ranking of roles and percentage time devoted to each

ROLES	RANKING					TIME DEVOTED
	Highest (1) - Lowest (5)					TO EACH (%)
	1	2	3	4	5	
<u>Instruction:</u> Assistance in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction.	X					20

Table 4.50 (Continued)

ROLES	RANKING					TIME DEVOTED
	Highest (1) - Lowest (5)					TO EACH (%)
	1	2	3	4	5	
<u>Curriculum</u> : Facilitation of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.	X					10
<u>Staff development</u> : Initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.	X					50
<u>Implementation</u> : Initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.	X					5
<u>Management</u> : Requisition of supplies; coordination of information about laws, liabilities district policies, safety regulations, financial status and budgets.					X	80-100

Table 4.50 (Continued)

ROLES	RANKING					TIME DEVOTED
	Highest (1) - Lowest (5)					TO EACH (%)
	1	2	3	4	5	
<u>Assessment:</u> Analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.	X					Continuous
<u>Assignment, transfer and load:</u> Assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff.	X					10

From Table 4.50 and a discussion thereof with the Deputy Director, it is clear that presently subject advisors' main roles are management (80 – 100%) followed by staff development (50%). The time devoted to each role is reflected in brackets next to each role. The Deputy Director felt that while a large percentage of time is devoted to management, he rated it lowest because they should not be involved in it. He rated all other six roles highest (1). He mentioned that instruction is problematic to carry out due to inexperience, budgetary constraints, transport problems and lack of support structure to assist with the role. He felt that the subject advisors should identify with the curriculum. With regard to staff development, he mentioned that it can be boosted by cooperation and coordination with teachers centres. Assessment is continuous and should start from the beginning of the year. Assignment, transfer and load was also rated highest.

4.4.46 A RESPONSE TO WHETHER THERE ARE ANY KEY TASKS THAT HAVE BEEN OMITTED IN TABLE 4.50

They were indicated as quality assurance with respect to physical science teaching, belonging to professional bodies and spending time with other members to receive and share guidance on their roles.

4.4.47 KEY AREAS THAT A PHYSICAL SCIENCE SUBJECT ADVISOR SHOULD FOCUS ON WHEN HE/SHE VISITS A SCHOOL

They were highlighted as:

- Progress on the syllabus.
- Checking whether effective teaching is taking place.
- Availability of resources.
- Assignments for students (OBE).
- Practical work.
- Whether theory and practice reconcile.
- Teaching methods.

4.4.48 A RESPONSE TO WHETHER THERE IS A DIFFERENCE IN THE TASKS OF SUBJECT ADVISORS AND THOSE OF CIRCUIT MANAGERS

Sometimes the subject advisors play the roles of circuit managers for example allocation of time for the subject (timetable), training of school governing bodies and governing body elections.

4.4.49 A RESPONSE TO WHETHER THE PRESENT POLICY ON SUBJECT ADVISORY SERVICES IS A PRODUCT OF A CONFERENCE WHICH WAS HELD IN THE NORTH WEST PROVINCE (TEACHER SUPPORT CONFERENCE) ON 24-25 AUGUST 1994, AND WHETHER THE CONFERENCE DOCUMENT IS AVAILABLE

The response to both questions was no.

4.4.50 A RESPONSE TO WHETHER THERE IS A POSSIBILITY OF INVOLVING SUBJECT ADVISORS IN THE APPOINTMENT OF SCIENCE TEACHERS

The answer was yes.

4.4.51 A RESPONSE TO WHETHER ANY EVALUATION HAS BEEN CONDUCTED TO CHECK ON THE EFFECTIVENESS OF SUBJECT ADVISORS (PHYSICAL SCIENCE OR GENERALLY) IN THE NORTH WEST PROVINCE

The response was that the Auditor General's office conducted a survey and the Deputy Director was verbally informed that there is a need for subject advisors and they need support. The report was not available at the time of the interview. The Deputy Director pointed out two officials from Pretoria offices who have knowledge of this matter.

4.4.52 CONCLUSION

The conclusions that can be drawn from this interview with the Deputy Director are that physical science subject advisors and subject advisors in general are involved in issues which are not related to their Directorate/tasks, there is no legislation governing the functioning of subject advisors, there is a shortage of experienced subject advisors as a result of a small supply of experienced science graduates. The Directorate recognises qualities which are important for advisor appointment and there is orientation of newly appointed subject advisors. Other issues are that there is no formal evaluation of subject advisors by seniors and teachers (after INSET) and this issue is not controlled by the Directorate as a result of the LRA. Subject advisors do not belong to a professional body which can be used for networking. There is evidence that the subject advisors are too involved in management at the expense of other roles. There is a need to clarify the subject advisors' roles so that there is no role conflict, e.g. subject advisors doing the tasks of circuit managers, the curriculum unit and examinations directorate.

CHAPTER 5

RESULTS OF THE SURVEY AND DISCUSSION

5.1 INTRODUCTION

In this chapter, results of the empirical survey, presented in chapter 4, will be discussed according to the participants' responses and key issues pertaining to the optimisation of the role of the physical science subject advisor in the North West Province. The main and common issues that emerge from the participants' responses will be used to suggest a model for the functioning of subject advisors which will hopefully be useful to other provincial education departments in the country.

5.2 PHYSICAL SCIENCE SUBJECT ADVISORS

The following facts became apparent from the investigation:

- Physical science subject advisors are adequately qualified both academically and professionally for their posts in terms of the requirements of the Department of Education which are a Science Bachelor's degree or equivalent and a professional qualification.
- Although well qualified as physical science teachers, they are inexperienced as subject advisors e.g. the subject advisor who has more experience as a physical science teacher according to the study, has only six years experience as a subject advisor.
- Ranking of the seven perceived roles of subject advisors reflects the importance attached to the implementation of suggested improvements, new instructional projects etc. Curriculum, staff development, assessment and implementation were ranked 2,5. Management was ranked 3,2 and this indicates clearly the low regard for management as a role for the subject advisors.

- Policy issues, OBE, subject clubs, compilation of instructional materials and catalogues, workshops, and motivation of teachers were cited as other roles performed by subject advisors in addition to the seven perceived roles of the subject advisors.

A comparison of these roles with the seven perceived ones indicates that these duties still fall within the framework of the latter roles. This indicates that subject advisors assent that they are supposed to carry out the seven perceived roles.

Of the roles mentioned, policy issues can be classified under management, OBE under curriculum, subject clubs under instruction, compilation of instructional materials and catalogues under instruction, workshops under staff development, school visits under staff development and examinations under assessment.

- Subject advisors perform functions/roles which are not related to their subject. 13 such functions were identified by the subject advisors. Monitoring of Grade 12 examinations, Expo for Young Scientists and olympiads, encouraging teachers to attend workshops, career guidance and the Telmast project appear to be the areas of more focus when analysing the 13 roles mentioned.
- 66,6% of the subject advisors did not receive a job description on appointment and the remaining 33,3% who received it indicated that their roles were not clearly spelt out.
- 83,3% of the physical science subject advisors did not undergo any training or induction on appointment.
- There is minimal or no support of physical science subject advisors by the senior subject advisor for physical science.
- A major activity of the physical science subject advisors during 1997 - 1998 was INSET workshops initiated by the subject advisors themselves or in consultation with teachers. The number of workshops varied from 4 to 24. The workshops focused on problem topics, evaluation, examinations, science Expo and olympiads, practical

work and school policy. The main focus was on Grade 11 and 12 classes. The approach to the workshops varies from advisor to advisor and it appears that there are no guidelines for their organisation and presentation. The number of teachers who attended the workshops ranged from 50 to 212 per subject advisor. The duration of the workshops also ranges from 2 - 4 hours per workshop. The duration of the workshops was mainly determined by whether the subject advisors travelled as individuals or as groups.

- Individual INSET of teachers does take place and it works along the same principles as group INSET and the topics of discussion are more or less the same. Group INSET was centralised and individual INSET took place at the individual schools or at the subject advisor's office. Contact time ranges from 20 minutes to 4 hours.
- Subject advisors also render other services like moderation of examination papers and memoranda, preparation of handouts, clustering of schools, practical work, cross teaching, compilation of common year plan and encouraging schools to share ideas and resources.
- The most prominent problems of subject advisors in carrying out their duties are ranked from the highest to the lowest: lack of transport, either government or subsidised followed by poor communication with schools and inadequate resources for example lack of paper to prepare manuals for teachers.
- Organisational and logistical problems experienced by subject advisors are mainly ranked from the highest to the lowest: lack of transport for senior subject advisors and teachers, and lack of communication with schools due to absence of telephones.
- As far as cooperation and attitude of teachers are concerned, there is evidence of a lack of commitment and culture of teaching.

- Financial problems encountered by subject advisors result in cancellation of workshops, shortage of equipment because it cannot be ordered, no petrol cards for pool cars to deal with repairs and maintenance, no transport for subject advisors and no funds for text books. These problems have been prioritised from the highest to the lowest.
- Other problems include a lack of support from senior management, lack of clear policy and direction from senior management and a lack of networking opportunities for subject advisors e.g. attending conferences, workshops and seminars, which leads to lack of empowerment of the subject advisors.
- All the physical science subject advisors are confident that their own training and experience are adequate for their task and they attribute it to self-empowerment through attendance of workshops, seminars and conferences.
- The most prominent problems experienced by physical science teachers are that the majority is underqualified or unqualified to teach science, lack of apparatus, overcrowding of learners, inability of teachers to deliver the subject matter and a lack of text books.
- The most popular suggestions for improvement of the above-mentioned problems are provision of more funds for workshops on problem topics and individual visits to schools to follow-up on implementation.
- Subject advisors experience various problems relating to their role, the most prominent on the side of the teachers being a lack of understanding of methodology and assessment due to lack of training, large classes, shortage of text books, a lack of science equipment, lack of practical skills and lack of transport to attend workshops.
- Other important problems although not highly rated but relate to the role of the subject advisor are the need to clearly outline the duties of the subject advisor, lack of servicing of subject advisors by the senior subject advisors, their involvement in

management problems and provisioning, lack of more authority, restrictions on travelling, lack of mobile units and science kits, lack of transport, lack of resources like computers, and focus on grades 11 and 12.

- Subject advisors evaluate themselves as very good on the aspects of general educational knowledge, knowledge of school management, skill in observing and assessing work in the classroom, skill in counselling teachers, knowledge of different INSET strategies and skill in leading discussion (INSET). However, the rating declines when answering those questions on how teachers see them.
- The most important qualities when a subject advisor is appointed are specialist knowledge, expertise and enthusiasm, teaching experience, knowledge of current developments, ability to look critically at work in the classroom and ability to form relationships with adults. The important qualities are skills in presenting orally and in writing, senior management experience, and ability to cope with pressure and stress.

The less important quality is experience of working with adults.

- When subject advisors visit physical science teachers at their schools, they mainly expect them to present their problems relating to content and students. After the school visit they mainly expect that their recommendations should be implemented by the teachers.
- Subject advisors indicated facilitation as their main role during INSET and follow-up (visits/implementation) and evaluation after INSET.

5.3 PHYSICAL SCIENCE TEACHERS

- The average teaching experience of the 70 physical science teachers who participated in the survey is 10,4 years.
- In this sample (70 teachers) there are more teachers teaching grades 10 - 12.

- 42,8% of the teachers have a 3rd year physics and chemistry qualification as their highest qualification. Their qualifications in physics and chemistry are low.
- Teachers do not receive regular help from subject advisors.
- 50% of the teachers did not attend INSET courses in 1997 - 1998 and only 8,5% attended INSET courses initiated by subject advisors.
- Science, Engineering and Technology (SET) career guidance is inadequate in schools. There are some science teachers who are involved in SET career guidance, but it is mainly done by career guidance teachers.
- The type of assistance received by teachers from subject advisors, based on the seven perceived roles is prioritised as follows: instruction, assessment, curriculum, staff development, implementation and management, assignment, transfer load. The time devoted to each varies quite a lot per role.
- The most important qualities for the appointment of subject advisors in order of priority are: teaching experience, specialist knowledge, expertise and enthusiasm, skills as a problem solver, knowledge of current developments, ability to look critically at work in the classroom, ability to cope with pressure and stress and skills in presenting orally and in writing.

The important qualities in order of priority are experience of working with adults, ability to form relationships with adults and senior management experience.

- Physical science teachers rate themselves very good in order of priority on approachability, availability, skills in observing and assessing work in the classroom, general helpfulness to schools and teachers and general educational knowledge. They rate themselves good in order of priority on skills in persuading and negotiating tying with skills in counselling teachers, knowledge of school management tying with knowledge of different INSET strategies and INSET skills in leading discussion.

They rate themselves as average on INSET skills planning and organising and INSET skills - presentation.

- The physical science teachers think that subject advisors rate them as very good regarding availability, approachability, general helpfulness to teachers, and skills in observing and assessing work in schools. The rating under good in order of priority is as follows: general educational knowledge, knowledge of school management and INSET skills - leading discussion.

INSET skills - planning and organising, INSET skills - presentation, and skills in counselling were rated as average.

The rationale behind these questions on INSET skills is based on the possibility of training teachers as advisory teachers to train their peers as it is done in the UK and the US where they are referred to as “master” teachers.

- The teachers’ expectations from subject advisors when they visit schools, in order of priority are: best advice and guidance on problems in the subject (71,4%), evaluation of the teachers (22,8%), motivation and acknowledgement of good work (15,7%), information (11,4%) and evaluation of students (7,1%).
- The teachers expect the subject advisors to do the following after their visit to schools: follow-up on problems (35,7%), draw conclusions on what needs to be implemented (22,1%), improvement in teaching and learning (25,7%) and more enthusiasm on their side (7,1%).
- Teachers expect subject advisors to play the role of facilitator (41,4%), guidance and encouragement (22%), to update the teacher (6%), expert (5%) and evaluation (5%).
- Teachers expect subject advisors to: visit (52,8%), evaluate them (25,7%) and implement programmes (10%).

5.4 PHYSICAL SCIENCE SENIOR SUBJECT ADVISORS

The following facts became apparent from the interview with senior subject advisors:

- The mission of the subdirectorate is to support all physical science teachers with regard to academic, professional and administrative services efficiently and effectively.
- The roles of the senior subject advisor are mainly to: coordinate the activities of the subject advisors, to accompany them on school visits, to ensure that standards are maintained in the subject throughout the different districts and to assist them with their professional duties, reports and to conduct workshops.
- The KPAs of subject advisors are as follows: training, coaching and guidance of teachers on content problem areas, to assure quality in the teaching of the subject, management of subject groupings, conducting workshops on examination related matters and difficult topics, action research, monitor students' performance and extra-curricular activities.
- There is an induction and staff development programme for the newly appointed physical science subject advisors. The programme entails administrative issues e.g. reports, cars, itinerary, appraisal, the importance of physical science senior subject advisor and his/her role, human relations, orientation during the first two weeks of assumption of duty. Not all subject advisors undergo induction and training on appointment.
- There is an attempt to encourage uniformity amongst the subject advisors through provincial meetings where all subject advisors are expected to report on their activities.
- Senior subject advisors come across obstacles in their duties and these include unqualified and demotivated teachers, negative attitude from teachers and they are expected to carry out tasks beyond their job description. Administrative problems include budget cuts, poor communication, poor coordination, lack of coordination

and cooperation with senior management, lack of follow-up on the part of senior management and lack of either a government or subsidised car for the present senior subject advisor which tempers with planning of school visits and workshops.

- Senior subject advisors assist subject advisors to overcome the above-mentioned obstacles by discussing the issue with senior management and suggesting that the subject advisors be excluded from duties beyond their scope of work. Sometimes no assistance is rendered because the senior subject advisor experiences the same problems, especially lack of transport.
- There is no similarity in the ranking of roles by the two senior subject advisors.
- Qualities which are most important in the appointment of subject advisors are: knowledge of current developments, skills as a problem solver and the ability to look critically at work in the classroom. Both subject advisors rated them as such although there are variations regarding other qualities. The first senior subject advisor rated 9 out of 10 qualities as most important and the second one rated 4 out of 10 as most important. There are only a few commonalities in the responses to these questions.
- Other functions performed by subject advisors are mainly Expo for Young Scientists which is problematic at this stage especially the time spent on its organisation, OBE, FEST and other activities like The Year of Science and Technology (1998) which can be classified as a project.
- Subject advisors perform functions which are not related to physical/general science which are as follows: (that is according to their responses)
 - ⇒ Organisation of Expo for Young Scientists in their districts.
 - ⇒ Assisting in the monitoring of examinations.
 - ⇒ Involvement in teacher appraisal.
 - ⇒ Collection of statistics from schools at the beginning of the year (admissions).

- Of the above-mentioned tasks, the most problematic, as a result of the time devoted to them, are admissions which takes a large percentage of their time during the first quarter and monitoring of examinations which takes a lot of time in the fourth quarter. These tasks affect planning negatively during these quarters, for example the first weeks of the first quarter are important for the induction of new subject advisors and for reflecting on the previous year.
- Senior subject advisors received a job description on appointment and their roles were clearly spelt out.
- It appears that induction and training differs according to the years of appointment because one senior subject advisor was inducted and trained and the other one was not. In the case of the one who was trained, the programmes entailed all duties and functions of the senior subject advisor, management and administrative issues, such as programmes, reports, transport/cars, etc.
- The effectiveness of the subject advisors has not been formally implemented because one of the senior subject advisors is not aware of the evaluation mentioned by the other one. The evaluation was indicated by one senior subject advisor involved a SWOT analysis and performance audit. The study was conducted in April 1998, but the results were not yet published at the time of the interview.
- Self evaluation by the senior subject advisors indicates that both rate themselves as very good on approachability, general helpfulness to subject advisors and teachers and skills in counselling subject advisors. They rate themselves as good on knowledge of school management and in-service skills - presentation. Their evaluation highlights that there are differences in the level of competence regarding general educational knowledge, availability, skills in observing and assessing work in schools. With regard to in-service skills - planning and organising and in-service skills - knowledge of different strategies there is also a difference in self evaluation.

Availability also differs. These differences may be attributed to experience, lack of induction or training or lack of uniformity in these aspects in dealing with new appointees, lack of INSET for the senior subject advisors and lack of transport in

some cases. This situation indicates the absence of a formal system of training and induction of senior subject advisors on appointment.

5.5 THE DEPUTY DIRECTOR FOR SUBJECT ADVISORY SERVICES AND PROFESSIONAL SUPPORT

The following facts became apparent from the interview with the Deputy Director.

- The directorate has a mission statement for the section on physical science which is to support all physical science teachers with regard to academic, professional and administrative services efficiently and effectively.
- There is no reference in the educational laws or policies to the appointment, roles/tasks etc. of subject advisors.
- There is no job description for physical science subject advisors, be it from the NDE or provincial education department which is a working document to guide them in their daily tasks.
- The minimum qualification requirements for the appointment of physical science subject advisors are matric plus a four year qualification which means a degree or equivalent. The latest appointments reflect well qualified but inexperienced subject advisors.

The reason advanced is a shortage of both well qualified and experienced science graduates.

- The experience requirements for the post are stipulated in the Personnel Administration and Management (PAM) regulations, but these regulations were relaxed in 1996 because of the shortage of experienced science graduates.

- There is no legislation governing the operations and functioning of the subject advisors. A need for such legislation was expressed by the Deputy Director which he hopes will deal with the misuse of subject advisors by directorates such as coordination and curriculum and examinations which compromises their own role.
- The most important qualities of a subject advisor are teaching experience, senior management experience, experience of working with adults, knowledge of current developments, specialist knowledge, expertise and enthusiasm, skills as a problem solver, ability to look critically at work in the classroom, skills in presenting orally and in writing. The above nine qualities were rated most important out of a list of ten. The ability to cope with pressure and stress was rated as unimportant because if there is proper planning, there is no need to operate under pressure and stressful conditions. The qualities are not in any significant order.
- The KPAs in an interview for the post of a physical science subject advisor are experience, qualifications, relationships, knowledge of the subject, managerial skills, ability to cope with pressure and stress, ability to delegate, weak and strong points. They are not in any significant order.
- There is a training programme specifically for the newly appointed physical science subject advisors. It occurs through orientation by the coordinator on issues like school visits, report writing and functioning of the unit. The senior subject advisor trains them in the subject related issues.
- The roles of the senior subject advisor are clear and known to them.
- There are eight physical science subject advisors and one physical science senior subject advisor in the North West Province.
- Each subject advisor is responsible for 325 schools and 425 teachers.

- The INSET programme which is in place to be implemented by subject advisors is the SEDIBA project. They are expected to support the initiatives of the PU for CHE which is responsible for the upgrading of physical science teachers through the project.
- The budget cuts for paying subsistence and travel costs of teachers to and from workshops is a drawback for INSET programmes.
- There is no formal system whereby teachers give feedback to subject advisors after INSET courses. The Labour Relations Act (LRA) poses some restrictions and there is no support structure to follow-up on this issue.
- The INSET programmes of the department are designed by the physical science subject advisors' provincial committee.
- There is no appraisal system for subject advisors in general and for the physical science subject advisors in particular.
- There is no registration or accreditation of subject advisors in the North West Province or nationally. The Deputy Director views it as an important issue for quality assurance.
- Of the seven perceived roles of subject advisors, namely instruction, curriculum, staff development, implementation management, assessment (assignment, transfer and load), six were rated on 1 (highest) to 5 (lowest) scale as 1. Management was rated as 5.
- 80 - 100% of the subject advisors' time is devoted to management, 50% to staff development (mainly INSET), 20% to instruction, and 10% to curriculum and assignment, transfer and load. It is evident that while the subject advisors spend a lot of time on management, it is not considered to be their major role.
- It is evident that staff development (mainly INSET) is a major role of the physical science subject advisors.

- According to the Deputy Director, quality assurance has been omitted in the seven perceived roles of subject advisors.
- Focus areas for subject advisors are progress on the syllabus, checking on whether effective teaching is taking place, availability of resources, written work (OBE), practical work and integration of theory and practice in the subject and teaching methods.
- Sometimes subject advisors play the roles of circuit managers for example governing body elections and their training.
- Subject advisors can be involved in the appointment of science teachers.
- Although the evaluation of the effectiveness of subject advisors generally and in particular those of physical science has taken place in the North West Province, it is not a continuous exercise. The report was not available at the time of the interviews.

5.6 CONCLUSIONS

The conclusions of this chapter are based on the discussion of the results of the survey in sections 5.1.1 – 5.1.5. Important issues pertaining to the role and functions of the physical science subject advisor will be highlighted as the main conclusions in order to address the main aim of this study. Limitations of the North West Province model of the physical science advisory service will be identified. These will be used to postulate a model for the optimal functioning of the physical science subject advisor in the North West Province.

5.6.1 LIMITATIONS OF THE NORTH WEST MODEL OF THE PHYSICAL SCIENCE ADVISORY SERVICES

The results of the survey indicate a number of limitations in the physical science section of the North West Province Advisory Services. This section deals with the limitations as a basis for suggesting a model for the optimal functioning of the physical science subject advisors. The limitations are as follows:

- The physical science subject advisors do not have a working document containing their specific roles. Their roles are not clearly defined and there are no clearly defined expectations by the Directorate. They did not receive a job description on appointment.
- There is no formal training (INSET) or induction programme for the physical science subject advisors on appointment.
- There is too much focus on Grade 11 and 12 examinations and teachers.
- The entry requirements are available but they have been relaxed recently.
- While INSET is a major activity of the subject advisors, there is no model for implementing the programmes. Each subject advisor determines what he/she wants to do during INSET courses.
- There is limited funding for INSET courses which are a major activity of the subject advisors.
- Subject advisors come across obstacles which compromise their expected role. They are as follows:
 - Lack of transport.
 - Lack of equipment e.g. computers.
 - Minimal support from the senior subject advisor.
 - Teachers with a negative attitude.
 - Teachers' expectations which are unrealistic because of absence of role clarification.
 - Minimal support from senior management in the directorate.
 - Poor communication with schools.
 - Lack of funding for INSET courses.
- There is no system of registration and accreditation of the subject advisors. There is no system of appraisal of subject advisors. There is no legislation governing the operations of the subject advisors.

- Subject advisors spend a large percentage of their time on management issues.
- Coordination of activities within the physical science advisory service is minimal.
- Subject advisors serve other directorates, and this compromises their own task.
- There is no continuous evaluation of the roles of the subject advisors in general, and in particular those of physical science, taking into account the changing of attitudes and perceptions of the recipients of the service.
- The relaxation of the entry requirement compromises the expected qualities and KPAs during the interview for the post of subject advisor.
- There is no evaluation of INSET courses by teachers due to the absence of a system to carry out that function and the fact that subject advisors are not obliged to do it.
- Senior subject advisors do not operate uniformly and they do not experience or carry out their task in a similar way.

5.7 A MODEL SUGGESTED FOR THE OPTIMAL FUNCTIONING OF THE PHYSICAL SCIENCE SUBJECT ADVISORS IN THE NORTH WEST PROVINCE

5.7.1 INTRODUCTION

In this section, a model will be suggested for the optimal functioning of the physical science subject advisors in the North West Province. It is hoped that the model will assist the planners of Subject Advisory Services in the North West Province to revisit the present roles of the physical science subject advisors as stated in the policy of the Directorate. According to CEPD (1994:19), alternative models for the functioning of subject advisors (and inspectors) in South Africa need to be developed and a program of INSET for both subject advisors (and inspectors) requires immediate attention.

It is clear from the limitations of the present model of the physical science advisory service that there are challenges facing the Directorate under which they function and

It is clear from the limitations of the present model of the physical science advisory service that there are challenges facing the Directorate under which they function and the Department of Education. The suggested model will be developed around these limitations and challenges.

5.7.2 LIMITATIONS OF THE NORTH WEST PROVINCE PHYSICAL SCIENCE ADVISORY SERVICE WHICH GUIDE THE DEVELOPMENT OF THE MODEL

The model is developed around important issues emanating from the survey and limitations of the present North West System of the functioning of physical science subject advisors. They are as follows:

- Role clarification for the physical science subject advisor which involves the statement of specific roles/functions, a job description and clearly spelt out expectations by the Directorate.
- Training (INSET) and induction of the newly appointed physical science subject advisors and ongoing training for those already in service.
- Qualities required of a physical science subject advisor upon entry of the service.
- Minimum facilities/resources required by the physical science subject advisors to optimise their role and function.
- The organisation of the advisory team and the approach of the team.
- Areas of focus when assisting teachers, e.g. INSET.
- Who should be assisted?
- Evaluation of the Model.

5.8 SUGGESTED MODEL

The most important question at this stage is: How will the model deal with the present situation in the North West Province? The discussion will focus on the role clarification and specification of expectations, new curriculum innovations, e.g. OBE and Curriculum 2005 and how these impact on their role, the extent to which certain changes are essential, the views of the recipients of the service, namely the teachers and where the senior subject advisor fits in the situation. This model has been adopted from the UK "Shared Criteria Model". Adaptation to the local scenario is taken into account throughout the discussion.

5.8.1 ROLE CLARIFICATION AND SPECIFICATION FOR THE PHYSICAL SCIENCE SUBJECT ADVISOR

Madrazo and Hounshell (1987:9-14) in the results of their study of the role expectancy of the science supervisor found that any given role in an organisation is perceived differently by different groups of individuals. In order to specify the role and function of the physical science subject advisor, the needs of the teachers who are the main recipients of their service should be taken into account. Research should be conducted on the role expectancy of these officials considering participants other than physical science teachers who are affected by the service and the subject advisors themselves. The US framework of the seven roles is a good example for use as a reference point. From the data it was well received by the participants in the survey. Specifications of the roles should be guided by the priorities, policies and curriculum innovations nationally and in the province. The incumbents of the posts of subject advisor for physical science should be involved in the drafting of the roles.

5.8.2 TRAINING (INSET) AND INDUCTION OF THE PHYSICAL SCIENCE SUBJECT ADVISORS

It used to be assumed that anyone who is a good teacher could advise other teachers effectively (Dean, 1992:161). Stillman and Grant (1989) make the point strongly that this is not the case. Their study also gave some interesting information about the problems people find on coming into advisory work. It quotes these two comments by advisers:

- “An adviser’s job is a strange one and it should not be assumed that senior management work in schools or colleges prepares people in any significant way for a job with completely different demands.”
- “I have been in the post for seven months. I don’t really understand what is expected of me. It is totally different from what I expected. I have no way of judging whether I am having any effect, making progress etc. I feel overwhelmed by the number and range of different skills I am expected to employ without any training. Although I am not happy, I find it impossible to answer the two most common questions asked by teacher friends: 1) What do you do? 2) Are you enjoying the job?.” Such problems could have been avoided if the LEAs of these advisers had had an adequate system of induction and INSET for their advisory staff (Dean, 1992:161-162).

These points highlight the need for proper induction of the newly appointed subject advisors and ongoing INSET training for those already in the service. Effective advisor INSET requires management to have clear goals and an effective method for assessing group and individual needs (Dean: 1992:163).

Stilman and Grant (1989) gave chief advisor’s views on the training that inspectors/advisors need. It included the following, given in the chief advisor’s order of priority:

- Acquisition of knowledge of phases and specialisms other than one’s own, finance, education, law, information technology,
- Management skills, leadership skills, the management of change and the management of time,
- General updating on curricular and other issues, central initiatives, reports, research, etc,
- Counselling, interpersonal, group and communication skills and stress management,
- Appraisal techniques, school self-evaluation and review,
- Inspection, evaluating, observing and supporting teachers, report writing, cross-curricular work, multi-cultural education, industry links, equal opportunities, etc. (Dean, 1992:163).

Advisors need opportunities to 'recharge their batteries' if the provision they are to make for teachers is to be of consistently high quality. Possibilities which ought to be pursued include:

- Access to a wide range of short courses,
- The adoption of a programme to grant each officer a sabbatical term at least once during his/her service,
- The development of long term exchanges between members of authorities and/or short term visits to neighbouring authorities,
- A system of exchanges between members of the advisory team and serving teachers when a suitable professional context can be identified,
- The creation of a number of research fellowships to be made available to subject advisors (Dean, 1992:164).

Among the themes likely to merit inclusion in any programme of professional development for advisors must be: An understanding of oneself in the role of advisor, an examination of the main objectives of advisory work, revision of the range of duties being undertaken, an opportunity to review current theories of learning, consideration of aspects of curriculum theory, styles of teaching and learning and approaches to school organisation, a review and refurbishment of the skills inherent in advisory work and a study of team work and management theory and practice (Dean, 1992:164).

Dean (1992:164) found that most authorities were taking the idea of training very seriously. 92% had arrangements for induction and 67% used the Centre for Advisor and Inspector Development (CAID) for induction courses, 78% had a compulsory in-house course and a further 28% had a voluntary in-house course. The researcher feels that training should be compulsory to ensure quality service to the teachers.

5.8.3 QUALITIES OF A PHYSICAL SCIENCE SUBJECT ADVISOR

According to the physical science teachers, who are the recipients of the service rendered by subject advisors, the following qualities in order of priority are most important for advisor appointment:

- Teaching experience,
- Specialist (subject) knowledge, expertise and enthusiasm,
- Skills as a problem solver,
- Knowledge of current developments,
- Ability to look critically at work in the classroom,
- Ability to cope with pressure and stress,
- Skills in presenting orally and in writing.

The important qualities in order of priority are:

- Experience of working with adults,
- Ability to form relationships with adults,
- Senior management experience.

It is suggested that in assessing candidates for the post of physical science subject advisor, the evaluation criteria should be developed around these findings from the physical science teacher.

5.8.4 MINIMUM FACILITIES REQUIRED BY THE PHYSICAL SCIENCE SUBJECT ADVISORS TO OPTIMISE THEIR ROLE AND FUNCTIONS

From the survey it is clear that the subject advisors come across many obstacles. The following, if managed by the directorate, can optimise their functioning:

- Provision of transport on a regular basis, be it pool or subsidised cars,
- Provision of computers which will assist in the development of instructional material, course material and compilation of reports and presentations,
- A revisit of the role of the senior subject advisors with a view to harmonise their activities throughout the province and provision of a subsidised vehicle for the physical science senior subject advisor,
- Clarification of the role of the physical science subject advisors to teachers,
- A budget for INSET to be created.

The above problems, if addressed, will hopefully optimise the role and functioning of the physical science subject advisors.

5.8.5 THE ORGANISATION OF THE ADVISORY TEAM AND THE APPROACH OF THE TEAM

The most important aspect of this section is the development of a policy on monitoring and evaluation of work in schools. Advice or “inspection” should be a shared process between the subject advisory team and the institution. This approach has a great deal to recommend it. In many ways it will be felt to be more professional and teachers are more likely to be committed to the exercise and to learn from it. Consulting the school about possible plans is probably the most economical approach (Dean, 1992:62). This “Shared Criteria Approach” or collaborative “inspection” is ideal for the present situation in education where activities are directed by the wishes and terms dictated by the teacher unions. (Experience by the researcher when she was a school inspector/circuit manager in the North West Province, 1996-1997.)

In this section adopted from Dean (1992:64) the term “Inspector” is used to mean advisor and “inspection” refers to advise. According to Dean (1992:64), the policy on monitoring and evaluating the activities of teachers in schools should involve the following:

- The aims of “inspection”,
- The methods of “inspection” chosen,
- The way institutions for “inspection” should be selected and the frequency of “inspection”,
- The people to be involved in “inspection”,
- The relationship to be established with the institution being “inspected”,
- The aspects of the institution to be “inspected” and the evidence which might be sought,
- The preparation required for “inspection”, including the information which should be available within the office or required from the institution,
- The way “inspection” and monitoring should be carried out, including the way time should be spent,
- The arrangements which should be made for verbal reporting immediately after an “inspection”,
- The discussion which should take place following an “inspection”,

- The presentation of reports to the institution and to the governors (Dean, 1992:64).

The second phase would be preparations for “the individual inspection” which is presented in diagrammatic form as follows:

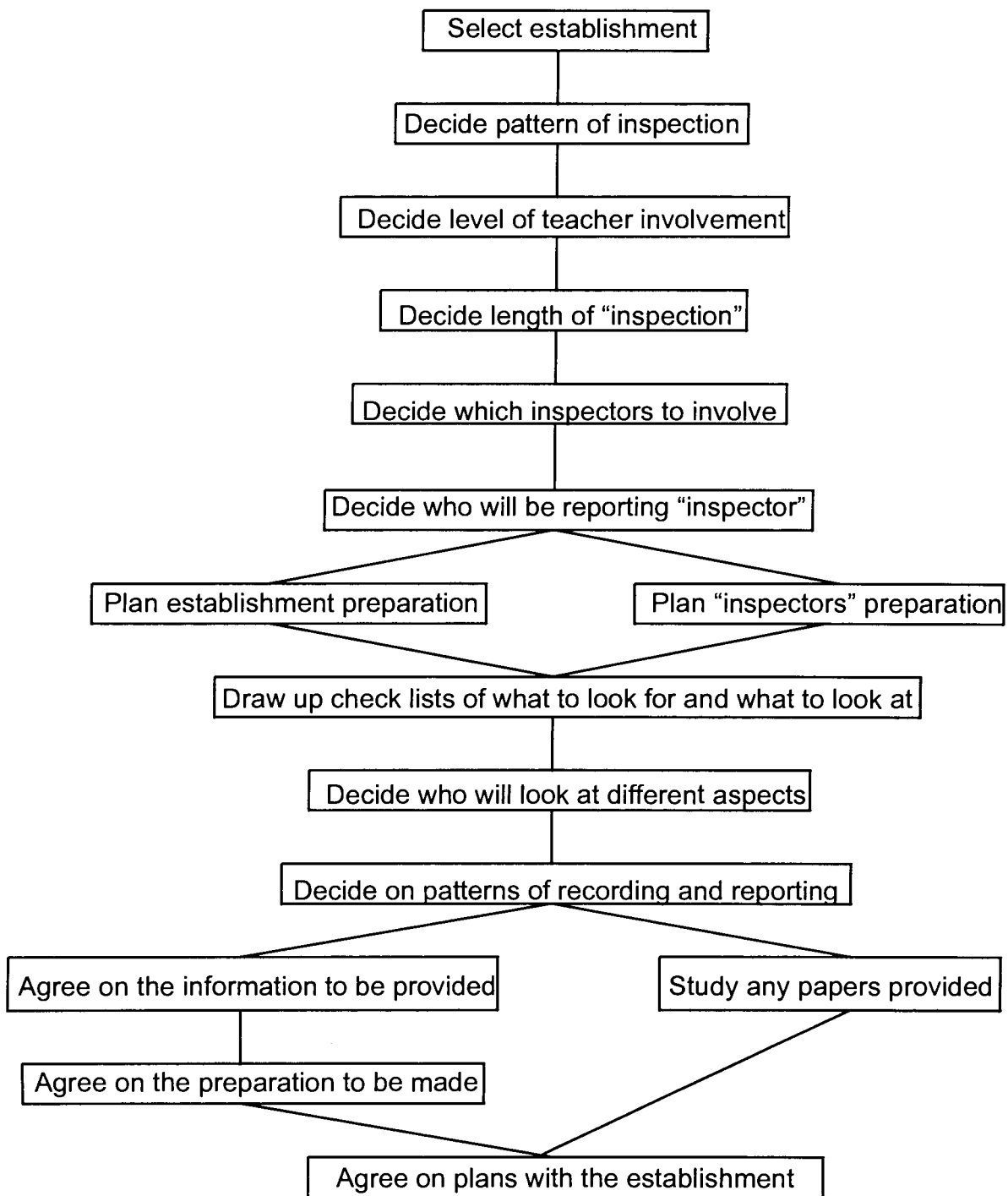


Figure 1: Preparing for the individual "inspection" (Dean, 1992:72)

In the North West Province, the advisory team can be constituted by the local physical science subject advisor, a subject advisor from another district, the senior subject advisor for physical science, a peer chosen by the teacher and a union representative. The planning process should be mainly the responsibility of the senior subject advisor. The criteria for “inspection” should be agreed upon before the process takes place.

The “inspection” process should take into account the teacher to be visited. Another important dimension of the monitoring and evaluation process is the definition of performance indicators. The system for determining such indicators should be dynamic and flexible and should relate to the institutions’ and the LEA’s objectives. Indicators may be expressed in terms of quality and quantity and should be openly declared and negotiated with the institutions (Dean, 1992:59).

The system of reporting after the “inspection” should also be agreed upon by the advisory team and the institution. Feedback to the teacher is essential. Figure 1 indicates all aspects of the evaluation which directly affect reporting at the end of the advisory session. The advice given should be treated as a starting point only and a more detailed discussion should take place as part of the follow-up (Figure 2) (Dean, 1992:83).

According to Dean (1992:84), the follow-up “inspection” will then follow the following format in figure 2:

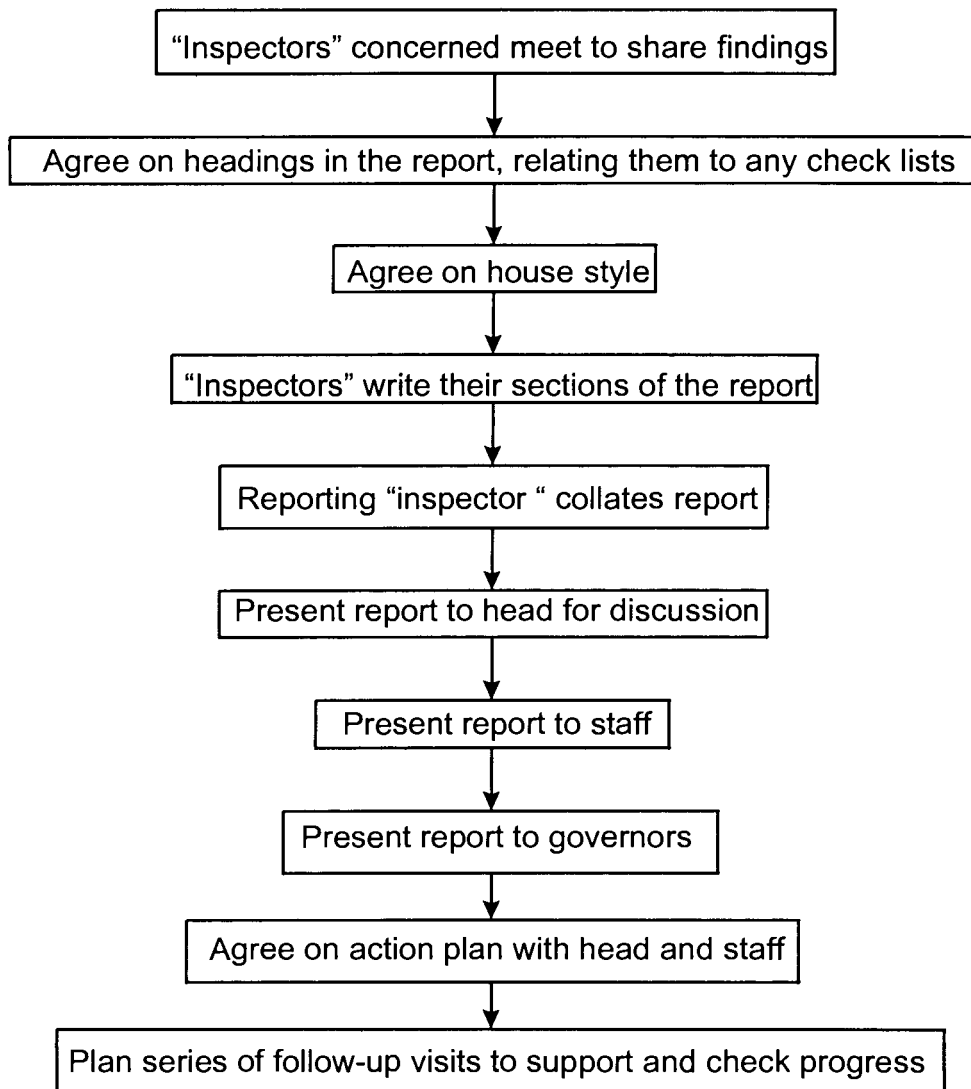


Figure 2: Follow-up "inspection" Dean (1992:84)

Once more, the coordination of all the follow-up activities should be the responsibility of the senior subject advisor for physical science.

5.8.6 AREAS OF FOCUS WHEN ASSISTING TEACHERS

While these focus areas will obviously be indicated by the teachers, the results have shown that INSET was a key task of the physical science subject advisor in 1997 and 1998. It is against this background that it is used as an example of a focus area and also as indicated by CEPD (1994:19) that there is a need to develop a program of INSET for the subject advisors (and inspectors) in South Africa.

The arrangements for managing INSET can be developed around this diagram:

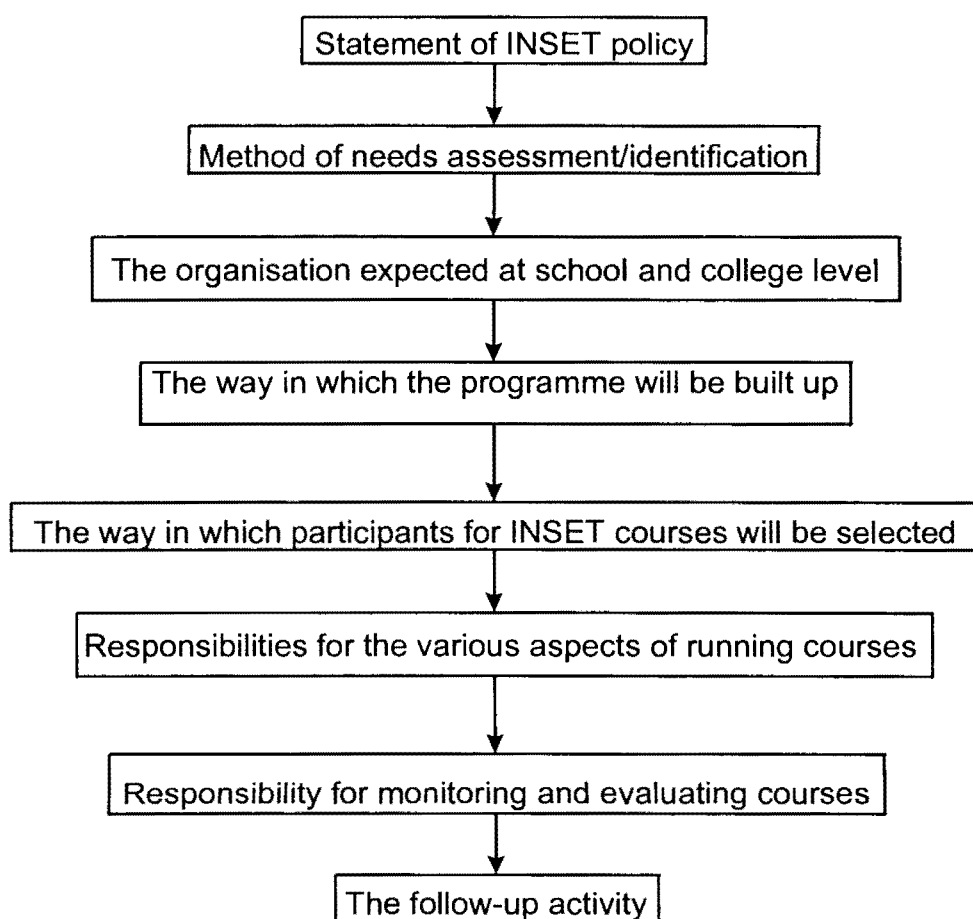


Figure 3: Arrangements for managing INSET Dean (1992:117-119)

5.8.7 DISCUSSION OF THE INSET MODEL

- **Statement of the INSET policy**

The statement of policy might be seen as a starting point for the process of deciding the planning of needs assessment and the designing, implementing and evaluating of the programme of INSET.

The INSET model suggests a process of consultation and negotiation with the recipients of the INSET programmes. Needs should be identified at individual, group, school and college level. The schools and colleges may be expected to appoint an INSET coordinator who should link up with the central one. Decisions about what goes into the INSET programmes should be guided by a set of criteria developed by a steering group consisting of representatives of all those who are affected by the programme to deal with the actual implementation. The programme planned must be linked to the resources available and must take account of the resources needed not only for the programme, but also for sending people on other courses, including some long courses.

There should be a selection method for those who apply for courses. There should be a clear statement about the roles of advisors, teachers' centre wardens and other support staff, including a statement about responsibility for support during the course and follow-up afterwards. The results of the survey indicate that teachers (41,4%) expect subject advisors to play a facilitation role during INSET and to do follow-up visits after INSET (52,8%). It is also interesting to note that subject advisors (66,6%) also indicated that facilitation should be their task during INSET and follow-up and implementation (83,3%) after INSET. The harmony prevailing in these responses indicates that the INSET Steering Committee when constituted will not have a difficulty to function. There should also be a statement about the role expected of the school or college when teachers are attending an external course.

The monitoring and evaluation of courses should be both formative and summative. Evaluation should be an integral part of planning any course, with an evaluator involved as early as possible and resource provision made for the evaluation

process. Thought should also be given to ways of using what is learned from evaluation in planning future courses. Finally much time should be allowed for a follow-up activity for any course and it should be accommodated during the planning stages.

The model for INSET can run smoothly if the Steering Committee is given a brief. The Steering Committee is responsible for:

- The day-to-day decisions needed for the implementation of the INSET programme by focussing on needs assessment.
- Outcomes of the needs assessment and their implications for the INSET programme.
- Agreeing on overall priorities in the light of national and local priorities and the resources available.
- Agreeing on the overall programme and a detailed pattern of monitoring and evaluation.
- Noting the comments of the advisory committee on the evaluation of the programme and seeing that the findings are applied to the following year's programme.

The advisory committee's brief might have to include:

- Planning the needs assessment programme in broad terms.
- Advising the authority on INSET needs, both directly and by commenting on the results of the needs assessment.
- Making broad decisions about priorities, taking into account national and local priorities and the resources available.
- Deciding the overall criteria by which course participants will be selected.
- Planning in broad terms for course evaluation.
- Studying evaluation reports and making recommendations in the light of them.

The membership of these two committees can be decided upon by the service providers and the INSET recipients.

A very important post for the implementation of the INSET model is that of the INSET coordinator. The inset coordinator has an important role to play. The job description for this post might include:

- Chairing the INSET advisory and steering committee meetings.
- Organising and coordinating work on the assessment of needs and presenting the findings to the INSET committees.
- Collecting and collating proposals for courses and presenting these to the appropriate steering committee.
- Ensuring that appropriate advisors are involved in proposals relevant to them.
- Advising the steering committee on priorities and resources.
- Ensuring that the programme agreed can be resources.
- Communicating decisions about the programme to all those concerned.
- Ensuring that each course provider plans adequately and within the resource allocated.
- Informing teachers about their selection or non-selection for courses and giving information about reasons for non-selection where appropriate.
- Advising schools and colleges on their staff development programmes.
- Communicating information to all concerned about the LEA's in-service provision.
- Keeping the chief executive officer (CEO) and the advisory service informed about developments in in-service education.
- Ensuring that there is adequate evaluation of each course and that this is used in planning future courses.
- Collecting data and completing questionnaires for any agencies providing grants for in-service education.
- Monitoring overall budget expenditure during the course of the year and ensuring virement of funds where appropriate (Dean, 1992:119).

5.8.8 WHO SHOULD BE ASSISTED

The advisory committee will advise the subject advisory service for physical science about teachers who need assistance from time to time.

5.8.9 EVALUATION OF THE MODEL

The model should be evaluated on an ongoing basis and all the stages should be monitored. Various evaluators can be appointed to check on the effectiveness of the model, for example consultants, university personnel from the two universities in the province, self-evaluation, peer evaluation and evaluation by the recipients of the service namely the physical science teachers. The reports of the different groups can be consolidated and recommendations can be drawn from these reports

5.9 CONCLUSION

The model, adopted from the UK, is expected to function fairly well in the North West Province. Budgetary constraints and local circumstances were taken into account when it was suggested, because it requires the services of the subject advisors and the senior subject advisor who are already in the system. The new developments which can be of minimal cost are the steering committee and the advisory committee. There is a need to budget for their meetings which should not be very frequent.

A critical post which has major budgetary implications is that of the INSET coordinator. It involves the creation of a new sub-unit in the Directorate which is viewed by the researcher as an investment for the subject advisors, the teachers and the province at large. The post requires a specialist in the area of INSET and coordination. The coordinator may be an asset to the physical science advisory team and the advisory service in general.

CHAPTER 6

GENERAL CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The general conclusions and recommendations of this research are focused on issues that would contribute to optimising the role and functions of the physical science subject advisors in the North West Province. Conclusions will focus on the above statement and recommendations will be drawn from these general conclusions.

6.2 GENERAL CONCLUSIONS BASED ON ISSUES THAT CAN OPTIMISE THE ROLE AND FUNCTIONS OF THE PHYSICAL SCIENCE SUBJECT ADVISORS IN THE NORTH WEST PROVINCE

- There is a need for legislation which governs the operations of the subject advisors in general and in particular those of physical science.
- There is a need to redefine and explicitly state the roles of the physical science subject advisors in the North West Province in order to contribute positively to the reform of science education in the province.
- There is a need for strict and firm criteria of appointment based on a priority list of the qualities which are most important for the post.
- A training (INSET) and induction programme for both physical science subject advisors and the senior subject advisors needs to be conceptualised and it should be a compulsory aspect of appointment to the post. There is also a need to study international trends on this issue. Accreditation of the INSET programmes is also necessary.
- There is an urgent need to revisit the problem of transport which seems to compromise the activities of the subject advisors.

- The issue of over involvement of subject advisors in management issues needs attention.
- There is a need to clarify the expectations of other directorates in relation to the subject advisors' role in the North West Province - role conflict.
- Funding of INSET programmes should be revisited as it appears to have been a major activity of subject advisors in 1997 and 1998.
- Minimum resources needed by the subject advisors, for example computers should be provided.
- The suggested Model, presented in Chapter 5, section 5.3, highlights various aspects which need attention which will hopefully optimise the role and functions of the physical science subject advisors if it is implemented. They are as follows:
 - Role clarification.
 - Training (INSET) and induction of physical science subject advisors.
 - Minimum facilities required by the subject advisors to optimise their role and functions.
 - Areas of focus when assisting teachers, e.g. INSET.
 - Who should be assisted?
 - Evaluation of the Model.
- Based on the suggested model, there is a need to revisit the role of the senior subject advisor and the structuring of INSET programmes.
- There is a need to develop and identify in-house and external INSET courses for the induction and training of subject advisors and their seniors.
- Based on the suggested model dealing with INSET, it is necessary to constitute the INSET steering and advisory committees in the province and the appointment of an INSET coordinator who will also deal with the INSET needs of science teachers, physical science subject advisors and senior subject advisors.

- There is a need to put an appraisal system in place to monitor the effectiveness of the senior subject advisors and subject advisors of physical science in general. This aspect can be negotiated with the subject advisors and the senior subject advisors.
- There is a need to outline the role of colleges of education and schools in INSET.
- There is a need to identify teachers who could be of assistance as support staff during INSET. This can be done by their peers. Those teachers can be trained to become advisory teachers or master teachers as in the UK and USA respectively.
- There is a need for continuous research on strategies used by subject advisors, success stories, problems encountered and action research in order for them to sharpen their skills.
- The development and change of names should be looked at critically and the impact they have on the teachers and the service itself.
- There is a need to form a professional body of the physical science subject advisors which can link up with international bodies for staff exchanges and networking.
- There is a need to conduct provincial surveys on the role of the physical science subject advisors. This should be done on an ongoing basis to deal with the problem of different perceptions of their roles by those who have links with the service. The research will assist the directorate in dealing with questions like: Who is the science supervisor? What role does he/she play in the district? How do successful science supervisors survive? What method does a successful science supervisor use? Do they see their role in a different way than expressed by other professionals? (Madrado & Motz, 1982:42).

It is only through reassessment of the role expectancy of the science subject advisor in the North West Province that the subject advisors themselves and other educational leaders will keep abreast of changing attitudes and perceptions concerning their roles.

With information from reassessment, role functions will be changed or re-emphasised and the job description of the physical science subject advisor will be classified. Further research is recommended in the areas of role theory, role expectancy, role conflict and role consensus. It is expected that if the role of the physical science subject advisors in the North West Province is optimised, they will be able to contribute maximally to the introduction and implementation of Curriculum 2005 and OBE at all levels of science education in future.

ABSTRACT

In most countries of the world, science education and training are important national issues and there is always a continuous effort to improve the quality thereof. There is also a growing consensus that achievement in mathematics and science subjects is symptomatic of the quality of education and training in a country and a good yardstick of a country's potential to be economically competitive.

It is against this background that this study was undertaken, the aim being to investigate the role and functions of the physical science subject advisors in the North West Province in South Africa. A literature study of science supervision in South Africa, the UK and the USA was undertaken with a view to establish the history, similarities, differences, strengths and limitations of science supervisors in these countries. The study mainly focussed on the task descriptions of the physical science subject advisors and specifically their task related to specialised subject advice.

The empirical survey was conducted from July to September 1998. Questionnaires were administered to 6 physical science subject advisors and 70 physical science teachers. Structured interviews were conducted with two senior subject advisors and the Deputy Director for Subject Advisory Services and Professional Support. The empirical survey focussed on the task descriptions of the physical science subject advisors as viewed by the different target groups involved in the survey.

The findings of the survey were analysed with a view to study the strengths and limitations of the present North West Province model of physical science advisory services and to suggest a model for the optimal functioning of physical science subject advisors. It is hoped that the model, if implemented, will assist with optimising the role and functions of the physical science subject advisors in the North West Province.

A model for the optimal functioning of the physical science subject advisors was developed around the following key points which emerged from the limitations of the North West province model:

- Role clarification for subject advisors
- In-service training for subject advisors
- Qualities required for appointment
- Minimum facilities/resources required for optimal functioning
- Organisation of the advisory team
- Areas of focus when assisting teachers
- Who should be assisted
- Laws that govern the functioning of subject advisors
- Evaluation of the model.

The following key terms were used in the study: subject advisor, science supervisor, science specialist, functions, roles, tasks, duties, in-service training, inspection and science consultant.

The research is expected to assist the North West Province to deal with the escalating problem of poorly trained, unqualified and under-qualified physical science teachers who need professional support in the form of well structured and accredited in-service training which is one of the focal points of the suggested model. Further research can be conducted on role theory, role conflict and role consensus which will assist further clarify the role and functions of subject advisors who will in turn make a positive contribution towards the implementation of Curriculum 2005 in the North West Province.

UITTREKSEL

Onderrig en opleiding in wetenskap is in die meeste lande van die wêreld belangrike nasionale geskilpunte en daar is altyd 'n voortdurende poging tot verbetering van die kwaliteit daarvan. Daar bestaan ook toenemende konsensus dat prestasie in wiskunde- en wetenskapvakke simptome is van die kwaliteit van onderrig en opvoeding in 'n land en 'n goeie maatstaf is van 'n land se vermoë om ekonomies kompetender te wees.

Die betrokke studie is dus teen hierdie agtergrond onderneem met die doel om die rol en funksies van die natuurwetenskap-vakadviseurs in die Noordwes Provinsie van Suid Afrika te ondersoek. 'n Literatuurstudie oor wetenskapbestuur in Suid-Afrika, die Verenigde Koninkryke en die Verenigde State van Amerika is onderneem om die geskiedenis, ooreenkomste, verskille, sterkpunte en beperkinge van wetenskaptoesighouers in hierdie lande te vergelyk. Die studie het hoofsaaklik op die taak-omskrywing van die natuurwetenskap-vakadviseurs, en meer spesifiek hulle taak ten opsigte van gespesialiseerde vakadvies, gefokus.

Die empiriese navorsing is vanaf Julie tot September 1998 gedoen. Vraelyste is uitgedeel aan 6 natuurwetenskap-vakadviseurs en 70 natuurwetenskaponderwysers. Gestruktureerde onderhoude is gevoer met twee senior vakadviseurs en die adjunk-Direkteur: Vakadviesdienste en Professionele Ondersteuning. Die empiriese studie het gefokus op die taakomskrywings van die wetenskap-vakadviseurs soos gesien deur die verskillende teikengroepe betrokke by die navorsingstudie.

Die bevindinge van die navorsingstudie is geanaliseer om die sterkpunte en beperkinge van die huidige model van wetenskap-vakadviesdienste in die Noordwes Provinsie te bestudeer en om 'n model vir die optimale funksionering van natuurwetenskap-vakadviseurs voor te stel. Daar word vertrou dat die moontlike implimentering van die model sal lei tot die optimisering van die rol en funksie van natuurwetenskap-vakadviseurs in die Noordwes Provinsie.

'n Model vir die optimale funksionering van die natuurwetenskapvak-adviseurs is ontwikkel rondom die volgende kern-idees wat na vore gekom het vanuit die beperkinge van die bestaande model van die Noordwes Provinsie.

- Rol-uitklaring vir vakadviseurs;
- In-diens opleiding vir vakadviseurs;
- Persoonlike kwaliteite wat benodig word vir aanstelling;
- Minimum fasiliteite/hulpbronne benodig vir optimale funksionering;
- Organisering van die adviesspan;
- Areas waarop gefokus moet word wanneer onderwysers geadviseer word;
- Wie moet geadviseer word;
- Wette wat die funksionering van vakadviseurs reguleer;
- Evaluasie van die model.

Die volgende kernterme is gebruik in hierdie studie: vakadviseur, wetenskaptoesighouer, wetenskapspesialis, funksies, rolle, take, pligte, in-diens opleiding, inspeksie en wetenskapkonsultant.

Daar word verwag dat die navorsing die Noordwes Provinsie sal help met 'n oplossing vir die steeds toenemende probleem van swak-opgeleide, ongekwalifiseerde en ondergekwalifiseerde wetenskaponderwysers wat professionele ondersteuning benodig in die vorm van goed-gestruktureerde en geakkrediteerde in-diens opleiding. Laasgenoemde is een van die fokuspunte van die voorgestelde model. Verdere navorsing kan nou onderneem word om rolteorie, rolkonflik en rolkonsensus te bepaal, wat sal meehelp om die rol en funksionering van vakadviseurs verder toe te lig. Laasgenoemde sal 'n positiewe bydrae lewer tot die implimentering van Kurrikulum 2005 in die Noordwes Provinsie.

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APPENDIX 1
QUESTIONNAIRE 1

QUESTIONNAIRE 1

SUBJECT ADVISORS: PHYSICAL SCIENCE

NUMBER OF SUBJECT ADVISOR

QUALIFICATIONS: ACADEMIC _____

PROFESSIONAL _____

EXPERIENCE: AS A TEACHER OF PHYSICAL SCIENCE _____ (YEARS)

AS SUBJECT ADVISOR: _____ (YEARS)

ROLES/FUNCTIONS OF PHYSICAL SCIENCE SUBJECT ADVISOR

RANK THE FOLLOWING TASKS OF SUBJECT ADVISOR FROM HIGHEST (1) TO LOWEST (5) IN THE BOXES NEXT TO THE TASKS. INDICATE THE % TIME SPENT ON EACH.

ROLES	1	2	3	4	5	% TIME
Instruction – Assistance in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction						
Curriculum – Facilitation of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.						
Staff development – Initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.						
Implementation – Initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.						
Management – Requisition of supplies; coordination of information about laws, liabilities district policies, safety, regulations, financial status and budgets.						
Assessment – analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.						

ROLES	1	2	3	4	5	% TIME
Assignment, transfer and load – assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff.						

2. Other functions performed by subject advisors.

2.1 Mention other functions/duties performed by physical science subject advisors not mentioned in 1 above. Estimated % of time.

2.2 Mention other functions/duties performed by physical science subject advisors, not related to physical/general science advisory service.

2.3 Estimated percentage of time devoted to the activities mentioned in 2.2

3. Did you receive a job description on appointment as a subject advisor?

If yes, were your roles/duties clearly spelt out?

4. Did you receive any training/induction after appointment?

If yes, what did the training entail?

5. What kind of support do you receive from your senior subject advisor and at what intervals?

6. INSET training initiated by subject advisors during 1997-1998.

WORKSHOPS

6.1 Number of workshops conducted _____

6.2 Number of teachers who attended the workshops _____

6.3 Who initiated the workshops? _____

6.4 Length of the workshop _____

6.5 Topics covered at workshops _____

INDIVIDUAL TRAINING OF TEACHERS

6.6 Number of teachers who received advice/guidance _____

6.7 Time of contact with teachers _____

6.8 Typical topics of discussions with teachers _____

6.9 Other services to physical science teachers _____

7. Problems

What are the main problems subject advisors experience in carrying out their duties?

7.1 Organisational and logistical

7.2 Cooperation and attitude of teachers

7.3 Finance

7.4 Other problems

8. Own training and experience

How do you regard your mastering of the subject content of physics and chemistry?

8.1

Adequate for task	Inadequate for task
-------------------	---------------------

Comments:

8.2 Problems experienced by teachers relating to the roles/functions of subject advisors.

8.2.1 Mention the most prominent problems that teachers experience in practice.

8.2.2 Suggestions for improvements or how to address problems.

8.2.3 Subject advisor's problems

8.3 Teacher's problems

9. Please complete the following advisor evaluation form.

Mark the appropriate box in answer to questions A and B below. Put a tick (✓) for A and cross (x) for B.

A How do you see yourself as an advisor? B How do you think teachers see you?	++	+	Average	-	--
General educational knowledge					
Knowledge of school management					
Availability					
Approachability					
General helpfulness to teachers					
Skills in observing and assessing work in schools					
Skills counselling teachers					
In-service skills – planning and organising					

A How do you see yourself as an advisor?	++	+	Average	-	--
B How do you think teachers see you?					
In-service skills – knowledge of different strategies					
In-service skills – presentation					
In-service skills leading discussion					
Skill in persuading and negotiating					

Figure 1. Advisor evaluation

10. When subject advisors are appointed, which of the following qualities do you think are of great importance by marking most important, important or less important in the space provided (✓)

Assessment form for advisor appointment			
Quality	Rating		
	Most important	Important	Less important
Teaching experience			
Senior management experience			
Experience of working with adults			
Knowledge of current developments			
Specialist knowledge, expertise and enthusiasm			
Skill as a problem solver			
Ability to look critically at work in the classroom			
Skill in presentation orally and in writing			
Ability to form relationships with adults			
Ability to cope with pressure and stress			

Figure 2. Assessment form for appointing an advisor

11. What are your expectations when you visit physical science teachers?

12. What are your expectations after the visit?

INSET

13. Which roles do you play during and after INSET?

DURING INSET

AFTER INSET

APPENDIX 2
QUESTIONNAIRE 2

QUESTIONNAIRE 2

TEACHERS: PHYSICAL SCIENCE

SCHOOL _____ TYPE:

MIDDLE	HIGH
--------	------

DISTRICT: _____

INFORMATION ON TEACHERS

Experience in teaching _____ (full years)

Experience in general science teaching _____ (full years)

State standard(s) taught in 1997/8 _____

QUALIFICATIONS

Degrees(s) _____ Diplomas(s) _____ Certificates (s) _____

Where obtained _____

Highest qualifications at college level _____

at university level _____

Where obtained _____

In physics _____

In chemistry _____

1. Assistance with professional development and problems.

From whom do you get professional assistance when required?

(Please indicate on a priority scale your evaluation of the importance of the contributions of the instances/persons to assist with your professional development and problems (highest importance – 1, least – 6).

I get help/assistance from:

	YES (1)	NO (2)	PRIORITY (3)
1. Teacher's centre			
2. A university			
3. An NGO			
4. Subject advisor			
5. A college			
6. Other			

Give details of 'other' (if applicable)

1. With reference to 1 above, how many times did you get help/assistance during 1997/8?

Describe in-service courses you have attended since January 1997 to date.

2. Considering career guidance to pupils, with regard to careers in SET (Science, engineering and Technology). I regard it as ...

3.1 Adequate	3.2 Inadequate	3.3 I am unable to judge
--------------	----------------	--------------------------

1. Who is responsible for career guidance at your school?

4.1 Science teacher	4.2 Career guidance teacher
---------------------	-----------------------------

1. What do you recommend with regard to improved career guidance to pupils with regard to Science, Engineering and Technology (SET).

2. Study the following roles of subject advisors and indicate the areas where you receive(d) assistance or support in 1997-1998 from the physical science subject advisor with a tick in the box next to the statement. State in the space provided how much time e.g. one afternoon per month.

Roles	Response (✓)	Time
Instruction – Assistance in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction.		

Roles	Response (✓)	Time
Curriculum – Facilitation of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.		
Staff development – Initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.		
Implementation – Initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.		
Management – Requisition of supplies; coordination of information about laws, liabilities district policies, safety, regulations, financial status and budgets.		
Assessment – analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.		
Assignment, transfer and load – assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff.		

1. When subject advisors are appointed, which of the following do you think are of great importance by marking most important, important or less important (✓).

Assessment form for advisor appointment			
Quality	Rating		
	Most important	Important	Less important
Teaching experience			
Senior management experience			
Experience of working with adults			
Knowledge of current developments			
Specialist knowledge, expertise and enthusiasm			
Skill as a problem solver			
Ability to look critically at work in the classroom			

Assessment form for advisor appointment			
Quality	Rating		
	Most important	Important	Less important
Skill in presentation orally and in writing			
Ability to form relationships with adults			
Ability to cope with pressure and stress			

Figure 1. Assessment form for appointing an advisor

1. Please complete the following physical science teacher evaluation form.

Mark the appropriate box in answer to questions A and B below. Put a tick (✓) for A and cross (X) for B.

A How do you see yourself as a physical science teacher?	++	+	Average	-	--
B How do you think subject advisors see you?					
General educational knowledge					
Knowledge of school management					
Availability					
Approachability					
General helpfulness to teachers					
Skills in observing and assessing work in schools					
Skills counselling teachers					
In-service skills – planning and organising					
In-service skills – knowledge of different strategies					
In-service skills – presentation					
In-service skills leading discussion					
Skill in persuading and negotiating					

Figure 2. Physical science teacher evaluation

1. What are your expectations when a subject advisor visits you at school?

2. What are your expectations after the visit?

INSET

3. Which roles do you expect the subject advisor to play during and after INSET?

During INSET:

After INSET:

APPENDIX 3

INTERVIEW SCHEDULE 1

INTERVIEW SCHEDULE 1

FOR: SENIOR SUBJECT ADVISOR (PHYSICAL SCIENCE)

THE ROLE AND FUNCTIONS OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

1. What is the mission of your section on physical science?

2. What is your role in the province with regard to physical science advisory service?

3. How many physical science advisors fall under your management and how many teachers does each manage?

4. What are the Key Performance Areas for physical science subject advisors?

5. Is there any systematic procedure used for visiting physical science teachers in schools?

6. What happens afterwards and what is your role in this regard?

7. Is there any induction process and staff development programme for the newly appointed physical science subject advisors?

If yes, how is it carried out?

8. Is there any system in place to evaluate and review the roles of subject advisors?

9. What kind of system is in place to ensure that physical science subject advisors function uniformly in the province?

10. What are the obstacles that you think physical science subject advisors come across in their duties?

11. How do you assist them to overcome these obstacles?

12. A sheet with roles/tasks of subject advisors is provided and you are requested to rank them from highest (1) to lowest (5). Also indicate how much time the subject advisors devote to each.

Roles	1	2	3	4	5	% TIME
Instruction – Assistance in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction						
Curriculum – Facilitation of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.						
Staff development – Initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.						
Implementation – Initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.						
Management – Requisition of supplies; coordination of information about laws, liabilities district policies, safety, regulations, financial status and budgets.						
Assessment – analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.						
Assignment, transfer and load – assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff.						

13. When subject advisors are appointed, which qualities from the following do you think are of great importance? Rate them by marking most important, important or less important in the box (✓).

Assessment form for advisor appointment			
Quality	Rating		
	Most important	Important	Less important
Teaching experience			
Senior management experience			
Experience of working with adults			
Knowledge of current developments			
Specialist knowledge, expertise and enthusiasm			
Skill as a problem solver			
Ability to look critically at work in the classroom			
Skill in presentation orally and in writing			
Ability to form relationships with adults			
Ability to cope with pressure and stress			

Figure 1. Assessment form for appointing an advisor

14. Other functions performed by subject advisors.

14.1 Mention other functions/duties performed by physical subject advisors not mentioned in 12 on page 3.

14.2 Mention other functions/duties performed by physical science subject advisors, not related to physical/general science advisory service.

14.3 Estimated percentage of time devoted to the activities mentioned in 14.2.

15. Job description

15.1 Did you receive a job description on appointment as a subject advisor?

If yes, were your roles/duties clearly spelt out?

15.2 Did you receive any training/induction after appointment?

If yes, what did the training entail?

16. Has any evaluation been conducted to find out about the effectiveness of subject advisors (physical science/general) in the North West Province?

17. Self-evaluation by the senior subject advisor.

Mark the appropriate box in answer to questions A and B below. Put a tick (✓) for A and cross (X) for B.

A How do you see yourself as a senior advisor? B How do you think subject advisors see you?	++	+	Average	-	--
General educational knowledge					
Knowledge of school management					
Availability					
Approachability					
General helpfulness to teachers					

A How do you see yourself as a senior advisor? B How do you think subject advisors see you?	++	+	Average	-	--
Skills in observing and assessing work in schools					
Skills counselling teachers					
In-service skills – planning and organising					
In-service skills – knowledge of different strategies					
In-service skills – presentation					
In-service skills leading discussion					
Skill in persuading and negotiating					

Figure 2. Self-evaluation by senior subject advisor

APPENDIX 4
INTERVIEW SCHEDULE 2

INTERVIEW SCHEDULE 2

FOR THE DEPUTY DIRECTOR: SUBJECT ADVISORY SERVICES AND PROFESSIONAL SUPPORT

THE ROLE AND FUNCTIONS OF THE PHYSICAL SCIENCE SUBJECT ADVISOR IN THE NORTH WEST PROVINCE

1. What is the mission of this sub-directorate with regard to the role of the physical science subject advisors?

2. Is there any reference in the educational law(s)/policy to the appointment, roles/tasks etc of subject advisors?

3. Is there from provincial/national departments of Education's side any specific job description for the physical science subject advisors or a general role/task description which is a working document to guide them in their daily tasks and to highlight their key performance areas?

4. What are the minimum qualification requirements for physical science subject advisors on appointment?

5. What are their experience requirements (e.g. number of years and experience in science teaching)?

6. Is there any legislation under which the subject advisors carry out their tasks (e.g. in the UK – The 1988 Education Reform Act)?

7. Of what importance are these qualities in the appointment of subject advisors? rate them as most important, important or less important in the space provided (✓).

Assessment form for advisor appointment			
Quality	Rating		
	Most important	Important	Less important
Teaching experience			
Senior management experience			
Experience of working with adults			
Knowledge of current developments			
Specialist knowledge, expertise and enthusiasm			
Skill as a problem solver			
Ability to look critically at work in the classroom			
Skill in presentation orally and in writing			
Ability to form relationships with adults			
Ability to cope with pressure and stress			

Figure 1. Assessment form for appointing an advisor

8. What are the key performance areas in an interview for such a post? Refer to figure 1.

9. Is there any training programme specifically for the physical science subject advisor on appointment?

10. What is the role of the senior subject advisor for physical science?

11. How many physical science subject advisors are there in the North West Province?

12. How many physical science senior subject advisors are there in the North West Province?

13. How many schools/teachers are assigned to each subject advisor?

14. What INSET programmes are in place to be implemented by the physical science subject advisors?

15. Is there a system whereby teachers give feedback to the subject advisor about INSET programmes?

16. Who designs these programmes and what guides this process?

17. Is there any appraisal system in place for the subject advisors? If no, which skills would you consider important in future evaluation?

18. If the answer to 17 is yes, how are physical science subject advisors evaluated?

19. Is there any system of registration and accreditation of subject advisors in place in the North West Province/Nationally?

20. A sheet with roles/tasks of subject advisors is provided and you are requested to rank them from highest (1) to lowest (5). Also indicate how much time the subject advisors devote to each.

Roles	1	2	3	4	5	% TIME
Instruction – Assistance in the development of instructional materials, implementation of curriculum changes, encouragement of student involvement in extracurricular programs, review and refinement of methods of instruction						
Curriculum – Facilitation of teacher involvement in curriculum development; evaluation of new methods and materials; communication of significant new developments and of the status, accomplishments, and needs of the science program.						
Staff development – Initiation of in-service programs, coordination with other school personnel, communication of opportunities for staff development, research in curriculum and long-range program objectives.						
Implementation – Initiation of opportunities for teacher exchange and cooperative teaching, dissemination of information on funding, coordination of teachers' ideas on the design or remodeling of facilities, development of proposals for new instructional projects.						
Management – Requisition of supplies; coordination of information about laws, liabilities district policies, safety, regulations, financial status and budgets.						
Assessment – analysis of test results, maintenance of data on student achievement, examination of teaching objectives based on test results, assistance to teachers in self-evaluation.						
Assignment, transfer and load – assistance in assignment, equalisation of teaching load, resolution of conflict and selection of staff.						

21. Are there any key tasks that you think have been omitted in this list?

22. What are the key areas that a subject advisor is supposed to focus on when he/she visits a school?

23. Is there a difference in the tasks of subject advisors and those of circuit managers?

24. Questions 24 and 25 are based on the Teacher Support Service Conference held on 24-26 August 1994 aimed at formulating broad policy issues which would serve to inform and influence the North West Provincial Education Department in implementing an effective and efficient Teacher Support Service.

Is the present policy on subject advisory services a product of this conference?

25. Is the conference document available?

26. Do you see a possibility of involving subject advisors in the appointment of science teachers?

27. Has any evaluation been conducted to find out about the effectiveness of subject advisors (physical science or generally) in the North West Province?
