

**A Study of the Impact of a Development Programme for  
Teachers of Mathematics and Physical Science in Rural  
Secondary Schools in South Africa**

**By**

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# DECLARATION

I Dhruwa Pandey (20210109) declare that the thesis, which I hereby submit for the degree Philosophiae Doctor at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

Signature:

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# Abstract

The study is an evaluation of the ‘Science Teacher Development Project’, which was undertaken in a rural area of the Mpumalanga Province of South Africa. The intervention of almost four years was an outreach programme located at eMpuluzi, a distance of 375 km from the University of Pretoria. The project was funded by a grant of the Belgian Council of Flemish Universities. Funding was administered by the South African Science Education Network (SASEN) which was located at the University of the Western Cape. The Centre for Science Education of the University of Pretoria designed, managed and implemented the intervention. A ‘Further Diploma in Education’ (FDE) from the University of Pretoria was the intended outcome for individual participating teachers and 26 of 28 teachers succeeded and obtained the diploma. The project was particularly unique through being funded and implemented by a partnership of universities, rather than through state initiatives or aid, and as such must be seen as a small project with high impact within its limited scope.

This thesis presents an evaluation of the project in terms of its impacts, achievements and failures, using qualitative paradigms. The evaluation process by the participant observer was an ongoing programme and included a post-completion summative evaluation for which the last interview was conducted two years after completion of the project.

The evaluation proceeded in two phases. The first was a traditional analysis based on proxies derived from the research question, namely self reported change in educator attitude and change in school and classroom practices of educators. The second investigation which was begun when a successful conclusion to the intervention was already evident established the degree to which expectations of stakeholders were met, and factors that contributed to the success. For this a novel adaptation of Checkland’s Soft Systems Analysis with six stages was used. This ensured that the nature of the project was modelled and assessed holistically. The model led to the identification of several perspectives for analysis. These included the competence criteria of the Department of Education known collectively as ‘the seven roles of educators’, and whether the project was a ‘learning organisation’.

A major factor which contributed to the successes of the project was the sense of ownership that developed amongst the participants.

This work presents a new approach to the in-depth evaluation of single interventions, particularly where these are presented over a long period and the roles of participants at all levels may change or develop over time. The Soft Systems Analysis approach has the distinct advantage of not imposing an assumption of structure onto the analysis of the project.



The potentially generalisable success factors which were identified (most importantly the sense of ownership developed by the participating teachers which exceeded the concept of partnership envisaged in the Jomtien (1990) declaration), the novel adaptation of Soft Systems Methodology, and the value of strongly academically focussed INSET are significant contributions to the body of knowledge of those planning, implementing and evaluating teacher development projects amid considerable complexity. These all lead to further research.



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## List of Abbreviations and Acronyms

ACE	Advanced Certificate in Education (the new name for an FDE)
AMESA	Association of Mathematics Educators of South Africa
ANC	African National Congress
C2005	Curriculum 2005
CATWOE	Customers, Actors, Transformation, Weltanschauung, Owners, Environment
CASME	Centre for the Achievement of Science and Mathematics Education
CEPD	Centre for Educators' Policy Development
CI	Curriculum Implementer
CIPP	Content-Input-Process-Product
CL	Cluster Leader (used in Appendix B)
COLT	Culture of Learning and Teaching
CSEUP	Centre for Science Education University of Pretoria
DFID	Department For International Development (United Kingdom)
DO	Departmental Official (used in Appendix B)
DOE	Department of Education
FDE	Further Diploma in Education
FET	Further Education and Training
GET	General Education and Training
GLR	Getting Learning Right [edited by Taylor and Vinjevold (1999)]
HAS	Human Activity System
HG	Higher Grade
HOD	Head of Department
HSRC	Human Science Research Council
INSET	In Service Training
ITO	Input-Transformation-Output general system model
ITOFc	Input-Transformation-Output general system model with classical feedback and adaptive control
JICA	Japan International Cooperation Agency
JPTD	Junior Primary Teachers Diploma
MDE	Mpumalanga Department of Education
MPSI	Mpumalanga Primary Schools Initiative
MSSI	Mpumalanga Secondary Science Initiative
OBE	Outcomes Based Education
P	Principal (used in Appendix B)
Pr.	Professor or Project Director (used in Appendix B)
PEI	President's Education Initiative

SADTU	South African Democratic Teachers Union
SAQA	South African Qualifications Authority
SASEN	South African Science Education Network. The project which is the subject of assessment reported in this thesis is also referred to as “the SASEN project”.
Sch.	School
SG	Standard Grade
SMT	School Management Team
SMASSE	Strengthening of Mathematics and Science in Secondary Education (Kenya)
SbTD	School based Teacher Development project (Kenya)
SPTD	Senior Primary Teachers’ Diploma
SSA	Soft Systems Analysis
SSM	Soft Systems Methodology
STD	Secondary Teachers’ Diploma
STM	Science, Technology and Mathematics project (Ghana)
STS	Science and Technology in Society
T	Teacher (Used in Appendix B)
TED	Transitional Electricity Distributor
TTFE	Tuckman Teacher Feedback Form
TUATA	Transvaal United African Teachers' Association
UK	United Kingdom
Unisa	University of South Africa
UP	University of Pretoria
USA	United States of America
UL	Union Leader (used in Appendix B)
UWC	University of Western Cape





## List of Symbols

$\alpha$	Cronbach's Coefficient Alpha
$\sum$	Sum
$S$	Variance
$I$	Number of items in the scale





# Chapter 1

## Introduction: Background to the Intervention Project and the Research Formulation

### 1.1 Introduction

This thesis reports an investigation undertaken to evaluate the implementation and impact of an in-service development project for high-school teachers of Science and Mathematics. The project was presented by Pretoria University's Centre for Science Education in the rural District of Eerstehoek in the Mpumalanga Province of South Africa from October 1999 until November 2003. It was funded through the South African Science Education Network (SASEN, located at the University of the Western Cape) by the Council of Flemish Universities of Belgium specifically through the University of Leuven. For this reason the project is referred to as "the SASEN project" within this thesis. It was a unique project in that its conception and funding arose within the university system, and was not part of a large scale local or foreign state-initiated programme, nor by privately funded NGO's. The project was thus largely academically driven.

#### 1.1.1 Outline of the SASEN project

The SASEN project focused on the under-qualified teachers of secondary schools from underdeveloped, rural areas of the greater eMpuluzi and the Elukwatini-Ekuledini-Badplaas triangle of Mpumalanga province, about 400 km from the University of Pretoria. Its purpose was to address the knowledge and skills of practising high school educators in the fields of Science, Mathematics and Technology, as well as their needs within the context of the new Curriculum 2005 through empowering and training the teachers via theoretical and practical studies. On successful conclusion 26 teachers (28 [of 35 who initially started the project] completed the first year and subsequently registered for the qualification, and a 27<sup>th</sup> participant completed the project through a second project a year later) earned an accredited 'Further Diploma in Education', the FDE (or as later renamed, the 'Advanced Certificate in Education', ACE) qualification. These qualifications were unique in relation to similarly named qualifications offered by other institutions at the time as they were focussed strongly on subject content knowledge modelled directly on general first year level courses offered in Faculty of Science degree programmes.

The Centre for Science Education of the University of Pretoria's Faculty of Science (CSEUP) designed and implemented the intervention project after discussions with the Community



Development Forum of the region and the Mpumalanga Department of Education. The Community Development Forum included representatives of the Mpumalanga Department of Education, two teacher unions, and the local subsidiary of ESKOM, the Transitional Electricity Distributor who facilitated and funded the Forum.

### 1.1.2 Outline of the study

The investigation had two overlapping phases. From the initial stages of the project, the impact of the project on improving professionalism and the attitudes of teachers, and their behaviour in learning and teaching, in and around the schools, was investigated. Towards the end of the project, when it was clear that the project would succeed in many of its aims, a more holistic investigation was begun to gain sufficient understanding to provide a reasonable answer to the rather open-ended question, “to what extent did the intervention project succeed, and what factors contributed to its success?”. This latter phase extended well beyond the end of the project, and must be viewed as mainly a post-completion evaluation of the intervention. Both phases are characterised within the broad classes proposed by Nentwig (1999) as value-oriented evaluations although key components of a fact-oriented evaluation (quantifiable criteria and programme objectives) are considered as a contributor to the evaluation reported here.

The investigation was performed while the investigator was a participant in the intervention. This provided the advantage that detailed “insider” information was available to the investigator, while it was accompanied by the danger that subjective assumptions would intrude and harm the objectivity of conclusions that could be drawn.

The first phase (attitudinal change) investigation was performed in a traditional manner through questionnaires and classroom observations, but showed several weaknesses in design. Many of the gaps in the attitudinal change investigation could be filled during the second phase investigations.

The second phase (holistic) investigation was designed explicitly to reduce the effect of prior assumptions resulting from being a participant researcher, by adopting (and adapting) a framework of Soft Systems Analysis. The Soft Systems Analysis is characterised by several stages of investigation in which data is iteratively obtained and analysed, while the drawing of final conclusions is postponed to mitigate bias associated with participatory research or preconceptions. The soft systems analysis (SSA) framework (Checkland, 1999) allowed one to discover the structure, interfaces and relationships between activities without pre-imposing assumptions of structure, which a more traditional evaluation format may have done. The tools for the investigation (or “lenses” with which the project was analysed) arose during the soft systems process, and were not pre-determined; rather, tools were added as insight was gained. This phase

also led to the discovery of initially unexpected impacts. The process ended once triangulation of evidence provided sufficient confidence that understanding, which allowed the research questions to be answered, had been achieved.

Historically, Soft Systems Analysis was introduced (Checkland, 1999; Sherwood, 2003) as a framework of analysis by strategic leaders within companies to ensure companies and projects adapt optimally to changing conditions for growth and survival. It has been used as a design tool for user systems and information systems and processes (Patching, 1990), but it has only recently been applied as a tool in an educational context to assist curriculum improvement (Patel, 1995). The application of the Soft Systems Analysis framework to project evaluation, in general, and to evaluation of an in-service teacher-training project in particular, is novel and required some adaptation of the stages to this context.

The Soft Systems Analysis approach identified the factors that contributed to the success of the project to be: local identification of needs and the structuring of the project to allow a strong component of local ownership; clustering teachers into groups within their geographical area while teachers had the full responsibility to manage their activities (and so gained ownership); two-way learning as a process and as an outcome; and improvement of confidence as reported by teachers (as improved self-efficacy belief). Also important was a style of management that was conducive for learning, in that through negotiation it created a friendly environment and a project that responded to changing needs.

Attitudinal impacts on teachers' professionalism indicated by findings in phase 1 of the research were probed fully in early phase 2. Teachers revealed how and what changed their attitudes and practices within the teaching profession. Soft Systems Analysis identified characteristic interrelationships within the project which were richer than those that were pre-supposed (or expected) during the design of the project, and thus led to several more aspects which were investigated as the analysis progressed. Several changes to the professional practice of teachers such as more learner centred teaching, spending extra hours attending to learners in their schools and taking more responsibilities within the school etc. which were suggested by the studies in phase 1, were convincingly established through the SSA process.

Before beginning the description of this study, an outline of the context within which the SASEN project and this research took place is provided. The outline includes a brief description of some socio-economic dimensions impacting on education in South Africa, especially in the fields of Science and Mathematics education.

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## 1.2 The context, background and the origin of the project

### 1.2.1 The state of Science Education in South Africa – the need for INSET

Kahn (1995) reported with concern that only 3000 out of 60000 successful matriculants in higher grade Science and Mathematics came from the black majority population. Physical Science is not a popular subject amongst Black students (Cherry, 1996), and this is worsened by the fact that many schools do not offer Physical Science. Demographically, the national population census of the year 2001 shows a population of 44.8 Million, of which 35.4 million are Black. With 443821 students sitting for the matriculation examination in 2002 (the first year for which racially aggregated data were made available) (Perry & Fleisch, 2006), the number of Black students passing mathematics sufficiently well that they may access tertiary education in technical, mathematical or scientific disciplines (which require mathematics achievement in the higher grade) is horribly low and is between 1400 and 7636, (Kahn, 2006) according to entrance criteria in the various sectors.

Over many years teachers as well as pupils have expressed unhappiness about the nature and content of the Science curriculum, poor teaching methods, the shortage of qualified teachers and inadequate textbooks and facilities prevailing in most of the schools (HSRC, 1981; ANC, 1992; 1994; CEPD, 1995). The situation has not changed much since 1994. Webb et al. (1999) identified a similar pattern of unqualified teachers in schools in the Eastern Cape. Harvey (2004) remarks that the period from 1976 onwards was characterised by poor access of education authorities to schools and classrooms whether for inspection or coaching, a situation that still largely existed in the late 90's and early 2000's during a climate of strong teacher labour union militancy.

After 1994, South Africa embarked on an urgent programme to reconstruct its education system based on principles of equity, human rights, democracy, and sustainable development. This led to the conceptualisation of knowledge, skills, values, attitudes and application as the achievable goals and the major priorities of education. An Outcomes Based Education (OBE) approach was chosen as the philosophical basis of a new curriculum known as Curriculum 2005 (C2005), not without criticism (Jansen, 1998). The curriculum was phased-in over a number of years, between 1997 and 2005. This is widely reported to have caused significant stress to teachers (Mtetwa, 2003).

C2005 proposed enormous changes for education in South Africa. It was intended that the school-leaving population would be better equipped to enter the job market, yield successful entrepreneurs and effective leaders in any field of development (even after only 9 years of schooling) (DOE, 1997). But the curriculum was demanding on resources (which were inadequate) and showed up severe deficiencies in teacher readiness to perform as expected.



The radically changed curriculum, the poor knowledge and skills of teachers and the demands of the changed environment in South Africa created a need for in-service development of teachers.

## 1.2.2 The context and design of the SASEN project

### 1.2.2.1 Context

From its creation as a result of the 1993 Interim Constitution of the Republic of South Africa, South Africa's largely rural and underdeveloped Mpumalanga Province engaged available national and international resources to improve Science Education in its schools. The first initiative by the special projects division of the Mpumalanga Department of Education to develop teachers and learners was the Mpumalanga Primary Science Initiative [MPSI] supported by the University of Sussex and coordinated and funded through the Department for International Development (DFID) of the UK which was implemented from 1996 to 1998, involving 74 schools and 185 teachers. (Malaza, 1999) The MPSI delivered some change in classroom practice, but major benefits included improved school governance in the participating schools through a sub-programme that improved the leadership capacity of school principals, and the beginning of a teacher development plan. This was followed by a project known as "Learning for Sustainability" and funded by the DANCED (Danish Corporation for Environment and Development) of Denmark (Mokhele, 2007). This was mainly focused on the 'environmental' part of the Natural Science learning area. These projects were characterised by a format consisting of a short series of workshops for teachers, sometimes accompanied by the installation of equipment, but with limited long-term benefit for the participating teachers.

The SASEN project was initiated in order to develop teachers of Science and Mathematics in a sub-region of the Mpumalanga province, known as Eerstehoek. The project was unique in that it was conceived and funded by the university sector, and its prime intention was an academic outcome requested by and agreed with the beneficiaries.

The SASEN project had its roots in the broad community. Early in 1997 several role-players formed the Eerstehoek Development Forum, which developed a strategic development plan for the region. The forum was supported by the ESKOM foundation, through its subsidiary the Transitional Electricity Distributor (TED). The plan, which was known as the 'Mpumalanga Development Cluster Business Plan', listed as a top priority the improvement of Science and Mathematics teachers. After being contacted by the ESKOM Foundation's Mr George Mahlaela in July 1998, the director of the Centre for Science Education at the University of Pretoria (CSEUP) was invited to meet with the forum at Elukwatini (September, 1998). Needs were presented, and it was agreed that the development of teachers should be done through a formally recognised course at the level of the 'Further Diploma in Education' rather than through a few workshops whose impact would be of a temporary nature.



After an application for funding was submitted to the South African Science Education Network, this organisation sponsored the proposed intervention programme of the CSEUP at Eerstehoek. The development programme had the support and active participation of the Provincial Department of Education, the District and Circuit Managers, the Principals' Council and the local development forums and TUATA. SADTU, the largest teacher union, took a wait-and-see attitude.

It is a result of the Soft Systems Analysis evaluation presented in this thesis that one of the important reasons for the success of the project was the sense of ownership the participating teachers had in the project. The seeds of this ownership lie in the regional development business plan. For this reason the relevant goals of this plan are presented here.

The *most substantive goal* in the 'Mpumalanga Development Cluster Business Plan' was the improvement in the quality of teaching and learning. Four specific areas of development were identified as follows:

- The professional development of teaching and management staff.
- The institutionalisation of sound education management systems and procedures at school and circuit level.
- The upgrading and efficient utilisation of resources and materials to enhance learning.
- The upgrading and enhanced use of the buildings, grounds and essentials services of water, sewerage, electrification and security”.

The business plan document outlined principles for programme participation. Those relevant for this project were that each school should select staff to attend training and transfer that training to the whole school. Staff development would be followed by classroom based activities thus implementing the changes. Every school would participate in the evaluation of the project and share findings with other participants. Also, projects should support the implementation of Curriculum 2005.

The business plan expected that the projects should have multi-level impacts and the relevant officials, namely the circuit managers, the learning area managers and the Curriculum Implementers (those immediately supporting teachers) should commit to, and participate in, the project.

The schools identified several priorities as mentioned in the business plan, namely, Management Development, Science, Mathematics, and English improvement, the initiation of Technology and Economics Education programmes, and managing the school-to-work transition i.e. from the interim to OBE curriculum.





The above needs analysis and hope of the community of Eerstehoek, provided the rationale and guiding factors for the design of the SASEN project with respect to its goals, syllabi and action plan. The project applied only to secondary school teachers (Senior and FET phases) in Science and Mathematics.

A survey and base-line study (1998) was performed by the curriculum unit of the MDE on the request of directors of a large-scale school-based INSET project being begun in Mpumalanga, the Mpumalanga Secondary Science Initiative (MSSI) in which the CSEUP had a partnership role. The survey highlighted that teachers' academic and professional qualifications were generally inadequate. Some high school teachers had a three year Senior Primary Teachers Diploma (SPTD) or Secondary Teachers Diploma (STD), and a very small minority had degrees. Some had a two year PTC (Primary Teachers Certificate) and some had no formal teacher training at all but only a Senior Certificate ("matric"). The schools were under resourced and poorly equipped. Many had no science laboratories and no water and electricity. Schools were scattered widely and were reachable only with poorly maintained dusty roads.

#### **1.2.2.2 Description of the SASEN project**

The SASEN project was an outreach INSET presented in contact form close to teachers, unlike those prevailing in many INSET programmes (such as the Sediba project of the North-West University, where some teachers from the Eerstehoek district travelled around 600km to attend contact lessons at Potchefstroom, in the southern part of the North-West province <http://www.puk.ac.za/opencms/export/PUK/html/fakulteite/natuur/snwto/sediba.html>). Teachers could reach the location of the meetings themselves and quickly apply what they had learned in their schools as they were not removed from their schools during a project meeting period. The university lecturers had to travel on Saturdays twice a month a distance of 400 km (one way). Teachers were grouped into three clusters, each located at a school close to their own, where they met to do the assignments, discuss and learn from each other.

Normally, FDE courses last for two years when taken part-time, but this one took an extended period of three-and-a-half years. It was begun in October 1999 and teachers graduated on 26 April 2003.

In 1999 and 2000 an introductory programme of Physical Science (which included high school level Physics and Chemistry), Mathematics and a course in Academic Language Proficiency (for which students registered at Unisa) was followed by all participants and served as a bridging and community-building programme. A course 'Current Trends in Mathematics, Science and Technology Education' which contained theories of Teaching and Learning featuring modern



international practice, specific to the relevant fields, formed a strong educational component. This gave rise to approaches to teaching relevant elements of the introductory and later core courses by participating teachers in their own schools. The implementation and reporting on these new approaches were set as assignments at times spaced throughout the programme.

In 2001 an advanced module in Mathematics was taken by all students, together with an elective of Chemistry or Mathematical Statistics for those preparing for Physical Science or Mathematical Sciences variants of the programme. The final year offered Physics and Earth Science modules for the Physical Science group, and further Mathematics and Statistics modules for the mathematics group.

Taken by all students in the first year and final years, respectively, were an informal Computer Literacy programme, and a module on Computers in the Classroom (to support enriched learning). For nearly all of the participants, this was the first opportunity to use computers, whether for administration or teaching.

Continuous assessment practices such as group and individual homework assignments, short class tests and term tests were applied to all modules and the trainees had to write annual formal examinations of the University in the subjects necessary for the Diploma.

A range of equipment was supplied to the teachers during the project. Six computers (and a printer) with both WordPerfect Office-9 and Microsoft Office-2000 software and programmes assisting learning were provided at the eMpuluzi Teacher Centre. Towards the end of the project they were distributed between the Elukwatini and the eMpuluzi Centres, and finally donated to centrally located schools in each of the three clusters. This allowed teachers to practice and learn operational computer skills. Science Kits were provided for teachers to practice and take them to their schools.

Teachers were provided with textbooks for all courses. This direct benefit of books and science kits cost around R4 200 per participant. On graduation, the province paid a bonus of R5 800 to each grandaunt, while their contribution to fees (participating teachers paid a share of 50% of formal course fees themselves) and travel over the period amounted to almost the same amount. As an appetiser, the increased level of qualification also allowed most completers to be rated at a higher salary level for a further benefit. Fixed costs of travel, equipment and payment for lecturers was effectively R400 000, while the per participant costs (which included around R3 000 per participant for course fees paid by the project) were around R200 000 in total.

While approach to teaching was a strong component of the programme, it is evident that the qualification was mainly focussed on the improvement of subject discipline knowledge, in both

depth and breadth. It is interesting how it transpired that several other skills expected of teachers by the Department of Education as published in the Norms and Standards (2000) were also positively affected by the programme.

Of 28 teachers who finished the first preparatory year, 26 (93%) graduated at the end of the project of almost 4 years, and one more graduated a year later after attending the Physics module at the University in Pretoria as part of the Mpumalanga Teacher Enhancement Project during which the FDE/ACE courses were presented once again. A contrast is seen in a Further Diploma in Education Management, run by the University of Pretoria and National Private Colleges (NPC) from 1994 to 1998 in a text-based distance format, where the completion rate has been reported as rather low compared with admission figures (Sayed, 2002).

### **1.3 Purpose and research objectives**

At the meeting at the Elukwatini Teachers' Centre in September 1998 which initiated the intervention project, stakeholders agreed that an evaluation process should be part of the project. It was expected that the evaluation would include successes (impacts), failures and sustainability of the impacts. This research is an outcome of this requirement. It appears that the demand for such an evaluation arose because of scepticism with the format of earlier projects which were based on a series of disjointed workshops with no effective follow-up and which had come and gone without there being benefits that were evident to the stakeholders.

The author of this thesis was present at the initiation of the project as the Curriculum Implementer responsible for teacher development of the sub-region, and thus on the client or beneficiary side of the intervention. As he holds an MSc (Science Education) qualification he was considered best placed to perform the evaluation. The research was supported by the CSEUP who provided the research supervisors of what was designed as a PhD project and appropriate research facilities. Consequently, the author and researcher was involved in the project from the beginning until the end as a participant as a critically important channel of communication between participating teachers, the CSEUP (project implementers) and the Mpumalanga Department of Education's Eerstehoek district, and hence part of the support structure for the project.

#### **1.3.1 Problem Statement**

The Sasen project, by agreement with stakeholders and representatives of teachers who would be the major beneficiaries of the project, was required to be evaluated to establish successes (effects or impacts), failures and sustainability of the impacts on the professional teachers' attitudes and

classroom practice. In the sense of Van den Berg (2002) and McKay (1999) the voices of the major beneficiaries, the participating teachers, would be the most important source of information, but these would be supported by voices of learners, colleagues and supervisors, as well as direct observation.

Additionally, a process would be developed that would lead to understanding of the project's systems structure and allow success factors and limitations on successes (as measured against the expectations of stakeholders) to be established that may be tentatively generalised for other future projects.

As the perspective from which the evaluation is performed is that of participants, the research questions and the methodology show an epistemology commensurate with a greater extent of non-realism than a more traditional realist oriented research approach which assumed an incontrovertible objective reality as its basis for assessment would show. (McKay, 1999)

### 1.3.2 Research objectives

Objectives are thus

- to establish a perspective from which the effects of the intervention could be examined, and to perform an assessment with in such a perspective. As teacher attitudes are a strong mobiliser of change, indeed an attitude positive towards a desired change is a necessary condition for change to occur, the proxy “attitude of participating teachers” would be established.
- to establish the soft systems nature of the project (and thus the complex environments of the project both internally and externally), develop a structural model and hence to identify key decision makers and role-players, and then to obtain their views in order to determine the extent to which their expectations had been met (thus successes and failures), identify the factors and characteristics of the project that supported these successes.
- The success factors would then be examined to suggest generalisations which may be considered for future interventions.

### 1.3.3 Research questions

The research questions were thus:

Question 1: What were the effects of the intervention and upgrading of their qualifications on attitudes and professionalism of educators?



Specifically, investigations which were conducted mainly in the first phase of the research were directed to the following areas of investigation:

- Change in educator attitude, as self-reported, and
- Change in professional behaviour of educators in school and classroom practice, as self-reported, observed in lessons and as reported by colleagues, supervisors and learners

The second question is a three-part question which was developed towards the end of the intervention when it was evident that the project was showing significant success. This question guided the post-project assessment of Phase 2:

Question 2.

- To what extent was the project successful in its purpose of satisfying the expectations of stakeholders?
- What supported the project's successes (success factors)?
- What are limitations and failures of the project?

This second question may be stated very loosely as: Why was the project successful?

### **1.3.4 Organisation and scope of the research**

The research was performed in two phases. The first was done with pre-defined indicators and variables as a proxy for impacts, which matched the purpose of the project, essentially a traditional evaluation. A second, mainly post-intervention evaluation, was performed using a soft systems analysis. At this stage it was evident that at least the major purpose of the intervention, to upgrade the content knowledge and the qualifications of teachers, would be successful. The second phase thus sought to determine the degree of success (thus successes and bounds to the successes) as determined by the expectations of key stakeholders, as well as obtaining potentially generalisable lessons or explanations for the successes.

During the first phase, the purpose of the research was to evaluate the project for its impacts on teachers as professionals. As impacts may be expressed in many ways, and measured over many years, a proxy was used during this phase, namely the impacts on teachers' attitudes towards their tasks, with observation of actual classroom practice supplementing this. The initial impact indicators were thus attitude and classroom practice.

Attitudes were measured in four variables:

- attitude towards the teaching career
- attitude to the learner-teacher relationship
- attitude towards accepting responsibility



- attitude towards working hours.

Classroom practices were observed according to variables and an instrument which were approved by an expert group:

- preparation of the teacher,
- classroom environment and management,
- background knowledge of learners established,
- whether homework was given at the end of the lesson,
- whether learners' issues were solved in class,
- use of chalkboard as media, and
- use of vernacular to explain concepts.

It can be expected that the attitudes that teachers develop about their roles in their schools are not especially different to that in other parts of the country faced with poor infrastructure and training. For example, Eving & Setsubi (1999) found that educators' *'internalised personal responsibility'* for the welfare and outcomes of their learners is at stake. It was found that the majority of principals, teachers and students have an attitude which blames forces outside their own control for their problems, and, similarly look to outside intervention for solutions. Wilson (1983) found that cognitive development goes hand in hand with positive attitudes. Schibeci and Riley (1986) have found a direct correlation between achievement and attitude to Science. Teachers' beliefs, attitudes and emotions are enabling to all aspects of the teachers' work including performance of learners and interaction with colleagues (van den Berg, 2002). Thus the investigation on attitudinal development of teachers in the programme was justified.

During the second phase, which overlapped with the first, the mainly post-project assessment was performed over a further two years, during which teachers and principals of participating schools and departmental officials of the MDE were interviewed and their responses analysed.

The participating teachers, learners, principals, colleagues, unions and several officials of the Mpumalanga Department of Education were the population for the data collection in both phases.

Table 1.1 summarises the nature of instruments used in the investigations.

**Table 1.1 Variables and methods of investigation**

In the table, the second phase is highlighted by shading to distinguish it from the first phase.

Phase	Variables to be investigated	Methods of collecting data and tools
1	Attitudes (Teaching as profession): <ul style="list-style-type: none"> <li>• attitude towards the teaching career</li> <li>• attitude to the learner-teacher relationship</li> <li>• attitude towards accepting responsibility</li> <li>• attitude towards working hours</li> </ul> Classroom practices: <ul style="list-style-type: none"> <li>• preparation of the teacher,</li> <li>• classroom environment and management,</li> <li>• background knowledge of learners established,</li> <li>• whether homework was given at the end of the lesson,</li> <li>• whether learners' issues were solved in class,</li> <li>• use of chalkboard as media, and</li> <li>• use of vernacular to explain concepts.</li> </ul>	Questionnaire / Interviews.  Individual Interviews: teachers and principals  Group Interviews: student groups   Classroom teaching observations of individual teachers, and  teachers selected as presenters on behalf of two clusters
2	Extent of Success in the dimensions identified by stakeholders as important  Contributors to success. Limitations.	Number of teachers graduated with the FDE/ACE. Questionnaires / Interviews with stakeholders: Stakeholders: These included teachers, cluster leaders, teachers union representative, colleagues, principals, MDE officials, lecturers and CSEUP staff

During the second phase the successes in meeting expectations of stakeholders, (concomitant) limitations of the project and factors contributing to success of the project were the focus. An adapted form of a Soft Systems Analysis methodology (Checkland, 1999) was especially designed to suit the process of evaluation and applied during the second phase. Soft Systems Analysis has as its prime purpose the creation of understanding towards making recommendations for future activities or change within a functioning organisation. Here, it was used to establish which stakeholders were to be interviewed. The particular roles of the stakeholders, as well as their expressed expectations determined the variables that were analysed for successes and limitations.



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(That the needs of stakeholders determines the purpose of a programme assessment and its key questions is emphasised by Murphy, D.F. & Rea-Dickins, P. (1999)

### 1.3.5 Additional variables of the Soft Systems Analysis

During the first phase the dimensions of attitude and classroom practice were predetermined and appropriate instruments were developed, interview questions and questionnaires were designed and applied. The second phase was led only by the research questions. In the second phase, the structure of the project was determined iteratively, key stakeholders were identified, and these stakeholders determined the variables for analysis.

The Soft Systems Analysis of the second phase, by iteratively creating a model of the project which was characterised by many interacting processes and people, required several sub-investigations.

Thus, unexpected impacts were found. For example, it was noted that participating teachers' self-efficacy beliefs (Bandura (1994), Grayson (2005)) had improved. Teacher competences when measured against the state's "Norms and Standards" for outcomes of teacher training projects (Norms and Standards for Educators 1998, 2000) were also positively influenced to various degrees. In interviews, the project participants, their principals, colleagues and learners expressed the opinions that the project provided improvement in the competence of participants in roles other than content (or subject) specialist and their self- and group- management skills had improved.

Explanatory characteristics were discovered, such as the extent to which the project behaved like a learning organisation (Senge, 1990) by relying on two-way learning (and the continuing evaluation and its feedback advantages), the formation of cooperating "clusters" of teachers which supported learning and relationship building with additional capacity building, and also the project's management and control that relied on frequent negotiation and communication while the project was structured as a soft system. A sense of local ownership by participants was strongly developed and was a critical factor contributing to its success.

These other measures were determined and identified as a consequence of the process of soft systems analysis itself. In a sense, the methods of the sub-investigations, being a consequence of the overall soft systems analysis methodology, are also themselves results of the analysis.

This demonstrates a characteristic of Soft Systems Analysis, namely no hard structure (and hence tools of investigation) are pre-supposed. Rather, the analysis yields insights which raises relevant dimensions for investigation while limiting the risk of the investigation losing purpose and spiralling out of control, because it is a structured process — albeit at several hierarchical levels.





## 1.4 Structure of the thesis

**Chapter two: Literature Review:** This chapter presents insights gained from the current literature. A short review of the INSET discussions leads to the location of the SASEN project in the spectrum of in-service programme models and types. Relevant approaches to the evaluation of projects when viewed as research, particularly the nature of case studies and participatory research, discussed. The central focus is the basis for the recognition of the SASEN project as a Soft System, and thus a discussion of general systems models and soft systems models, in particular, is provided. The framing of the evaluation process to be in resonance with the nature of the project and therefore the design of the evaluation (in the second phase) was a consequence of a soft systems analysis. A detailed discussion of the methodology of Soft Systems Analysis is provided. The Soft Systems Analysis identifies issues that needed to be further assessed from specific lenses, and some of these matters are reviewed, even though they can be justified only later.

**Chapter three: Research Methodology.** This leads the reader through the hierarchical nature of the evaluation, provides support to the formulation of the research instruments for the highest level and the most detailed levels of the evaluation. An extensive section describes the adaptations made to the general soft systems methodology in order to make it applicable to evaluation of a completed project. In a sense anticipating the consequences of the analysis, which actually produces the need for the sub-investigations and measurements, the methods of several sub-investigations are described. It also provides a critique for the evaluation itself. The design process of the evaluation is justified in this chapter.

**Chapter four: Data, Analysis and Discussion:** The presentation of the data and the subsequent discussion provide the outcomes of the evaluation. Initial analysis presents traditional procedures such as tables, interpretations and outcomes etc. Narrative presentation of qualitative analysis procedures which are a consequence of the soft systems analysis are a significant part of the chapter. This section includes discussions of how specific sub-investigations were required by the soft systems analysis. A synthesis of results of the two phases, a detailed phase that assesses attitudinal change and how the two phases are mutually supportive completes the chapter.

**Chapter five: Summary and Conclusions:** The final chapter provides the collective conclusion and outcomes of the research findings. It provides recommendations for future projects based on the findings of this research. A criticism of the research is undertaken and some limitations are identified. Chapter five also presents some research implications and scope for future evaluation research along with suggestions for practitioners of in-service development projects in the field of Science Education.



**References:** The bibliography and sources consulted.

**Appendices.** The information about the tools for data collection, data, and other resources are given in the Appendices.

Appendix A contains the questionnaires and interview questions used during interviews.

Appendix B contains raw data not available in the printed version of the thesis:

Appendix B provides the transcripts of interviews.

Appendix C is a tabular analysis of classroom observations conducted in 2001 and 2002 as well as observer notes.

Appendix D presents a record of post-project interviews of stakeholders about their expectations of such a project and of other stakeholders in general.



## Chapter 2

# Literature Review

### 2.1 Introduction

This chapter reports the essence of literature relevant for assessing in-service teacher development programmes, with a particular focus on a case-study approach in complex situations, particularly while the researcher-evaluator is an active participant in the programme.

An approach followed in the evaluation reported here was soft systems analysis (SSA). As a framework, the SSA approach does not specify the specific measurements to be performed but rather gives rise to them as the analysis proceeds. Consequently, considerations which are pertinent to the criteria which arose from the SSA framework and which were ultimately used to assess the programme are also discussed. These include progressive changes in international Science Education as pertinent to modern challenges and expectation of science and mathematics teachers and school contexts in South Africa, similar INSET programmes and their evaluation, and the nature of a learning organisation, particularly as an organisation that is characterised by a level of organisational self-awareness and the ability to adapt to changing demands.

As impacts and their potential origin formed the theme of the evaluation, ‘Self Efficacy beliefs of teachers’ and the state’s expectation of teacher development programmes (“seven roles”) are reviewed.

### 2.2 INSET programmes

Perraton (1993) wrote, “Good education demands good teachers”. In order to keep teachers updated with the growth and development in education and to avoid stagnation and knowledge and approaches becoming obsolete, teachers are expected to continually update their knowledge and skills. Burkhardt et al. (1989) recognised teacher development as an agent of change, which is of central importance. The fundamental assumption is that by improving the quality of teaching the quality of the education that pupils and students receive is improved (Hofmeyr & Pavlich, 1987; Ural & Sekete, 1997).



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### 2.2.1 Types of INSET

Murphy (1985:6) observes that there are as many definitions as there are INSET programmes. Understandably, therefore, one assumes that the definition of INSET will depend to a large extent on the emphasis that is placed on INSET in terms of its plan or design. Murphy (1985:7) agrees that any activity undertaken by teachers after the commencement of his teaching career and which is directly related to his professional work can be regarded as INSET. Tatto (1997) found that INSET has different meanings across countries, as was similarly found by Pather (1995).

Van Niekerk (1995) gave the fundamental aim of in-service teacher development programmes (INSET) as concretising lifelong learning after an initial qualification, while not removing the teacher from the classroom. INSET can be formal and award bearing which ultimately leads to some form of certification of the teacher and upgrading of qualifications (Hofmeyr & Hall, 1995) and hence is a programme of finite duration. Or, INSET can be a non-formal, continuous updating process which focuses on classroom competence and is usually not accredited. The latter is sometimes referred to as non-formal INSET and is usually aimed at expanding and/or updating teachers' subject knowledge and methodology (Bot, 1986).

In some cases [as in Japan (Grayson et al. 2001) where each prefecture has specific in-service training programmes which all teachers must participate in during the 1<sup>st</sup>, 5<sup>th</sup> and 10<sup>th</sup> year of teaching] an INSET process may be based around a progression of short mandatory programmes each leading to higher status, and ultimately promotion. The process in Japan is used to incrementally and slowly modernise the curriculum in 10 year cycles.

In India, a developing country that employs teachers without formal qualifications, INSET provides a formal teacher education certificate ('Licentiate in Teaching') for secondary school teaching as a two year part-time programme (Mohanti & Pani, 2007).

Hartshorne (1985) suggests that INSET is: *"the whole range of activities by which serving teachers and other categories of educationalists (within formal school systems) may extend and develop their personal education, professional competence, and general understanding of the role which they and the schools are expected to play in their changing societies. INSET further includes the means whereby a teacher's personal needs and aspirations may be met, as well as those of the system in which he or she serves"*

The purpose, format and implementation strategy of a particular INSET programme may thus be influenced by a range of factors, classed by O'Sullivan (2001) as Macro-, Meso- and Micro-factors, the last of which she divides further into subjective and objective realities. These classes include

social/cultural, political and economic factors at the macro level and immediate authorities of school and district such as principals and curriculum implementers/teacher support structures at the meso-level. The two micro levels contain culture, attitudes, relevance, desirability, motivation, perspectives and phenomenology of change in the subjective grouping, and realities facing teachers such as salary, location, access to resources, professional capacity and personal obligations in the objective subclass of factors. These factors, when duly measured or established for a context collectively impart information regarding feasibility of particular INSET approaches, the time extent and progression over which the intervention should proceed, the flexibility of presentation, location and assessments, and the complexity of challenge or response that have to be accommodated, (and reciprocally, these latter factors influence all the others). They are also useful indicators both during design and implementation but also for assessment of success during evaluation, as several reflect needs, motivational and empowerment realities and opportunities rather than obstacles.

O'Sullivan (2001) lists seven INSET types (under the term "inset strategies") as: (i) School-based and school-focussed programmes, (ii) based on teachers' needs, (iii) related to classroom realities, (iv) series of courses rather than one-shot courses, (v) opportunities to try out new skills, (vi) adequate supervision and follow-up, and (vii) planned and formal in nature.

Attempts have been made to make INSET the prime focus of a curriculum change. It was suggested that teacher development be an element in any curriculum change. PEI Researchers (GLR, 1999:161) in South Africa suggested that INSET programmes for teachers have significant impact on the quality of learning. Improving the conceptual knowledge of teachers alone gives them the confidence and resources to engage children at more challenging levels and undertake more adventurous learning tasks. The dominant outcomes generating 'best practice' were reported to be improved knowledge and skills and a high degree of value congruence. Specific outcomes that could be expected from any particular teacher development programme needed to be made explicit when developing the course (Webb et al., 1999).

Harvey (2004) reviewing the outcomes of many INSET projects, reveals that in the few cases where evaluations are available, many reveal modest progress in terms of instructional behaviour and learning outcomes. He ascribes this largely to the "push" side designs – needs for training are not those perceived by the teachers, but rather external. The minimal success is further blamed on an absence of accountability pressure on teachers in the South African context, in particular.

The common aspect is that the intervention intends to help to improve the quality of education in schools (meso-level), enable teachers to be more effective in their posts and enjoy job satisfaction (micro-subjective level). Also, INSET may prepare teachers for promotion and provide

opportunities for all educators to upgrade and improve their qualifications (micro-objective level) in order to become more knowledgeable and competent (Bagwandeem & Louw, 1993).

The diversity of INSET programmes which are often tailored to specific contexts and a concomitant lack of detailed evaluative or impact research (O’Sullivan, 2001, 2004) means that beyond the more descriptive guidelines emerging there is as yet no set of absolute design criteria that are sufficiently general to guide developers, presenters, funders and even evaluators in the delivery of INSET programmes. Frameworks of “best practice” are not universally accepted and the identification of critical success factors is a valuable contribution to the field of INSET design, delivery and policy.

The SASEN project implemented several of the strategies described by O’Sullivan [with significant contributions from the experience gained from the Science Education Project (MacDonald & Rogan, 1988) available to it, since both the founder of SEP, John Rogan, and the then director of SEP, Thembi Ndlalane, were staff members of the CSEUP at the time of the SASEN project]. In particular the intervention was based on teachers’ expressed and inferred needs (at macro-, meso- and micro-levels) [(ii)], was related to classroom realities [(iii)] in that the assignments of the programme required classroom application, feedback and observation by peers, the CI/researcher and the cluster facilitator, Ndlalane. The courses were phased in intent and presentation [(iv)] and decidedly not one-shot, having been presented over several years. Opportunities to try out new skills were at the heart of cluster activities and class interventions [(v)] while strongly supported by both the CI and the cluster facilitator [(vi)]. The formal element [(vii)], necessarily, consisted of the diploma programme which was integrated into the project, and ultimately became the major vehicle for motivating and accrediting the participating teachers’ content knowledge and skills gains and provided a component of quantitative accountability. The design and its effects took account of the meso- and micro-levels in the various strategies, as will be evident in the evaluation presented later.

### **2.2.2 INSET projects focussed on Science and Mathematics in developing countries**

INSET projects focussed on improving the teaching of Mathematics and Science in developing countries have been undertaken since the 1990’s with strong support by national and regional education authorities. Prior to that period many projects were conceived and delivered by NGO’s. This includes projects such the Science Education Project (SEP) (MacDonald & Rogan, 1988) and the Primary Science Programme (PSP) (Harvey, 2001; Harvey 2004) in the South African context, both of which sought to extend quality Science and Mathematics education to communities of learners that were otherwise severely disadvantaged by the systematic discrimination of a racially segregated schooling system before 1990. Harvey (2001), in particular, emphasises that the impact of the project was achieved after an intervention over an extended period of several years.



The period after 1990 also coincides with a view that local ownership and direction of such projects is of paramount importance. Rather than projects being driven by the external funding agency, or the political interests of a foreign government, full partnerships are necessary. This is a major impact of the Jomtien Conference on Education for All, in particular Article VII of the Jomtien Declaration (Jomtien, 1990):

*“Genuine partnerships contribute to the planning, implementing, managing and evaluating of basic education programmes. When we speak of ‘an expanded vision and a renewed commitment’, partnerships are at the heart of it.”*

The Mpumalanga Primary Science Initiative [MPSI] was academically supported by the University of Sussex (United Kingdom) and coordinated and funded by the Department for International Development (DFID) and used local expertise to a significant extent. It involved 185 primary school teachers between 1996 and 1998. (Malaza, 1999) The MPSI achieved some change in classroom practice, but major benefits included improved school governance in the participating schools through a sub-programme that improved the leadership capacity of school principals and the beginnings of a teacher development plan. A project known as “Learning for Sustainability” was funded by the DANCED (Danish Corporation for Environment and Development) of Denmark (Mokhele, 2007) and was mainly focused on the ‘environmental’ part of the Natural Science learning area. Both projects were characterised by a format consisting of a short series of workshops for teachers but had limited long-term benefit for the participating teachers themselves. The hope that curriculum change can be achieved through an INSET process that consists of sporadic workshops was subsequently treated with scepticism by the teachers and departmental representatives of the Eerstehoek Development Forum who formulated the need statement to which the SASEN project was a response. (Refer to Par. 1.2.2.1.)

The MSSI project (Nagao, 2001; Nagao et al., 2006; Ono et al., 2007:323) was a large-scale school-based INSET project in the same province as SASEN, Mpumalanga, which had as its aim the development of a systemic change of teacher support practice through the creation of school-based INSET capacity and practice in the Mpumalanga Province. It was intended that the INSET process would become provincial practice where all schools are supported through continuous in-school in-service development by curriculum implementers (CI’s) of the province. Its focus was putting in place a *process* of continuous change within the resources available to the province, but not to produce radical change itself in a short number of years. The University of Pretoria through the CSEUP was the university partner on the MSSI project, together with Mpumalanga Department of Education, with funding and international expertise provided through JICA. CSEUP provided strong leadership and expertise in the establishment of a cluster system to support the implementation of the MSSI project within the schools themselves in the second phase





continuation, post 2003 (Ndlalane, 2006; Jita & Ndlalane 2009; Bukari & Jita, 2009). (This leadership was largely the result of experience of CSEUP staff with the clusters of the SASEN project, described here.)

Similar large-scale school-based projects at the high-school level were the SMASSE project (Strengthening of Mathematics and Science in Secondary Education) in Kenya and the STM (Science, Technology and Mathematics) in Ghana, also funded by the government of Japan and coordinated through JICA, together with local partnerships of the Ministry of Education and Science and Technology, and participating schools. (Sifuna & Kaime, 2007; Mutahi, 2006; Nui & Wahome, 2006; Bukari & Jita, 2009).

These latter large-scale projects were inspired by the view that systemic change should be seeded and gradually brought about through a cascading system of development of leadership skills and science and mathematics transference skills within the province including provincial educational leadership, teacher support staff and ultimately the schools. Ownership was primarily by the state institutions involved and, in order to affect thousands of teachers, had to be strongly politically supported. A cascade system which first addressed the administrative levels, followed by teacher support specialists and ultimately the in-school phase made the teachers themselves late participants. Wedell (2005) has criticised cascade approaches as failing to come up to expectations if change in classroom practice is the ultimate purpose, but has suggested that formation of teacher groups that meet regularly may address this shortcoming.

Important innovations in these programmes (that were explicitly incorporated into the SASEN programme for participating teachers) included an emphasis on lesson planning, performing the lesson in a careful, innovative and reflective manner, often working out lessons as a cooperative group effort and allowing colleagues to be present during lessons, and reviewing them thereafter to ensure reflection and improvement (known as “lesson study”). This process was formalised in the SMASSE programme where it became part of the “Planning, Doing, Seeing, Improving - PDSI” approach. (Nui & Wahome, 2006, Sifuna & Kaime, 2007)

In an in-depth evaluation of the effects of the SMASSE programme (and a British DFID-coordinated and funded primary school initiative with similar aims, the SbTD project (Hardman et al., 2009)) on actual classroom practice the latter authors conclude that efforts to deliver effective INSET programmes remains extremely important. They showed with very strong evidence based on classroom observation that these efforts had a near-negligible effect on actual classroom practice during the timeframes of the intervention, yet teachers reported that they had significantly changed their class practices and used careful lesson planning, reflection and learner-centred teaching approaches. Impact over the longer term has been ascribed to these interventions and this



justifies the view that longer term “seeding” produces sustained effects. (Nagao et al., 2006; Hardman et al., 2009)

Mutshekwane (1999) has described INSET programmes for geography presented in the Venda district of the South Africa’s Northern Province (now renamed as Limpopo Province) which combined subject content lectures presented by subject experts with additional sessions devoted to teaching methods, teaching media and assessment. Mutshekwane confirms that participants gained confidence through the content presentations, yet had reservations about the usefulness of the programme, generally returning to original methods of presentation. It is reported that INSET programmes that are presented close to teachers but away from school venues and that do not require teachers to be absent from the classroom are preferred. Lack of follow-up was identified as a key weakness of the programmes considered. While Mutshekwane advocates partnership that includes the client and tertiary institutions, the programme described was owned at the level of the provincial department of education, driven by INSET centres with experts as paid service providers obtained from tertiary institutions.

The projects described above were large scale, presented at specific INSET centres and owned at the regional department of education (political) level. Partnerships were strongest between funders and the departmental level. Academic role-players were either service providers or minor partners. While the Venda project was directed to teachers, the MSSI and SMASSE projects had a cascade philosophy which ultimately sought to achieve change of practice, knowledge and skills through in-school based INSET.

### **2.2.3 Lessons from INSET projects**

In developing countries such as South Africa, as Hofmeyr (1988) indicates, the sheer size of the teaching force, whether qualified, unqualified and under qualified, that is in need of INSET poses a huge challenge particularly in the endeavour to upgrade and improve academic and professional qualifications. In developed countries, on the other hand, professional skills for teachers to be effective and their career needs are the main objectives of INSET (Bagwandeem & Louw, 1993). South African teachers often depend on workshops and interventions organized by the curriculum section of the Department where the attendance of teachers depends on the teacher and the situation of the school.

Some challenges that face INSET programmes in South Africa are (Bagwandeem & Louw, 1993):

- Lack of PRESET-INSET continuum in teacher education policy
- The absence of theoretical framework incorporating research and practice in INSET.
- Problems of implementing knowledge gained through INSET in the school situation.

- Financial constraints for the provision of relevant INSET programmes.
- Limited experience and knowledge of facilitators of INSET
- Problems related to release time for teachers.

Any suitable intervention means addressing all these aspects, especially developing conceptual understanding of the subject matter, learner-centred teaching and coping with curriculum change in the participating teacher, while needing to conceptualise a framework for the programme in a situational manner.

The SASEN project could address the last four of Bagwandeem & Louw's challenges directly. The first was not addressed, in that the PRESET training body of the teachers (generally various teacher training colleges), and the CSEUP were not related, and the project was certainly not part of a continuum of planned progressing training opportunities. The conceptualisation was, as expected, done without the background of a formal theoretical framework, except perhaps that of Fullan (1991:105-107) who reasoned that change, as "*a process*", to be sustained and over sufficient range of dimensions to be effective, must take place over time. Recently, (O'Sullivan, 2001) has introduced a theoretical framework for INSET programmes, the "INSET strategies model" which was not available to CSEUP when the programme was formulated. Instead the project was conceived directly to address the perceived and expressed local needs within the assumption that content knowledge and skills had to be developed together with classroom skills.

The PEI (GLR, 1999) ideal that INSET can be the medium for teacher development with a view to curriculum change is limited in realisation by both the extreme change that the South African context has demanded – change in curriculum with a base of very poorly qualified teachers – and the cost implication described by Hofmeyr (1988) which means that generally workshops are short, and once-off events, that are soon forgotten (O'Sullivan, 2001).

In contrast, the INSET process in Japan is deliberate, organised and scheduled over a ten-year cycle when supporting incremental curriculum change with well qualified and highly motivated teachers. (Grayson et al., 2001).

The importance of reflection by teachers is emphasised in the INSET work in school systems of developed countries. Borghi et al. (2001) (and to a lesser extent Buchan, 1995) report significant improvement in teachers' practice after introducing strong elements of reflective practice to teachers of the Italian school system. They particularly noted that reflection led to improved self-efficacy beliefs, and the teacher became more innovative in consequence. A key component of INSET that they recommend is "activities in which teachers reconsider their disciplinary

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knowledge and cooperate to make it suitable for teaching” where reflection is mainly on the subject content as is emphasised also in Borghi et .al. (2003).

Reviewing INSET accompanying curriculum change in Britain, English (1995) concluded that change induced by INSET is rather limited, rather the role of INSET must be to support change brought about by external factors such as curriculum change. In this sense, the SASEN project was opportune, as it responded to a need expressed by a community of teachers when the philosophy of teaching (OBE) that underpinned the newly introduced curriculum (Curriculum 2005) was a challenge to established teaching approaches.

The SASEN project is a different form of INSET that seeks to achieve a change of knowledge, skills and attitudes that capacitate teachers to service the demands of the changed curriculum. It was designed to be of limited scope, but with a primarily university-driven academic focus. The potential value of academic-driven INSET has recently been described by Mattheoudakis & Nicolaidis (2005) in the context of a developed country (Greece) in which lack of opportunity for teachers’ professional development (and resulting feelings of isolation and professional stagnation) were also addressed by university-run teacher training certificates. These programmes are reported to have been positively viewed by participants as leading to closer cooperation between the academic community and the practicing teacher. Preliminary research indicated that teachers implement changes in their classrooms, to at least some extent, following such a programme.

To do this it was designed to deliver a programme over a period of three to four years to a limited group of teachers, in order to achieve the aims of INSET as captured by Hartshorne (1985), but at no mean cost and effort. The cluster activities and the lesson construction and presentation assignments which formed part of every year of the SASEN project was a major location for a form of “lesson study” and subject content reflection.

### **2.3 Evaluation of educational projects / programmes**

A programme evaluation is the systematic collection of information about the activities, characteristics and outcomes of programmes in order to develop judgements, improve effectiveness and/or inform decisions about future programmes (Rossi et al. 2004). Programme assessments performed from the point of view of the funder or implementer (often referred to simply as evaluations) usually seek to determine that what was intended to be performed was in fact carried out, within specific quality measures. Programme assessments that are done from the perspective of the benefactor and that seek to establish the value or effectiveness of what was done seek to demonstrate that the programme was the cause of desired outcomes, and are thus impact assessments (which may also be referred to as impact evaluations). (Varghese, 1999)



Impact studies in which representative stakeholders (and the prime beneficiaries in particular) are participants in the study with a formative intention (and necessarily thus with a non-realist epistemology) are referred to as Participatory Action Research (PAR) by McKay (1999). McKay has described some aspects (advantages and otherwise) of PAR when applied to the assessment of impact in the Molteno Early Literacy and Language Development (MELLD) project in Namibia with the twin goal of obtaining formative impact assessment as well as educational for the participating teachers themselves. The significant importance of the voices of the participating beneficiaries themselves during a formative impact assessment is emphasised by Van den Berg (2002) and also by Shotton (1999). We maintain that these voices are also critically important during a summative impact assessment.

Generally however, impact or outcome evaluation is a summative evaluation. Such an evaluation must be able to answer whether the problem did get solved or the client benefited in some way. Effectiveness of the programme can only be ascertained through detectable or measurable change (Hudson, 1995; Varghese, 1999). The impact assessment should be designed to determine what effects the programme has on intended outcomes and whether, perhaps, there are important unintended effects (Malaza, 1999). To conduct an impact evaluation, the evaluator needs a plan for collecting data that will permit him to demonstrate persuasively that observed changes are a function of the intervention and cannot be accounted for in other ways (de Vos, 2005).

Hamilton et al. (2003), state that effective evaluation of educational programmes requires an appropriate outcome measure. They state that assessment and evaluation should be built into programmes from the outset, as is also concluded by Nentwig (1999). Continuous programme monitoring, leads, in essence, to a kind of formative evaluation (Royse, 1993).

If an evaluation focuses on programmes of study, Calder (1994) suggests that the scope of the evaluation should be relevant, and includes the pedagogic, management and often the financial responsibilities lying in the education and training.

However, evaluation rarely, if ever, occurs under ideal controlled conditions (Robottom, 1989).

The evaluations of context, input, process and product (CIPP) (Stufflebeam, et al. 1971) were suggested as evaluation framework. It is to be noted that these aspects or dimensions of assessment themselves are in effect a model of a general system (Johnson *et al.* 1964), and as such tend towards a framework for a soft systems analysis (described below) if a suitable flexibility in functions is allowed for. The evaluation of the “product” implies a summative evaluation, while

including the aspects of process provide an opportunity for the study to be formative, while context allows the study to be comprehensive.

Nentwig (1999) has presented a typology of evaluations that introduces two major classes of evaluation based on the purpose of the educational programme. These classes are fact-oriented and value oriented. The former class includes evaluations based on the stated purpose of the programme being evaluated including efficiency criteria and the stated measurable programme objectives. Value-oriented evaluations include evaluations determined by decision needs, needs of consumers or clients (such as McKay's considerations when they are participants), accountability regarding accreditation criteria, policy rules, and expert experience and assessment.

Desimone et al. (2002) supported by Garet et al. (2001) propose six key features of professional development that should be assessed, grouped into three structural and three core features. The structural features included: whether the activity was organized as a reform type, the duration of the activity, and the quality and degree of collective participation of the groups. Core features were noted as opportunities for active learning, the degree to which the activity promotes coherence in teachers' professional development, and the degree to which the activity has a content focus. Core features work through the structural features.

The environment of the intervention, both that in which it takes place and that which it creates, must be assessed. For example, both teachers and students differ in their approach and attitude to teaching and learning. The size of the class and the cognitive abilities of the students also vary. Classroom climate has been identified as having the most influence on student achievement (Simpson & Oliver, 1990). Students appear more likely to achieve better in a classroom environment favoured by the students. Not all students within a particular class favour the same classroom condition (Schibeci et al., 1987). Researchers must therefore take into account external factors, which may impact on the teaching and learning environment when analysing the result of an evaluation study.

Within this range of approaches to guidelines for evaluations lies the strong admonition that purpose, methodology and environment must match appropriately.

#### **2.4 The Case Study approach to the evaluation of an educational project**

The SASEN project had a defined beginning and end, functioned with a single group of participants, and thus provided a single opportunity for assessment. By its very nature, the challenges associate with obtaining a generalisable set of insights is the challenge faced with any Case Study.

The evaluator of the project was internal to the project. He was the formal link between the Mpumalanga Department of Education and the project presenters and the participating teachers. The possible advantages, conflicts and subjectivities which the participant observer may face and the extent to which being within the project enriches or limits the quality and nature of the resulting evaluation, are examined once the general characteristics of a Case Study are discussed.

A case study can be regarded as an exploration or in-depth analysis of a “bounded system” (bounded by time and/or place, and with bounds determined according to the needs at the time Babbie (1992)) or a single or a multiple case, over a period of time. The case being studied can refer to a process, activity, event, programme or individual or multiple individuals. The exploration and description of the case take place through detailed, in-depth data collection methods, involving multiple sources of information that are rich in context. These can include interviews, documents, observations or archival records. As such, the researcher needs access to, and the confidence of, participants (Creswell, 1998).

Case study researchers use several research strategies that may include triangulation, comparison, intensive involvement, and case selection to obtain validated and generalisable conclusions (Mark, 1996:220). As defined by Stake (1994:241) triangulation is the “*process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation*”. Mark further explains that triangulation is a method for verifying a concept or a conclusion put forth by the researcher by looking for multiple sources of confirmation. In the current study of the SASEN project the findings were verified by different sources of information and analyses, and conclusions were drawn after triangulation.

Stake (1995) argues that the sole criterion for selecting cases for a case study should be “the opportunity to learn”, a rather general statement which perhaps justifies the use of the term “study” more than “case”. This is opposed to the fact that a “case” may present itself for detailed analysis initially in isolation from a specific research programme – the research programme is a consequence of the opportunity presented by the case, not the other way round.

Mark (1996:219) describes three types of case studies with different purposes, namely the intrinsic, instrumental and collective case studies.

The *intrinsic* case study is solely focused on the aim of gaining a better understanding of the individual case. The purpose is not to understand a broad social issue, but merely to describe the case being studied.



The *instrumental* case study is used to elaborate on a theory or to gain better understanding of a social issue. The case study merely serves the purpose of facilitating the researcher's gaining of knowledge about the social issue.

The *collective* case study furthers the understanding of the researcher about a social issue or a population being studied. The interest in the individual case is secondary to the researcher's interest in a group of cases. Cases are chosen so that comparisons can be made between cases and concept and so that theories can be extended and validated.

Stake's "case" fits Mark's *collective* context.

The current study is described by the "bounded system" case format envisaged by Creswell (although the soft systems analysis later shows that several boundaries are not quite as rigid as may be supposed) and the "intrinsic case" of Mark (although the intention is always to gain some generalisable insight, and hence there is an extended dimension towards the "instrumental" case).

The challenge presented by the SASEN project was to gain an in-depth understanding of the single presentation, its participants and contexts, to purposefully inform possible future interventions in similar contexts. Mark (1996:220) noted it to be necessary that the researcher must be intensively involved in a case study approach. Researchers spend a great deal of time "on site" and personally interact with the study participants. They gather much of the data themselves through observation, participation in activities with the participant, taking notes, and recording on tapes the interviews. Researchers must develop a "feel" for the persons, group, or the phenomenon being studied. This can only happen, when researchers immerse themselves in the research setting.

By these criteria the current research was a participatory research case study through participant observation and interviews while the evaluator, representing a significant beneficiary stakeholder, was deeply involved in the daily affairs of the (single) project.

### 2.4.1 Quantitative evaluation techniques

Many researchers in science education evaluate the success of the project by determining the extent to which students' knowledge and/or attitudes to science have changed (Schibeci et al, 1987; Aikenhead, 1988; Krajcik & Penick 1989; Zoller et al, 1991). Changes are assessed by tests administered to learners before and after instruction (often termed "*pre-* and *post-*testing"). This method allows the assessment of a large number of students within a relatively short time and provides results, which can be analysed quickly.

Attitudes are often measured quantitatively using a summated rating scale, which commonly consists of numerous items, whose scores are summed to yield a total score. A control assumption

underlying the use of this technique is that the items in the scale reflect a common construct. If this assumption is not met, the scoring procedure produces largely, meaningless, uninterpretable data (Gardener, 1996, p 913). Individual items which address different constructs should be analysed separately.

One of the most frequently used methods of studying students' beliefs is the Likert technique. This technique is designed to measure the strength of the students' beliefs about the topics or a statement as an item. Students are presented with a number of statements and asked to select one of the responses: strongly agree; agree; undecided; disagree; and strongly disagree. Unfortunately, students' viewpoints are not always accurately assessed using this method (Aikenhead et al, 1987), since ambivalent responses are not always distinguishable from neutral ones (Gardener, 1987; Grant and Harding, 1987).

Instead, Zoller and Maymon (1989) have suggested that trends in belief changes – even when not statistically significant – be accepted as indicators of effective change. Such trends may involve a change from a less extreme to a more extreme response in the same direction, e.g. from agree to strongly agree or vice versa.

The single case study format itself, with its limitation of a small number of participants makes a detailed, statistically well-founded, broadly generalisable quantitative analysis unjustified. The more natural, qualitative study format is the major focus of the Soft Systems analysis, and is described next.

#### **2.4.2 Qualitative evaluation techniques**

Robottom (1989) shows that most evaluation studies in science education fail to recognise the significance of qualitative analysis, suggesting that researchers tend to concentrate on measurable data. His contention is that many aspects of the learning environment, which may impact on the evaluation process, are ignored when qualitative outcomes are discarded. Campbell et al. (1994) agreed, stating that quantitative evaluation is unreliable when assessing, for example, readability, suitability, ease of use etc. In addition, research has shown that qualitative methods may provide evidence of effective instructions when quantitative methods did not (Finley, 1986). Unfortunately, a major disadvantage of most qualitative research studies is that they require more time to complete the process than quantitative assessment. The number of teachers and students involved may therefore have to be limited.

Qualitative evaluations, usually involve the use of questionnaires, surveys, interviews, formal discussion and/or observations. Evaluating the gains out of the use of instructional materials in a



classroom by teachers and students, Schibeci (1989) used these methods successfully. Providing the context of data collection Bogdan & Biklen (1992) emphasises that natural setting is the data resource and the researcher is the key data collection instrument.

The application of a qualitative approach to the field of evaluation has been termed '*responsive evaluation*' (Stake, 1975) and '*naturalisation evaluation*' (Guba & Lincoln, 1981). In this approach, the researcher visits a site or field location to observe – perhaps as participant observer – the phenomena that occur in that setting (Tuckman, 1994). Guba and Lincoln (1981) point out some methodological concerns associated with the qualitative approach, including the need to set boundaries and find a focus to ensure that the process is credible, appropriately consistent, confirmable and neutral. Such structured qualitative research is natural to case study research (Tuckman, 1994).

Qualitative assessment constituted a major source of information in the current study particularly interviews, when stakeholders' views were collected. In addition, observation and questionnaires were used to know the attitudes of teachers and professional behaviours in and out of their performance sites e.g. the classrooms and school respectively. This provided data for both the traditional analysis and the Soft Systems Analysis.

#### **2.4.3 Conducting the Case Study (Tuckman, 1994)**

Obtaining all available documents regarding the event or phenomenon (or its background) should be the first step of the researcher. This is the best way of orientating the researcher with the situation and the study areas. In reading the document one can collect information regarding (1) the setting, (2) the participants and their respective roles, (3) the behaviours displayed by the various participants, (4) the motivations or the intentions of the participants, (5) the relationships between intentions and behaviours, and (6) the results or consequences of the behaviour

The collection of data in a qualitative case study or field work, is accomplished during site visits and requires detailed advance preparation to ensure maximal effectiveness. A visitation schedule, appropriate appointments arranged and interview and observation instruments must be developed. A mechanism for recording responses to interview questions and a procedure or mechanism for taking the field-notes that constitute observation and interview data must be available.

The quality of data is enhanced if good relationships can be maintained with all the members of the community throughout the project (Neuman, 2000). Relationships should be built on mutual trust, cooperation and the knowledge that the relationship will be terminated at some stage or another when the enquiry has been completed.

It is useful for the researcher to be ready to answer questions that the people visited may ask regarding the data collection activity. Bogdan & Biklen (1992) indicated that the most frequent questions asked are: (1) what are you actually going to do ? (2) Will you be disruptive? (3) What are you going to do with your findings? (4) Why us? (5) What will we get out of this? It is suggested that the general rule to follow in answering all questions is to be honest. They also offered the following suggestions regarding the researcher's behaviour: (1) Do not take what happens personally. (2) Set up your first visit so someone is there to introduce you. (3) Don't try to accomplish too much first few days (4) Remain relatively non-controversial. (5) Be friendly.

Participation in the inquiry might not have any obvious advantages for the participants and they might not feel that the study in any way better their circumstances. It is thus important that the researcher makes all efforts to maintain a relationship of trust with respondents. The researcher should be as unobtrusive as possible, instead of being too involved from the start. Some respondents may see the researcher as an intruder and will do their best to make him feel unwelcome in their community.

#### **2.4.4 Analysing the data**

The field notes that are prepared in the notebook or in the mind of the researcher (reflections), interview transcripts, plus any information gleaned from the programme documents are the data for the qualitative research project. Analysis of these data means using the data to answer the questions the research set out to answer.

Turner (1981) in Tuckman (1994) identifies eight stages of development for organizing data as follows:

- i. Use the data collected to develop category labels for classification of the data;
- ii. Identify examples of each category in the data of sufficient number to completely define or saturate each category, making it clear how future instances would be classified;
- iii. Based on the examples, create an abstract definition of each category by stating the criteria to be used for classifying subsequent instances into each category;
- iv. Use the definitions you have created as a guide to both data collection and theoretical reflection;
- v. Attempt to identify additional categories that suggest themselves on the basis of those already identified (e.g., opposites, more specific ones, more general ones);
- vi. Look for relationships between categories, develop hypotheses about these links and follow up on them.

- vii. Try to determine and specify the conditions under which relationships between categories occur;
- viii. Where appropriate, make connections between categorized data and existing theories.

These steps of analysis suggested by Turner guided the analysis both in phase (1) and phase (2). Categorising the data by definitions helped classifying and organizing them. Drawing conclusions after relevant interpretations became systemic and useful. Items (iii)-(viii) were used in the Soft Systems Analysis approach described below in almost all of its stages of analysis.

## 2.5 Participant observation

The evaluator of the project was internal to the project. Although he was asked to present an occasional lecture, he was the formal link between the project presenters and the Mpumalanga Department of Education as a full-time employee of the department in the district in which the project was being presented. He participated in the original negotiations that conceptualised the intervention. He had full access to schools in his capacity as Curriculum Implementer whose duty was to support teachers of science in the schools. He had the opportunity to regularly provide feedback of observations he was able to make at schools, and at other opportunities to the director of the SASEN project as he and the director would often travel together to the venue of the project from Pretoria on the Saturday mornings that the project was presented. While this provided an excellent channel of communications for the project, this did place a risk on the objectivity of the observer as evaluator.

Strydom (2003) defines the role of the researcher on a “continuum from total involvement on the one hand to total observation on the other”. Dane (1990), Grinnell & Williams (1990), Babbie (1992) and Rubin & Babbie (1997) discuss ways in which the participant observation can take place while the observer is embedded in the project: As the total observer who observes but acts in no other capacity (which maximises an expectation of neutrality), the observer as participant (the observer serves some minor functions, but primarily observes), the participant as observer (where functions as part of the presentation team predominate, but he is still known as formal observer), and the total participant (who records events, reflects and records impressions after his roles are performed).

Tripodi (1983) expressed the opinion that the researcher and the respondents should be fully involved in the total research project. Dane (1990:158-160) suggests that the researcher becomes part of the situation but at the same time nothing should be changed in that situation (as Babbie’s “total observer”). Muller (1995) and Sheppard (1995) state that the researcher should be actively

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involved in the daily situation of respondents while observing their behaviour (as Dane's etc. "total participant").

The level of participation of the evaluator as representative of one of the beneficiary stakeholders (the MDE), as mediator between the Department and the presenters, and with a fulltime teacher support function (within the MDE) places him outside the actual presentation, but firmly as participant in the project. While presentation activities are under way, he is an embedded observer. In Babbie's sense he is best viewed as "observer as participant".

### **2.5.1 Advantages of participant observation**

Strydom (2003:283-4) listed several advantages of participant observation derived from Babbie (1992), Bailey (1994); Chadwick et al. (1984); Graziano & Raulin (2000); Jorgensen (1989); Muller (1995) and Smit (1983).

Participant observation often makes the observer less obstructive, and in so doing reduces the likelihood that the observer will influence the participants' behaviour. This requires the participant's role to be natural and by participating fully in the activities of the community, the researcher does not stand out as an outsider.

Participant observation can be of special importance in the case of studying attitudes and behaviour patterns of respondents in their natural situation.

It is suitable for longitudinal studies since the study can take place over a period of months or even years, as the participating observer has a reason for being present, besides the role of observation. Changes that take place over time can thus be successfully studied.

These advantages are particularly relevant for the investigation of the SASEN project where the researcher participated from the initial design through to the post-completion evaluation as an official of one of the major owners of the project, the Mpumalanga Department of Education.

### **2.5.2 Disadvantages of participant observation**

Strydom (2003:283-5) also highlights several disadvantages of participant observation that must be guarded against, however. (Babbie, 1992; Bailey, 1994; Chadwick et al., 1984; Denzin & Lincoln, 2000; McBurney, 2001; Preston-Whyte, 1985; Smit, 1983 and Yegidis & Weinbach, 1996 as cited in Strydom, 2003).

When the researcher fully participates in the activities of the community, respondents will not act as naturally as in the case of no outsider being present – if the researcher is viewed as an outsider.

The mere presence of the researcher will cause changes in the community, and reactivity, which will always be a problem whether minor or major, needs to be taken into account during interpretation. It is virtually impossible for the researcher to leave the field in the same state as it was before his involvement. Where the research is based on the effects of an intervention intended to produce change, this is itself less of a problem.

Data gathered can seldom be quantified because of the small number of respondents normally used in studies of this nature. Thus it is depth of insight rather than breadth of information that is gained. Most of the time data collected will tend to be qualitative and explorative in nature.

Combining the advantages and disadvantages, it is clear that participant observation can be used in a wide variety of settings. Participant observation provides the opportunity for an in-depth study over a period of time with a restricted number of respondents, albeit that the results are qualitative rather than quantitative or statistically based. The greater the level of participation of the observer, the more the precautions must be addressed in the methodology.

### **2.5.3 Data gathering during participant observation**

In participant observation an opportunity is created for additional data that is gathered as continuous observation supported by the keeping of field notes. Judd et al. (1991) state that field notes should consist of everything the researcher sees or hears. Initially this might seem to yield uninteresting, boring detail but the researcher is unlikely to know at the beginning of the study what might become important later on.

In addition, various data collection techniques can be used, e.g. open-ended narrative, checklists, pamphlets and interviews (Denzin & Lincoln, 2000). Coertze (1993) emphasises the importance of in-depth interviewing.

## **2.6 Soft systems methodology as an analytical approach to developing understanding of a complex project**

Desimone et al. (2002) identify and describe a professional development activity as a complex issue. The nature of professional development experiences can be described on many dimensions, many of which must be identified during an evaluation process. Complexity increases in a system over time (Senge, 1990; Fisher & Torbert, 1995; Kelly, 1995; McMaster, 1996; Trivitt, 1996),

particularly systems involving human beings, who may take on differing roles as a programme progresses.

Sherwood (2003) identifies the essence of systems thinking as taming the complexity of a real world situation by seeing things as a whole: holistically (Smuts, 1926). Systems thinking is founded in the insight that component parts of a system can best be understood through their relationships with each other within the system and with other systems, rather than in isolation. Dividing up a system, conceptually, into bits for study is likely to destroy the system's connectedness and hence the system itself: in order to influence or control the behaviour of the system one should act on the system as a whole. Tweaking it in one place often fails because of the connectedness. Sherwood has emphasised the use of systems thinking in enhancing our understanding of complex systems, to help one to take a holistic rather than a narrow view. Sherwood has applied these concepts to human activity systems.

We first introduce a general system before defining the characteristics of a soft system that makes the SASEN programme assessable through the process termed Soft Systems Analysis by Checkland (1999).

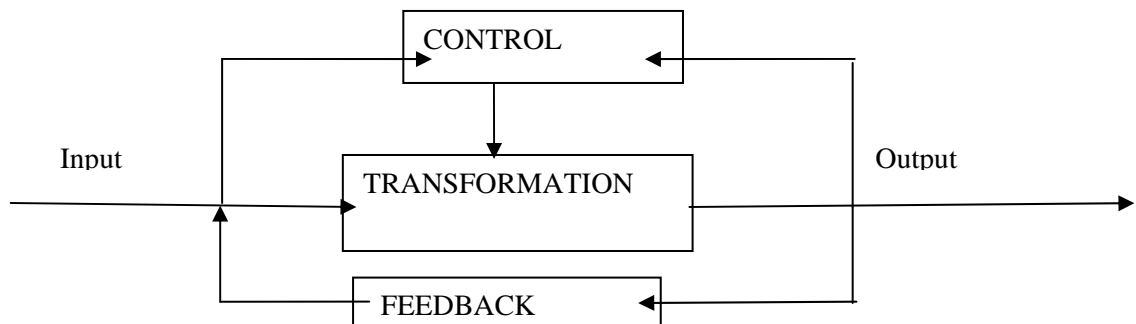
A system consists of elements with interactions (relationships, defined by some hierarchy) that work together to achieve a purpose, which cannot be “achieved” if the elements work individually. In a sense, “a system is greater than the sum of its parts”.

As a basis for evaluation of a project, Calder (1994) describes the CIPP model of a system, and its associated formal evaluation processes. The evaluation itself is described in terms of the CIPP model. The purpose of evaluation decides the approach or method of evaluation to be used. For the evaluation of learning and teaching or of the impact of an educational intervention on its students' academic development, Calder (1994) put forward criterion-referenced test, pre-test – post test, illuminative evaluation as the measurement processes required within a CIPP (Context evaluation, Input evaluation, Process evaluation and Product evaluation) evaluation model of the system.

Calder elaborates the understanding of CIPP as a process of evaluation as follows (after Richmond & Daniel, 1979):

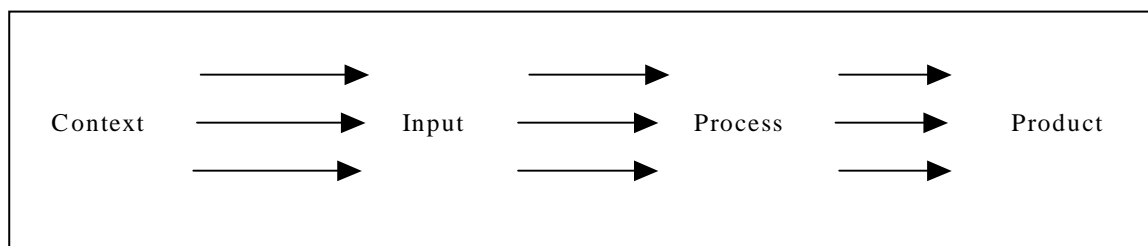
- Context evaluation: describes data about the programme objectives, intended outcomes and criterion measures.
- Input evaluation: the selected programme study
- Process evaluation: the implementation of the programme, procedures and strategies.
- Product evaluation: the success of the programme (the same as summative evaluation).

In Figure 2.1 the system shows several major components, the central function of the system is the “transformation” process, which produces change of the inputs, to produce a desired outcome or “output” consistently. The transformation process is controlled, and depends on measurement of the outputs (and adjusted accordingly by a “control” function), and should the output deviate from the desired, a feedback provides, adjusts inputs and informs the control function which controls the transformation to once again produce the desired output. This kind of system, ITOFC, is adaptable and adapts the transformation process to its environmental input – it survives, certainly longer than a rigidly defined system is able to. (Field & Keller, 1998:275)



**Figure 2.1 A diagram of the key elements of an ITOFC system. See for example Field & Keller (1998:275).**

The system functions over time, to produce a desired output from an input which may vary over time by including a classical control loop with adaptive control of the transformation process.



**Figure 2.2 A diagram of the key elements of a system that produces a desired product from an input within a context. Calder (1994)**

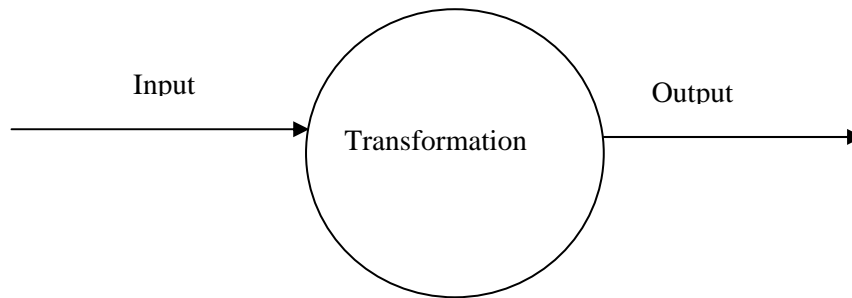
Calder elaborates the understanding of CIPP as a process of evaluation as follows (after Richmond & Daniel, 1979):

- Context evaluation: describes data about the programme objectives, intended outcomes and criterion measures.
- Input evaluation: the selected programme study
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- Product evaluation: the success of the programme (the same as summative evaluation).



Patching (1990) suggested the ITO model of a system (also known by Kast & Rosenzweig 1972, 1976 as the Open Systems Model) with which to design measures of performance for a system for the purpose of an evaluation. This comes from the idea that a system should have an ongoing purpose or mission to effect a change.

In the ITO model (Figure 2.3) the system is viewed as formed from three elements: Input, Output and the Transformation process as the central component which is intended to transform a defined input into a desired output.



**Figure 2.3 The ITO general open systems model (Kast & Rosenzweig 1972, 1976; Patching 1990)**

The ITO and CIPP models of a system can be seen to be parts of the more general ITOFC adaptive system model with classical feedback and adaptive control, with the ITO model being the lowest in the hierarchy of complexity (or identified elements). Both Calder and Patching design their evaluation procedures around the models. Below, it is a consequence of analysis that the SASEN project is more adequately described by the ITOFC model, in particular to include the environmental elements in greater detail, as control and feedback subsystems. It is however relevant to compare the descriptions that are achieved by discussing the generic form of Checkland's systems approach with the more restricted (or less detailed, more abstract) ITO systems description, particularly when used as the basis of an evaluation.

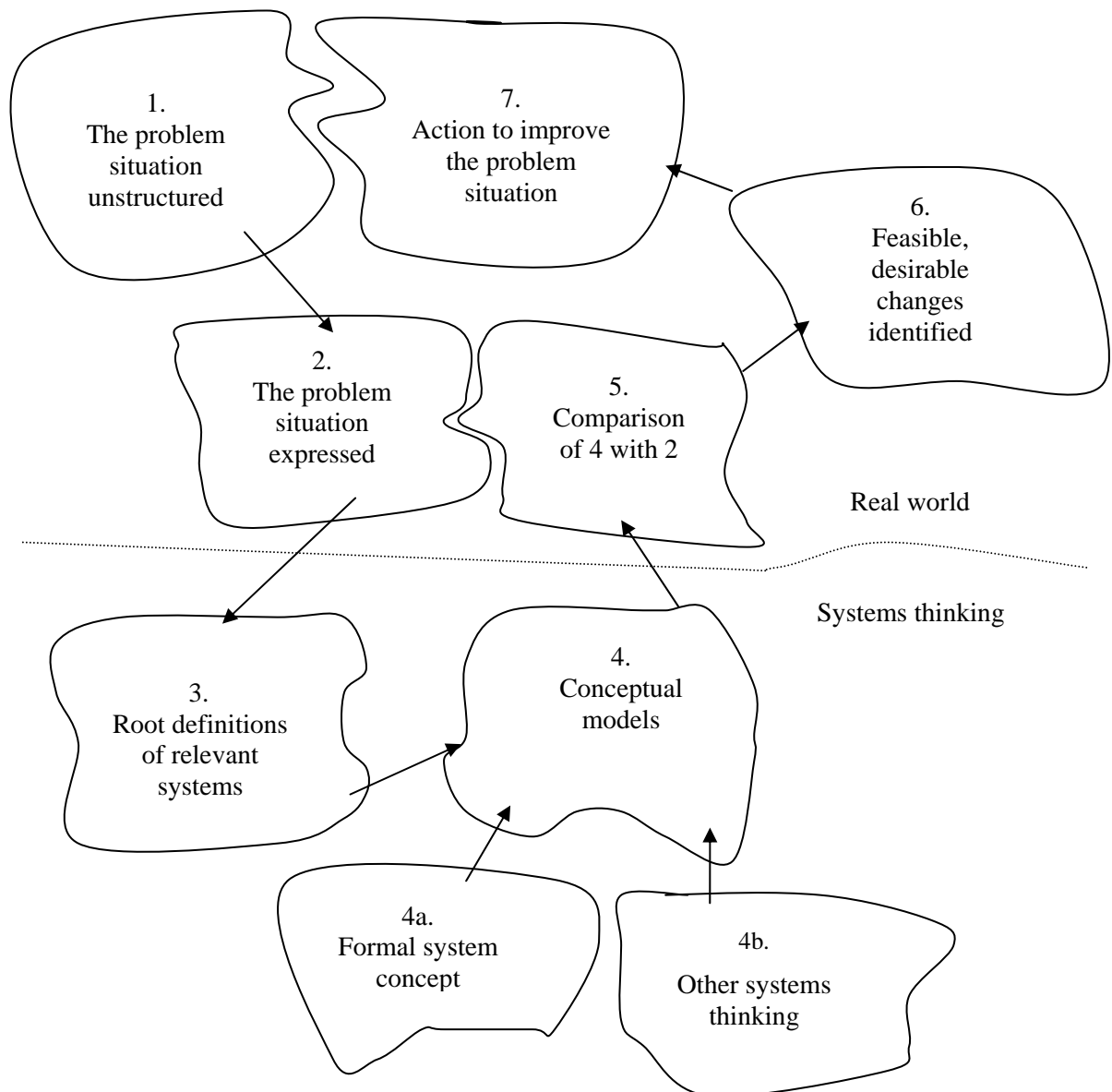
In our view, the models must be appropriate to the complexity of the system to be investigated. Choosing a systems model influences the design of the evaluation by imposing assumptions of the structure of the programme or project being assessed. More specifically, if the elements and their relationships change over time, the analysis must be sensitive to these changes. Models with rigid boundaries or structure are inappropriate if the systems involve people with relationships that change continually. Soft systems are of this kind. (Checkland, 1999; Sherwood, 2003). They vary and have multiple interactions and actions contributing to producing the output.

An evaluation process that involves stable rolls and structure, may be appropriate for projects that function in a short time frame, or are rigidly managed to avoid role changes (such as military organisations) but hardly applies to evaluating a project that functions over several years, with a



considerable component of voluntary contributions. For the latter, an approach that is sensitive to structural changes, role changes, even changes of personalities and multiple sub-groupings is required. Discovering and tracking the multiple roles over time is an inherent challenge.

Checkland's (1999) Soft Systems Analysis Framework (or "Soft Systems Methodology for Tackling Unstructured Problems" or simply "Soft Systems Methodology") allows one to establish a suitable hierarchy of structures, and appropriate measurements to be performed to characterise them, while assessing the soft system. The methodology provides a structured and systematic approach for analysing human activity systems such as an educational programme (Patel, 1995).



**Figure 2.4 The soft systems methodology in summary (Diagram from Checkland (1999:163)).**

The diagram in Fig 2.4 (after Checkland, 1999:163) illustrates the soft systems process. The methodology contains two kinds of activity in seven stages. Stages 1, 2, 5, 6 and 7 are activities

performed in analysing the “real” situation, necessarily involving people in the problem situation. Stages 3, 4, 4a and 4b are ‘systems thinking’ (or modelling) activities which may or may not involve people within the problem situation (“participants”).

### 2.6.1 Stages 1 and 2. Expression of the problem situation

Checkland states that the function of stages 1 and 2 is to display the situation so that a range of possible and, hopefully, relevant choices can be revealed. In a problem situation, the initial step is to build *the richest possible picture* of the situation being studied. Such a picture then enables a selection to be made of a viewpoint (viewpoints) from which to further study the problem situation. Aspects that appear to be related are grouped together, and relationships identified. Once those selections are made, of course, one or more particular systems, which will be part of a hierarchy of systems, are defined as *relevant* to solving the problem.

A tool proposed by Sherwood (2003:70) is the causal loop diagram. In addition to forcing the analyst to order the information that is available, creating such a diagram requires the analyst to identify which elements influence others, and in what direction a change of one element, produces a change in the other (whether an increase of magnitude of some measure in one, causes an increase or decrease in another). This creates recognition of the cause and effect relationships that underlie the system. Each cause-and-effect relationship is indicated by an arrow in a diagram pointing from “cause” to “effect”. Each link is identified either of type S (which represents the relationship in which an increase in cause produces an increase of measures of the effect) or of type O (where an increase in cause, causes a decrease of measures of the effect).

Where closed loops occur, one has identified parts of systems that contain feedback. If the number of O’s in the loop is odd, then there is a net dampening built in, and the system tends to stabilise itself and continue to pursue a set, continuous output goal. If even, then each pair of O’s is equivalent to an S type, and that system is ever-accelerating in a virtuous or vicious cycle at every turn. [This is used below in Figure 4.2.]

Identifying such parts of a system add to the rich picture of Checkland’s second stage.

### 2.6.2 Stage 3. CATWOE and root definitions of the relevant (sub)systems

In this stage definitions of the purpose or role of the system and relevant sub-systems or related groupings is sought. It gives names to notional systems, which, from the analysis phase, seem relevant to the problem. In particular the categories of subsystems which Checkland provides lead

to a deliberate systematic process of identifying the relevant subsystems. The model of the system is shaped through the root definitions at stage 3.

To build a model of a purposeful activity a clear definition of the activity is required. These definitional statements are the ‘root definitions’ of Soft Systems Methodology. They are constructed around an expression of a purposeful activity as a transformation process T. In this entity, the input to the transforming process is changed into a different state or form, so becoming the output of the process. A bold sparse statement of T may stand as a root definition. T is included in the mnemonic CATWOE, the letters of which guide the building root definitions suitable to the purposeful activity:

- C – Customers (beneficiaries or victims of a notional system).
- A – Actors or the system’s participants, in particular the participants of the transformation subsystem.
- T – Transformation process, the core process that derives its nature from the purpose of the entire system.
- W – Weltanschauung – world view, which gives it a meaning. This describes the (unquestioned) image or model of the world which makes this particular human activity system (with its particular transformation process) a meaningful one to consider. This statement may contain the value system driving the evaluation of the outcome.
- O – Owners, those decision makers who could destroy it, and thus provide controls to the system.
- E – Environmental constraints, to which the system is subject, hence a potentially higher level system of constraints or controls.

This systems analysis guides thinking at three levels: What? (System: T, A, O); How? (Sub-system: T, O, A); and Why? (Wider system: C, E, W, O). [It is to be noted, that these are also guiding questions for an evaluation.] CATWOE elements are used to check “who is doing what for whom, and to whom are they answerable, what assumptions are being made and in what environment is this happening?” (Wilson, 1992). But the choice of the level in the hierarchy, and the depth of analysis, is always observer dependent, and thus the ultimate systems model is not unique – if produced by a group it, however, reflects a common achieved understanding.

For the purpose of an evaluation Patching (1990) (in terms of an ITO model) identified the most important element to be the transformation process or subsystem and the associated worldview. The system should seek to satisfy a customer and the output should be a satisfied customer. Patching thus takes note of actual output of a transformation in relation to the inputs to assess the

success of a transformation process. Checkland has a richer set of elements, which are captured here in the ITOFC structural model.

### 2.6.3 Stage 4: Creating and testing the conceptual model

The root definitions of stage 3 may collectively be looked at as a description of a set of purposeful human activities conceived as a transformation process. According to Checkland the conceptual model is a model of an activity system and its most important components will be verbs stating actions. The technique of modelling is to assemble the minimum list of verbs covering the activities, which are necessary in a system defined in the root definition, and to structure the verbs in a logical sequence. Patching (1990) suggested that the activities of the system should be expressing the *how* rather than *what* is being done in particular. In Patching's abstraction, the desired attainment is customer satisfaction. Here, we have expressed this as satisfaction of stakeholder expectations.

After this stage, the major characteristics of the system have been identified, captured in clear statements of purpose, cause and effect relationships have been mapped, and a structural model has been built. This allows the design of an appropriate series of measurements to be undertaken in the next stage.

### 2.6.4 Stage 5: Comparing conceptual models with reality

In Stage 5 the conceptual models (alternatives and the hierarchy of sub-systems that have been built through stages 3 and 4) are compared with the real-world descriptions of stages 1 and 2.

Checkland identifies *four ways* of carrying out the comparison: By using a systems model to open up a debate about change, by reconstructing a sequence of events in the past and comparing it with what would have happened if relevant conceptual models had actually been implemented, by asking what features of the conceptual models are especially different from present reality and why, and by '*Model Overlay*'. This last one has been used successfully by researchers (Wilson, 1979) in seeking a more rational organisational structure. With this method of direct overlay of one model on the other the mismatch between the models, which is the source of discussion for change, is revealed.

As Checkland describes '*the purpose of the comparison stage is to generate debate about possible changes which might be made within the perceived problem situation. In practice initial work on this stage frequently draws attention to inadequacies in the initial analysis or in the root definition(s). Eventually, however if necessary after several iterations, the comparison will lead to*

*discussion of possible changes*'. The possible changes identified could be: Changes in structure, in procedures, and/or in attitudes. The term '*change in attitude*' as Checkland explains is intended to include things like changes in influence, and changes in the expectations which people have of the behaviour appropriate to various roles, as well as changes in the readiness to rate certain kinds of behaviour 'good' or 'bad' relative to others. Vickers (1968, 1970, cited in Checkland, 1999) explains these changes as an effect of an '*appreciative system*' (thus understanding) that develops during the process. Such changes will occur steadily as a result of shared experiences lived through by people in groups, and they will also be affected by deliberate changes made to model structures and procedures of the analysis (as well as in the real world).

Of relevance to the current task, where the 'problem situation' is the evaluation of a programme, the changes in models (or assumptions) are part of the iterative process of discovering the detailed requirements for the evaluation that support adequate judgement. It is relevant that the attitudinal changes, so important when assessing the progress of a programme involving people over time, is both part of the evaluation process, as well as a purpose (i.e. something to be measured deliberately,) of the evaluation of the SASEN project.

#### **2.6.5 Stage 6 & 7: Finding the desirable and feasible changes and the implementation in solving the problem**

In a running process, the changes identified and reduced to those that are most appropriate during stage 5, should meet two criteria. They must be arguably systemically desirable as a result of the insight gained from selection of root definitions and conceptual model building, and they must also be culturally feasible given the characteristics of the situation, the people in it, their shared experiences and their prejudices. (Often desirable and feasible changes may not be the same.)

Stage 6 involves the recommendation of the identified, optimally selected or accepted, changes to be made – and their implementation follows in stage 7.

In principle, once implementation has been initiated and is underway, the process reverts again to the earlier stages. Checkland agrees that once changes have been agreed, their implementation may be straightforward, or their introduction may change the situation so that although the originally perceived problem has been eliminated, new problems emerge. Or the activity of implementing changes may itself be problematic. This new problem situation may thus be tackled by means of the methodology, hence a return to the earlier stages for the altered situation.

Checkland's terminology and approach is not only applicable to the progress of the system under study [the intention of Checkland's Soft Systems methodology is the management of a complex

long-term continuing activity from within], but also (of particular interest to us) to the progress of the evaluation of the system. This realisation is the key to allowing Checkland's methodology to be applied not only to developing understanding of a complex system while managing the system (hence being internal to the system) – but also to be used as the framework for evaluation of a complex programme. The purpose of evaluation is also to gain (unbiased) understanding (particularly when the evaluator is also within the system), and where the object of the evaluation is a complex system that involves people in multiple roles that change over time. Checkland's Soft Systems Methodology can be adapted as a framework for evaluation and Stage 5 is the suitable stage for locating the actual measurements that are required by the evaluation, whether quantitative or qualitative.

For an evaluation process, the recommendations for change, and the assessed collection and expression of the final understanding, are the ultimate outcome. It is proposed here that the evaluation itself, based on Checkland's methodology, thus ends at stage 6.

If the recommendations and understanding are used in the design of a continued phase of the running project, or in a new and unrelated project, one may claim to have reached a seventh stage. Stage 7 is thus a stage beyond the evaluation itself. Calder (1994) has emphasized that an evaluation must be viewed as an activity that is to be utilized and utilization must be viewed as part of the evaluation process. The final stage is essential, if the institution wishes to identify itself as a '*learning organisation*'. Westerheijden et al. (1992) gave three categories for utilization: no utilization, passive utilization and active utilization. It is stressed that only the level of utilization determines the importance and gives value to the whole evaluation process.

While the soft systems based evaluation process is described in 6 stages, the seventh is implementation, and is thus the beginning of a changed programme, organisation or intervention – and is a consequence of the evaluation, applied to a continuing project.

### **2.6.6 Discussion of Soft Systems Analysis**

The SSM [Soft Systems Methodology] considers the human problems and issues to be handled as a focal point whatever their nature or complexity. Underwood (1996) notes that some of the people categories in Checkland's "*CATWOE*", namely "actor", "client", "owner", and "environment" categories may overlap, and they and their intersections may change with time.

There will always be many possible versions of the system to be engineered or improved and system boundaries and objectives may well be impossible to define (Checkland, 1999). However, SSM is potentially able to address all areas of purposeful human activity. Patel (1995) maintained that the methodology is unique in that it enables the analyst to embark on a process of learning

about the real world situation being investigated, while simultaneously seeking to improve it. The analysis performed yields recommendations for further action to improve the problem situation. Patel, acting as a reflective practitioner and as analyst used the methodology to explore the learning and teaching situation prevailing in undergraduate education with the aim to improve the process.

The purpose of the soft system is established through obtaining and expressing a common understanding as “Root definitions” which specifically indicates the agreed human activities. Underwood (1996) emphasizes that achieving an agreed root definition (at least tentatively) is probably the most beneficial part of the SSM.

Vickers (1968, 1970, cited in Checkland, 1999) argues against taking social systems as goal seeking, pointing out that ‘relationship-maintaining’ is often a better description of their purpose. In a different context of motivating African workers to achieve more, Mbigi (1994) asserts that ‘intimate relationships empower people to freedom and action, instead of analysis and paralysis. The intimate relationships rest on shared commitment to ideas, to issues, to values, to goals and management process. These relationships enable people to find meaning and satisfaction in their work.’ This supports Vickers, and by extension, Checkland, as well as the applicability of an analysis which inherently seeks to identify relationships in an evaluation.

A characteristic of the SSM is that it does not actually tell one how to build a system; there is no real method (Underwood, 1996). The open-ended nature of the Soft System Methodology is of specific concern and risks that it is impossible to manage and produces ever more complexity as a consequence. As a unique conceptualisation is neither expected nor possible, there is no way of telling whether an SSM process is a success or a failure (in the sense of producing a best, or even optimal recommendation for change) (Checkland in Underwood, 1996). It is essential that the process end once its iterations have raised *sufficient understanding* to produce cogent results of analysis (in an evaluation) or clear recommendations for change (in a running process). These are the best possible result, based on the insights gained. The process, being meant to provide understanding (and acceptance by participants), provides a basis for informed judgement, not the judgement itself.

Underwood (1996) criticises the use of the SSM as a tool in a running system as it may be too simplistic for real situations in that SSM risks ‘*impos[ing] values of openness and “niceness” which are more suitable to middle class academics than to managers and workers*’. SSM itself is based on a too simplistic understanding of social systems in this application. This should not be a risk in an evaluation, however.



An evaluation, and potentially the conclusions and recommendations flowing from an evaluation based on the SSM, may be considered the outcome of a particular understanding that arose within the process. As in any evaluation, its outcomes are as good as the conceptual model it developed (or used). Its major advantage, perhaps is that the conceptual model (or assumed structure) is not imposed *ab initio*, but developed within the process, and may be expected to be more relevant, richer and more able to identify the unexpected, than an evaluation based on a pre-assumed over-simplified, or inappropriate, structure.

## 2.7 Aspects that became part of the evaluation as a result of the soft systems analysis

Soft Systems Analysis is an iterative process which leads to an identification of a hierarchy of sub-systems each with their set of elements and relationships within and between them. As part of the SSA, several evaluation issues were found to be relevant during the evaluation process, and consequently analyses were performed in accordance with them. Although the identification of these criteria may be appropriately discussed as *outcomes* of the soft-systems process (and hence as a kind of “result”), and are then applied within the evaluation process (leading to “data” and thus further “results”), we discuss their sources here, rather than in Chapter 3 or 4. We ask the reader to bear with us as we describe these apparently unrelated aspects at this stage, at the risk of running ahead of the actual evaluation process described in the succeeding Chapters 3 and 4. This allows the structure of the report (which keeps source and analysis chapters separate) to better support readability.

Below, we will use the CATWOE mnemonic in a simple manner, without yet identifying who or what sub-organisation was ultimately part of a hierarchy of sub-systems, to guide the introduction of these aspects that are applied later as a consequence of the actual modelling process within the soft systems methodology.

### 2.7.1 Self -Efficacy beliefs as an outcome [C: Customers ]

Grayson (2005) has found direct links between ‘self-efficacy beliefs’ about competence to teach Mathematics and Science to teaching practices and professional attitudes Accordingly as teachers struggled and succeeded during the courses their confidence grew, their willingness to try new things grew, their willingness to put in time on task grew, their desire to keep working on a problem until they solved it grew. All of these changes point to teachers’ self-efficacy beliefs about their subject matter competence. Kriek (2005) also maintains that Mathematics and Science teachers’ command of their subject has wide ranging effects: it influences what they teach, how they teach, and even their level of professionalism. Perceived self-efficacy is defined as people’s



beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave (Bandura, 1994).

Grayson (2005) wrote that success should not come so easily that when faced with a difficult situation or hard work people may be discouraged and give up the task. Therefore the teacher development projects should comprise hard work and require perseverance in order to achieve the desired targets. Bandura (1994) explains that easy successes make people expect quick results and failures easily discourage them. A resilient sense of efficacy requires experiencing overcoming obstacles through perseverant effort. Some setbacks and difficulties in human pursuits serve a useful purpose in teaching that success usually requires sustained effort. ‘Mastery experience’ in the field of learning is suggested to be one of the effective tools to gain ‘self-efficacy belief’.

Grayson et al. (2001) assert that *‘whilst content knowledge is vital, Maths and Science teachers’ attitudes also need to be considered, when developing interventions aimed at improving pupils’ performance.’* Malcolm et al. (2000:76) reported to have found similar attitudes of the teachers in successful disadvantaged schools, and add that a major factor leading to pupil success is hard work and long hours the “natural outcome of dedication and motivation”. Another reported factor by the same paper in the pupils’ success was their feeling that teachers cared for them and were prepared to spend time with them, not only during class and in subject related discussions but also by offering encouragement and pastoral care to pupils.

Ogunniyi (1986) found a lack of teacher motivation as one of the problems hindering good Science education.

Taylor and Vinjevold (1999, in GLR, 1999:135) reported (based on PEI research) five main issues in teaching and learning: institutional conditions, the attitude of teachers, teacher knowledge, classroom practices and student learning. Attaining a belief in one’s self-efficacy, which is supported by one’s perception of knowledge, with potential impacts on motivation, willingness to challenge learners, and professional practice and attitudes should be an outcome of a successful INSET programme.

### **2.7.2 Attitudes of teachers [C: Customers]**

*“Attitude and interest are vital in teaching and learning for both serve as mediators of responses and as motivation forces.”* LetsHufi (1988).

Attitude is an affective reaction that involves emotional feeling about an object (Mogari, 2003). There is a tendency among pupils to attach value to the subject that they enjoy (Kulm, 1980) and in which they perform well (Wigfield & Mece, 1988). Some researchers (Ma, 1997; Kulm, 1980) found that there is a causal relationship between attitude and achievement. Maqsd (1992) also reported a statistically significant relationship between achievement and attitude, as well as between each of the four components of the constructs of the attitude. Although in a slightly different setting and in the context of understanding Euclidean geometry, Mogari (2003) found no statistically significant relationship between achievement and attitude, but he did find a significant relationship between achievement and motivation.

Kulm's (1980) causal relationship with attitude in the case of learners is achievement, but in the case of teachers the same cause seems to be conceptual and in-depth knowledge of the subject, which affects developing the positive attitude towards their profession as educators. Reeves and Long in Taylor & Vinjevold (1999:151) found evidence of a strong relationship between improved Science learning and the extent to which teachers are able to promote learners' engagement with Natural Science knowledge (content, concept, process and language). Webb et al. also in Taylor & Vinjevold (1999), claims a correlation between teacher knowledge and student achievement. It is reported by them that teachers' conceptual knowledge is significantly improved through subject focused in-service training. Additionally, improved teacher knowledge leads to improved student learning. On top of this on the point of 'spending more time in schools and achievement of learners' Maja in Taylor & Vinjevold (1999) postulated a link between student achievement and schools, which exhibit higher degrees of discipline, order and productivity. Teachers in better performing schools spend more than twice as much time preparing lessons than their counterparts in the relatively poorer performing schools.

Attitudes and efficacy beliefs are interrelated and both affect learner attainment.

### **2.7.3 Teacher clusters [A: Actors and T: Transformation]**

Gottesman (2002) calls clustering "systematic school improvement through peers". Adams (2000) defines the cluster as teacher professional networks that are instrumental in shaping teachers' beliefs, knowledge and practice. Sawyer (2001) describes a cluster as a group of teachers that grow as collaborative leaders within the same school or even in the same department and are supported by the particular school or the same community. Schmoker (1999) wrote about unlimited boundaries of teachers involved in professional growth, when they take part in cluster activities. At the same time Fullan (2001) suggests limiting the boundaries and advocates a cluster to be formed from nearby geographically situated schools that meet frequently to discuss their professional

issues. Ndlalane (2006) insists that successful clusters should be bottom up community structures working for a common goal.

In the sense of Ndlalane (2006), 3 clusters of teacher groups were formed in the SASEN project, reflecting three geographically separated school circuits. The organisational structure that was established for each of the structures, their meeting locations, schedules and activities were decided by the participating teachers themselves, after an initial facilitation by Ndlalane. In this sense, the “customers” became “actors” and “owners” – taking responsibility for an important part of their learning, and so actively contributing to the transformation.

#### **2.7.4 Learning Organisation [T: Transformation]**

Senge (1990:4) quotes Arie de Geus, head of planning for Royal Dutch/Shell “*Forget your tired old ideas about leadership, the most successful Corporations of 1990s will be something called learning organisations. The ability to learn faster than your competitors may be the only sustainable competitive advantage*”

The problem, which has to be dealt with, is chiefly connected with the complexity that surrounds modern management particularly as complexity increases in a system over time (Senge, 1990:1-3; Fisher & Torbert, 1995; Kelly, 1995; McMaster, 1996; Trivitt, 1996). Trivitt (1996) suggests that an organisation is like a machine, which has to be controlled. Increasing complexity can leave staff feeling powerless. Senge et al. (1994:50) believe that the organisations that will truly excel are the organisations that discover how to tap peoples’ commitment and capacity to learn at all levels in an organisation. Senge (1990:3) states one must build a learning organisation, “where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together”

Hayes and Hillman (1995) distinguish between learning and non- learning organisations as shown in Table 2.1.

Characterising a learning organisation is the encouragement of forward-looking – where problems have arisen, one not only solves the problem, but investigates the implications particularly for the future, and makes long-term changes to the organisation/policies/practices if necessary. Staff are recognised as the custodians of organisational memory and skill, and these are developed, shared and captured (where possible).


**Table 2.1 Comparison between Learning and non-learning Organisations (After Hayes & Hillman (1995))**

Non-learning Organisations	Learning Organisations
React to current problems;	Anticipate future problems; focus largely on internal operations; pay attention to the external environment;
Respond to the evidence of poor performance;	Continuously seek improvement;
Approach solving problems through trial and error and in compartmentalised ways;	Approach problem solving through conceptual analysis and on an organisation-wide basis;
Reward past performance;	Reward initiative and creativity;
Define jobs narrowly and discourage risk taking.	Define jobs to encourage risk-taking exploration, initiative and knowledge sharing.

The idea that all organisations should prioritise learning stems from a management culture but it has, in the context of promotion of the learning society taken on a much wider significance for organisations, which have as their core business the major goal of delivering learning (Ball, 1992; Richardson, 1995; Coffield, 1997; Kennedy, 1997). Young (1997) termed such organisations ‘specialist learning organisations’.

Calder (1994) also gave importance to the evaluation of a learning organization for its success. Argyris and Schon (cited in Calder 1994) asserted that evaluation is used, or should be used, to enable the institutions to operate as learning organizations. Making continuous evaluation a part of the practice of the organisation is one step towards building a learning organisation.

### 2.7.5 Balance between change and delay [T: Transformation]

In a sluggish system, aggressiveness produces instability. Either be patient or make the system more responsive (Senge, 1990:378-79). Jones (1996) argues and suggests that a narrow and functional approach is a major reason why so many management and training initiatives intending to increase efficiency, quality and innovation are unsuccessful and promotes ‘giving recognition and practical support to managers who learn with and develop employees’.

Duckett (2002) asserts that the learning organisation should be viewed within the context of organisational behaviours as a whole. Hunt (1998) argues that the looser structural form has

advantages — it focuses on performance rather than procedures and liberates teams and individuals to make decisions, be creative and behave in an independent, adult way.

Mbigi (1994) argues that western leadership and management practices are often too focused on organizational efficiency, and neglect the feelings and desires of the people who work in an organization. He then suggests that the strength of the western approach should be integrated with African traditional thinking in order to accommodate and use these, often, irrational desires and behaviours to the end of better productivity. As an example he suggested the use of a ‘*Shona traditional pungwe*’ to open up communications as a conventional management technique. *Pungwe* is a gathering characterised by eating, singing, dancing, and slogan shouting in which everyone present participates irrespective of status, class, gender or relationships. A spirit of togetherness predominates in these ceremonies. Mbigi thereby identifies the intensely group-oriented dimension of African culture. For change to occur, a group has to adopt change, which is possible only over time (Fullan, 2001). The clusters of 2.7.3 specifically catered to these needs, in social and time dimensions.

A person, a group or an organisation, acting towards a goal adjusts their behaviour in response to the delayed feedback. If they are not conscious of the delay, they end up taking more corrective actions than needed or (sometimes) just giving up because they cannot see that any progress is being made. Reform activities tend to have a longer duration, which allows them to offer more active learning opportunities for teachers (Garet et al. 2001). Darling-Hammond (1997) recommends that reform types of activities may be more responsive to teachers’ needs and goals.

Calder (1994) suggested adjustments in assessments through negotiations where severe situations arise because of poor performance of learners. He exemplified that “*The number of assignments which students are expected to complete, the monitoring of standards, the course approval strategy and the testing strategies are all aspects where the institutional procedures may have to be modified if the problem is found to be widespread or severe*”.

#### **2.7.6 Changes in science education [W: Weltanschauung]**

The programme evaluated here was presented within a context of socio-political change that integrated racially segregated departments of education and made the school subjects of science and mathematics a priority to be presented in schools, including those of the Eerstehoek district, where they were previously rarely offered. Simultaneously, change to curriculum approaches was introduced in the new “Outcomes Based” curriculum, and, thereby, to bring the teaching approaches into line with international trends. An evaluation of an in-service programme for

science and mathematics must be sensitive to international trends, and where appropriate, determine whether the programme supported modernisation.

Internationally, the goal of science education has progressed over years in line with changing needs in society. Scientific literacy underpins and goes hand in hand with scientific development. As science is itself a process of learning (Lawson, 1995:3, 5), the basis of rational and critical thought (Feynman, 1966), and a contributor to the foundations of a modern economy, scientific literacy is a social necessity (Rowe, 1983; Lederman, 1986; Jenkins, 1997; Hurd, 1998; Jegede, 1997; Rutherford & Ahlgren, 1991).

Ogunniyi (1982) has stated that science should be taught as a major human activity (a process), which explores the realm of human experience, and creates a coherent system of knowledge (body of knowledge). Science has knowledge as content, process (explores the realm of human experience), and context (human activity). The responsibility on the Science, Mathematics and Technology teacher thus shifts from a focus on rote learning of “facts” to exploring the processes of science and imparting its worldview, often within a complex context.

Yager (1990) found that many developed countries address the problems associated with the quality of science education by changing the curriculum. Successful change has been reported in some developing countries including Swaziland (Dlamini et al., 1994) and the Philippines (Fensham & Gunstone, 1995). However, attempts to bring about curriculum change in other developing countries have not always been successful (Ogunniyi, 1986; 1995; 1996). In Kenya primary education as such is faces problems in pastoralist communities (Sifuna, 2005).

The Further Diploma in Education (FDE) programme around which the SASEN project was presented contained a module ‘Current Trends in Science Education’ which sensitised teachers to modern best practices and particularly approaches based on the constructivist nature of learning (Vygotskii 1978, Piaget 1978). Initial (“bridging”) content was presented in a hands-on fashion, with assignments defined within the “Current Trends” module to challenge teachers to use the hands-on content in their classrooms, but with adaptations according to specific approaches addressed in the module. However, the major part of the project later presented advanced content in the sciences which, although related to the school content, was usually presented at a typical university level.

### **2.7.7 Role of donors [O: Owners]**

In the Eastern Cape, an INSET project was undertaken by the Rhodes University Centre for the Advancement of Science and Mathematics Education (CASME) and lasted from 1996 to 2000. Its



evaluation reported stories of disappointment on many fronts especially concerning funding. Funding agencies did not fulfil their commitments resulting in teachers' interest in the intervention being eroded (Muwanga-Zake, 2000). It was noted that some funders have an interest only in advertising their organisations rather than in the real benefit of the intervention programme to the communities involved as a long-term educational process. Donors with unrealistic expectations like instantaneously improved matriculation results attach strings and conditions to projects. Muwanga-Zake (2000) criticised a trend amongst some foreign donors to use the project to improve their own image rather than to provide real support. Muwanga-Zake felt it would have been better to seek government funding rather than to accept external funding.

Calder (1994) finds funding agencies in the public sector generally look for evidence that their money has been well spent; in other words, that there is no waste of resources. On a national scale, Harber (1998, 2006) expresses scepticism about World Bank help which is often accompanied by the policy of structural adjustments. With regard to South Africa the question is raised whether or not education, and in particular the redress of historical inequality and disadvantage in education, would actually benefit from World Bank intervention in South Africa.

Ogawa (2002) has pointed out that foreign agencies do have control and influence on every stage of negotiation, enjoying potential power because of financial and political interests of their governments. Nagao (2001), who coordinated the MSSSI project (Ono et al., 2007), emphasised that although material and technical support was provided in the project it was the Africans who had to decide what the Japanese should offer – control and responsibility were shared between recipient and donor in this case.

The potential influence of funders, thus, makes it essential to determine the motives of funders when they provide funding, and the level of control they wish to have over the projects. The role could be negative or positive.

### **2.7.8 Roles and competences of a teacher [O: Owners]**

Teachers' roles are changing through changing expectations (Kimball 1999:101-102). Expected outcomes of teacher education programmes include knowledge of the child/adolescent, development and principles of learning, knowledge of subject matter, instructional strategies and technology, assessment, classroom management etc. Kimball emphasises that, in the USA, the areas that need more attention according to employers, school mentors, and university supervisors are working with parents and families, addressing ethnic and cultural differences, and using enquiry to improve teaching and learning

In South Africa, the National Education Policy Act 27 of 1996 (Norms and Standards, 1998:115-116), specified the 'Roles and Competences' of a South African educator, and lists seven roles that a future teacher is expected to be competent in performing in schools. These are: Learning Mediator; Interpreter and designer of learning programmes and materials; Leader, administrator and manager; Scholar, researcher and lifelong learner; Community, citizenship and pastoral role; Assessor; and Learning area/subject/discipline/phase specialist. Each role is further broken down into three competences: "Practical competence (Occupational), Foundational Competence (Academic) and Reflexive competence (Professional)" (Brunton et al. 2003).

Competence-based and performance based approaches to teacher education are by no means new. They were popular in the USA in the 1970s and began to have some impact in further education in the UK in the early 1980s (Tuxworth, 1982). Messick (1984) has made a distinction between competence and performance stating that competence refers to what a person knows and can do under ideal circumstances, whereas performance refers to what is actually done under existing circumstances. Competences need to be assessed in a variety of settings as they might not be validly revealed in either classroom performance or test performance because of personal or circumstantial factors that affect behaviour. A programme which claims to assess competences should thus show evidence of several different assessment types. These approaches may produce greater confidence in employers about what teachers can do (Whitty & Willmott, 1991).

As long ago as 1977, competence-based education was described as "a bandwagon in search of a definition" (Spady, 1977). To meet the aspects of training of educators, however, Blank (1982), gives two basic philosophies: 'First is the notion that "human competence" is the ability to actually perform - Knowledge, attitudes, and effort are of little value without results. The second philosophy "mastery learning" holds that [al]most anyone can learn [al]most anything well if given quality instruction and sufficient time'. The latter is defined as a training programme, which is designed, monitored, and adjusted with one thing in mind – results. First, the student is presented with some sort of cue. Next, the student participates by actually practicing, applying, responding, or in some other way doing something with the cues that were presented. As the learner participates, he or she is periodically reinforced to ensure that correct performance will continue and incorrect performance will not. Finally, feedback and correctives help students find out how well they are doing and what they need to improve to reach mastery. A mastery-learning programme would cycle through this process repeatedly, with new targets set as the student masters required outcomes one-at-a-time.

Competence-based education programmes come with some dangers. Whitty & Willmott (1991) warn that advantages of competence-based approaches remain to be proven. 'Such approaches to education are often considered problematic because of the central focus of competence upon





outcomes rather than upon course content'. Other identified difficulties of competence-based approaches are that they may lead to reductionism; they may shift the emphasis toward outcomes at the expense of the learning process. Additionally, it may be difficult to reach agreement on a definition of competence; to specify which competences should be included; or even to arrive at valid and reliable criteria for assessment.

Providers of teacher-education in South Africa are expected to provide a curriculum, which develops and assesses competences associated with the specified roles, and hence the roles and competences provide a set of benchmarks. A short term programme such as the FDE around which the SASEN project was constructed may be expected to address some of the expected roles and competences. Nonetheless, as the benchmark has been provided by the state, any programme should be assessed according to the degree it does achieve these.

### **2.7.9 Needs of teacher development [E: Environment]**

Schools in South Africa can be classified depending on their location, viz. urban and rural. Both these categories include State and independent (private and/or church) schools any of which may be elite or poorly resourced and underperforming.

The schools are characterized by disparities in quality depending on the community they serve (Hofmeyer & Hall, 1995). Urban schools are generally better equipped than rural schools in terms of staffing, number of classrooms, electricity and running water. Most schools in rural areas have no access to electricity and running water, are scattered over large distances and their learners come from relatively informal settlements. The schools in these communities predominantly have large classes with sometimes as many as 150 students per class, taught by un(der) qualified teachers, often in informal settings (Gray, 1995; Hofmeyer & Hall, 1995; Kahn 1996). Resources such as textbooks, chalkboards, scientific equipment, laboratories are scarce (Rollnick & Kahn, 1991). Demonstrations and hands-on practical work are hampered by the shortage of laboratory facilities and equipment in many schools (Ware, 1992; Manana, 1994; MacDonald & Rogan, 1988). Jennings & Everett (1996) found that only 23% of black schools in the Eastern Cape had laboratories. Muwanga-Zake (1998, 2000) reported that very few learners actually have the opportunity to do experiments themselves; most watch from a distance. It was reported that some teachers and learners believe in just 'touching and seeing' the Science equipment.

Christie and Potterton (1997) found South African schools that were the exception to the general rule and were successful in spite of being poorly resourced. Principals at these schools were strong managers and leaders with: 'adaptability, flexibilities of approach, preparedness to consult with staff at least to some degree, commitment, concern for the well being of the school, sense of

purpose and courage' as common characteristics. 'Time on task' was noted to be the most important ingredient of success in these schools – it was noted that it was the practice to use all available time during school hours-and sometimes study time was scheduled after hours.

The demand for scientifically oriented graduates is particularly high in South Africa where only fifty-three per million of the population are scientists or engineers (Kennedy, 1993). Improvement in the educational standard of learners in Mathematics and Science whether within the existing syllabus or by changing the teachers' approach to Outcomes Based Education (OBE) in South Africa (as required in the new C2005 syllabus), requires in-service education and training (INSET) (Fensham & Gunstone, 1995).

### **2.7.10 The need for teacher development programmes that strengthen subject knowledge [E: Environment]**

Taylor and Vinjevold (1999) reported that a poor grasp of the fundamental concepts in the knowledge areas they are responsible for is a major problem facing teachers in disadvantaged classrooms. The absence of a culture of reading amongst teachers appears to be a concomitant problem. Low knowledge resources amongst teachers are accompanied by a number of features including learning topics being dealt with at low levels of conceptual knowledge and tasks that are set at low levels of challenge.

Teacher development projects in the field of Mathematics and Science, especially in disadvantaged rural areas, have always been a necessity. Studies reveal that as many as 50% of South African teachers of Mathematics and Physical Science are unqualified (Kahn, 1995; Cherry, 1996). Most of the remaining hold three-year diplomas (Hofmeyr & Hall, 1995). These diplomas are the Junior Primary (JPTD), Senior Primary (SPTD) and Secondary Teacher Diploma (STD) with respective syllabi varying with content and complexity standards. In many cases the diploma holders are not employed according to their training relevance but according to the needs of the institutions and availability of the teachers. In disadvantaged communities it is common that a Senior Primary Diploma holder teaches in a secondary school and on occasion a matriculated person without any Diploma will be seen teaching Physical Science or Mathematics in high school. The majority of teachers are heavily dependent on student textbooks for content, with rote learning as the only methodology (Rollnick & Kahn, 1991). This is not to say that there is a total absence of teacher support material and initiative in the country.

The new Outcomes Based curriculum, known as Curriculum 2005, created a further demand for teacher development. 'OBE' is a learner centred and result oriented design, based on the belief that all individuals can learn. What a learner must demonstrate to show learning has taken place

("outcomes") is clearly identified and there is a clear focus on outcomes of significance. Ideally, all learners work to become more responsible for their own learning; able to make appropriate learning decisions; be independent in their learning and thinking; self-assessing and successful. Jansen (1998) indicates that Curriculum 2005 is a policy shift, which is not possible to achieve given existing conditions, such as the low level of professional competence of teachers. Sayed (2002) suggests that teacher education providers are thus expected to provide teachers with skills to operate in an outcomes-based educative framework and to focus on the learner. In many cases it is a welcome shift away from rote and transmission-orientated learning approach. The risk that providers may focus only on teaching methods, and ignore the need to provide trainee teachers with the content knowledge they also require, is considerable.

Darling-Hammond, (1997) advocated active learning aimed at genuine understanding of core subject matter concepts. Competence pedagogies of whatever kind require that teachers play a more covert role than they would in teacher-centred performance models, but make far greater demands on teachers (Taylor & Vinjevold, 1999).

Webb et al. (1999) reported a correlation between teacher knowledge and pupil learning outcomes. Maja et al. (1999) reported that teachers in better performing schools spend more than twice as much time preparing lessons than their counterparts in the relatively poor performing schools, and are also more at ease with the subject matter. They found that method does not seem to be as important as meaning during a lesson. Whether the teacher's lesson is 'learner centred' or 'teacher centred' does not seem to relate in any way to performance. What seems critical is whether the lesson promotes understanding of the subject being taught, whether the learners attach meaning to what is being taught, and most importantly, whether learners are able to engage with the lesson (GLR, 1999:156). Olivier et al. (1991) recognized that advances in conceptual knowledge lead to advances in procedural knowledge. They also gave considerable weight to attitudes and beliefs of learners and teachers.

Subject content knowledge within the science and mathematics curriculums underlies procedural knowledge, understanding and professional confidence. The change to OBE (C2005) further exposes existing weaknesses, but in itself is not the cause of these problems. Simply training in OBE principles will not improve the performance of teachers while subject knowledge in all aspects is lacking. A change towards the OBE-based curriculum has tended to further expose teacher weaknesses in subject content and procedural knowledge, as well as professional knowledge.

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## 2.8 Gaps in the literature that this study addresses

The review above has identified several gaps within the literature and current practice. Prior to the Jomtien conference (Jomtien, 1990), international aid appeared to have an agenda towards supporting change under democratic or non-democratic governmental systems (depending on its source). Many internationally funded educational INSET projects were directed through non-governmental organisations and served the purposes of the funder.

A central aspect of the Jomtien Declaration (Jomtien, 1990) was a call to partnership, with in particular, development of local capacity within projects. Many projects with strong local partnership have been presented in the latter half of the 1990's. In particular the DFID run projects such as the MPSI and SbTD primary school and the JICA secondary school projects MSSI, STM and SMASSE (in Mpumalanga Province of South Africa, Ghana and Kenya, respectively) used local education authorities as partners, and in the case of the JICA project in South Africa added a local university (through the CSEUP) as partner in three-way partnership.

A project funded internationally and implemented through university systems with an academic focus rather than only a developmental focus is somewhat unique in its agenda and presentation, and the experiences, benefits and challenges of such a project are analysed here, making a contribution as a new kind of partnership and design.

This study, by introducing the Soft Systems Analysis process adapted for evaluation for the purpose of gaining understanding of reasons for success (with an identification of success factors and how they interlink to support success) adds both a new purpose to evaluations (establishing reasons for success with a view to improving designs of future projects, hence going beyond a “so what?” question faced by evaluations, see for example, Nentwig, 1999 Table I) and an appropriate methodology.

Although the study is primarily a case study, potentially generalisable factors that contribute to the success of a project of this more innovative nature are of interest to all practitioners and designers of INSET projects as well as teacher educators.

## 2.9 Conclusion

The SASEN project was developed to serve a need which was identified in the local community, particularly the development of teacher competence of knowledge and practice in Physical Science and Mathematics. It was created as an in-service project which would not require teachers to be

away from their classrooms during the programme. It provided university lecturers as experts of the subject matter and teaching practice. To ensure that effective learning would take place, the first year was designed as a year during which hands-on practical work basic subject matter in the physical sciences and Mathematics and activities that teachers should use in their classrooms with their learners were prescribed, and lesson plans and reports were expected. This process allowed teachers of Mathematics in the group to assist teachers of Physical Sciences, and vice versa to master the foundational subject matter of both disciplines and ensured that the benefits of learning were quickly brought in to the schools. This design addressed some of the serious constraints of INSET and incorporated lessons of comparable programmes in Mathematics and Science described in some detail in section 2.2.

It was recognised that the SASEN project was a complex system involving human beings working towards a common purpose in an environment of educational challenge produced by the demands of rapid economic, social and political change. This recognition allowed one to see the project as appropriate for Checkland's Soft Systems Framework for analysis when the framework is adapted appropriately. The simple open ITO model of a system or even the CIPP model, while assumed during the Phase 1 analysis, are seen to be inadequate and not to reflect the complexity of the actual project. Ultimately, the soft systems analysis itself yields an appropriate representation, closer to the ITOFC model shown in Figure 2.1. This representation allows one to infer the points at which measurements must be made, or in the case of a soft system with human beings, who will be interviewed, and what about.

Added to this was the specific constraint that the evaluation was to be performed on a single case, by a participant observer. The form of data collection and analysis was predominantly qualitative in such a case. Aspects of these approaches have been discussed in this chapter.

The concept of Soft Systems Analysis, and the background to several specialised sub-analyses and criteria that were required at the analysis stages of the project itself have been introduced. These included the environment of the SASEN project, a picture of the roles and forms taken by INSET projects, and expectations set by the environment in which the project took place. [The outline of the project itself has already been given in Chapter 1]. At the higher levels, sensitivity to the demands and roles of the various owners of the project itself, and as a consequence the detailed analyses and measurements that needed to be addressed were introduced.

Stages 1 and 2 involve the collection of structural information about the project and its context. The CATWOE analysis of Stage 3 of SSM, frames the questions for the evaluation and allows the creation of a suitable structural model that underlies the evaluation (in stage 4). Checkland's Stage

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5 frames the measurements, structuring and analysis of data that forms the actual evaluation. Based on the understanding arising in stage 5, the recommendations for change are expressed in Stage 6.

Of special interest is the role played by the attitudes of teachers in schools. It was seen in section 2.7.1, 2 that even under-resourced schools can be successful, if teachers are professional and maximise their use of time for the education purpose.

In the next chapter we describe the detailed methods applied to the evaluation of the project in two overlapping phases. The attitudes of participating teachers are assessed in a traditional fashion, supported by information gained as a result of a soft systems analysis. A general evaluation is performed using the SSA as theoretical framework in Phase 2 (but information obtained in phase 1 is included in stage 2, where appropriate).



## Chapter 3

# Research Methodology

### 3.1 Scope of the research emanating from the SASEN project

After viewing the project documents of the CSEUP, the researcher found the guideline to decide the outline of the scope of the research to lead the research in a direction motivated by the project initiatives. For this purpose the measurable outcomes from the documents of the project as envisaged by the proposed Further Diploma in Education included:

- Improvement in the theoretical subject knowledge of teachers.
- Orientation towards Outcomes Based Education as appropriate for Curriculum 2005.
- Empowerment of teachers as curriculum developers within Curriculum 2005 and local resources (advantages and constraints).
- Computer literacy

The longer-term outcomes envisaged by the project included:

- Building stronger positive attitudes amongst teachers towards their professional behaviour and empowerment. This would be reflected in classroom practices such as facilitation of interactive and experiential learning.
- Shift towards improved enthusiasm for co-operative and collective learning. Increased pride in their profession may be reflected in an increase in the number of pupils wanting to become teachers themselves.

The teacher development project chose the route of improving teachers' qualifications through a Further Diploma in Education [or an Advanced Certificate in Education] from the University of Pretoria and recognised by the South African Qualifications Authority (SAQA).

The hypothesis underlying this research was that a suitable intervention in the form of INSET would improve the professional performance and academic behaviour of the practising teacher. It was also expected that the teachers would gain a more positive attitude towards their profession. Additionally, as a consequence it was further expected that the impacts of the intervention could be sustained even after the project has ended.

The study therefore involved the evaluation of the intervention, assessment of the teachers through administering questionnaires, observations and interviews at several stages of the intervention, and assessment of the measures adopted to sustain the effects of the intervention. A (mainly) post



project evaluation to obtain a holistic understanding of the project and to identify factors that led to its success formed the second part of the study.

### 3.2 The population of the research

The population of the research study comprised Science/Mathematics teachers, principals, learners studying Science/Mathematics in those schools whose teachers had joined the FDE (Further Diploma in Education) project, and the staff of the University of Pretoria implementing the teacher-training project. Other stakeholders were identified in the second part of the research, and included decision-makers and officials of the Mpumalanga Department of Education, the director of the project, colleagues of the participating teachers and representatives of teacher unions.

A representative sample from the defined population were identified and interviewed or observed for data collection. The original design called for the selection of six principals, 12 learners, 12 teachers and two staff from the University of Pretoria to be involved in the sample, but the investigation of the soft systems nature required other role-players also to be interviewed for example the director of the project, teacher colleagues in the schools, Union Representatives and staff of the MDE to have a holistic picture of the project and its impact. The school whose principals were interviewed necessarily had at least one teacher as part of the project, and needed to be accessible regarding ordinary road vehicles. A balance of small town and deeply rural schools was maintained in the sample. More schools came from the larger cluster than from the smallest cluster, which was very rural. Table 3.1 summarises the sample sizes .

**Table 3.1 Overall samples out of the population (years 2000-2003)**

Population group for samples	Teachers	Principals	Learners	Colleagues/SADTU	MDE	UP Staff	Total
Population (Estimated)	28	20	(400)	(50)	12	9	519
Cluster 1	11	4	18	2	-	-	35
Cluster 2	6	2	8	1	-	-	17
Cluster 3	4	1	4	-	-	-	9
MDE	-	-	-	-	3	-	3
UP Staff	-	-	-	-	-	3	3
Total	21	7	30	3	3	3	67
Sample %	71	35	7.5	6	25	33	12.7



From three clusters, 21 teachers and a total of thirty learners from different schools were interviewed to establish the needed data. The reflections on school-based indicators were gathered by interviewing seven principals that represented the community of schools. The principals and the learners were chosen to probe the data available from teachers from those schools whose teachers were involved in the project. This provided a comprehensive sample of the participants of the project from three components of the school's teaching and learning system. Others (UP staff, colleagues/Union leaders and MDE staff) could provide data for holistic picture of the project from a distance. The results, finally obtained from the analysis of the data collected through the respondents of the sample, were treated as the response of the population in a generalised way.

### 3.3 Research paradigm

The research was a '*Participatory Case Study*' more so because the researcher was in an advantageous position to do so. The impact of the intervention and the impact of improving the qualifications of educators on learning and teaching were the two focused areas to be investigated and results thereby to be established.

The study of the SASEN project reported here was holistic in nature because it needed to provide an evaluation on implementation, procedures and impact. It would be appropriate to mention the research period as period of the project i.e. 1999 – 2003. But for the sake of full coverage of the post project evaluation it went up to 2005 when the last interview was held. The project had boundaries of time, a restricted number of participants, a limited area of work and fixed physical settings, therefore, the study was a case study.

The researcher (the author) had been working in the District with the teachers in their schools as a Curriculum Implementer (CI) of Physical Science before the project came into being and also was one of the role players in bringing this project to the rural district of Eerstehoek. The researcher was not an outsider whose presence would affect much to change the response of the trainee teachers or to influence the set up as being unnatural. The author's (Researcher) presence was an encouragement to teachers because of his longstanding cordial relations with them. Therefore the work of the researcher was convenient, natural and comfortable to all parties in the project.

### 3.4 Research process and plan

It was a case study of the SASEN project for its impact on the teachers, teaching and learning. The project had limited number of teachers [28] taking part in its FDE programme. Teachers were



drawn from 20 secondary schools of the sub-region Eerstehoek. The qualitative research methodology dominating the research mostly depended on reflective interviews and impressions gathered from the stakeholders mainly teachers themselves. Although some quantitative techniques were used in checking the reliability and analysing the responses of the early questionnaires and analysing the observation data, the research mainly depended on the data collected by interviews and analysed qualitatively. The soft systems analysis procedure being holistic in nature used all types of data and their analyses findings to develop a full understanding of the project and its impact. The SSA included all possible avenues to collect information drawn from the interviews and elsewhere regarding the project that could make it comprehensive.

### 3.4.1 Research procedure

Evaluation was part of the project design from its inception in 1998. The evaluation protocol, which used teachers' attitude and professionalism as variables to establish the effect of the intervention, was prepared and approved in April 2000. For this purpose questionnaires were used as primary instruments. To establish further details and for purposes of triangulation interviews were conducted with teachers and learner groups during 2001 – 2002.

During the early months of the year 2002 it was evident that the project would achieve success in several of its aims. However, a fuller evaluation that would be able to provide understanding of the contributors to the success of the project was required. It was decided to use “soft systems analysis” (SSA) as a framework for this purpose. Structured, Semi-structured and open-ended interviews with a wider range of stakeholders were conducted within this second phase which included a series of post-completion interviews beginning in 2003, the last of which was with the Chief Director, Curriculum of the MDE in 2005. The range of interviewees included MDE officials, colleagues of teachers, a teacher union representative and lecturers of the University who had presented the courses. The project concluded its last contact session in Nov. 2002. The successful teachers graduated in April 2003.

The understanding gained during this second phase of the SSA supported a better interpretation of results of the 2000 –2001 data. The attitude and professionalism evaluation became part of the whole evaluation.

Observation of classes in teachers' schools was also done during the evaluation years parallel to the other techniques of data collection as mentioned earlier. The main aim was to find out the reality of the impact happening in the classrooms. For such observations no plan was given to schools but the researcher could go and observe because of his position (CI) known to schools and the teachers.

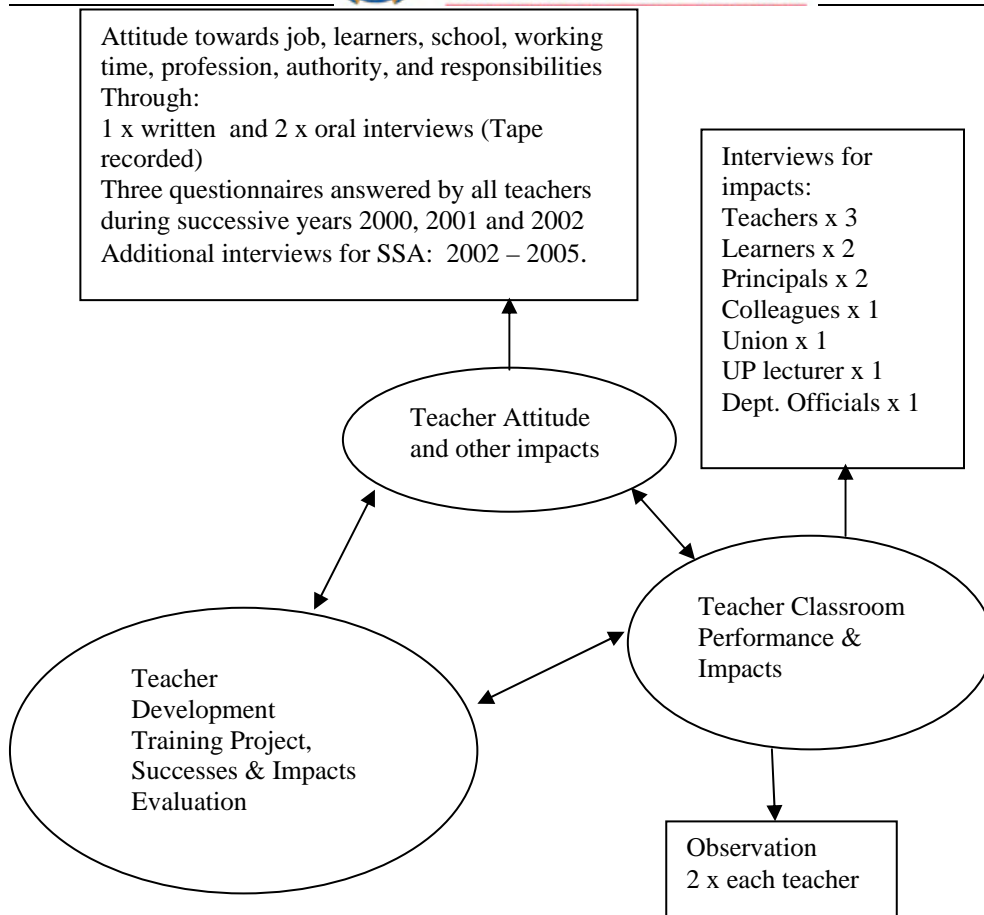
But the cluster presentations of lessons were pre organised. Figure 3.1 gives a picture of the consolidated research plan and process.

### 3.4.2 Time line

The project and the research had different time frames. The research began in the year 2000 and continued beyond the end of the project. The data collection of the Soft Systems Analysis continued during the post-project period up to 2005.

**Table 3.2 Project and Research: Activities and time frame**

Project		Research	
Activities	Time frame	Activities	Time frame
Negotiation and planning stage	1998 – 1999	Research proposal to evaluate impact of the project on teachers mainly covering “Attitude and Professionalism”.	Approved during April 2000.
Project began and first inaugural meeting and registration of teachers.	September 1999	Three questionnaires designed and administered	2000, 2001 and 2002, one a year
Lecturing, assessment, clustering teachers, organising computers, standard learning and provision of teaching materials	2000 – 2002	Interviews of teachers, principals and learners, and class observation of teachers.	2001 and April 2002.
Final Examination, assessment and awarding of the FDE/ACE by the University of Pretoria.	Nov. 2002 – April 2003.	Early 2002, SSA concept introduced for full understanding of the project hence going back to actors and customers for broader views. New wave of data collection started through interviews of teachers, UP lecturers, unions, colleagues and MDE officials.	Nov. 2002 – Aug. 2005.
--	--	Transcription of interviews from Audio-Tapes, organising the data, the two analyses and synthesis	2003 – 2005



**Figure 3.1 Research design map (Procedures for data collection)**

### 3.4.3 Research instruments

Qualitative evaluation usually involves the use of questionnaires, surveys, interviews, formal discussions and/ or observations (Schibeci, 1989). In this evaluation also, questionnaires, observations and interviews were used as tools for collecting the necessary data. While the largest part of the analysis was qualitative, where it was necessary and found to be appropriate, a quantitative approach was also utilised. For example to find the internal consistency/reliability of the answers of the questionnaires and where observers rating scales were involved during the observations quantitative procedures were used. In other cases where the statements had to be analysed on their meanings and effects, qualitative analysis was preferred. Because qualitative analysis takes more time, the number of questions for the interviews was not more than ten and the number of schools was limited to six.

Documents were reviewed to have guidelines on scope and initial direction for the research from the project. These were from CSEUP and Mpumalanga Development Business Plan for Eerstehoek.



Questionnaires and Interviews: Researchers use questionnaires and interviews to convert the information directly given by the person into data. By providing access to what is “inside a person’s head”, these approaches make it possible to measure what a person knows, what a person likes and dislikes (values and preferences), and what a person thinks (attitudes and beliefs). Further advantage of such information is that it can be transformed into number or quantitative data by using the attitude scaling or rating-scale techniques (Likert type). These have some problems also like (1) respondent may not cooperate when completing a questionnaire or interview, (2) They must tell what is rather than what they think ought to be or what they think the researcher would like to hear, and (3) they must know what they feel and think in order to report it (Tuckman, 1994, Ted-Buchholz). This version and understanding supported to use questionnaires to collect data through a questionnaire regarding attitude of teachers in this case of the study. Likert rating scale was also used to rate an attitude in form of a quantitative data. Interviews for the same motivation were used to collect information from people involved. Mostly the interviews probe the information collected from questionnaire. In this research therefore the interviews served two purposes (1) probing or verifying the information already received through the questionnaire (2) getting more or new information. At the same time teachers had a second opportunity to air their views on those related matters, which were left untouched in the questionnaires. Another reason to use interviews to collect data was that such data are in most cases rated as qualitative. The project evaluation being a case study the interviews were the most useful instrument to collect the data for evaluation. Keeping the dimensions of measurement of attitudes the same, the questions changed in successive questionnaires in order to accommodate the contextual changes due to intervention around the teacher. Based on same reason interview questions also had to change from time to time depending on the context and the year in which interview was held.

In a participant research the observation and interviews are the major tools for data collection. Observation of actual teaching for pre-existing and new classroom practices in schools was done and data recording took place on the observation sheets.

#### **3.4.3.1 Questionnaire design**

Three questionnaires were administered on similar themes of teaching as a profession but questions were not necessarily the same in the questionnaires presented at different times. Although the concept of direct comparison of pre- and post-tests with the same questionnaire in this case may not be exactly possible, valid results are arrived at through triangulating the findings with evidence derived from several sources. The first two questionnaires were administered in classroom situations during May 2000 and during August 2001 at the end of the day’s workshops and were collected directly thereafter. The third questionnaire was given during Nov. 2002 to be completed at schools and required consultation with colleagues and the respective school principal. This questionnaire was returned on the closing day of the project the 22 November 2002. The responses



to the questionnaires allowed conclusions to be drawn about the attitudes of participating teachers attained over the time of the project. To be able to establish the changes in attitudes three direct questions were included in the questionnaire administered in Nov. 2002, in which teachers revealed their feelings about their achievements during the tenure of the project. It evaluated the changes in their teaching practices and their careers as a whole. These questions appeared as Questions 8, 9 and 10 in the Nov. 2002 questionnaire. In 2002, the questionnaire involved the data of Science and Mathematics learners' admission from their schools, which clearly depended on availability, and cooperation of the schools' Principals. The second hurdle was that it was the closing day of the programme and postal services to send it were limited in that area. The qualitative analysis is thus based on the available data.

Questionnaires were prepared and/or organised along a range of themes of professional teaching. Themes remained the same, but questions were changed in successive years of comparison e.g. May 2000, Aug 2001 and November 2002. Some teachers did not take part in answering the questionnaires, some answered with keen interest and at times some teachers did not attend. As a result the numbers that responded did not match the total number of teachers who had registered for the project. The third questionnaire was handed to participating teachers and they were asked to return them on the last day of the project, but not all returned them. In this exercise more than 50% attendance was accepted as a good sample. However, 21 (75%) in 2000, 18 (64%) in 2001 and 13 (47%) in 2002 submitted completed questionnaires out of 28.

Likert type written questionnaires was administered to extract the existing attitudes of teachers during the starting sessions of the intervention. A second questionnaire was applied during the middle of the project and a third was administered towards the end of the project. . The questionnaires were administered to registered FDE aspirants of the district during 2000, 2001 and 2002 of their study, respectively. Considering the change amongst teachers due to the intervention the questions did not remain identical for each questionnaire, but needed to be redesigned to explore the views, feelings, effects and attitudes of the teachers, although the theme remained the same. New dimensions were added to the second and third questionnaires. Therefore the three questionnaires did not contain the same questions but were designed to test what was expected of a professional Science or Mathematics teacher

The attitude test contained a few multiple choice, opinion setting, agreements with given ideas and structured short answer questions. Short answer questions were mostly open ended. The possible weakness of the multiple-choice questions (random selection) would thus be compensated for by the addition of other types of questions. Respondents were provided with space to write their comments, criticisms and additional attitudinal opinions, where required.





The first questionnaire (Appendix A.1) was based on statements assessed through a Likert scale. (Tuckman, 1994:198) This questionnaire administered during the year 2000. Items pertaining to a particular theme representing an area of the attitudes were designed in the form of statements whose acceptance or non-acceptance were characterised by choosing “strongly agree, agree, undecided, disagree or strongly disagree”.

Statements in positive form were scored by the following keys SA = 5; A = 4; U = 3; D = 2 or SD = 1. A negative statement was scored by SA = 1; A = 2; U = 3; D = 4 or SD = 5. The reason for writing items in both directions was to counteract the tendency for respondents to automatically and unthinkingly give the same answer to all questions. Another scale with SA = 3; A = 2 or D = 1 and SA = 1; A = 2 or D = 3 in the manner as above was used. The reliability of the instrument was tested by Cronbach’s Coefficient Alpha value of the responses which is given by (Slavin, 1984:210):

$$\alpha = \frac{I}{I-1} \left( 1 - \frac{\sum S_i^2}{S_x^2} \right)$$

where

$I$  is number of items in the scale.

$\sum S_i^2$  is the sum of the variances of the individual scores on each item in the scale.

$S_x^2$  is the variance of the individual scores on the total scale

The average value of  $\alpha$  was found to be 0.78. This indicates that the questionnaire was reliable in the sense of internal consistency.

### 3.4.3.2 Interviews.

The main aim of the interviews was to probe the expressed views and to explore other attitudes. The yardsticks being: change from teacher centred to learner centred teaching paradigms; delivery of prepared activity based lessons; teachers’ preparedness to spend more time in school; taking responsibility for and changing the attitude towards learners. Organised interviews were based on open-ended, structured and semi-structured questions. The purpose was to collect information about teachers’ own understanding in their own words. This technique was appropriate in this research because it allowed the control of the focus of the interviews, while allowing space for the participants to elaborate on their ideas and utterances. Greeff (2005:292-297) has described such open ended, unstructured or semi-structured interviews as appropriate in circumstances where “*in-depth interviewing*” was expected for exploring reliable data. Semi-structured interviews generally last for a considerable amount of time and can become intense and involved. Smith et al. (1995:9-26) assigned much importance to the participant interviewee and advocates that the participant



could be perceived as the expert on the subject and should therefore be allowed maximum opportunity to tell his story.

Open-ended questions (self developed) were designed to establish the impact of the teacher development programme, particularly to establish whether the intervention influenced the teacher towards having a right attitude in their teaching style. It also included questions to probe the answers given through the questionnaires. Spontaneous questions were accommodated to supplement the inquiry arising from the answers of the questions asked.

Field notes were kept to record the environment and major happenings during the interview process. The interviews were recorded on audio tape with the permission of the interviewees. A transcript of each interview from the tape was prepared and analysed.

### **3.4.3.3 Observation of teaching**

Observations probed the expected conceptual and skill improvements in teachers' ability to provide a good lesson. Observations of the teaching lessons were recorded in field notes. An observation instrument was developed which was based on the existing class observation document of Mpumalanga Department of Education. The instrument is provided in Appendix A 2. The instrument consisted of a checklist and also contained the rating of the lesson by the researcher on a rating scale of 1 to 9.

The observation instrument was presented in a seminar organised by CSEUP at University of Pretoria during September 2000 for discussion and comments by a team of researchers of the centre and the supervising professor at the time, Prof JM Rogan, and subsequently the validity of the instrument was accepted by the team and approved by the supervisor to observe teaching lessons.

Teachers were able to choose the lesson programmes they wished and presented the lessons in their normal classrooms. Two to three teaching lessons were observed for each teacher. The two formal observations of their lessons took place during 2001 and 2002, because by then the intervention had taken shape. Therefore, the impact of the project should have been visible in their classes. Observations produced both qualitative and quantitative types of data.

## **3.5 Procedural framework:**

Two analyses, which support each other, have been used in this research.

The first involved data collection through questionnaires, interviews and observations from 1999 to 2002 specifically to address the impact of the intervention on attitude and professionalism of participating teachers. Initial conclusions rely largely on self-reported perceptions of both change and causes of these changes.

The (so called traditional) analysis of attitudes and professionalism in this section was based on self-reported changes by the respondents, which was considered sound only up to a limited extent because it depended on questions posed to respondents. A comprehensive observation with a team of observers to allow the data to be comprehensively tested for consistency in observation was not done. The nature of the questionnaires was such that change over time could not be uniquely determined by these procedures alone.

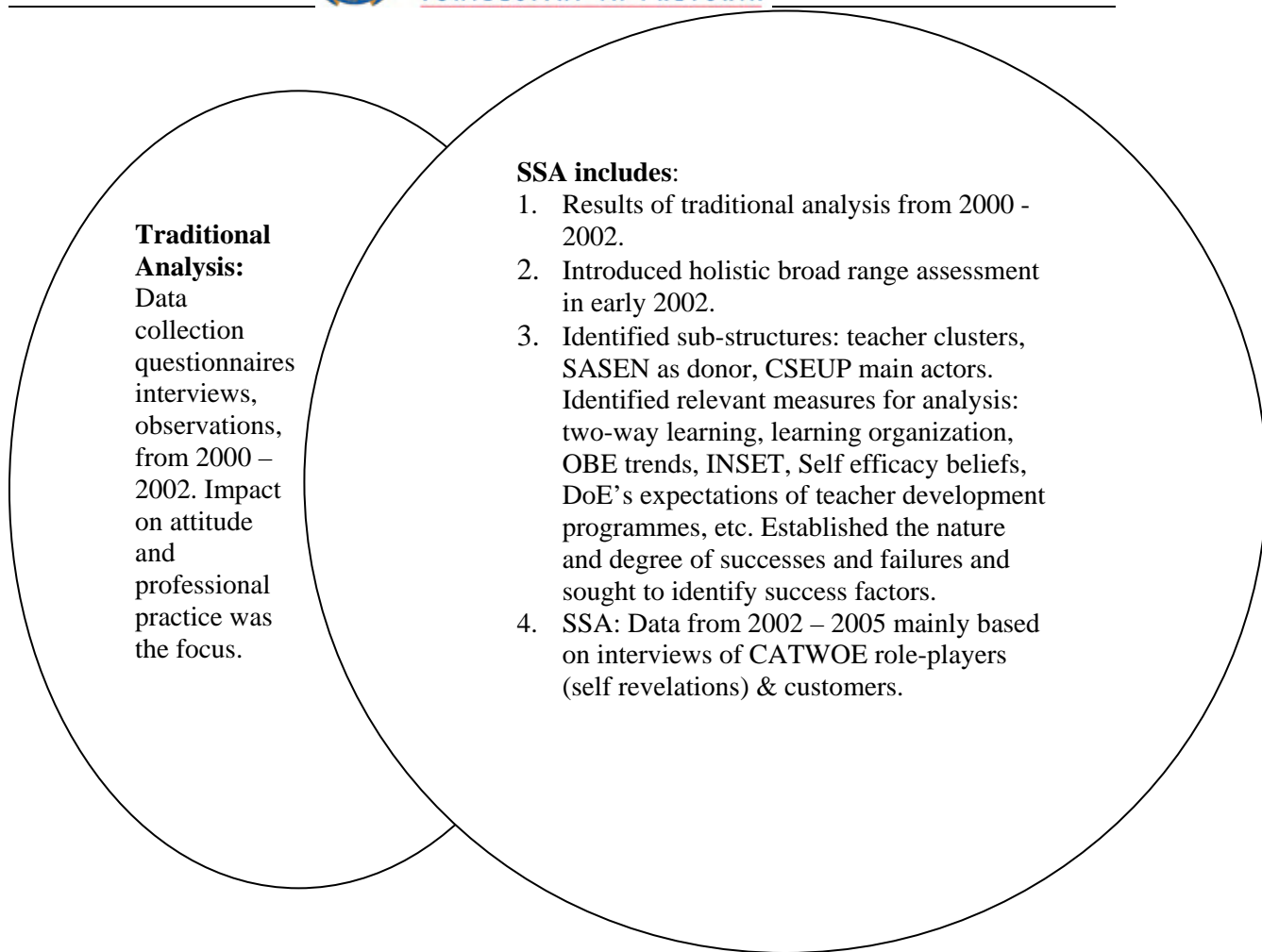
In early 2002 it was considered that because the situation in which the SASEN project was located was highly complex the evaluation of the SASEN project from a single point of view and with limited time dimension was insufficient for well-founded conclusions to be drawn. The second process of soft systems analysis was adopted in the third year (2002) of the project to address the more open-ended research question as to why the project succeeded. This required an analysis which could provide explanatory depth through being somewhat more holistic. A full understanding of the project was needed in order to identify factors that contribute to success and that could be (at least tentatively) generalised for future projects. Patching (1990) has observed that the soft systems approach supplements rather than replaces other forms of analysis.

For Phase 1, the primary question asked was: What were the effects of the intervention and upgrading of their qualifications on attitudes and professionalism of educators?

The analysis of phase 1 was guided by the following areas of investigation derived from the first research question:

- Change in educator attitude
- Professional behaviour of educators in school and classroom practice

The first area of necessity relied primarily on self-reports. The second provided a partial opportunity for confirming reports of the first area, as objectively determined evidence of behavioural change can lead to inferences of attitude change. Evidence for the second was obtained from classroom observations and reports by colleagues, supervisors and learners, in addition to self-reports.



**Figure 3.2 Overlapping and supportive nature of the two analyses**

Phase two attempted to achieve a more holistic view of the project in order to develop a (sufficient) understanding to identify success factors with some confidence. Proceeding beyond the end of the intervention itself, the SSA addressed the following appropriate sub-questions:

- To what extent was the project successful in its purpose of satisfying the expectations of participants?
- What supported the project's success (success factors)?
- What were limitations and failures of the project?

Written answers by teachers to the questionnaires, observations of classroom teaching and the functioning of the project as a whole, and interviews were three methods for data collection in this research. Over the period of the project, data collection of this kind was performed periodically (Refer to Table 3.2, above.). To establish the success of the project with regard to the stakeholders' expectations, stakeholders (or representatives of stakeholders) were interviewed after the project was completed. Graduation data and academic progress of teachers provided objective information.



### 3.5.2 Approach to analysis

This research was predominantly qualitative despite the fact that some analyses involved quantitative calculations in handling the responses to questionnaires. The general consensus is that data analysis in the research of this nature is an on-going, cyclical process integrated into all aspects of the research (Neuman, 2000; McMillan & Schumacher, 1993; Best & Kahn, 1993; Mouton & Marias, 1990). Accordingly the categories and patterns should emerge from the data rather than being imposed on the data prior to data collection. Data were organised into relevant categories, in order to be comparable with others and suitable for giving conclusion after interpretation. Results from the Soft Systems Analysis (SSA) procedures were used to further triangulate the findings, which compensated for some weaknesses of the research of the first phase.

#### 3.5.2.1 Tabulation and analysis

To analyse the three questionnaires administered during the course of the project, each year's questionnaire was tabulated. Against a statement/view/opinion the Likert type scales were used to establish how many respondents were in agreement, undecided or in disagreement. To provide some quantitative insights the absolute numbers were converted into percentages. Questions are grouped in tables representing a single attitude or similar behaviour. Thus a quantitative impression about a particular type of attitude or behavioural pattern could be indicated. Teachers' comments about a particular attitude or view are clustered just below the table to have enriched responses from the participating teachers who are the most important component of the population of the research. A brief interpretation is given after the views of teachers have been noted.

The observations of teachers' classes were analysed against particular behaviours expected of teachers to find a general trend of practice of teachers in their classes as an impact of the project. Some comments of interpretation of data are given.

Interviews of stakeholders over three years became a vast collection of data, to be organised, compared and analysed. Interviews were transcribed and presented in groups according to learners, teachers, principals etc. year by year and put together in the Appendix B. Questions and responses were given consecutive numbering so that they can be located when there is a need to consult them as raw data. Impacts were mentioned and evidence was cited to show the supporting data. Interpretation directly follows the tables.



### 3.5.3 Soft Systems Analysis (SSA)

Although Soft Systems Analysis has been used since the 1980's in complex management environments (Checkland, 1999; Sherwood, 2003), the SSA has rarely been used as an approach for the analysis of educational projects (Patel 1995). The current attempt to apply the Soft Systems methodology as a framework for evaluation is thus novel, and will in all likelihood be improved over time by others.

The project was a soft system through being a contributor to solving a complex human problem faced in education, while it itself was an organised and complex whole, of people with many roles that changed over time. This was especially due to its location in a new South African educational system which was faced not only with restructuring of the educational system as a whole, but also the introduction of the OBE approach which teachers generally found difficult to implement and perceived as a threat. The question "Why was the project successful?" requires "understanding of the project" as an outcome of the research. That discovered "truth" may differ for each analyst – but provides insight for judgement and a basis for making decisions. The SSA of Phase 2 provided an opportunity to triangulate the findings of the earlier, Phase 1, approach.

The SSA of the second phase raises the criteria for measurement during the analysis. The researcher's informal experiences, observations and field notes were also part of the data, in addition to data obtained during phase 1.

The analysis engaged six steps of Checkland's (1999) soft systems methodology as presented in Chapter 2 (2.6.1-5). Stages 1 to 3 develop a systems model of the project. Stage 4 presents the model which in Stage 5 is used to define the measurements that are required and the analysis that is itself the evaluation. Stage 6, the evaluation conclusions and recommendations are developed.

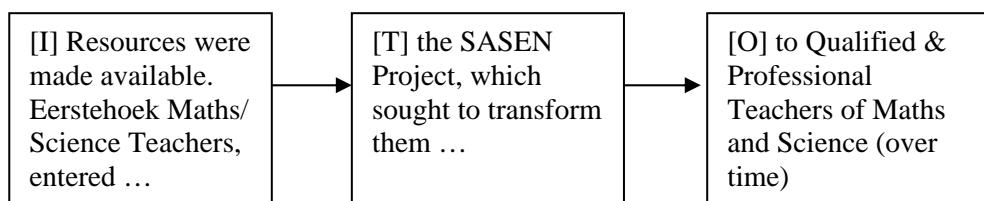
Stage 1 presents the problem situation rather loosely. Stage 2 uses causal loops to provide structuring of the information of Stage 1 and identifies how parts of the system influence (or depend) on one another. At Stage 3, using CATWOE, roles of elements are identified, and subsystems are identified in terms of root definitions which defines the characteristics of the conceptual model. In Stage 4 the conceptual systems model of the project is developed. Stage 5 uses the systems model derived in Stages 3 and 4 as a basis to determine where information is needed to be gathered, and at which key points this needs to be done. The measurements performed and their analyses are the major part of the evaluation itself. At Stage 6 the consequences of the research findings are presented in the form of recommendations and suggestions for future projects, and hindsight conclusions for the completed project.

As Stage 7 represents the implementation of changes recommended due to the analysis, Checkland's Stage 7 falls away in an evaluation. In a sense, Stage 7 is the beginning of a new form of a continuing project, and initiates a new cycle. As the current project had terminated, this stage was not reached.

### 3.5.3.1 Stage 1: The problem situation unstructured

The analysis presented is to evaluate a project as a soft system whose purpose was to provide a process for teachers with inadequate qualifications to become suitably qualified and skilled professional teachers of Mathematics and Science at a secondary level. The soft system is more closely seen as a Human Activity System [HAS] composed of structure, process and the relationships between process elements and structure.

The analysis of the project as a soft system is the focus of the "problem": diagrammatically, represented as an ITO model the SASEN project appears as shown in Fig. 3.2.



**Figure 3.3 A simple ITO systems model for the SASEN project.**

Detailed context has been presented in the introduction in Section 1.1.

### 3.5.3.2 Stage 2: A rich picture

The reflective participant here has had the opportunity to gain understanding from reflection in addition to interviews of stakeholders, classroom observation, etc.

In drawing the rich picture elements of structure from the real world have to be included, thus the elements of *structure* form the first component. Such elements would include the type of activities and the physical location of the contact venue(s). The second component concerns the *processes* occurring in the area of concern. Elements to be included here basically answer the question, "What is going on?" Such elements are teaching, learning and assessment, amongst others. The relationships between the structures and processes present are identified at this stage.

A 'causal loop diagram' (Sherwood, 2003:70) is presented to understand the problem situation to allow the identification of components and hierarchical relationships of the systems organisation.



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The reporting and communication structures within the project are developed. The role of interpersonal relationships in the project is established.

### **3.5.3.3 Stage 3: Root definition of the relevant system**

A CATWOE analysis of the system elements is performed at this stage. This supports the creation of root definitions and provides the necessary grounds for the design of the conceptual model.

Root definitions, as minimal statements that define subsystems and elements of the system, and their functions and activities are developed.

### **3.5.3.4 Stage 4: System's formal conceptual model**

The conceptual model includes (a) the model of the soft systems and its hierarchies, its interactions, relationships and actors. (b) The lenses which must be used to quantify the conceptual elements are derived from the systems model.

The conceptual model contains the Wider Systems (which perform the control systems enabling the other sub-systems in the hierarchy to function). The wider systems also effect changes in the performance of the transformation system when necessary. The transformation subsystem is the main system which is identified with the actual education programme delivered and contains several subsystems, which need to be identified in the model.

As a feedback system (including the continuing role of the evaluator, in addition to measures built into the lesson delivery subsystems) formed part of the system design, it is not surprising that the ultimate conceptual model contains components of the ITOFC model described in section 2.6.

### **3.5.3.5 Stage 5: Comparing the conceptual model of Stage 4 with the real world situation.**

In Stage 5 one first seeks to ensure that the project examined actually has the form of a soft system, we do this by ensuring that what we know of the real world situation (as given in the Stages 1 to 3) is represented in the conceptual model. Hence what forms the control, what contributes to the feedback, how the control acts to review the input and structure of the implementing sub-systems and measuring the quantified output etc.

Secondly, one ensures that important elements of the system have been identified, and their relationships and interactions have been represented adequately in the conceptual model of Stage 4.

Thirdly, the conceptual model is used to define the measurements and observations that are required to establish a detailed understanding of the real world that is the project being evaluated.



In a practical sense, the conceptual model of stage 4 is considered tentative, until the model has been compared to the rich picture (or complete information) established in stages 1 and 2 and the observations it identifies are performed. Stages 4 and 5 (and to some extent 2 and 3) thus actually occur in an iterative, often parallel, process. As more information is gathered the picture is enhanced, the debates that concretize the model occur, and the model is adapted. As may be thought to be the case with all stage theories, descriptions in terms of stages are idealised and actual application requires all of the activities grouped under the stages to be performed, but rarely are they performed in a truly sequential order.

The further measurement processes and analyses are performed and, as a consequence, are the actual “evaluation”.

A traditional evaluation would have skipped the four stages establishing the conceptual system model and have assumed a general model, as for example, the ITO (Patching 1990) or CIPP models (as described by Calder (1994) and discussed with system models in section 2.6).

### **3.5.4 Measurements and analyses that were performed as a consequence of the systems model**

During Stage 5 the evaluation itself was performed. As the guiding question included the open-ended question “why” the purpose of the evaluation required a comprehensive series of analyses derived from the systems model of stage 4.

Although what is to be measured is actually a result of the systems analysis, describing these details in the results chapter makes the chapter rather complex. For this reason, as in the preceding literature chapter (Chapter 2) we present the discussion of measurements and analyses here. The reasons for the measurements are given with the results in the next chapter, however,

#### **3.5.4.1 To what extent was the project successful?**

This measure involves a statement of actual graduation rates, as well as interviews with participating teachers, principals and colleagues at schools from which the participating teachers were drawn. Responses from earlier questionnaires of teachers and learners were also included in the data analysed.

These interviews were performed at three schools, one each drawn from the three clusters which had been formed as part of the project. Each of the three schools was chosen as being a school at which a teacher who had taken an active role in the clusters was located. The sampling should thus



be seen as a convenience sample, which may be biased in that these are the ones who had become the most active teachers.

The clusters are however described and the activities as reported by participants and observed by the CI indicate that activities and responsibilities were shared within the clusters, and thus this differentiation, and correspondingly the potential bias, is mitigated.

Interviews contained structured questions and allowed follow-ups and responses. They were recorded and transcripts were analysed.

Interviewees were interviewed to assess the quality of output of the project, hence the extent to which the participating teachers and their schools obtained benefit from the project, in their opinion.

- The impact of the project on teaching and learning through reported changes of approaches in teaching, and
- Time spent with learners was explicitly determined through the interviews with principals, learners and colleagues as well as teachers.
- Perceived improvement in attitudes towards science and mathematics
- Participation by learners in project schools in Science Expo
- Membership by teachers in professional associations such as AMESA
- Computer use in the schools as reported by interviewees and the extent to which this was ascribed to the project were investigated.

The wider system (for example the Department of Education) expected teacher training programmes to assist development in the “seven roles”. The impact on roles in addition to the one addressed directly by the project, namely the content knowledge (subject expert) was inferred from interview responses.

#### **3.5.4.2 To what could the successes be ascribed?**

The following aspects were considered, largely based on responses of teachers and other stakeholders:

- Rare opportunity for such development in Science/Mathematics education with possibilities of opening opportunities for promotion
- Affordable cost to teachers
- Teachers understood the intended longer duration
- Feeling of ownership by trainee teachers
- Role of culture and language

- Motivation, punctuality, discipline and accountability in the SASEN project
- Formation of functioning clusters of teachers
- The SASEN project was a ‘Learning organisation’
- Appropriate courses and content design which were negotiated and upgraded from time to time.
- Desirable constructive role of foreign donors
- Role of the CI as ongoing evaluator and MDE representative
- Sustainability

#### **3.5.4.3 Limitations and failures of the project**

To create a complete picture several challenges and failures which respondents to questionnaires and interviewees suggested to be important were examined.

#### **3.5.5 Stage 6: Conclusions of the analysis**

This stage presents the conclusions of the analysis, in particular a summative evaluation, as well as aspects of recommendations for future forms of the project.

### **3.6 Discussion**

The evaluation sought to answer whether the project successfully addressed poor attitudes towards the demands of the teaching profession and improved the culture of learning and teaching. The evaluation also sought to answer the extent to which the project was successful in addressing not only its primary design aims of strengthening the content knowledge and laboratory skills (as would be the focus of a traditional evaluation) but also in meeting the expectations of various stakeholders. These additional expectations provide the opportunity to identify unexpected successes and support the identification of factors that contribute to successes, as well as failures and limitations of the project. Consequently, a rich set of recommendations which are potentially transferable to other projects can follow from such a more holistic view.

Table 3.3 contrasts the two analyses.


**Table 3.3 Comparison of the Phase 1 (Traditional analysis) and Phase 2 (Soft Systems Analysis)**

	Phase 1: Conventional/Traditional	Phase 2: SSA (Soft Systems Analysis)
1.	Structure	
	The structure and responsibilities within the project were assumed. [CIPP based evaluation]	The actual structure was discovered through a process built on the framework of the Soft Systems Analysis. [ITOF model was tested and populated]
2.	What was analysed	
	a) Determined by the assumptions of the structure and the purpose of the project.  b) Focussed and bounded, with a limited range of proxy measures which are pre-chosen.	a) Determined by the needs of stakeholders (“customers” and indirect clients) who are identified from the discovered structure and purpose.  b) Broad. May accommodate unexpected measures.
3.	Dependence on biases	
	May be limited in its ability to deal with the bias of a participating assessor.	A staged methodology delays the effects of biases of the participating assessor, until sufficient information is available to mitigate such biases.
4.	Methodology	
	a) Structured and often rigid. Questionnaires were designed to assess the particular aspects of the project that were justified by the structural assumptions made at the beginning.  b) Adaptation along the way reduces the value of the assessment.  c) Respondents had limited opportunity to elaborate on the broader picture.	a) May be more loosely structured. The SSA follows stages that lead from unstructured information, through a conceptual model that includes hierarchies of subsystems that affect the project, followed by a stage in which appropriate tools for data-collection and analysis are designed and applied in the real world.  b) If a mismatch between the conceptual structure and the real world is discovered, the stages are repeated.  c) As tools are provided by the dynamic structural model, input from respondents allows greater opportunity for both adaptation of the



	<b>Phase 1: Conventional/Traditional</b>	<b>Phase 2: SSA (Soft Systems Analysis)</b>
		assessment methods, as well as the adoption of new information in response to interaction with respondents
5.	Results of the analysis	
	<p>Suggestions and conclusions are determined by the assumptions made initially, regarding structure and purpose. They may be incomplete.</p> <p>Conclusions are constrained by the context created by the initial questions asked, as derived from the initial assumptions of structure.</p> <p>Recommendations are derived within the constrained assumptions of the assumed structure, and limited by the specific information collected within the scope determined by the evaluation questions which themselves were based on the initial assumptions.</p> <p>It must be noted that if the questions do represent the needs of those who request the evaluation, this is not necessarily a disadvantage.</p>	<p>The major result of the analysis (and also the criterion for deciding on completion) is “sufficient” understanding. This may include some insights towards answering such questions as how, or why the project succeeded (and to what extent).</p> <p>The conclusions are more holistic in nature.</p> <p>Recommendations may be of wider scope, and may bear increased confidence, due to the broader range of information on which they are based.</p> <p>It is to be noted that the Soft Systems Analysis is constructed to develop understanding in order to derive recommendations, wherever they might fall. It is not limited by initial assumptions of structure. Its danger is that it may be hindered by a potential absence of focus.</p>

### 3.7 Conclusion

The Community Development Forum requested a project and defined the needs that should be addressed in 1998. The actual first presentations took place in September 1999 and the intervention formally ended in April 2003 with the award of the Diploma/Certificate to teachers.



The evaluation of the project for impacts and qualities of its implementation was done as a case study within a participatory research paradigm. The data, collected through interviews, observations and questionnaires, were analysed in two phases. The first followed a traditional format and was conducted during the project, involving mainly participating teachers, some school principals and a sample of learners. The second, which followed an adaptation of Checkland's Soft Systems Analysis format, was begun during the final stages of the project and ended 2 years after the end of the project. This was designed to establish the actual structures and relationships, and thus establish further important interviewees, and measures of performance towards generating a holistic understanding of the project in order to allow the inference of plausible reasons for the project's success. During the latter analysis further aspects including "roles of teachers" as an expectation of the National Department of Education as stakeholder, aspects of "learning organisations", improved "efficacy beliefs", and the role of the donor were identified from the systems model. These required additional interviews with important role-players, many of whom were part of a wider system of decision makers and were shown to be important by the systems analysis. Matters of this kind that are examined in the next chapter have also been given.

This chapter has described the design of the data-collection procedures, which included the design choices underlying the questionnaires, the process of interviews, observations of demonstration lessons, actual classrooms and cluster activities as part of a traditional evaluation procedure. A second framework, the adapted SSA process, and its application have been described.

The next chapter (chapter four) presents the data and interpretations obtained through the methods described above. The first phase analysis presents the attitude change that teachers, colleagues and learners ascribe to the project's influence. The Soft Systems analysis of the second phase builds a systems model that is specific to the project, and, based on this model, analyses are performed to develop sufficient holistic understanding to suggest explanations for the successes of the project.





## Chapter 4

# Data Presentation, Analysis, Interpretation and Discussion

### 4.1 Introduction

The project evaluation was performed in two phases.

During phase 1, performed while the project was in progress, the attitudes and professionalism of teachers were the targets of the research. For this the traditional technique of administering questionnaires from time to time to find the attitudinal behaviours of teachers was done. Additionally, observations of teachers' classroom teachings were undertaken with the purpose to triangulate and probe the results found from the successive questionnaires from 2000 –2002.

In Phase 2, which was begun in the closing stages of the project and continued beyond its end, interviews of other stakeholders like DoE officials, colleagues, unions, cluster leaders in addition to teachers and principals provided data for the Soft Systems Analysis. Iteratively, a clear picture of the structure and relationships between “elements” (participants including those who are not themselves the actual participating teachers, and their roles) emerged, and measurements are performed that characterise the project, and its level of success and sustainability of its impacts. The understanding obtained is used to venture some explanations for the successes of the project.

### 4.2 Phase one of the analysis – addressing impact [Question 1]

Research Question 1: What were the effects of the intervention and upgrading of their qualifications on attitudes and professionalism of educators?

Specifically, investigations which were conducted mainly in the first phase of the research were directed to change in educator attitude, as self-reported, and change in professional behaviour of educators in school and classroom practice, as self-reported, observed in lessons and as reported by colleagues, supervisors and learners.

The Phase one analysis draws on three sources to establish the impact of the project on teacher attitudes and aspects of their professionalism. These are formal questionnaires, (presented in 2000, 2001 and on the last formal workshop of the project in 2002), interviews with teachers, school



principals and learners (which were drawn from interviews performed both during the period of presentation in 2001 to 2002 and after 2002 during the Phase 2 series of interviews), and classroom observation in both normal classroom sessions as well as demonstration lessons performed by clusters (during 2001 and 2002).

The questionnaires together give very little information of the change produced by the project over a time dimension. However when correlated with their comments, classroom observations and responses during interviews, it is clear that teachers report a change in attitude and practice which they ascribe to the project. The triangulation with the interviews of colleagues, learners and principals gives one the confidence to conclude that the project was an important factor in change towards improved confidence and professional self image.

#### 4.2.1 Questionnaire analysis

This section presents the attitudes and professionalism achieved and practiced by teachers as a consequence of the intervention.

In the questionnaires of 2001 and 2002 a place was provided for respondents to provide comments in explanation of their agreements/disagreements. In the tabular analyses the **comments of teachers** have been presented after each table. A lower-case letter links the comment to the statement in the table. Not all respondents provided comments. One accepts that these views represented the teacher's own thinking about the item presented.

##### 4.2.1.1 Attitude toward the career of teaching of Science or Mathematics

In this section a tabular analysis represents the responses of teachers regarding their agreement with statements. These responses were collected during three consecutive years 2000, 2001 and 2002, in which 21, 18 and 13 trainee teachers voluntarily completed questionnaires.

The analysis in this section cannot establish the change in attitudes of teachers, rather, it detects the attitudes of teachers established over three years of the project life. This is a limitation of the questionnaire design and methodology used. However, the responses of teachers to questions 8, 9 and 10 of the questionnaire of 2002 report changes in their attitudes, and show that the respondents credit the project with causing the changes.

The statements in the questionnaire were to be responded to as follows: SA- Strongly agree, A- Agree, U- Undecided, D- Disagree and SD- Strongly disagree. For analysis SA & A have been merged as A, and D and SD have been merged as D. Data are presented as percentages. The abbreviated labelling is followed throughout the analysis.

**Table 4.1 Response analysis, attitude of teachers towards teaching**

Item statements		A	U	D
		%	%	%
a	From very start I wanted to be a teacher and so I am. (2000)	71	4	25
b	I like teaching, because there is ample free time to do other business (2000)	20	8	72
c	I like to work even when severe conditions are prevailing, if I can perform better. (2000)	95	0	5
d	A science teacher must always be a good maths teacher (2000)	86	5	9
e	The main role of the teacher is to impart knowledge (2001)	44	12	44
f	A capable teacher who knows the subject, never gets tired of the learners (2002)	100	-	-
g	Even if there are no learners in the school my presence until late makes a difference (2002)	85	-	15
h	I cannot sacrifice my private time for the school for no monetary gains. (2002)	15		85
In this table and in subsequent tables: A – Agree, U – Undecided and D – Disagree The year the question formed part of a questionnaire is given in parentheses with the statement.				

The following comments were provided by the some respondents:

- e. “Teacher should also learn from them. (learners)” (*Two way learning*)
- e. “Teacher is just assisting; pupil must learn to work on his or her own. Not only knowledge to be imparted. Learners are not empty vessels.”
- f. “it is difficult because of overcrowding of classes”
- f. “learners get their weaknesses known”
- f. “it helps them to prepare again”
- f. “teachers learn to keep pace with learners and understanding about learners.” (*Two way learning*).
- g. “Even if there are no learners left in the school my presence in the school until late makes a difference to the image of the schools.”
- h. “The fact is that I enjoy teaching. When I am at school and no learners, I really miss the class and sharing educative ideas with my learners.” (*Two way learning advocated*)
- h. “My learners have become part of my life, I enjoy their company.” (It shows commitment towards work. It also shows emotional attachment towards the school.)
- h. “Teaching to me is a calling. Teaching even on holidays and Saturdays is what I enjoy.”
- h. “The profit is the learners’ success of my teaching.”



## Interpretation

Teachers accepted that they liked to be teachers. They enjoy teaching and they want to learn and improve their career. Teachers seem to agree to take pastoral charge of the learners.

Over the three years of time spent with the project, teachers realised that spending longer time in schools leave positive impact on learning and teaching, sharing ideas with learners (two-way learning) is important, learners are not empty vessels but they construct knowledge on existing knowledge to learn the subject and digest the content material and teachers liked associating with learners to help them succeed.

Teachers showed their positive attitude towards teaching and expressed the feeling of satisfaction when learners too cooperate and perform. “*Efficacy beliefs*” of teachers are indicated in c, f, g and h seem to be playing a role in creating favourable attitudes of teachers towards preparing and presenting good lessons by later in the project, 2002. Teachers became more active, committed, well prepared in their classes and evidence shows that they took their satisfaction from learners’ successes. These Maths and Science teachers do have positive attitude towards teaching as their career.

### 4.2.1.2 The learner-teacher relationship

The responses regarding learners’ trust and its effect are expressed in the following tabular data analysis.

**Table 4.2 Attitude towards learners-teachers relationship**

Item statements	A %	U %	D %
a I like to work even, when severe conditions are prevailing, if I can perform better. (2000)	95	-	5
b My learners trust me because I can lay a solid foundation for their future. (2000)	76	19	5
c When asked for extra class my learners attend in full force. (2000)	62	5	33
d [It is reasonable to expect of a teacher:] To visit parents of pupil at their homes. (2001)	61	33	6
e A teacher’s role is to teach and not to deal with learners’ problems. (2001)	11	22	67
f A teacher should be concerned with the general well being of a student (2001)	89	4	7
g It is SMT’s (School Management Team) job to put learners in the class. Teachers have only to teach. (2002)	0	0	100



Item statements		A %	U %	D %
h	After school I want to grow myself and do not want waste time with unruly learners of the day. (2002)	15	0	85
i	A capable teacher who knows the subject never gets tired of learners. (2002)	100	0	0

**Comments** by the respondents:

- d. "Teacher is also a parent to the learner."
- d. "Visiting homes of learners is possible but they live far from school."
- e. "My learners have become part of my life I enjoy their company." (*Positive attitude*)
- e. "It is professional to help solve a learner's problem."
- f. "Teacher does not know the answer then he scolds the learner. He is unprepared."
- f. "Hitting the child is the only effective punishment."
- f. "Learners should be out of any tension and never be intimidated."
- f. "Male teachers give money at lunch for their lust."
- i. "Class discipline comes through a teachers-learner at the same time teacher should share knowledge with the learners."
- i. "As teacher I should inculcate love for the subject."
- i. "The teacher does not feel insecure."

**Interpretation**

Teachers seem to be positive about creating a healthy relationship with learners. They realise their responsibilities and roles in shaping the lives of learners by providing them with a quality education. Teachers accepted their responsibility to behave as parents. A teacher commented that some colleagues give money to learners for their lust also and not for a healthy relationship. This concern indicates acceptance that there are bounds to the teacher-pupil relationship – ulterior motives are not acceptable. Teachers were not united on corporal punishment. A confident teacher has good relations with learners, but unprepared and weak teachers go for scolding and punishment of learners. [This last statement is supported by the comments made by some learners in the section 4.2.2.4] Teachers (76%) agreed that learners trusted them (teachers) and they are ready to support them (learners) for their achievement. Teachers feel secure with good relations. A majority of 85% of teachers reported that they were willing to cooperate and assist even unruly learners.



### 4.2.1.3 Attitude towards accepting responsibility and accountability attached to their position as teacher

**Table 4.3 Attitude towards accepting responsibility and accountability**

Item statements		A %	U %	D %
a	The matric results of Physical Science in my school were good because of my good teaching. (2000)	62	19	19
b	The Maths results of my school were bad because of learners' parents' neglect. (2000)	65	5	30
c	Science and Maths teachers should sacrifice their time to organize extra lessons with learners to improve their results. (2000)	96	0	4
d	Many feel that poor culture of learning and teaching are contributing most to have poor performance in Grade 12. (2000)	96	0	4
e	I can improve the results drastically if I get facilities e.g. textbooks, equipment, laboratory, etc. . (2000)	81	5	14
f	A teacher's role is to teach and not to deal with learners' problems. (2001)	11	22	67
g	It is the School Management Team's (SMT) job to put learners in classrooms teachers have only to teach. (2002)	0	0	100
h	I feel guilty if my school did not perform well. (2002)	100	0	0
i	Only empty teachers run away from their classes. (2002)	70	0	30
j	Teaching Science and Mathematics is a dull job. (2002)	15	0	85
k.	Teachers always produce some excuses when they miss their classes and they don't compensate. (2002)	23	77	0

**Comments** by the respondents:

f. "Teachers should teach learners in totality."

f. "No discipline no learning in the classroom. They disrupt and no effective learning takes place."

f. "Personal problems can affect learning."

f. "There are teachers who stay behind and cover up the work they have missed. Others lack commitment maybe because of poor culture of learning and teaching environment."

h. "In the beginning of the year I set my goals to achieve 100% pass rate of my learners. Their success is part of mine."

i. "Knowing the subject creates confidence and makes one a better teacher."

i. "It is a common trend now-a-days that teachers are no longer dedicated and committed to their profession. They always have someone to blame for their failures." (*Avoiding taking responsibilities*)

j. "It is a problem to conceptualise when matter is not presented concrete and put into the context."



j. "Science and mathematics are very interesting in class when teachers deal with the real situation of the problem in the class."

### Interpretation

Teachers do want to take the credit for good Science and Mathematics teaching, but they don't want to be responsible for failures. They rather blame weaknesses on the system and non-availability of needed facilities, disinterested learners, Science and Mathematics as boring for learners (69%) and dull subjects -- in other words on external factors. The statement "Teachers always produce some excuses when they miss their classes and they don't compensate" was given full or tentative support by teachers. Teachers supported the statements which credited teachers, but those statements where direct responsibility of failures fell on them they avoided. This supports similar findings of Ewing & Setsubi (1999) and confirmed by Gilmour [in Taylor & Vinjevold (1999:138)]. In Gilmour's interviews with teachers in eight successful schools in the Western Cape respondents ascribed the success of their school results overwhelmingly to staff factors (77.2%), but when asked why they thought students might fail, 80.5% put this down to student factors, and only 1.2% thought it might be due to poor teaching. Nevertheless, there is an indication of a shift between 2000 (a-e) and 2002 (g-k) towards taking responsibility for their role as professionals in the performance of their learners and the school.

#### 4.2.1.4. Attitude towards working hours

**Table 4.4 Attitude towards working hours**

Item statements	A %	U %	D %
a   I enjoy myself being most of the time in the school. (2000)	96	0	4
b   [It is reasonable to expect of a teacher:] To spend time in the evening and over weekends on school work. (2001)	78	6	16
c   [It is reasonable to expect of a teacher:] To spend time during vacations on school related work. (2001)	83	5	12
d   [How often have you heard of teachers doing this? A; often, U: occasionally, D: never] A teacher leaves the school early without permission. (2001)	11	62	27
e   When school is closed I feel very lonely. (2002)	23	31	46
f   I cannot sacrifice my private time for school for no monetary gain. (2002)	0	15	85
g   No one likes to teach after the school without any incentives. (2002)	0	31	69
h   Performance of learners is directly related to the time spent by the teachers with learners fruitfully. (2002)	46	31	23






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**Comments** by the respondents:

- b. "Teachers are involved in business deals, therefore staying away from towns is a problem."
- c. "I can attend the school if learners are willing and work is not completed."
- g. "Teachers have another need to cater for their life."
- h. "To teach extra the teacher should have knowledge of the subject."
- h. "Unprepared teachers to teach a class have no direction & enthusiasm."<sup>1</sup>
- h. "They go late to class to reduce time in the class to leave earlier."
- h. "To spend more time with learners builds learners morally and gives them opportunity to new trends."
- h. "Clears misconceptions and empower to solve problems."

**Interpretation**

Up to 96% of teachers claim to be positive about working extra hours in the interests of the school. Teachers (46%) were of the opinion that being with learners during extra time empowers them to solve more difficult questions and clears misconceptions as well. Such teachers argue that it creates a culture of learning and teaching in the school, builds learners morally, gives them an opportunity to adopt new trends, clears misconceptions and empowers learners to solve problems (comments to h).

**4.2.1.5 Change as self-reported by teachers during the project (Nov. 2002).**

In the analysis above the attitudes of teachers are found over three years of the project. These questionnaires cannot reflect a change in their attitude over the three year period, as this was not assessed as a pre- and post-project phenomenon. However, the following questions (8, 9 and 10) do throw some light on changes in teachers' attitude as reported by teachers themselves. It also reflects, in the responses of Question 9, the actions and influences of the project, which caused the changes in their attitudes. However, even these questions cannot produce a measurement of the depth of change actually produced; rather, the responses by teachers produce evidence of change, but do not quantify the change itself.

Three questions discussed here were the part of the questionnaire administered last (on the closing date of the project). Only thirteen teachers submitted their responses. Others left for home promising to send their responses later but these were not received. Statistically the response represents only 48% of the teachers. The responses indicate that the project contributed positively to the professional lives of teachers.

The questions are addressed in the order 8, 10 and then 9, because both 8 and 10 ask the respondents to select changes they perceived in themselves from a list. Question 9 was open-ended, and asked the respondents to provide reasons for the changes they perceived. Several of the



responses themselves are further reports of change, and so are additions to the lists of Questions 8 and 10. It is clear from their responses to these questions that they perceive changes in themselves, their attitudes, professionalism and confidence, and ascribe these changes to the project.

**Question 8:** After the FDE the following changes have occurred in my daily working at the school (✓ where you agree, X where you don't)

**Table 4.5 Answers by teachers showing the effects of the intervention / project. (Question 8)**

Item statements	Agree	Disagree
1 I am fully confident.	100%	0
2 I can prepare for any class professionally and present it	100%	0
3 I am always ready to attend my class; rather I wait for the bell to ring for me.	94%	6%
4 I am motivated because I know the subject and I am capable of handling any question asked by learners	100%	0%
5 I have developed better reading skills and improved conceptual understanding	100%	0%
6 Still I don't like to remain in the school after hours.	12%	88%

The confidence of teachers has improved overwhelmingly. Teachers became eager to meet learners to teach what they had learned with the intervention. This evidence from teachers regarding their attitude tells a story of success of the project over the three year intervention.

**Question 10.** As a Maths and Science teacher complete the following table, comparing before and after you participated in the SASEN project (FDE) regarding your attitude and behaviour.

**Table 4.6 Comparative changes in teachers' behaviour before and after the project**

	Attitude and Behaviour	No change	Major change	Comment
1	Punctuality	39%	61%	I have changed a lot. Now I am always early for work
2	Respecting authority	39%	61%	By respecting authority, it is a smooth working environment
3	Trust of learner	31%	69%	Because I am confident, learners trust me a lot. I am confident of the knowledge.
4	Respecting the profession	31%	69%	Now I understand my profession better than before.



	Attitude and Behaviour	No change	Major change	Comment
5	Preparing lesson plans	23%	77%	Prepare lessons before going to class makes wonders because the content is well understood.
6	Improvising apparatus for practical work	8%	92%	Now I know how to handle apparatus and how to plan an experiment lesson.
7	Confidence in the subject	0%	100%	Gained a lot to be confident.
8	Being methodical	8%	92%	Vary strategically in my approach to teaching.
9	Devoting more time to school work	15%	85%	It helps to finish the syllabus in time and revise most of the work and identifying problems that learners might have unsolved.

Here also the teachers provide claims of good practice, and claim improvements and ascribe these to the project.

**Question 9.** After the FDE, I am a new Maths and Science teacher because of:

Answers provided by teachers are listed below:

“Skills learned.”

“Using a computer.”

“Many methods of teaching.”

“Subject matter I gained during the course of the project. Extra information.”

“Apparatus, more equipment and reference material that I received.”

“New approaches.”

“SASEN project.”

“More academic experience.”

“Clear understanding of Maths and Science concepts.”

“Better understanding of the subject matter from the University of Pretoria staff.”

“Got rid of misconceptions.”

“Renewed confidence.”

“Could experience (through discourse and communication in the subject) with my learners confidently.”

“I can teach both Maths and Science from grade-0 to grade 12.”

“I can assist other colleagues who teach Maths and Science.”

“Learnt Earth Science, the new component of OBE.”

“Love of teaching.”

“I gained information, acquired several skills and have more confidence.”



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**Interpretations of answers to Questions 8, 10 and 9**

Responses above indicate that the post intervention teachers (100%) are confident in handling Mathematics and Science subjects. In addition to being confident 92% accepted and confirmed that they became methodical in presenting their lessons with varied strategies and approaches. Teachers (69%) believe that because of this confidence learners trust the teacher more than before.

Another important belief that 70% of the teachers developed is that they understand the teaching profession better than before. A majority 77% prepare lessons before going to class to teach. Teachers (92%) learned how to handle apparatus in the laboratory and are able to improvise where the need arises. 85% have developed the belief that devoting extra time in school helps more learning to take place as learners have said that they learn more during afternoon lessons. [This view expressing the experience of teachers is a finding also of the Malcolm et al. (2000:76).]

The main contribution of the SASEN project among others was its focus on improving teachers through providing deeper conceptual knowledge of the subject. There do appear to be other benefits.

**4.2.2 Interviews with learners (with additional teachers' comments)**

Questionnaires were completed by teachers on three occasions, as presented in the preceding section. Interviews with learners of participating teachers were conducted in 2001 and 2002. The interviews were generally held in the form of groups of students from two to three in size. [These may be considered small focus group sessions.] The interviews are supportive of the reports by teachers. The negative reports from the 2001 interview provide an additional assessment.

Comments by teachers were obtained from interviews held in 2002 and later. The teachers were not aware of the learner comments and their own are thus independent. Most of the teacher comments formed part of discussions triggered by interview questions, often to follow-up questions.

The discussions refer to full transcripts as an Appendix B which, because of the extreme bulk, is not provided in the printed version of the thesis. The transcripts are provided in electronic format as a PDF file on a Compact Disk [CD] as AppendixB.Interviews.pdf.

**4.2.2.1. Attitude towards learners**

**Learners' responses from 2001 interviews** (Appendix B 1, Learners' interviews 2001: Answers: 10s, 16s, 22s, 26s, 32s, 34s, 35s, 44s, 358s, 392s, 394s, 398s, 400s etc.)



Significant examples of learners' responses to the question: 'Q. Can you tell something from your class that they [the learners] like him [the teacher]?' are:

'When we write a test and a few of them miss the test, he feels bad about it. He feels like crying.'

(2001, 44s, Sch-1, App. B1.1)

'I am very satisfied with my maths class and with my Maths teacher because he does his job to the best he can with his ability.' (2001, 394s, Sch-7, App. B1.8)

'She teaches me but, I am not well satisfied with the subject. Because this subject is very difficult. So maybe I need a brilliant teacher...with the present one I am not satisfied'.

### Interpretation

Teachers who know the subject conceptually and have developed confidence do well with learners. Learners show respect and develop trust in such teachers. Learners expressed explicitly that they want knowledgeable and confident ("brilliant") teachers. Weak teachers have been found to be scary, rude, showing a low level of confidence and not supportive in scientific projects which learners have to do as part of their assessment. Learners don't want to attend the extra classes of such weak teachers. Such teachers lose the trust of learners.

#### 4.2.2.2 Learner centred approach

##### Learners' views:

Answering "Q. How satisfied you are with your Science classes?" the learners commented on their teachers:

'...I like him very much. He tries to bring forth the student's background knowledge. He does not move until he is sure that students have already taken the chapter in their minds. He poses as if he doesn't know it and want to know from students. He wants students to ask many questions before he talks. (2001, 368s, Sch-7, App. B1.7)

'I can say he is gaining a lot of new knowledge from the project. Because he comes back to us after attending and helps us. He knows more and teaches better. He is improving day by day. I say the project has given so much' (2001, 407 s, App. B1.8)

##### Teachers' views:

Q. Well I have seen some change but do you also agree that your teaching style before and now, we see a lot of change?

'In my approach, you know in the past I was the only person in the class giving information to the learners. But of late I also get their views. They give me what they know. Then I know their views also. I feel I have also learned something. It is no longer teacher centred. (2001, 90T, App. B3.1.2)



## Interpretation

Both learners and teachers expressed views in favour of learner-centred teaching. Learners felt that the project has imparted a lot of knowledge to their teachers.

### 4.2.2.3 Extra time for learners and for the school

#### Learners' Views

**Q.** Do you like to attend extra classes of your Science and Maths teacher, even though it might be after the school time?

'In the afternoon we mostly come and do projects and questions and answers' (2001,388s, Sch-7, App. B1.7)

'Yes I will like because I think, I can get more information from those extra classes' (2001, 483S, S<sub>10</sub>, App. B1.10)

#### Teachers' views

**Q.** Suppose you are asked to attend a meeting after school, would you prefer to attend?

'We most of the time remain behind after school to catch up Maths/Science classes. So this remains as a routine' (2001, 27T<sub>1</sub>, Sch-1., App. B3.1.1)

**Q.** (follow up) So how would you manage the time, I mean, there is so much work to be done, it will be a bottle neck home work, class work, CASS, syllabus etc. how would you manage?

'Yes, it will be difficult, you know, considering the number of learners you are handling, I am going to set time aside for CASS, for adjustment. They do everything but for record purposes you cannot do everything. Then for projects we have to give time after normal school hours. During the weekends and after classes, extra classes should be organized for such activities, the normal school teaching time can not be over loaded so much, it will affect the other classes, while you are pushing the teaching forward' (2001, 45T<sub>1</sub>,Sch-1. App. B3.1.1)

Another interviewee:

'I would prepare to attend yes! You know time wasted during school hours will never be brought back. If you are teaching Maths /Science, once you lose some minutes it will be difficult to recover it! (2001, 68T<sub>2</sub>, App. B3.1.2)

'If you attend after hours it helps us' (2001, 70T<sub>2</sub>, App. B3.1.2)

'Yes it is my private time, but at the end one ends up using his own private time on Saturdays or on free days to cover up the syllabus. Therefore it is better to use that time off after hours' (2001, 72T<sub>2</sub>, App. B3.1.2)

## Interpretation

These few quotes out of many similar statements reveal that most teachers acknowledged that time after school is their private time, but they also felt that in the interest of their learners they have to



sacrifice and offer extra classes. Teachers agreed to teach during weekends and learners recognised that there is more learning during extra classes. Teachers started caring about loss of contact time during normal teaching and felt the need to compensate through their own initiative. This shows a positive attitude of teachers towards spending more time in the school with learners.

#### **4.2.2.4 Learners' views about the attitude and knowledge of their teachers (Interviews, Aug./Sept. 2001)**

##### **Learner-teacher relationship from interviews:**

The following self-explanatory excerpts are taken from learners' and teachers' interviews to present their feelings about learner-teacher relationship.

##### **Attitude towards learners (reported by learners):**

Learners' trust in teachers' responsibility:

'When we write a test and few of them miss the test, he feels bad about it. He feels like crying. (2001, 44s, Sch-1, App. B1.1)

Q. Do you trust him (teacher)?

Answer: Yes I trust him.

Q. Do you go anytime to tell your secrets to him?

Answer. (Laughing) I did not tell him, but if I had a chance I would tell him. (2001, 53s-59s, Sch-1, App. B1.1).

'Sometimes I go to my friends, when he is not available. I can go to him even if he is in staff room. He always welcomes me. He takes it as a part of learning. (2001, 358s, Sch-6, App. 1.6)

'Sometimes he goes for workshop, for one or two days, but he lets us know in advance and gives work to do during the period, (2001, 392s, Sch-7, App. B1.7).

I am very satisfied with my maths class and with my Maths teacher because he does his job to the best he can with his ability. (2001, 394s, Sch-7, App. B1.8)

'He is academically strict and may be personally strict. Because he makes sure that he teaches well without disturbance in the class. He asserts the importance of science and maths in life and teaches very well that makes us to work in class perfectly' (2001, 398s, App. B1.8)

He is one of the best teachers in the school, who attends all his classes and never dodges his classes. We also don't want to miss him anytime. I trust him (2001, 400 s, Sch-7, App. B1.8)

##### **Interpretation**

The majority of learners' representatives showed trust in their teachers because teachers cared for the well-being and educational development of learners inside the school as well as out.



**Negative feelings of learners about a teacher**

(2001, Sch-4, S9 & S10, App. B1.9 & B1.10)

Q. How does she teach you in the class?

Answer: 'She teaches me but, I am not well satisfied with the subject, because this subject is very difficult. So may be I need a brilliant teacher...with the present one I am not satisfied.

Q. Do you do any practical?

Answer. Yes we do. I don't understand, but I think she is not a brilliant teacher.

Q. Do you trust her?

Answer. Yes I trust her but a little bit.

Q. If you have trouble in learning something do you ask a friend for help rather than going to the teacher?

Answer. Yes I ask my friend and teacher, but sometimes I become very afraid to ask the teacher...very, very afraid.

Q. Why, if you go to ask will she punish you?

Answer. Because sometimes I think she will not answer me because maybe she doesn't know and get angry on me.

Q. Do you think your teacher knows the subject very well?

Answer. No, sometimes, if you are doing practical and she is writing on the board you can see that she is not confident.

Q. Do you want to attend her extra classes?

Answer. No...

Q. Does she encourage you to do scientific project?

Answer. No...

**Another student also expressed reservation about going to the teacher for his problems.**

Q. If you have a personal problem, suppose that you have not eaten, or you are not well or your parents are not happy, do you go and tell her [teacher]?

Answer. No! I don't.

Q. Why don't you tell her?

Answer. I am afraid.

Q. If you have trouble in learning something, do you ask a friend rather than going to the teacher?

Answer. Yes! I ask my friend, the one in my class, when they cannot explain my problem then I go to teacher.

Q. Did you go to the teacher anytime for help?

Answer. No.



## Interpretation

Learners point out that those teachers who appear to not have sufficient subject content knowledge did not show much interest in learners. Learners also were scared that the teacher would be angry and would not answer the questions asked. If learners go to him and present their problems teacher would not attend. The leading reason that learners give is that the teacher does not know the content. Such teachers do not support or encourage doing scientific projects.

### Extra classes after school

Learners gave the following views regarding their wishes to attend extra-classes and possible benefits that they perceive: (Answers by interviewees (learners) to the question, Q. Do you like to attend extra classes of your [Science or Maths] teacher? 2001, App. B1.1-1.14.)

‘When I attend extra classes I learn and understand more.’ ‘Yes, my classmates always attend extra classes.’ ‘We are willing to attend because of expecting to achieve more knowledge.’ ‘I will like to attend his extra classes.’ ‘Yes, I attend; sometimes he is fast in class and revises in extra classes. We do attend his extra classes.’ ‘We attend his classes even though it may be after school.’ ‘No not here at the school, maybe we attend if she takes us out somewhere else.’ ‘No extra class for science. ...If he gives us extra class, I will be the first to attend his class. I will like to attend.’

### Teachers’ Readiness to teach and to help in preparing projects for Science Expos.

Learners responded about teachers who teach them well and have attitude to help preparing Projects. Their responses include:

“He is a good teacher, he knows and he’s ready to help.” “He is prepared.” “Many get ‘A’ or ‘B’.” and in particular: ‘I went to District Expo. and got Bronze’ (2001, 318, 320S, Sch-5, App. B1.4)

The teacher acts responsibly: “He tells in advance if he is absent and goes for a workshop.” “He is always ready and comes prepared.” “He helps in projects and encourages us. He is always there to help us. He helps us if we are doing any project” (2001,362S<sub>6</sub>, Sch-6, App. B1.6).

Contrasting a weaker teacher: “She sometimes talks about projects. She really does not want to do projects. She says do projects but doesn’t participate in them to help us out.’ (2001,451S<sub>9</sub>, Sch-4, App. B1.9)”

### Views of 14 learners’ interviews in 2001

(2001, App. B1.1)

**Learners’ views** about their teachers after two years of training of their teachers, can be summarised:

- Except for a few, the majority of other learners were satisfied with the teaching of their teachers. Learners praised teachers for their punctuality, presenting understandable lessons, caring for learners, and showing Christian behaviour towards learners.



- Learners showed trust in their teachers for their education as well as for their (learners) private matters.
- Learners had faith in teachers and attended the extra-lessons organised by teachers for them. It was expressed that learners learnt more and in-depth during after hour's lessons.
- Teachers helped learners in preparing for the Science Expo and for projects also in Science and Maths. Some exceptions were also noted that those teachers, who were weak in and not confident in their subject knowledge, had negative attitude towards their teaching behaviour and did not help learners in project work neither encouraged.

#### 4.2.2.5 Learners' responses: Second round interviews (April – May, 2002)

(2002, App. B2.1)

Here, questions and group responses of learners regarding the impact of the project on their learning behaviour and behavioural changes of teachers are reported.

Question 1: (Learners are in a joint session). How should a Maths and Science Teacher look like? What should he do in class?

*S1 & S2:* "He must be friendly." "He must look clean; when he is in the class he must teach loud so that we can hear him." "He should dress very well like us or like you in a class." "If he wants to do something in the class he should do like students do, so that we can understand." (*Responses.4 & 7*)

*S11, S12 & S13:* "I want him to be strict and honest." "I want them to be confident, so that when they teach we take it and understand it." "He should be patient with learners until they understand, they should show openness and pleasant so that we feel free to ask when we don't understand."

"He is strict and he does not change that. But he is talking to those who could not do well last year to perform well this year." (*Responses 118 – 122*)

*S14, S15 & S16:* "He should teach well, be sober so that he can teach well." "If something is wrong in the class he should ask the class 'what are you doing?'". "He should explain things to us so that we understand." (*Responses. 151*).

Question 2: Do you see Maths/Science a difficult course that you cannot do?

*S1 & S2:* "Science is a busy subject and I can do it." It is a good subject if you see your teacher and follow him. It is a good subject and makes you great." (*Responses 13 & 14*)

*S7 & S8:* "He shows his sympathy because we failed his test." "After that he called us for two afternoon studies, so that we can pass next test." "He is friendly." (*Responses 70 & 72*)

*S9 & S10:* "I don't see Maths/Science as a difficult subject." "Any one can do it" (*Responses 107*).

*S11, S12, S13:* "No it is not difficult. It needs more practice and time. I can pass it excellent." "He teaches us very well. We are encouraged to science and maths." "I will try to score good level of performance and will do engineering." "They are easily approachable and are ready to help." "We love him" (*Responses 126 – 133*).



**Question 3:** i) Do you think Science and Maths should have more time?

ii) Does your teacher remain in school and attend periods fully prepared?

*S1 & S2:* “I want to have more classes.” “He comes on time and goes when he finishes the period.”  
*(Responses 16 & 18)*

*S9 & S10:* “For maths, period are too short.” “He needs to explain many things for which we need more extra classes.” “My teacher remains and teaches us even during after hours when others are gone.” *(Responses 109)*

*S14, S15, & S16:* “He knows maths. I find it easy with the help of my teacher.” “My teachers should have more classes.” “My teachers should have more classes in maths and science.” “And I am sure he will be happier to have it” *(Responses 165 – 171)*. “He remains full time and does the work.” “If he does not come he gives work/assignment for tomorrow.” *(Responses 175)*

### Interpretation

In the second round of interviews in (2002), during the third year of training of their teachers, learners added some new dimensions about their teachers.

- A regular, punctual, responsible, knowledgeable and competent teacher was the choice of almost all.
- It was often expressed that Science and Mathematics are not seen as difficult any more. A learner said with confidence, “Maths is a good subject. It is not difficult, if you concentrate it is most easy”. Science was seen as a “busy subject” that could make learners “great”.
- Generally, learners expressed the feeling that they welcomed more periods for Maths and Science in schools. Learners emphasised that teachers were attending their classes fully prepared.

#### 4.2.3 Analysis of observations of classroom lessons

This section is an analysis of observations of the classes taught by the teachers in two successive years, namely, 2001 and 2002 begun one year after the start of the intervention. It is probable that some effects of the intervention were already visible in the classroom lessons of teachers. For practical reasons it was decided that at least two teachers per cluster be observed for any effective improvement in their teaching behaviour in a real class. In total nine teachers’ classes and two cluster presentations were observed. These observations were done to further check consistency with the results of questionnaires and interviews.

Individual classes were observed by the researcher and a report was given to, and accepted by, the principal of each school. Cluster presentations were observed by two people [a UP lecturer and the researcher] and a joint conclusion was drawn on each point after some discussion. Therefore inter-



observer reliability was addressed by joint decision (observer-observer) in the case of cluster observations and a separate reliability test was not done. The individual class observations, although accepted by the principal (and thus presumably confirming his preconceived impressions although he was not present as an observer), thus should be used with caution and may be considered potentially subject to the biases of a single observer. The observer was aware of the potential for the halo effect (which describes an influence on the observer due to attractiveness of or friendship with the subject observed) (Tuckman, 1994:203) and thus claims that conscious effort was made to not allow such biases to intrude on his observations and ratings. The use of checklists and general recording of comments were used to further mitigate bias.

In both situations observations were recorded on a checklist. This instrument was based on the Tuckman Teacher Feedback Form (TTFF) (Tuckman, 1979, 1994:202) used to measure teacher style. To establish a rating, a scale ranging from 1 to 9 was used to assess the teachers' competence. The detailed results of the observations (and ratings values which could be assigned) are given in Appendix C. Although these observations do not give enough evidence for generalisation they do give some reasonable grounds for triangulation of the results from the other sources.

### **Individual classroom presentations**

Four Science teachers and five Mathematics teachers were chosen to represent the observed instructional behaviour in a classroom situation.

The aspects of observation considered here for analysis purposes were: preparation of the teacher, classroom environment and management, background knowledge, homework was given at the end of the lesson, solving learners' issues in class, use of chalkboard as media and use of vernacular to explain concepts. These were derived from the Tuckman Teacher Feedback Form (TTFF) (Tuckman, 1979, 1994:202). Details include: Classroom environment (Does the classroom have: a usable chalkboard (Yes/No), Seats and desks for learners, Space for practical if organised), Teacher preparedness (by kind of event); Teacher Demonstration (by class, or by group, all able to see); Learner involvement (with or without teacher assistance, group work) Language usage (Vernacular used Yes/No), Teaching aids used (Yes/No), Method of approach (Background knowledge established, homework assigned), Does teacher take interest in personal problems of his learners, Use of chalkboard ( Often, seldom, not at all).

**Table 4.7 Observation data for the Years 2001 and 2002**

Criteria of observation	Four Science Lessons		Five Maths Lessons	
	Years		Years	
	2001	2002	2001	2002
1. Presentation of prepared lessons	100 %	100 %	40 %	100 %
2. Classroom management and environment	58 %	74 %	49 %	61 %
3. Back-ground knowledge of learners established	25 %	75 %	60 %	100 %
4. Homework was given at the end of the lesson	75 %	100%	40 %	100 %
5. Solving learners' issues in class	0 %	25 %	0 %	60 %
6. Use of chalk-board to present the lesson	59 %	69 %	75 %	62 %
7. Use of vernacular to explain the concept	25 %	25 %	20 %	40 %

In 2001 the year of first round of the observation, Science teachers presented roughly prepared lecture type lessons. In the following year (2002) the involvement of learners increased and teachers demonstrated experiments. By then, the project had provided Science kits to the schools and the improvement in situation was probably an effect of this. It also demonstrated that the science teachers were moving towards learner centred teaching. Teachers (74%) in their second observation lesson looked for learners' background knowledge as compared to 25% in 2001. Learners' issues were given 25% attention in (2002) while no one cared for learners' issues in 2001. Teachers started preparing for and inviting questions from learners. In a few cases teachers were found probing for questions and helping learners find the answers in 2002. One science teacher used vernacular to explain things frequently which was in line with the principle that bilingual learning of concepts helps construction of new knowledge in the minds of novice learners. Others (75 %) were satisfied with English to explain things.

In Mathematics classes in 2001, teachers' used more chalk and talk than attending to learners' grasping of the taught matter. There appeared to be some change in the second round in 2002 and there was some evidence that lessons were better prepared. Noisy, uncontrolled movements of learners' in and out of the classrooms noted in 2001 were better controlled and the same learners were engaged in learning in 2002. More learning materials were available in the form of work sheets, Class-work and homework for learners in the later years. An increase of 20% in the use of bilingual teaching was noted in 2002. Remedial activities were seen being practised in classes as a joint venture by the teacher with learners for incorrect home-work. All (100%) teachers gave home-work to learners in 2002 as compared to 40% in 2001.

Because of the obvious contextual reasons namely no running water, no electricity, crowded classroom, shortages of equipment in laboratories in these rural areas teachers could not perform as much as was expected, but visible qualitative improvements in teachers' classroom behaviour was noted by principals, colleagues and learners. More teachers were teaching with a learner-centred approach as expected in an Outcomes Based Education approach.



### **Cluster presentations**

Two cluster groups were organised to teach a lesson prepared together in their clusters in a real classroom situation, and were observed. This observation provided the observers an opportunity to see the impact of the intervention on teaching and learning when a joint effort was made by teachers to demonstrate their sample instructional behaviour in a real classroom situation. The teachers presented two lessons collectively in their respective clusters, which highlighted team teaching, learner centeredness and built in assessment as required by the Outcomes Based Education (OBE) programme of the intervention. This confirmed that teachers understood how a lesson could be converted into an OBE lesson. The model lessons were prepared by two of the three clusters and were observed in 2001 only. Cluster 3 was not active at the time.

Teachers produced worksheets for learners to work in the classroom and homework to do at home. While learners were busy on worksheets other teachers of the team did the supervision of learners' progress by visiting them at their seats. Learners used "learning by doing" and from "known to unknown" approaches for their learning. Teachers asked exploratory questions to learners to establish the background knowledge and to provoke interest in learning the new content to be taught. Learners took active part in the discussion and also had opportunities all the time to ask any question of their interest. Another feature of the cluster lesson was that it was a well planned and prepared lesson, which again indicated the positive impact of the SASEN project and the joint supportive environment created by the clusters on effective teaching and learning.

The cluster presentations were a collective effort to present a model lesson. A remarkable feature to be noted is the team teaching by the teachers. The model lessons of both clusters manifested learner centred teaching, good lesson planning with work sheets, teaching media etc.

Good preparation and extra teaching aids to assist explanation of concepts were lacking in individual teaching, however. The contrast shows the potential value of networking and clustering of nearby schools to allow teachers to support one another with shared equipment and development of lesson plans.

### **Rating summary**

The aspects of teacher style observed were rated against a scale ranging from 1 to 9 to assess the teachers' competence.

The following conclusions could be drawn based on the rating data analyses. Complete tables showing the quantitative scores are tabulated in (Appendix C).





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*Ratings for individual classroom lessons*

Of nine teachers observed in both 2001 and 2002, teachers 1, 3, 7, 8 & 9 showed a shift towards learner centred teaching but 4, 5 and 6 seems to remain as usual. Teacher 5 showed no shift in rating scale. All are rated towards more prepared teaching. Teachers had good trend in improving discipline in their classes. Teacher (4) is not rated as a disciplinarian. Teacher 9 was rated to remain positive when learners' interests arise to help and support. Teachers showed much improvement in managing time in the class to complete their proposed work for the day.

*Ratings for cluster lessons*

It is true that cluster (1) presentations were more activity based and learner centred than those of Cluster (2). Cluster (1) was found more organised in all activities. It was a leading cluster, which in many aspects provided an example for the others.

The quality of lesson plans, worksheets and the organising of teaching aids were more evident in cluster (1). Cluster (1) and (2) both took care of their learners. In both cases it was a self-disciplined class and had active learners. There was no free time for learners to play in the class or to idle. In the dimension of time management cluster (2) performed better. The coverage of work in cluster (1) was a little better than in (2) while the number of teachers and observers was almost double in cluster (1) to that of Cluster (2).

**4.2.4 Discussion and conclusions of the Phase 1 analysis**

Triangulation (using questionnaires, interviews of teachers, learners and principals and classroom observations) supports the interpretation that positive change of attitude and professionalism did occur because of the intervention. The analysis of the self-reported data of teachers, learners and stakeholders (namely principals, colleagues, lecturers, departmental officials) provided evidence and supported the achievements laid down as expectations. Teachers, principals and others ascribe this beneficial change to the SASEN project.

For Phase 1, the primary question asked was: What were the effects of the intervention on attitudes and professionalism of educators as a result of the intervention and upgrading of their qualifications? Specifically, the analysis addressed the following areas of investigation:

- Change in educator attitude (as self reported)
- Professional behaviour of educators in school and classroom practice (as self-reported, reported by others and observed)

The first area of necessity relied primarily on self-reports. The second provided a partial opportunity for confirming reports of the first area, as objectively determined evidence of



behavioural change can lead to inferences of attitude change. Evidence for the second was obtained from observations of classroom and cluster-based model lessons and reports by colleagues, supervisors and learners, in addition to self-reports.

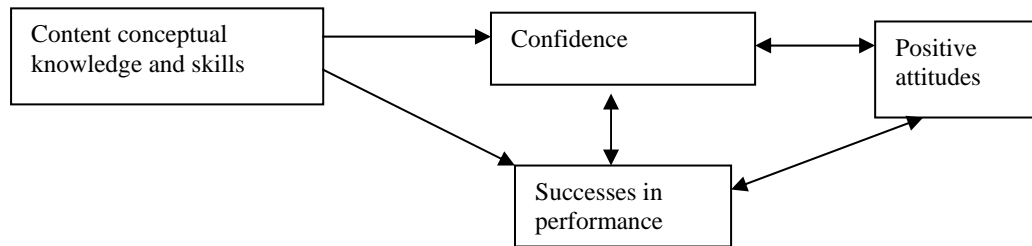
Written answers of teachers to questionnaires administered in three respective years (2000, 2001 & 2002), interviews with stakeholders (teachers, learners and principals) and observation of teachers' classroom practices were used as instruments. As self-reported, teachers initially knew what professionalism meant, but they had little confidence to act in such a manner. Improvement of attitudes towards teaching by being well prepared in class and accountable (4.2.1.1, compare an ambivalent 4.2.1.3 in 2000 to a confident 4.2.1.5 of 2002) with a willingness to assist even unruly learners (4.2.1.2) and moving towards learner centred teaching as a result of improved knowledge (reported by learners in 4.2.2.2 and teachers in 4.2.1.5) was evident in practice towards the end of the project. A willingness and belief in the benefit of spending more time after class (4.2.2.3 reported by learners, 4.2.1.4 quotes the term 'quality time' used by a teacher), winning trust of learners (4.2.1.2; 4.2.2.1), being more responsible for their teaching and accepting administrative responsibilities of the school (4.2.1.3) were noted, amongst others, as the impact of the project by teachers (4.2.1.5) and learners (4.2.2.5). The change in impressions of teachers expressed by learners in 2001 (4.2.2.4) and improved by 2002 (4.2.2.5) is strong. Interviews with learners (4.2.2) and principals (4.4.2.5 – during Phase 2 interviews, see below) of the schools confirmed these changes.

Learners strongly endorsed the achievements in expo-science activities with their teachers' support (4.2.2.4). University lecturers appreciated the performances of these teachers had found something to learn from them.(4.2.2.5) Observation of classroom practices (4.2.3) provided contextual evidence that these teachers had begun to implement more learner-centred teaching and team teaching and prepared their lessons more carefully.

Further evidence (for purposes of triangulation this look-ahead is mentioned briefly here) for the view that the changes were as a result of the projects were obtained from phase 2 interviews of principals, colleagues, lecturers and department officials. At the interviews conducted with colleagues and principals during Phase 2, these confirmed that they benefited from their fellow teachers in many ways and were looking forward to opportunities to join such a project. (4.4.2.5 and 4.6, below). MDE officials continue their support of the project and confirmed that through these teachers newly implemented OBE has obtained support and CASS activities were strengthened (4.5.7). Departmental official noted that expo-science activities in the district have found fertile ground with these trained teachers (4.2.2.7).

From various stakeholders and with different instruments of data collection the analysis arrived at similar findings that trainee teachers improved their professionalism towards a desired level. The Department endorsed these achievements by promoting many of these teachers to higher responsibilities in schools and in the Department (4.4.2.9).

The following model to develop positive attitudes among the teachers may be a guide for an intervention.



**Figure 4.1 A model showing the virtuous cycle of influences on confidence and positive attitudes**

This leaves open the question of which aspects of the project succeeded, and why – which challenges were met, and which were not, and why was the project able to meet these challenges? This was the focus of Phase 2, where a more holistic analysis was performed, using a Soft Systems Analysis framework to evaluate the project. This latter analysis itself raises questions and thus gives rise to other dimensions that needed to be examined.

### 4.3 Phase 2: The Soft Systems Analysis of the SASEN project (Stages 1-4: Modelling)

#### 4.3.1 Introduction

In this section all available data are used and interpreted. The understanding gained through the analyses and interpretations above was also considered. The researchers' experience in the project and with the CSEUP managers and the team of lecturers, and other experiences with the community of school teachers, learners, principals and the Departmental officials engaged in the project to some extent have been used to support the analysis. The data used in the two analyses thus overlap.

The project involved the coordination of several organisations, namely, schools, MDE, SASEN, UP, and teachers in developing Science and Mathematics teachers. This 'soft systems analysis' of the project reviews the project holistically in terms of its design, environment, and implementation. The author as a participant observer uses his experience of being with the project right from inception till its completion. In addition to the interviews of the participating teachers, principals



and learners, system owners and those who controlled the process were also used for this analysis as data resource.

The analysis of the project, followed the modified process described in Chapter 3 (3.5.3). It engaged six steps of the soft systems methodology as advocated by Checkland (1999) and described in Chapter 2 (2.6). Stage 1 presents the problem situation of this research in evaluating the project. Stage two elaborates the stage 1 issues with a rich picture of the situation. At stage three root definitions of the problems and definitions of the CATWOE elements, which led to the systems model, are given. In stage 4 a conceptual model of system is derived from the definitions of the preceding stages. Stage 5 organises the data analysis of the real world situation obtained through actual measurements suggested by interrogation of the conceptual model of stage 4. Stage 5 presents the real findings of the research as the project evaluation. Since this was a post project evaluation at stage 6 the consequences of the evaluation/ research findings are presented in the form of a summary of results and recommendations consequent to the evaluation and usefulness for future projects.

#### **4.3.2 Stage 1: The problem situation unstructured**

Although the detailed context has been presented in the introduction in Section 1.1, some important aspects are briefly listed here as a reminder of the context, history and purpose of the intervention itself.

The Eerstehoek Development Forum (EDF) had acknowledged an internal survey conducted by the Mpumalanga Department of Education during 1997 which concluded that teachers' academic and professional qualifications were not adequate for the levels at which they were required to teach,. This was identified as the cause of other problems like ineffective and poor quality teaching and learning. Generally, the schools were under-resourced and poorly equipped affecting the performance of teachers in their classrooms. Many had no Science laboratories, no water and electricity, and schools were scattered and connected with poorly maintained dusty roads. Weak content knowledge of Mathematics and Science teachers, poor teaching skills, passive or negative attitudes towards their profession were found the area of concern on the part of teachers.

The MDE and EDF required an accredited, registered qualification for teachers as a result of the project, not a project which provided a few non credit-bearing workshops. OBE, should be incorporated both in presentation and as a component of the curriculum. A three to four-year term of the project was agreed to put the transformation in place. Participating teachers were themselves already experienced teachers – adult learners. This raised the issue of retention, transport, and



whether meals would be provided. Teachers agreed that they would pay half the course fee while the remainder would be funded by the project.

The project was designed by the Centre for Science Education at the University of Pretoria, and the qualifications concerned (an FDE in Science and Mathematics, for science teachers, and an ACE in Mathematics and Computer Literacy for mathematics teachers) were formulated and accredited through formal processes, including the Higher Education Council and the South African Qualifications Authority. A component in academic language was presented by the University of South Africa, and although accredited, did not form part of the qualifications themselves. The project was approved by the Special Projects section of the MDE after it was presented to a meeting at which the director of the section, the director of curriculum and the district head of Elukwatini district were present. The Special Projects section occasionally sent a representative to observe the progress of the project, while the MDE representative regularly reported to the district manager.

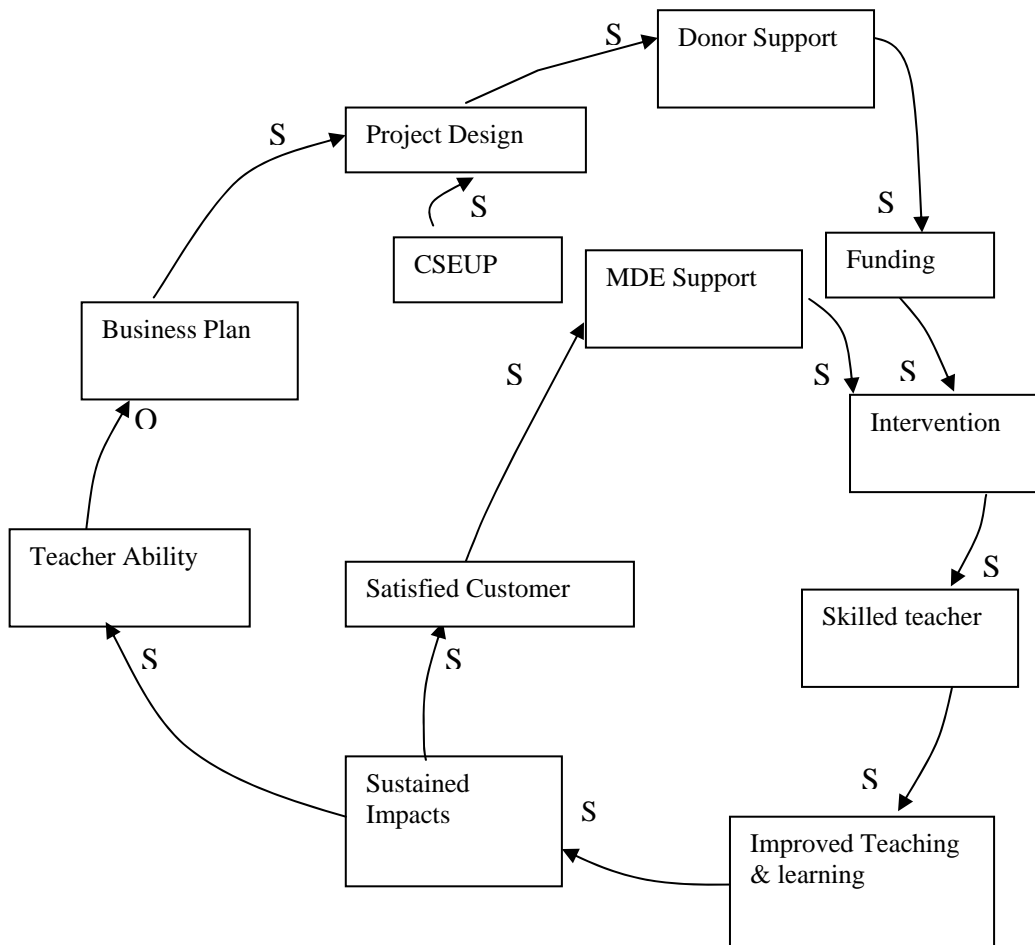
The project itself was funded by three annual contributions of R200 000 by the South African Science Education Network (SASEN), supported by the Flemish Universities and administered by Prof Jos Odeurs of the University of Leuven. SASEN required semi-annual reports with full financial accounting, orders and receipts. Annually the progress of the project was reviewed, a conference was held at which all projects were presented, and the grant was continued, or could be discontinued, based on its performance.

The Centre for Science Education University of Pretoria was authorised to tackle these problems and the problem situation. For the managers and lecturers working on Saturdays at a distance of around 400 km one way, reaching on time and delivering fruitful lectures beginning at 9:00 (am) were some of many other challenges to be handled carefully to keep them with the project. Participating teachers were given the responsibility of funding their own transport to and from the venue, which was up to 50km on poorly maintained roads for most of them. Except for some bread and spreads, tea and coffee during a mid-morning break, the participants provided their own meals. Textbooks, science kits and study notes were provided by the project. Five networked computers and a laser printer were installed by the project at the eMpuluzi Teachers' Centre near the small rural settlement of Mayflower. The Science kits and computers were ultimately donated to schools in each of the cluster areas.

Of 35 initially participating teachers, 28 continued to the end of the first year and achieved registration for the diploma. Of these, 26 completed with the qualification, and a 27<sup>th</sup> completed a year later when the qualification was presented for a second project.

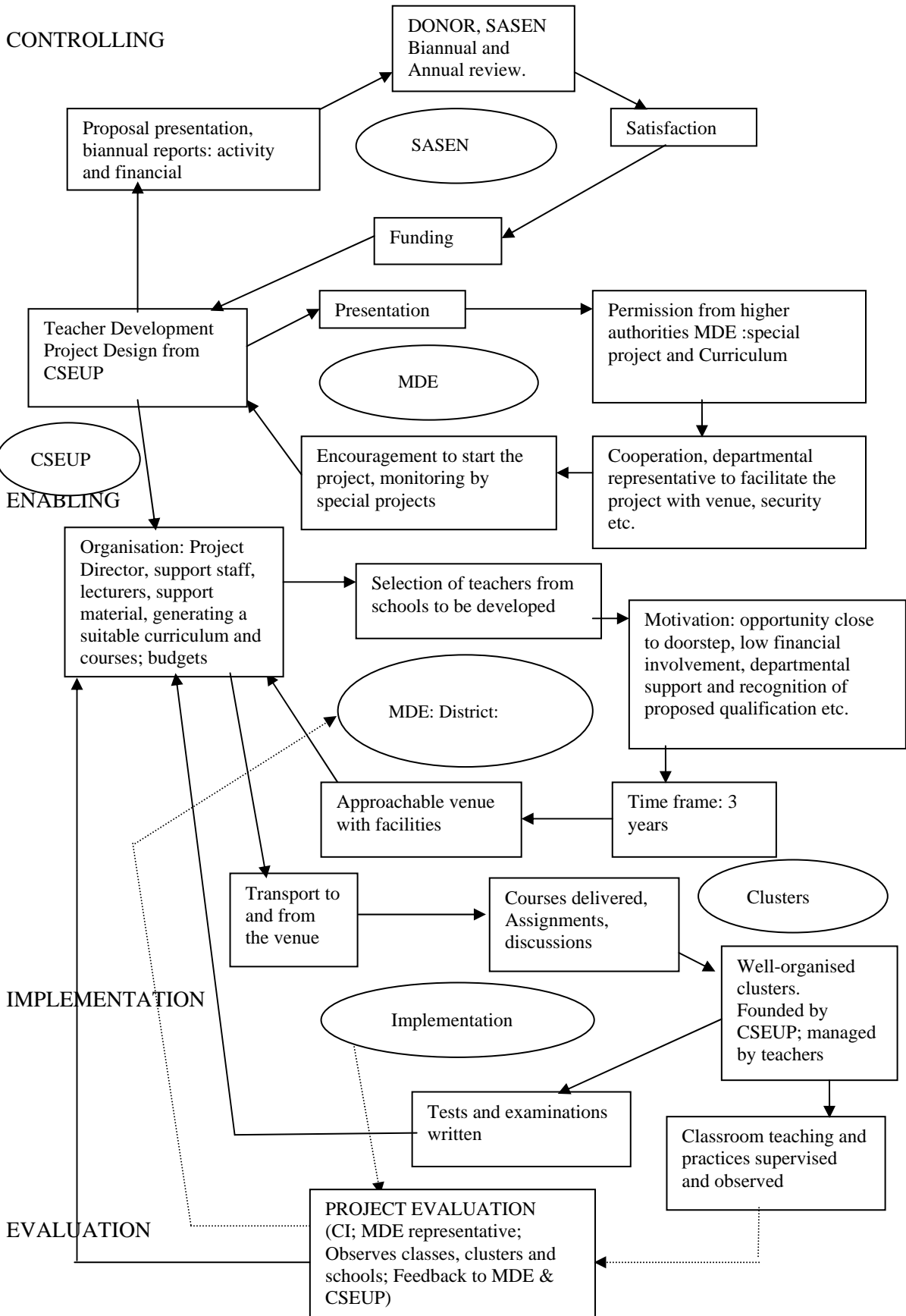
### 4.3.3 Stage 2: The problem situation expressed: A Rich Picture

A ‘causal loop diagram’ (Sherwood, 2003:70) is presented in Figure 4.2 to indicate the process through which the initial controlling aspects created the project.



**Figure 4.2 Causal loops leading to the project**

Figure 4.3 represents a diagrammatic “Rich Picture” showing elements of structure, grouping of elements and listing activities and roles.



**Figure 4.3 A Rich picture presentation of the SASEN Project showing key structural elements and their relationships: Controlling, Enabling, Implementation and Evaluation**

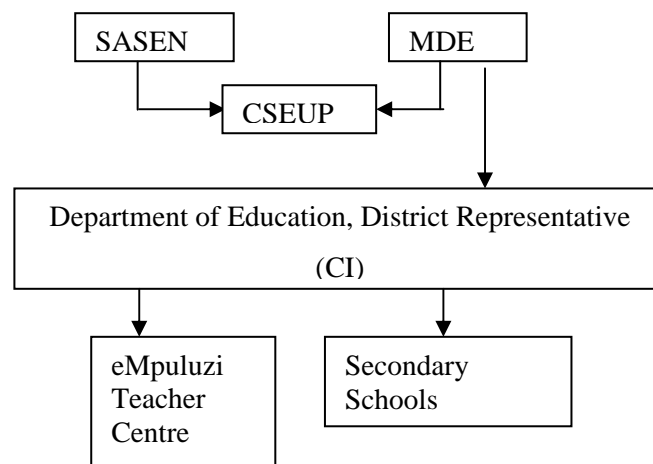


### 4.3.3.1 Structure

The wider system level includes a control structure containing the South African Science Education Network (SASEN), the Directorate Special Education Projects, and the Directorate Curriculum of the Mpumalanga Department of Education (MDE). CSEUP was the organisation which was responsible for the design and implementation of the project and thus to implement the system.

The District Office at Elukwatini in the eMpuluzi district with its Curriculum subsection recruited teachers from secondary schools, provided two teacher centres (Elukwatini and eMpuluzi) as possible venues with infrastructural resources namely furniture, security services, electricity and telephones.

#### Power Hierarchy: Organogram



**Figure 4.4 Power hierarchy in the SASEN project.**

#### Reporting structure:

CSEUP provided financial reports to SASEN at UWC directly. It also reported about progress and development of educational activities through a written activities report and a paper presentation at the annual SASEN conference (Braun, 2001; Braun et al., 2002). The curriculum unit of the District Office reported back to the MDE's Director for Special Educational Projects about the annual progress report of the project. The Curriculum Implementer (CI) reported on the project on weekly and monthly basis (informally oral and a formal written report) to the district management. The CI also reported to the CSEUP about the views and activities of teachers and needs and actions of the District office.



### 4.3.3.2 Communication

Communication about the internal management of the project e.g. negotiations, suggestions, conversations etc. mostly remained informal and oral. Reports about the project, monthly or annually, were formal, written reports, supported by detailed documentation, receipts and records.

### 4.3.3.3 Process

The Director CSEUP attended an Eerstehoek Development Forum meeting.. Subsequently, he developed the curriculum for the proposed FDE and negotiated its registration and accreditation. The project proposal was presented to the MDE for approval of the programme and to obtain support from the various structures in the Department.

Staffing was the responsibility of the Director CSEUP including finding suitable lecturers who were available on Saturdays and were ready to travel the long distance. The CI recruited the teachers as trainees and negotiated permission, support and facilitation from principals of the secondary schools involved in the project.

The task of evaluation of the project in terms of its successes and impacts had been given to the CI. The Director of the project and the evaluator monitored the project. Appropriate corrective action was the responsibility of the project director.

### 4.3.4 Stage 3: Root definitions of the system

The CATWOE analysis of the system guides the development of root definitions.

Customer: The Mathematics and Science teachers of secondary schools of Eerstehoek sub-region and at a higher level the schools and MDE.

Actors: The project Director from CSEUP, lecturers, the CIs of the MDE and cluster leaders. These actors produce the output through their control and actions within a purposeful transformation process. The actors (CIs and cluster leaders) also give information feedback for control and change in the systems.

Transformation: The process to develop teachers with FDE qualifications with positive attitudes and professionalism.

Weltanschauung : All involved grasped the opportunity to improve qualifications, teaching skills and the spirit of learning at their schools. Commitment to success and cooperation produced ownership by the participating teachers, which was



evident in the responsibility they took for their own learning and for one another in the clusters.

Owners: This represents a higher system of entities/decision makers in a position to stop the project. The South African Science Education Network (which provided funds), the Centre For Science Education (which designed and implemented the project) and the Mpumalanga Department of Education (which owned the schools and venues) are the three owners. The owners provide the control and required necessary changes. Participating teachers also became owners in the project as they took responsibility for their learning and the application of what they had learnt.

Environment: The school authorities and teachers were willing to participate to improve learning and teaching situation (customer willingness). Trainee teachers organised and paid for their meals and local transport. Physical facilities in the form of necessary infrastructure, classrooms and laboratories were available. The venue was a distance of 400 km from Pretoria. This was the closest venue to the three teacher clusters.

Root definitions clarify two aspects of the area of concern for further analysis. First is the identification of the problem addressed by the system, namely what is required to be addressed. Secondly, it identifies the system in which the subsequent analysis would be done – which human activity system is of concern. Of prime interest here is the evaluation of the soft system itself, correspondingly we focus here on the defining (and thus bounding) the sections of the project.

Root Definition 1 (RD1): Transformation Process, Means (Input) and purpose (output)

CSEUP and lecturers own the teaching and learning system jointly with trainee teachers. The system is expected to deliver a confident and qualified Science and Mathematics teacher.

Root Definition 2 (RD2): Transformation ( Input and Process, by CSEUP )

The system with the available resources (lecturers, textbooks, handouts, computers, Science Kits etc) ensures that teachers learn relevant knowledge and skills (Accredited FDE/ACE curriculum).

Root Definition 3 (RD 3): Transformation (Input and process, by teacher clusters on ground)

Clusters as sub-systems ensure that collective learning takes place by taking responsibility of self-learning and the peers' learning and subsequent performance.



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**Root Definition 4 (RD 4): The Feedback to Teachers**

The director, lecturers, CIs, CSEUP cluster mentor, cluster leaders themselves provided the feedback to teachers on the matters of continuous academic progress assessment.

**Root Definition 5 (RD 5): Information feedback to controls**

The control system of the project received the feedback from teachers' spokespersons (within clusters and discussions at workshops) to control the system for the desired output. Feedback to controls also came from CI's and CSEUP's cluster mentor.

**Root Definition 6 (RD 6): The Controls**

The control system of the project was organised by the wider system constituents e.g. SASEN controlled overall finances and continuously assessed activities of the project, University of Pretoria controlled accreditation, finances and infrastructure, MDE controlled schools, and trainee teachers, CSEUP controlled the resources, lecturers, assessments procedures and administrated academic matters..

The root definitions which are supported by and derived from the CATWOE analysis allow the formulation of a conceptual model for the project.

**4.3.5 Stage 4: The system's formal conceptual model**

The conceptual model includes (a) the model of the soft systems and its hierarchies, its interactions, relationships and actors. It provides (b) the lenses which must be used to quantify the conceptual elements.

The conceptual model was built from the simplest ITO model, outwards, and the contextual, feedback and control elements were added, to ultimately fit the ITOFC model of Figure 2.1.

**Wider System:** Wider systems do control measures and institute adaptations to the processes and inputs as required. In this project SASEN, MDE, UP, and CSEUP are the top decision making bodies and hence the components of the wider system and perform the controlling function.

**System (Transformation):** The main system through input implement the transformation in the project is the CSEUP along with its contributory subsystems. The actual education programme delivered was the heart of the transformation system, which included several subsystems.

**Sub-system (Input and Transformation):** The subsystems, which worked together in this project and brought transformation, were:



- Lesson delivery sub-system: lecturers of University from different academic departments prepared and delivered the content to their classes at the centre during their contact lessons. They also did the assessment of their trainees through the standardised assessment tasks.
- Clusters of trainee teachers: Choosing a cluster leader who leads the cluster activities. The cluster activities among others included drawing up a timetable, taking attendance registers, and caring for absent teachers, organising transport to attend Saturday classes of the project at eMpuluzi Teacher Centre, and negotiating matters with the project organisers and the CI.
- The teacher centres as the venues (facility): Teacher Centre eMpuluzi: As a working venue of the project, care had to be taken to ensure security, cleanliness and availability of the venue on the days it had to be used for the activities of the project.
- The circuit offices of MDE. (support and facility)
- Several finer subsystems such as the circuit office and clerical support in circulating messages, regular transport arranged by the clusters cannot be ignored

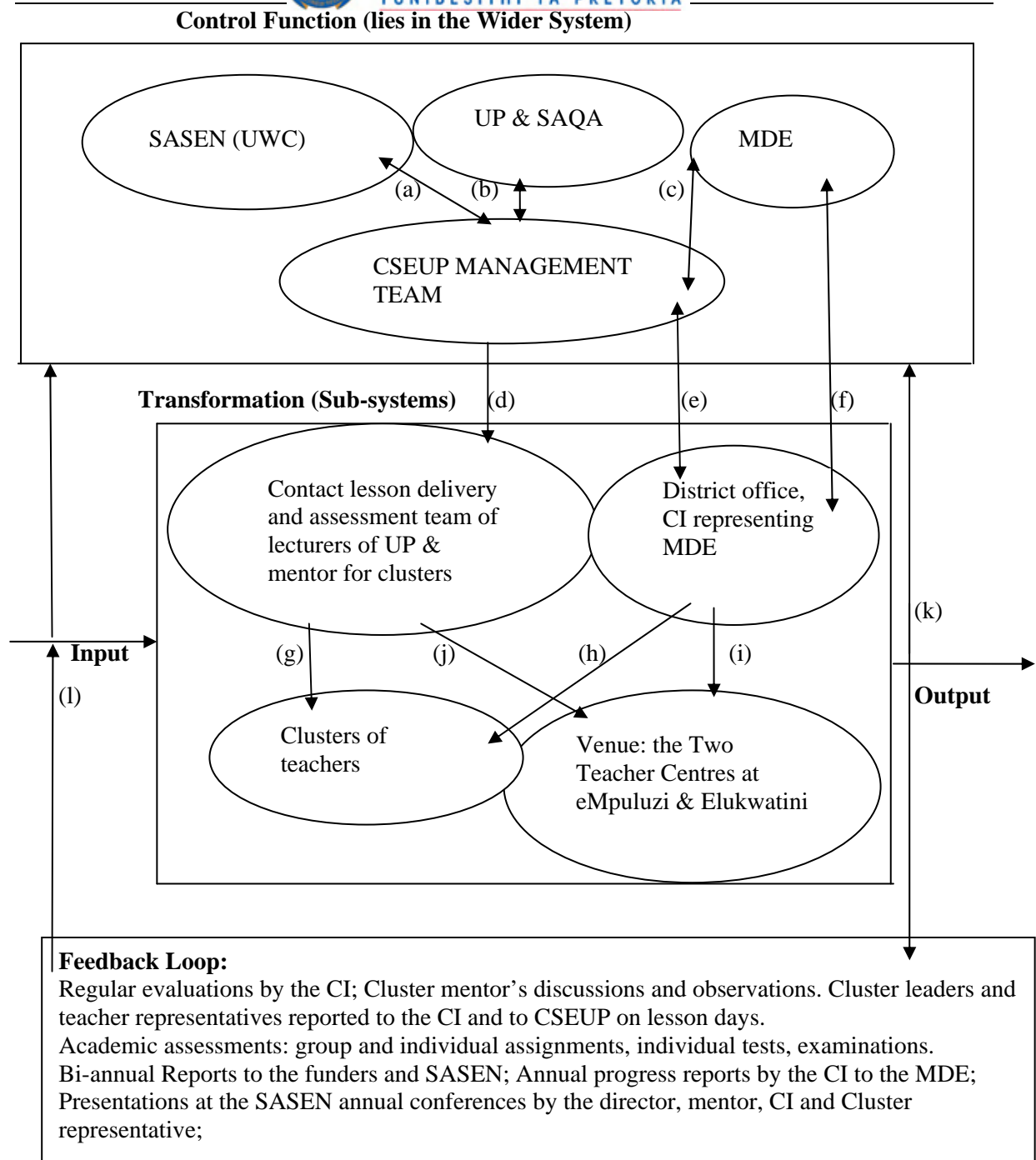
#### Feedback System:

The cluster leaders, the CI and the cluster mentor (T) led the feedback system (explained in RD 4 & 5). The feedback provided information to the control system to affect necessary changes in the transformation system and input to get the output as desired.

Figure 4.5 presents a conceptual model of the SASEN project which collects the important element groupings into subsystems and overall shows it conforming to the ITOFC Systems Model

In Figure 4.5 links from (a) to (l) have the following contextual meanings:

- (a) CSEUP received funding for the project from the SASEN (network) under the management of U.P. Biannual reporting is expected from CSEUP to the SASEN at UWC. A full narrative report is presented at the annual network conference at UWC.
- (b) CSEUP presented a curriculum design for FDE/ACE to the UP and SAQA. The qualification and curriculum was accepted and approved by UP & SAQA. UP sets examinations, accredits & maintains quality controls.
- (c) CSEUP presented the project plan to MDE's curriculum and Special project sub-directorate. After being satisfied the project intervention was allowed to recruit teachers of the Eerstehoek schools for the proposed qualification and training.
- (d) CSEUP appointed a team of lecturers for course/ lesson delivery and assessment. A mentor for cluster also was appointed to look after the clusters of teachers in the District. After feedback necessary changes could be directed to the subsystems from control to improve the input for desired output.



**Figure 4.5 A conceptual model of the SASEN project conforming to the ITOFC Systems Model**

- (e) CSEUP and District office held several meetings and ultimately the project took off in September 1999. The district maintained monitoring through the appointed Curriculum Implementer.
- (f) MDE through its special projects office and the District office worked together with good communication to make the project a success. Monitoring was performed through both the district and by directly sending a senior representative to observe activities at key times. The CI (Natural Science) became the project facilitator and Departmental representative for the



project. The CI evaluated the project and submitted annual report of the project to the special project Section of the MDE.

- (g) The mentor for clusters from CSEUP facilitated cluster formation and supervised the functioning with their cluster leaders.
- (h) The CI, with the mentor for clusters from CSEUP monitored the cluster activities.
- (i) The District Office made the teacher centre available as venue for the project activities and provides the necessary facilities for teaching and learning to take place.
- (j) Lecturers' team travel to the venue (eMpuluzi Teacher Centre) on contact Saturdays and present lectures, supervise practical and deliver materials for the course. The lecturers also do the continuous assessment for the courses.
- (k) & (l) The feedback about training of teachers and functioning of clusters were given to CSEUP orally in reflection meetings as formative information. Cluster leaders, CI and mentor from UP presented annual progress reports in form of papers as feedback to SASEN at UWC in annual conferences held annually every year. The feedback provided information for control and changes in input of resources for the transformation to produce the expected outputs.

**Input:** Input is directed to serving the teachers' needs, to support the education process which leads to the qualification. [These include: textbooks, computer software, appropriate training worksheets, manuals etc...]

**Feedback:** As the project progressed the CI performed the formative evaluation of the project, the reflective information were given to the CSEUP and this allowed changes to be made. The cluster mentor's findings, feedback from cluster leaders and teachers provided additional routes of feedback to the CSEUP. Other feedback opportunities included presentations at SASEN's annual conferences by the director, the cluster mentor, CI and Cluster representatives, CI's annual progress report to the MDE and results of assessment exercises e.g. weekly tests and assignments and annual examinations.

**Output:** The project should provide the development of teachers, impart positive attitudes and developed professionalism, and a formal FDE/ACE qualification. On a continuous basis progress towards this aim was monitored. Output must be measured against the expectations of the customers and stakeholders in the wider system.

The conceptual model informed the evaluator what needed to be measured to evaluate the real world performance of the project in the following Stage 5. Thus, as part of Stage 5, the conceptual





model is used to define the detailed investigations that are required to fit the purpose of the evaluation (hence, the research questions).

#### 4.4 Phase 2: SSA: Stage 5: Measurement and Evaluation

The realities of our project have been carefully listed, and we accept that the reality matches the conceptual model, in which the components of the general ITOFC theoretical model have been indicated and detailed sufficiently well to provide the required insight. Ultimately, after several iterations in the earlier stages, the conceptual model (Figure 4.5) presents a valid picture of the project and guides measurement and analysis.

The issues (from Research Question 2) which guided the analysis of the real world of the project were:

- To what extent was the project successful in its purpose of satisfying the expectations of participants?
- What supported the project's success (success factors)?
- Limitations and failures of the project.

Interviews were conducted with stakeholders identified in Stage 4. These interviews were semi-structured in form, with some prepared questions that often elicited quite extensive responses and spontaneous additional valuable information. In this stage we used all available information, including results from Phase 1 (attitude) research, and interview and questionnaire responses already discussed. Extensive interview transcripts are available in Appendix B, and all quotes from interviews are referenced and can be found in complete form in the Appendix. Where appropriate we have quoted the questions asked in the text, but generally, where responses provide wider information, the questions are not repeated here, to assist the reader.

Following each segment a discussion is given in the form of an interpretation segment. All sections of the research question are addressed individually in sections 4.4.2 (Successes), 4.5 (Success factors), 4.6 (Limitations and failures) respectively. A collective integrating discussion of the consequences and meanings of Stage 5 measurements follows in section 4.7 which forms the evaluation conclusions and recommendations as Stage 6.



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#### 4.4.1 Deriving measurements from the conceptual model

(i) Output: The project had a purpose, to “... develop teachers of Science and Mathematics ... in Eerstehoek” [Section 1.1.2.1] in response to needs identified by the Eerstehoek Development Forum.

The primary customers were the Science and Mathematics teachers who participated. Already the impact on them has been studied through questionnaires and observations in clusters and classrooms during Phase 1. However, interviewing colleagues, cluster leaders and school principals and a trade union representative (who was also a colleague) brought them to the fore less as “product” and more as people whose beliefs and experiences were more important than the qualifications the teachers had earned.

Investigations yielded acceptance by teachers that the project had given them improved knowledge and skills (g), and thus strengthened self-efficacy beliefs that has enhanced their performance and produced an impact on teaching and learning were investigated. The latter interviews included reports of increased willingness to spend time after school with learners and colleagues. Enhanced professional practice included membership of a mathematics teacher association AMESA, and supporting learners to participate in regional Science Expo, and supporting activities in schools through enhanced computer literacy brought about by the project.

The model indicates that several other role-players had expectations of the project, and these included the Department of Education (an Owner in the wider system), where the gazetted Norms and Standards (1998, 2000) specified 7 roles and associated competences that teacher education programmes were required to develop (k). A programme designed to support a change of approach towards Outcomes Based Education (and interactive and hands-on teaching styles) but primarily focussed on content knowledge and skills within the disciplines may have been expected to enhance only those competences explicitly targeted, so the effects on other competences that may be ascribed to the intervention were also investigated.

Longer term effects on the teachers were found, in that they rapidly achieved promotion – even to levels within the provincial structures. (an Owner-Customer interface)

(ii) The Transformation subsystem had several elements, including the actual accredited lesson delivery elements and teacher clusters. An investigation of the relationships and roles of the clusters in developing the teachers as independent learners (g) was undertaken, and surprisingly, sustained teacher networks derived from this. Of note is the (h) role of the CI and the requirement that this role-player be a link with the district MDE, affecting the primary resource of venue and



being communication and feedback channel with the MDE and the CSEUP (through h, i and the Feedback Loop (k), (l)).

The conceptual model shows that there are control and feedback elements that can adapt the transformation subsystem, in its processes and resource allocations. Thus is there evidence of adaptability – of change of plans? Is there evidence that the organisation could and did learn as time went by, and did it entrench organisational learning to capture skills to perhaps improve?

(iii) Within the Control function, several elements interact, reporting requirements between the SASEN funder and the CSEUP (a) have been documented, but the fact that the CI was able to attend annual conferences and contribute to discussions provided formative assessment ((e) and Feedback Loop) and credibility.

(iv) Difficulties and failures necessarily need to be investigated, as a difference between intended outcomes and the actual outcomes of the project, and necessarily form part of this summative evaluation (a purpose of the Feedback Loop and the link (k)).

The measurements were analysed to both qualify the model, as well as seek to identify the success factors.

#### **4.4.2 To what extent was the project Successful? [Research question 2, bullet 1]**

##### **4.4.2.1 Overall success based on the performances and acceptance by the trainee teachers**

(a) Was the project a successful venture?

At the beginning of 2000, twenty eight (28) trainees continued and were registered for their FDE or ACE qualification. On 26 April 2003, twenty six (26) graduated which was a 93% success rate. A 27<sup>th</sup> completed the single outstanding course on a second project which offered the same qualification, the Mpumalanga Teacher Advancement Programme, and completed in 2004.

When asked how success should be measured, a departmental official replied:

‘The teachers who went for training are successful. And we see progress and a change in terms of: Matric to tertiary, theory to practical work in class, teacher centred to learner centred, concept built, which was not before (2003, 12D, DO-2, App. B8.8.2)’.

The expectations held by the stakeholders (principals and UP lecturers) as stated below were not unrealistic, at the same time the project was aiming to achieve even those that were not explicitly expressed in the beginning. The following were the views of a principal while responding to the interview question “Q. Now the SASEN project has ended and the teachers are back in the school with their diplomas. We want to know the changes in teachers’ attitudes and behaviours in the



school, as achievements in their professional performances. Please tell us in the light of your expectations and achievements.”

‘My expectations were not so high, except that the teachers should come back with deeper knowledge of the subject and practical skills of Science teaching. But we found more than we expected for example: Computer literacy and its marvellous impact on teaching and management of schools in general. 90% of the staff can do their work on computer. Number of enrolment in maths and science has increased dramatically. Number of learners in grade 12 going for Higher-grade Science and maths also increased. More group work than individual is the practice of the day. Attitude towards other staff members is very positive. Teachers are sharing the knowledge with confidence. They are more dedicated with added skills and motivation. Whole credit goes to these teachers. (2003, 2p, App. B8.5.1)

Whereas, in the early stages of the project a UP-lecturer expressed his hopes:

‘I would like the teachers to be competent Maths and Science teachers in their classrooms. Most of the teachers that are teaching at the high school level don’t have the qualification of that level, therefore we are trying to make them competent’. (2001, 2T, Lecturer-1, App. B8.6.1)

### **Interpretation**

Confidence as process as well as outcome had a significant role in achievement. Thus the project, as an INSET programme, trained teachers to be knowledgeable and confident teachers in their school. Teachers obtained promotions in their posts. And finally the teachers were themselves appreciative of the programme run by the project. Therefore, the project has satisfied its customers and was a successful INSET.

**(b) Did the system respond to satisfy the main participant – the teachers?**

In Section 4.2.1.5 teachers themselves report changes that they ascribe to the project (Tables 4.6-7) Changes reported by teachers themselves include, very tellingly : “Many methods of teaching”, “Subject matter I gained during the course of the project”, “New approaches”, “Better understanding of the subject matter from the University of Pretoria staff” and particularly “Renewed confidence.” Almost summing these up a teacher responded “I gained information, acquired several skills and have more confidence.”

### **Interpretation**

The self-realised responses of trainee teachers show how the project changed teachers and also reflected the project’s contributions in their lives as teachers. Teachers credited the lecturers of UP and the project for these good impacts. This indicates the satisfaction level of the main clients, namely the teachers in the system.



Quantitatively, success in the sense of graduations is self evident. More telling are the comments of teachers themselves, and their line heads – principals. We examine the change of confidence in greater detail in the next section, and establish links between the changes and what was done on the project.

#### 4.4.2.2 A confident and satisfied customer: Self-efficacy Beliefs generated

The world-view of Root Definition-1 was to transform a teacher to a level where he will have self confidence and belief in his competence. A teacher responded as follows:.

“It is true to say that when you achieve something in your life, you are far ... more sure of yourself. The ‘FDE’ that I have received from the University, the certificate itself has contributed to me a lot” (2003, 67 T, App. B8.1).

Self Efficacy beliefs and their effect have been discussed in Section 2.7.1.

Factors like performance skills, working in a group and being rewarded for the contributions in the group, willingness to work, taking responsibility for their [teachers] own learning and creating a holistic situation where there is mutual respect for each other and for each others’ contributions probably created a self-efficacy beliefs amongst the teachers in the project. Perhaps these factors, which were visible in the SASEN project created self-confidence, self-efficacy beliefs and responsibility of the accepted work amongst teachers. Teachers became dedicated as a result of the courses to be good teachers.

It appears that the practice of rewarding teachers for their hard work in SASEN was another factor to motivate teachers to learn and apply what they have learned. For example, the project director commented :

“They [participating teachers] said that if someone contributed to the programme (group working) they should be credited for that. Their names would be listed as contributors to the assignments” (2003, 21Pr., App. B8.7)

On the use of worksheets as a tool to improve self-efficacy beliefs in SASEN project contact lessons:

“They did not have background to complete the worksheets and yet they had to show their own creativity referring to those worksheets. They were given support, discussion opportunity and I feel achieving on those worksheets and assignments that go with them gave them a very rapid feeling that they are achieving certain things. When they first said I couldn’t do this, then later they said it was not so difficult. The progress keeps them motivated.” (2003, 21Pr., App. B8.7).



An effective tool to gain ‘self-efficacy belief’ is suggested by Bandura (1994) to be the ‘mastery experience’ by the teacher in the field of learning. Grayson’s (2005) five quotes from the journals of teachers in conformity with the confidence level of teachers in teaching Physics are similar to the SASEN teachers as shown in Table 4.8:

**Table 4.8 Mastery, experience and confidence of teachers (a comparison from two separate experiences)**

Grayson’s paper (2005)	Interview reports from SASEN teachers
<p>I have also learned that there are two sources of magnetic fields, i.e. permanent magnets and moving electric charges. Before I had no idea of connecting the magnetic field and electric field but after studying this study unit, I know the connection. I used to omit this section when teaching because I had not enough knowledge and understanding of it. Now I will treat it with confidence because of what I learned from this study unit of magnetism.</p>	<p>We looked at the mid-point theorem, questions on equilibrium geometry and spherical geometry.... I got another understanding of not all triangle’s sum of interior angles is <math>180^\circ</math> in spherical geometry. The sum of angles [interior] is greater than <math>180^\circ</math>. Because there were portions that I was afraid of like looking at the questions on geometry, but after going through that course now I can teach them quite simply. ... Now I got no problem with geometry so far, now it is a matter of going back to classes. (Nov. 2002, 10-22T<sub>15</sub>, App. B5.1)</p>
<p>I feel excited about knowledge that I have gained here because it will help me a lot and it will boost my confidence as a physics teacher.</p>	<p>I had a problem some time to understand why they [interior angles] have to make <math>180^\circ</math>, Why there has to be a complementary angle etc. But when we did it on a computer I understood it because I was doing it myself. Geometry is tough but this course has helped me a lot because there were things that I did not know before and now I know. For example when we are given sketches and asked questions on that I feel I can handle but I had to struggle with those statements that I had to draw myself, but I think I can handle that with ease. (Nov. 2002, 262-272T<sub>16</sub>, App. B5.2)</p>
<p>I got more knowledge as far as graphs is concerned since from that day [the workshop]. This brought to me a confidence and I feel I can handle the section very well now.</p>	<p>With regard to potential difference and its relationship with resistance I was a little bit doubtful some time ago but now I am sure about this. Going to the class I used to work hard but I am even more motivated now than I was before.</p>



Grayson's paper (2005)	Interview reports from SASEN teachers
	<p>The course capacitated me much more and I am very confident now in every thing I do. (<i>Nov. 2002, 295-297T<sub>9</sub>, App. B5.3</i>)</p> <p>[Another teacher] yes! Misconceptions clarified and some new correct concepts learned like parallel and series connections etc. I am capacitated now and developed confidence to deal with those problems: it can be electric circuit problem or any I can do it myself with a lot of ease. (<i>Nov. 2002, 380-382T<sub>19</sub>, App. B5.7</i>)</p>
<p>I discovered that something what was missing in me which I was not confident about so I started to study and going through those books I started to have much more confidence and even the assignment you give us – make me work harder than I used to do.</p>	<p>The skills that I have obtained from the SASEN project I didn't have before. With these skills now I can approach problems even difficult ones and will be handling with confidence.</p> <p>It has taught me that don't stop learning, keep continuing and reach the highest. (<i>Nov. 2002, 299-311T<sub>9</sub>, App. B5.3</i>)</p> <p>[Another teacher] With this course I have got a number of things and now I am not afraid of teaching mathematics and even physical science at grade-12 because we did it and now I have confidence. (<i>Nov. 2002, 363T<sub>8</sub>, App. B5.6</i>)</p>
<p>I have discovered ways of attempting a problem if you don't have a clue of what to do. It has helped me to upgrade my mathematical insight.</p>	<p>The momentum we did very well. In electricity Ohm's law I understand very well now. I can say I am more confident than before. (<i>Nov. 2002, 320-324T<sub>17</sub>, App. B5.4</i>)</p> <p>[Another teacher] I had very serious problem in electricity as such. When it came to teach that position, I had to take someone to come for assistance and to lead the class. But as far this year, I am doing myself and I have improved with confidence. (<i>Nov. 2002, 339-341T<sub>18</sub>, App. B5.5</i>)</p> <p>[Another teacher] I joined because I wanted to enhance my capabilities in the subject I am teaching i.e. Mathematics and Science. If I tell you the confidence after being the part of the</p>





Grayson's paper (2005)	Interview reports from SASEN teachers
	<p>project that I have built is unbelievable. There were so many concepts that I was afraid of too much when I was alone, now I am doing freely with all confidence. (2003, 104T<sub>2</sub>, App. B8.2)</p> <p>[Another teacher] Yes I would like to thank him (A professor lecturing Physics) very much today Because I would not be where I am today and I wouldn't be confident as I am today. He helped me a lot to build Science and Maths for me. Now I can do Maths in my school up to grade 12.(Nov. 2002, 367T<sub>8</sub>, App. B5.6)</p>

The examples above, taken from two studies in different situations agree that there is a relationship between perception of increased self-efficacy and increased motivation, in this case the motivation to work harder than before with more ease and confidence in correct delivery in their [teachers] classrooms. At the same time it also indicates how increasing content knowledge and learned related skills have lead to increased willingness to face classroom challenges, another effect of increased belief in self-efficacy.

Resources like Science kits and the skills to use them in a classroom situation also contributed to improved classroom practices and consequently resulted in increased expression of belief in efficacy:

Question: It is an impression that materials are supplied to schools and in the absence of skills and knowledge teachers keep the boxes unpacked. Now what is your position?

Ans: " Yes! It is true. Before there were some other things, which we were not, used to, but now I can use any thing that can be given to us in the school. I can say, it (SASEN) has done much to us especially in using science kits and materials." (Nov. 2002, 328 T & 330T, App. B5.4).

Question: There are materials like science kits, standard textbooks and computers etc. Are those materials user friendly? Can you use them for your future?

Answer: Yes. Those are user friendly and in fact very important to me. All are user friendly except some CDs for computers because I don't have a computer of my own. But soon I will try to have a computer and use them also" (Nov. 2002,345 T, App. B5.5).

In an interview for the project evaluation teachers' opinions about the computer literacy programme are as follows:



Q. Did you have knowledge of computer literacy before you joined the project?

“Even I did not know what a computer was. To me the monitor was a computer. So the knowledge what we gained helped us a lot. Now I can work on the computer, do whatever I like. I don’t have to wait for a typist or a clerk to come and help me. It is so easy to work and complete the job on my own.

One becomes organized. You get worksheets and other documents printed by computer. We take the computer skills to our learners. When they see that the teacher did not know before, they also realize that the learning is a life long process. Some say it as ‘experience of life’. In that term I tell myself that,” I am much more experienced than I was before” (2003, 29T, App. B8.1).

The extended duration of the course helped teachers.

When asked “Q. Did you change towards spending more time in the school? After being with SASEN for so long, can you say something about the project when it ends today?”:

“Although the course took a very long time to finish, but for the time we have been here with Professors and with our colleagues as such, I can say I gained a lot”. (2002, 351T, App. B5.5)

Another:

“I found that we benefited the most from the project [SASEN]. The longer the project was the more we can gain and digest. (2003, 43T [Last part], App. B8.1)

And following up with “Q. What did you gain as a Science Teacher?”

“From the project we have gained different approaches to solve a problem in science. These make us more independent in our approach” (2003, 45T, App. B8.1).

### Interpretation

These support the idea that to achieve enhanced self-efficacy beliefs teachers should be exposed to resources and be given better and relatively longer term skills training to be able to make the best use of them as it was done in SASEN project.

Clusters and working in groups was the backbone of activities in this project. Teachers were involved in their groups, discussing subject matter, doing assignments, preparing activities for their schools and collective presentations, transport, meals, all decisions etc, which created a group work culture amongst the teachers in the project. This study seems to be in agreement with the suggestions made by Reeves and Long in Taylor & Vinjevoold (1999:151) where ‘... For these methods to be beneficial (to contribute to learners’ understandings, knowledge and skills) learners need meaningful subject content to talk about or work with. Successful group work was observed when learners were set a clearly defined task, had the essential foundational knowledge and understanding of the subject matter gained from preceding activities, and possessed the reading skills and other communication skills, strategies and attitudes required for working together.’



The SASEN project tried to focus on improving the content knowledge of Science and Mathematics teachers by implementing courses, assessment procedures and techniques and classroom management practices adequate to achieving the objectives set out for the teachers of Eerstehoek.

Post-project interviews (2003) of principals and observation of classroom practices of these teachers confirmed that these teachers are very sober, regular and punctual, prepared to teach, and helpful with administration. These factors are indicators of educators' high degree of professionalism in the performance of their work.

The socio-cultural and socio-economic conditions of the communities also have been found to shape the behaviour of educators in the SASEN project (personal observation of the researcher).

The SASEN project in its short duration of about four years left behind a legacy that rigorous training of teachers through content and skill development can create quality in Science and Mathematics teaching and learning. In the next section we investigate quality changes.

#### 4.4.2.3 Impact on teaching and learning

Several affirmations from teachers demonstrate a shift towards a greater role for a learner centred approach in teaching.

Being asked about attitude change, a teacher responded at length, including the following:

'I used to demonstrate the experiments to learners; it was easy that way because we want to do things very fast. But now learnt that it was easier for learners to learn if we allow working on their own' (2003, 43T Central area, CL-1, App. B8.1)

On learner-centred teaching:

'If you talk about proper learning that is the only way to do it. Our teaching must be learner centred' (2003, 49T, App. B8.1)

'There is an effect, but unfortunately on the part of our learners they are not ready. When you give work to them, their response is negative. Their attitude is negative' (2003, 145T, CL-2, App. B8.2)

'Yes! Even with time learners will also do. When they are motivated they do wonders. Now a number of factors are demotivating them. For example they are not exposed. In this part of our country, they are used to teacher centred education, receiving everything from the teacher. So a lot needs to be done to change things. And it is going to take some time. But myself, I am fully motivated to go for learner centred education' (2003, 150 T2, CL-2, App. B8.2.)

'After the FDE we have a very positive feeling about learner centred approach in doing OBE, which was previously an unknown matter to us' (2003, 196 T, CL-3, App. B8.3)



‘There is a great change in the style of teaching. If we make use of computer to prepare our lesson it will have a good impact. Now as a facilitator, learners should use 90% of the time to work and facilitator only 10%. They (learners) should be doing the activity, let them do research to do projects and go on [on their own]. (2003,187T, CL-3, App. B8.3)

A university lecturer was asked: “Q. Did you learn anything from them [participating teachers] which was unique in teaching and learning situations? Did you use those to improve your lessons for them?”

‘What was important in the first instance ... was the negotiation process of managing the group and stimulating them to learn. ... so there was a two-way negotiation that was going on with the learning. .. ‘I used worksheets and re-edited them in order to cover the specific work, when I moved from a lecturing situation to work situation in groups, they would work and then report. We started getting a very positive success’ (2003, 21 Pr., U.P. Pr., App. B8.7)

Earlier, teachers had become conscious of opportunities of a broadened palette of teaching methods, and had begun to apply them:.

Q. I Can I say that you have changed a lot compared to before SASEN course and now?

‘I do agree that I have changed. The way I approach problems and I teach learners I am no longer teaching as before. Now I use many strategies which I didn’t know before I entered the SASEN project. Now I am different for example: working in groups, and at the same time not forgetting the individual learners.’(2001,221T, Sch-8, T7, App. B3.4.1)

‘SASEN project has been successful to provide me with conceptual vision regarding mathematical knowledge. Now I am able to handle with confidence any question in class. Calculus and its applications, which I learnt through SASEN, have made me more confident and I am able to generate a positive attitude among children (2001, 200T, T7, App. 3.4.1); (2001, 243 T,Sch-7, App.3.4.2;2001,283T, T9,Sch-4, App. B3.5.1).

‘It has changed the inner approach to science education, the personal approach to the needs of a child. It has made us international. Now I teach my learners beyond and make them competitive in any field.’ (2001, 192T, Sch-6, T6, App. 3.3.2);(2001, 342T & 344T, Sch-4, T10, App. B3.5.2).

### **Interpretation**

Teachers now understood that in a classroom practice learners should do 90% of the work. Teachers advocated for learner centred teaching and confirmed that they have started practising in their classes. They also confirmed the positive successes that they achieved with their learners.

These changes that teachers report have also been confirmed by learners themselves, somewhat earlier (in 2001), as reported in section 4.2.2.2.



Teachers have confirmed that they were exposed to international trends in Science and Maths education in the SASEN project, and that this has had a sustained impact on their classroom practice. These teachers are able to use a variety of learning and teaching strategies in their classrooms. They also affirmed that they developed confidence through conceptual content knowledge of subjects, which learners expected from teachers.

#### 4.4.2.4 Towards spending more time in schools

##### Cluster leaders' statements:

**Q.** Did you change towards spending more time in the school?

'In fact I would say that I was spending more time even before also, but now I am talking about more 'quality time'. What we are doing is much more productive. I think before it was difficult for us to open our classes to any other person. Now I have realised that now I have no problem in sharing the class with other persons (2003, 43T, CL-1, App. B8.1)

'I can say that 90% of my available time, I spend at the school, and I want to be with my learners. You can't spend that much of your time unless you take your learners as a part of yourself, like parents do' (2003, 154 T2, App. B8.2)

'A great change in my life. I am always busy in making lesson preparation and worksheet, staying late in the school for the next day. I try a method for few days, and then I change it to other and see whether the learners benefit more. From all these I am motivated to spend more time for learners regarding teaching Maths and Science' (2003, 193T, Sch-10, App. B8.3).

##### Union leader's view: of a participating teacher who was a colleague

**Q** Kindly give your views regarding your expectations, experiences with participating teachers and outcomes of the course in practical life of the schools.

'They give more time after school in teaching, training others as well as preparing for the next day. Now we see quality work' (2003, 229T, UL, App. B8.4.3)

##### Interpretation

Teachers' representatives (cluster leaders) accepted that valuable changes occurred. With new knowledge and teaching and learning skills learnt they don't hesitate to remain in school for longer time to spend with learners. Even they feel free to interact with other colleagues from neighbouring schools. One cluster leader termed the time spent after training as 'quality time' and work done as 'quality work'.



#### 4.4.2.5 Computer activities initiated and implemented by trainee teachers

The following excerpts from interviews are presented of the project's role in establishing computer literacy.

##### Teachers' statements:

Q. Did you have knowledge of computer literacy before you joined the project?

'I had no knowledge of computer before but now I know enough at least to manage my work and much of the schoolwork on the computer' (2003, 175T, Sch-10, App. B8.3).

'Not at all. Even I did not know what a computer was. To me the monitor was a computer. So the knowledge what we gained there helped us a lot. Now I can work on the computer and do what I like' (2003, 29T, Sch-5, App. B8.1)

In 2001 there already was a recognition that the project was contributing at this level.

'We are gaining some skills e.g. computer skills. I have been typing my work just now' (2001, 17T<sub>1</sub>, Sch-1, App. B3.1.1)

'but now I know how to use a computer. Last I did not know anything about computer, but now I can try and do a lot of things' (2001, 354T, 309T, 311T, Sch-4:T10, App. B3.5.2; 3.5.1).

##### Principals of schools:

Q. What are your expectations from the FDE that your teachers are currently attending.

'I am witness or rather say, evidence that there are some programmes in the computer, they (teachers) are happy to bring them here and are showing others also, how to use' (2001, 9P, App. B6.1, Sch-1).

'Yes! That is very good. Everyone is trying to learn computer' (2001, 116P, Sch-8, App. B6.6)

'As it is said before, what adds further to their professionalism is that of the use of computer and methodical way of doing things' (2001, 96P, Sch-4, App. B6.5)

'Using computers in preparing the certificates of learners, preparing lesson plans etc. have rated the two teachers excellent' (2002, 216P, App. B7.4, Sch-1)

##### Affirmed by colleagues and a union leader

Q. Kindly tell us your experience as achievement by the teachers, which affected others also.

'their computer literacy marked a great change in the general life of the school. Now we prepare certificates for learners ... extending support to even other schools regarding the teaching aids and skills training is given' (2003, 227T, Colleague, App. B8.4.2).

'... The bonus they achieved, which was not expected, is computer literacy. ...' (2003, 229T, UL, App. B8.4.3).

'... As a good leader he is helping others on getting computer literacy and using the knowledge in providing good worksheets, teaching material, schedules etc. ... Computer is used to save and store data' (2003, 223T, Sch-5:UL (a colleague), App. B8.4.1).



## Interpretation

Computer literacy in this course proved to be one of the major attractions and achievements of the project. Teachers reflected that they produce worksheets and lesson plans using computer oriented desktops and the Internet. School principals and colleagues valued their impact in improving schools and the teachers' knowledge in using computers.

### 4.4.2.6 Science and Maths have become more popular measured against the traditional attitude that 'Science is difficult and is not for all' in South Africa

#### Principals' statements responding to the question posed:

Q. Is the Science/ Mathematics teacher popular among his colleagues and learners?

'Yes, they are so popular. I say so because science and maths are becoming popular amongst learners' (2002, 134-138P, Sch-3, App. B7.1).

'In Science Higher Grade number has increased considerably' (2002, 178P, Sch-6, App. B7.2).

'I think teachers should be able to work with those who are under-achieving and also try to change because, there are those who still believe Maths and Science are difficult' (2002, 199P, P2, App. B7.3)

Q. What attitude do you expect from a teacher towards a) Job b) Learners c) Profession, d) authority and e) Responsibility. Just your expectations and how do you rate them?

'Maybe if we can give more professionalism in Science teaching and be exposed to learners, more female learners can also take part and grow, mainly female learners who are scared of science learning because they take it as a difficult subject' (2002, 216P, App. B7.4, P2).

Q. Have you noticed any change in the teacher?

'In grade 10 this year, I have got 58 learners who have enrolled for science subjects instead of 22, I used to have. It has impact on Mathematics also' (2003, 8P, P8, App. B8.5.2).

'Number of enrolment in maths and science has increased dramatically. Number of learners in grade 12 going for Higher Grade science and maths also has increased'

'Maths commercial group learners also have more enrolment and popularity in the school' (2003, 2P, Bullet 4, Principal: P1, App. B8.5.1)

#### Teachers' response to attitudinal change regarding Maths and Science

Q. Can you be specific about those which you got and made teachers to change their attitude towards work, job, learners, responsibility etc (follow up question)

'A big feeling that "Science is for all", what we had before was: Science is for those who are brilliant ...' (2003, 13T, Cl-1, App. B8.1).





‘When it comes to performance of learners in grade-12, their performance is improving and other teachers who teach them, I help them improving their teaching’. (2003, 175T, CL-3, App. B8.3)

These statements contrast with those of 2001:

Q. A school principal should put a Maths/Science teacher to task when the learners don’t go beyond 40% and recommend for demotion? Please comment.

‘I don’t know whether it is a paradigm or whatever, they [learners] only know that Maths and Science are difficult’ (2001, 61T2, Sch-1, App. B3.1.2)

‘Even though some students have got the attitude that Maths is difficult, with the help of knowledgeable teachers now, the students do seem to change their attitude now from negative to positive’ (2001, 198T, Sch-7, T7, App. B3.4.1)

Q. Generally Maths/Physical Science has poor results in our schools, what contributes most for this performance?

‘Our children have got attitude that Mathematics is Difficult ...’ (2001, 225T, App. B3.4.2)

‘I have never understood mathematics before this project’ (2001, 233T, Sch-7, T2, T20, App. B3.4.2).

‘Another factor is that learners are told that these subjects are difficult and that demotivates them’ (2001, 248T, Sch-7., B3.4.3; 2001, 425T, 427T, Sch-8, T12, B3, 6, 2; 2001, 59 & 61T2, Sch-1, T2, App. B3.1.2)

### Departmental officials

Departmental officials remarked as follows during their interviews.

‘The way learners are getting more interested in HG science and maths’ ... Previously, Science, Maths and Technology were treated as not approachable ...’ (2003, 12D, DO-2, App. B8.8.2)

‘It has been seen that these teachers’ confidence has increased considerably high. There is a sharp increase in number of learners going for science ...’ (2003, 16D, Do-2, App. B8.8.2).

‘I am glad that there is improvement in science education. Communities too are benefiting from them (teachers)...’ (2003, 4D, DO-1, App. B8.8.1)

### Learners

Q. How satisfied are you with your Maths teacher?

‘I am satisfied because, Mathematics is my subject. I like it. (2001, 283 S4, App. B1.4)

Q. Do you see Maths/Science a difficult course which you can’t do?

‘No! Science is a busy subject and I can do it ...if you see your teacher and follow him it is a good subject and makes you great’ (2002, 13S1, 14S2, p41, Sch-3, App. B).



'Maths is not difficult. If you concentrate it is most easy. I like it. (2002, 76S<sub>2</sub>S<sub>1</sub>, Sch-5, App. B2.3.1)

### Interpretation

The stakeholders acknowledged that Mathematics and Science were traditionally taken as difficult subjects. But as an impact of the project trainee teachers made these relatively more popular in recent years. Still, this trend has yet to apply to female learners. Principals and Departmental officials confirmed that there is a sharp increase in the number of learners taking Science and Mathematics in general and an increase in Higher Grade registration. Many learners said that Science and Mathematics were no longer perceived as difficult.

#### 4.4.2.7 Expo-science participation increased

In section 4.2.2.4 learners reported in 2001 that they noticed an increased willingness of teachers to assist in Expo Science projects. This was followed up in interviews in 2003 and confirmed by departmental officials and a union-leader colleague, showing, in fact, that the trend was continuing:

'The participation in Expo-Science and MSSSI has also increased. Despite the area being predominantly rural-science has attracted more schools and more learners to be involved in producing good projects' (2003, 16D, DO-2, App. B8.8.2)

'Quality projects in expos and good performance in CASS are improving amongst learners that show the wisdom of teachers transmitting to learners' (2003, 16D, DO-2, App. B8.8.2)

'They give extra time for school work with full support organising expo-science for this school as well as supporting the other schools in the District is very common' (2003, 229T, UL, App. B8.4.3)

### Interpretation

Teachers exposed to a broader scope of Science and Mathematics and international trends of teaching approaches were confident enough to help school learners produce projects for Science-Expo's. This quality effort has been recognised as a positive impact in improving science education in schools.

#### 4.4.2.8 Membership of professional organisations e.g. AMESA has become popular amongst SASEN teachers

Teachers ascribe changes in their professional interests to the project:

'A lot of changes in our academic life, like now I am a member of AMESA. I attended the conference and many seminars, which were not interested to me before but now I enjoy it' (2003, 162T, Sch-1, App. B8.2).



‘You know in this AMESA conference I just realised that only the members who attended SASSEN went to the AMESA conference from the District. I feel something is happening with our group which was not happening before’ (2003, 163T, CL-2, App. B8.2)

A union leader comments when noting this change:

‘They organised for AMESA membership and conference, a team - work is very much in place. It is actively visible in clusters’ (2003, 236T, UL, App. B8.2).

### Interpretation

Teachers recognised the importance of being members of professional bodies to support further improvement. Whether this was achieved through the enhanced networking provided by the clusters, or was a direct effect of the development of professional attitudes supported by the project is uncertain. However, it is accepted that the project created an environment in which this wish for continued professional growth through active membership of professional bodies of teachers flourished over time.

#### 4.4.2.9 Promotions

Within two years of the end of the project 35% of graduating teachers were promoted. New positions include Head of Department, Deputy Principal and Curriculum Implementer in the MDE.

**Q.** Some people say that those who are in SASSEN project have become so good that the chances are coming to them. How do you see that?

‘I am not sure, because with SASSEN not much management is done but what SASSEN has contributed is confidence, when you talk to the panel you say with confidence’ (2002, 144T2, App. B4.4.2).

The view below was presented by the principal of a participating school about his teacher who was a trainee in the project:

**Q.** Your school participated in the SASSEN project and now the project has successfully ended. What were your expectations from [the] SASSEN project and what do you think it did?

‘I expected that the project would not be a once off event. Because you see as a school, we sent only one person and he is the only resourced person where as there are so many standards to be covered and he himself alone can’t do all the work involved with Science. Therefore we expected that it should be a continuous project. This year the other teachers should have gone to take up the course. Now the Science teacher who was trained is my deputy while I need such person in classroom. When there is a promotional post, we need a well versed person who has knowledge and better skills which takes such peoples to managerial post and we loose them from a class. And



we remain with weaker peoples in classrooms. This is my main concern about the matter. Maybe now he is deputy, and during next years he might be principal somewhere else and I may lose him completely. Therefore the teacher who should be chosen for such course should be the youngster, so that you can have them in classroom for sometime. Most of these teachers when they come with Secondary teacher Diploma, they are scared to continue with their Science teaching. They go to Johannesburg or to UNISA to have B.A. (History and Bibs) type course to get away from Science because they can't do Science course from here. That is how we are losing Science teachers in our area. They can't continue with Science.' (2003, 4P, P8, App. B8.5.2)

### Interpretation

Although no claim can be made that the SASEN project deliberately provided managerial skills to the trainees these promotions provide some evidence of such an effect because of improved confidence amongst the trainees.

#### 4.4.2.10 Expected 'Roles of South African Educators' and contributions of the SASEN project

It is not very clear that the 'Science and Maths teacher development project' initiators at Eerstehoek and those involved at the Centre for Science Education University of Pretoria set out the goals according to the prescribed Departmental 'Roles of Educators'. But there is evidence that a measurable outcome of the project was an "Orientation towards Outcomes Based Education and Curriculum 2005", which should lead towards the competences expected as an educator by the national Department of Education. These roles and associated competences are described in Chapter 2: 2.7.8. These are: 1. Learning mediator, 2. Interpreter and designer of learning programme and materials, 3. Leader, administrator and manager, 4. Scholar, researcher and lifelong learner, 5. Community, Citizenship and Pastoral Role, 6. Assessor and 7. Learning areas/subject/discipline/phase specialist. We examine the extent to which the competences of teachers appear to have been strengthened by the project in a scale of "weaker, medium and strong" achievement. The position on the scale is determined by the depth of the evidence that is available that indicates that the project was itself responsible to a significant extent (strong), or at best facilitated the development of this, but not much evidence is available that suggests the project directly produced the change (weaker).

Learning mediator: The intervention made its effort through the course "current trends" which was presented during the first year and a half of the project. Assignments derived from the course formed part of a continuing programme.. Teachers were acquainted with modern practices in learning and teaching e.g. computer assisted learning, Constructivism, Outcomes Based education and classroom practices etc. Teachers demonstrated this role in their schools and classrooms by being pioneers in using the computer for preparing handouts, lesson plans etc., implementing OBE, and learner centred teaching (Section 4.2.3). Reports by teachers themselves demonstrated



increased enthusiasm, confidence and skills (4.2.1.1-4). Their learners and principals reported that more time was being spent in class and after hours, teachers were better prepared. (4.2.2, 4.4.2.4, 4.4.2.6) This is rated as a **strong** achievement.

Interpreter and designer of learning programmes and materials: The project enhanced content knowledge through textbooks of international standard. Lessons were observed, teachers reported they were creating their own worksheets, and principals confirmed that teachers were preparing lesson plans (4.2.3, 4.4.2.3, 4.4.2.5). This is rated a **strong** achievement.

Leader, administrator and manager: The project provided them with opportunities to practice leadership roles in clusters as manager, and as part of the cooperative management of the project. Teachers demonstrated this role in managing their clusters, arranging their own transport, developed and delivered a presentation at the SASEN national conference and employers showed their confidence in them by promoting these teachers to various managerial positions. (4.4.2.5, 4.4.2.9) This should be rated at a **medium** level.

Scholar, researcher and lifelong learner: The project was designed to assist these teachers to become life long learners, able to extract necessary information from text and internet sources. Several teachers have enrolled for continued education at universities after the project. All interviewees showed their willingness, desire, and need to be a lifelong learner as an educator. The continued networking that is reported through the clusters beyond the end of the project is an aspect of this attitude (see section 4.5.7, below for a complete discussion). This is thus rated at a **medium**.

Community, Citizenship and Pastoral Role: At clusters these roles had to be practiced. Teachers had regular meetings and interactions making a community of teacher learners, provided support and were advising colleagues on personal matters. Teachers said that they look after their learners like parents in and outside the school (4.2.1.2, 4.2.2.3-4), they care for their colleagues in the clusters (see section 4.5.7, below), in schools and in the project. They ascribe to the project (at the very least the enhanced networking has supported this) their increased support of learners' participation in the Science Expo (4.2.2.7), and participate more in professional associations (4.4.2.8). This must be considered a **weaker** achievement.

Assessor: Current trends, content coverage, assessment techniques in current trends as well as in content courses were taught to these teachers by the UP lecturers. Teachers are observed practising assessment in their classrooms (4.2.3). Many teachers were appointed as assessors/markers for Grade-12 Oct./Nov. national examinations and moderators for Continuous Assessment (see 4.5.7, below). This is rated as a **medium** achievement.



Learning area/ subject/ discipline/ phase specialist. Sufficient learning -content, Science kits and learning support material provided and rigorous courses were provided by UP lecturing staff. These aspects were tested directly in the various qualifying examinations and assignments. This has also been recognised by the employers in the department (where many have obtained promotion to Education specialists and deputy principals.) principals, (4.4.2.5, 4.4.2.6, 4.4.2.9); teachers themselves (4.2.1.5 and 4.4.2.2), by learners (4.2.2.5) and formal university assessment results. The evidence in confirmed in multiple settings that they became specialists well recognised by the MDE. This is thus a **strong** (and apparently the strongest) achievement.

The strong rating of achievement for the 7<sup>th</sup> role of content specialist reflected that the major focus of the project was to improve the subject content. None-the-less, the project also contributed strongly to several other competences and benefitted all to some extent.

### **Interpretation**

The competence as *subject specialist* was a central target of the project, and it is heavily commented on as having been achieved to the strongest degree. Others that appear to have been strongly developed are roles as *learning mediator* and *interpreter and designer of learning programmes and materials*.

Medium development while on the programme has been judged to be applicable to the roles of *leader, administrator and manager* and *scholar, researcher and lifelong learner* and that of *assessor*. For several participants, strengthening of these roles has been remarked on by principals and colleagues.

The remaining role, the *community, citizenship and pastoral role* has the least evidence of having been developed by the programme, although the cluster leadership strongly practised this role, and learners report increased support of their participation in the Science Expo.

One may tentatively suggest that the project's focus on content and the development of learner support techniques together with the effect of activities within the clusters has assisted the development of competences outside of these two target areas.

#### **4.4.2.11 Successes of the project**

Quantitatively, the project graduated 93% (26 of 28) participants that registered for the Further Diploma in Education. The teachers have themselves expressed increased confidence and several (more than 1/3 of participants) have obtained promotions within two years of completion. Teachers have credited the project as the underlying cause of these personal successes.



Teachers, learners and colleagues report changes in the classroom practices of teachers, with significant enhancement in belief in self-efficacy. They spend more time in schools, relate and support learners at an increased level in their participation in Science Expo projects. They have increasingly become members of professional associations.

Learners, principals and district officials contend that Science and Mathematics have become less threatening and more popular amongst learners.

Computer literacy, which was developed deliberately as an activity and integrated into learning experiences in the project, was followed up with a programme in the use of computers to assist learning in the classroom. This underlies some of the popularity of the programme, and some of the added opportunities for the teachers to contribute to school activities, which they and principals have mentioned with appreciation. Teachers have been able to transfer this new kind of skill, at least, to colleagues in their schools.

The programme has significantly strengthened competences in at least four of the roles of an educator foreseen by the national Department of Education, with additional evidence that the remaining three roles were also positively influenced.

Improved skills as educators, knowledge of their subjects, their belief in their personal efficacy with consequently improved confidence and their change towards more professional behaviour must be rated as significant successes of the project.

#### **4.5 What contributed to the success of the project? [Research question 2 second bullet]**

A programme that lasted over three years can be expected to show some successes. The intriguing question is, however, how these successes were achieved. Gaining some understanding towards answering this question is the function of the SSA in this section.

##### **4.5.1 Rare opportunity in Science/Mathematics education**

This outreach programme was a very rare opportunity in that area. Such an assumption was present even in the planning stage. The following are self-explanatory statements from a CSEUP professor: 'We have found a large dedicated group of teachers, who are ready to do anything not to miss the opportunity' (2003, 13Pr last two lines, Pr. App. B8.7)

'My assumption was two fold. On one hand there would be a group wanting to improve on their work to be more satisfied in their knowledge and skill level. The second level would be the people





who would want to improve their qualifications for promotion. ... In other words, to develop outside the task given to them and move towards the administrative side like a Principal or something of that kind. Inherently we designed into the system computer literacy, and opportunities to use the computer' (2003, 7 Pr., Pr., App. B8.7)

Cluster leaders stated the following regarding the project:

**Q.** You were asked to pay 50% of the tuition fees; you had to transport yourself to the centre; provide your lunch pack yourself and even to go to University of Pretoria for lab work on your own. What made you not to be deterred from all these things and you continued with the project for so long until the success was achieved?

"Initially when I looked at the course outline, I saw that there was Computer Literacy; there was Mathematics and Science. There I saw that was my line. In fact this way of doing things for nothing not paying anything and so on, people think that you are not serious. In fact paying money for the transport and lunch you mentioned of it, was just to show that we are serious it was for us to achieve the goal with SASEN which gave opportunities to achieve our goals at our door. And this is what we are looking for" (2003, 107T2, App. B8.2).

**Q.** Sometimes you had to pay for transport, you had to struggle to reach the centre. How did you take up this obstacle?

'Compared to other projects where we had to go far up to the Universities, it was simple for us. Because the projects came to our place. Coming to the issue of transport, we did not pay that much. Think of those who travel longer distances and pay for accommodation etc, it was the best project because it came to us' (2003, 21T, App. B8.1)

### **Interpretation**

The project which was nearer to their homes, affordable and with all that teachers needed was seen as an opportunity for academic and professional development by them. Thus teachers joined it. This is a similar conclusion to that of Mattheoudakis & Nicolaidis (2005) in the context of a developed country.

#### **4.5.2 Affordable cost to teachers**

The following quote from the interviews of teachers is self-explanatory concerning the affordable cost and popularity of the project amongst them:

**Q.** Any other things (including finances) which kept you [with the project]?

"I think from my point of view the finance was not an important factor. We always benefited from the project sponsors." (2003, 19 T, App. B 8.1)



“Coming to the issue of transport, we did not pay that much. Think of those who travel longer distances and pay for accommodation etc, it was the best project because it came to us.” (2003, 21T, App. B8.1)

### Interpretation

SASEN teachers were serious and motivated about improving themselves. Money needed was affordable and not a major factor to be considered compared to the education they were getting. Teachers willingly incurred the cost of their transport, lunch and half of the course fees for all the courses with Unisa and UP.

#### 4.5.3 Teachers and MDE understood that the longer duration improved the benefit

‘If you do this course from other Universities through correspondence, it takes just two years. When I started thinking what did we benefit in three years? I found that we benefited the most with the project. The longer the project was the more we could gain and digest’ (2003, 43T, CL-1, App. B8.1)

**Q.** You went to the programme and you had to pay half of the fees of the University, your transport, your lunch and few other things on your own. What made you to continue and finish it?

‘It was not a boring one, we learned a lot from it, the hunger to achieve the knowledge kept us going. It told us what the OBE is all about, and how to implement it properly. It helped us from old way of teaching to the new way of teaching’ (2003, 177T, Sch-10, App. B8.3)

‘Initially when I looked at the course outline, I saw that there was computer literacy; there was Mathematics and Science. There I saw, that was my line’ (2003, 107T 2, T1, App. B8.2)

An MDE official offered the following comment on the SASEN project which speaks to the enhanced credibility earned through its duration

‘... Some projects ran away and this Science one only remained with us until it succeeded. This automatically tells the determination and commitment on the part of project implementers and teachers’ (DO-2, 2003, 16 D, App. B8.8.2)

In appreciation of the impact of the project on communities of learning and teaching in general the Curriculum Coordinator of the District said in unequivocal terms “the project has given a very positive impact on the community. Systemic built-up in schools, expo-science being maintained and continuing growing with confidence, ability to using computers in teaching and learning situation etc are the proofs of the impact of the project (2003, 16 D, App. B8.8.2)”.



## Interpretation

Teachers found the course relevant for their development. The duration provided them more time to assimilate and practise what they learned. This needed time, therefore, duration also helped teachers to make meaning of the course in their life. This was positive factor to teachers. In the end this proved to be advantageous to providing a longer-lasting impact

Balancing the process of the system by delay, when the SASEN project showed sluggishness, seemingly worked. It seems quite relevant that other project evaluators such as Muwanga-Zake (2000) in the Eastern Cape also showed their concern about outreach projects that were sponsored only for a short duration.

### 4.5.4 Feeling of ownership by trainee teachers

**Q.** Do you remember when they [project implementers] were appreciating your [cluster leader's] contribution?

'We were in direct communication with each other. No one ignores anyone. Every happening is taken seriously and attended to, Every one is the part of the project.' (2003, 37T, CL-2, App. B8.1)

**Q.** You were asked to pay 50% of the tuition fees; you had to transport yourself to the centre; provide your lunch pack yourself and even to go to University of Pretoria for lab work on your own. What made you not to be deterred from all these things and you continued with the project for so long until the success was achieved?

'In fact this way of doing things for nothing not paying and so on, people think that you are not serious. In fact paying money for the transport and lunch you mentioned of it, was just to show that we are serious, it was for us to achieve the goal with SASEN that gave opportunities to achieve our goals at our door. This is what we are looking for a long time' (2003, 107T2, App, B8.2)

'It is useless to take up something halfway and leave it along the way. Although we were supposed to pay among other our transport and move forward the course, that was minor compared to what we pay for the full time course. And we had opportunities at the same time to teach our learners and continue our class' (2003, 110T 2, Sch-1, App.B8.2)

**Q.** You were around four years with the implementers of SASEN. Did you observe anything that they learned from you?

'I think they did learn from us something. Like I remember, one day someone said let us start with prayers, and one of us leads the prayer and it was adopted. I remember they will come there and then I will say that let us stand up and sing, I think they learned it from us. Again we behaved ourselves, the way we conducted ourselves in the clusters. I think it is very rare to find people working on Saturdays and sticking to the time schedule. I think they learned something from our



cluster management also. But all in all we were committed and it was popular as a quality cluster. And I should think when we were learning we were discussing. And I think it was an opportunity from them to read, the entire District as one problem transpiring because we bring our experiences and share with them and in a way those experiences were given a sort of background of what is transpiring on a certain issue like computer sharing. Yes we had only two computers for 25 members, we cooperated and accepted to make the process going on' (132T, App. B8.2)

**Q.** I want to know why did your cluster worked while many other clusters did not? Give examples.

'The way we behaved, it was like somebody controlling our work. In fact it was not some body, but ourselves, we were all committed...' (2003, 117T1, 118T2, 119T, 121T2, P11, App. B8.2)

On the way to representing the participating teachers at a SASEN conference, a cluster leader remarked: 'With this project we have done something and now we have to go and report on what you have achieved. This gave a sense of responsibility and accountability' (2003, 70T, CL-1, App. B8.1)

Teachers felt ownership of the project and that feeling allowed the project to continue. It was possible through:

- i) Paying for transport, a part of the tuition fee and organising their lunch themselves
- ii) Being given a partnership position in negotiations regarding decisions of the project
- iii) Opportunities to represent the teachers at annual SASEN conference at U.W.C.
- iv) Teachers felt the project to be for them and they were major partners.
- v) A cultural feeling 'not to leave work halfway'
- vi) The project was not the 'centre's project' but all participants owned it and all parties would contribute. It was a joint venture' (2003, 25Pr., Pr., App. B8.7)
- vii) Negotiations with respect for other views

Even the lecturers recognised this sense of responsibility and ownership:

'Once a student stays for about three months they have become dedicated active student with a vision to achieve. They become ambitious and they need to be respected for this. So the mutual respect situation regardless of the group was very strong regarding the SASEN teachers. (2003, 21Pr, Pr. App. B8.7)

"There was another preconceived idea that we were told and we had from our own past experience also that 'if you didn't feed teachers and if you don't provide transport and even if you didn't support teachers financially to join such a programme, it will very soon run dry... We reached an agreement that we will supply only light refreshment at teatime and they will do the rest...it



become quite clear that they accepted this. This is the risk we had taken out of budgetary necessity, but it already at that stage was coming through. We had found a large dedicated group of teachers who are ready to do anything not to miss the opportunity. We did ask them to pay half of the fee for two courses.... and students were quite willing to pay that. This we find quite gratifying, which we didn't do with other projects." (2003, 13Pr., Pr., App. B8.7)

### Interpretation

Every partner owned the project and put their effort into making it a success. This sense of ownership played a crucial role to keep it moving till the goals were realised.

#### 4.5.5 Role of culture and language

Teachers found it easy to work in their cultural way and environment. The following statements show the effect of their cultural practices as reflected in the project

**Q.** Do the same language and culture of cluster participants play a role?

'[With] our culture and same language, we quickly understand the problem we are facing. In our meetings we accommodate each other according to our culture set up also. Like those who are married, we had to consider the limitations and organise the meetings which suites to all of us...' (2003, 25T, CL-1, App. B8.1)

'The way we behaved, it was like somebody controlling our work. In fact it was not some body, but ourselves, we were all committed' (2003, 117T1, 118T2, 119T, 121T2, App. B8.2)

'In a cluster we were empowering one another... If you perhaps have a wrong perception or understanding on a particular point other colleagues will immediately correct you... (2003,122T1, 123T2, P11, App. 8.2)

'With our cluster we were discussing the questions and answers together. We did assignments together wherever we encountered difficulties we brain-stormed and discussed those problems and got good solutions. Mostly we did the assignments individually and discussed the issue in the cluster meetings. When we had any organising issue, we discuss those with lecturers and solve. So we did a lot with our cluster. We had three schools and we did very well. We all succeeded and got our diplomas.' (2003, 181T, CL-3, App. B8.3)

### Interpretation

Teachers had the cultural freedom to work and practise learning in their clusters as well as in their teaching community. This provided natural opportunities for translating academic knowledge and international trends in education into their practice with ease and with recognition in their teaching fraternity. This contributed to keeping teachers interested in the project. Another cultural trend



among the people of that area was “not to leave the work taken until its completion”. Thus a cultural contribution towards the project’s success was also a factor.

#### 4.5.6 Motivation, punctuality, discipline and accountability in the SASEN project

Asked, “Q. Now according to you what is the impact of the SASEN project?” a teacher replied:

‘SASEN is leading us in 100% positive change in direction. There is a great change. Now there is a completely new teaching style than before. For example: now I have more confidence’ (2002, 42T, CL-2, App.B4.2.1)

Teachers were asked to comment on the statements:

“Our effort here is to see, whether it ended into a good learning organisation based on the following issues: i. Creating capacity to achieve desired results; ii. Innovative thinking nurtured; iii. Collective aspirations set free; and iv. Learning to learn together..”

Comments included:

‘... Now if you are creative, you are going to be able to allow your learners to use their creativity in their learning. Looking at the way, how we were taught, I feel that was excellent’ (2003, 92T(i), CL-2, App. B8.2)

‘...There was no Saturday, which was scheduled and not honoured. So they were all fully utilized and I remember some other day we went there and [although] some [football] games were going on it was utilized by those, it was scheduled from 9 to 4 o’ clock, it will like that undisturbed, no excuse. This shows that we were committed and at the end we achieved what we wanted’ (2003, 100 T1 App. B8.2)

‘...The UP staff were always punctual, they put 100% effort behind the project...’(2003, 125T2, App. B8.2)

‘And also the UP staff were self-disciplined. Some other day their seniors would not be there but they don’t say that let us knock off earlier. Motivation was so great that when we went there, we were just like young kids every one wanted to say something.’(2003,126 T1, App. 8.2)

‘With this project we have done something and now we have to go and report on what you have achieved. This gave a sense of responsibility and accountability’ (2003, 70T, CL-1, App. B8.1)

UP lecturers expressed their views:

When asked “Q. Any other experiences which you would want the researchers to know on the project regarding the teachers’ behaviour and the attitude as professionals?”:

‘Even sticking through right up to the end is a tremendous personal achievement. I think it should be respected and acknowledged in some way’ (2003, 37Pr, P28, End of the paragraph, Pr., App. B8.7)



Q. What was your own contribution?

'I was always positive and enthusiastic about my lectures. I was always on time, did good preparation, did good planning of learning material using all learning experiences as lectures' (2003, 5.3 Ans., Lecturer 2, App.B8.6.3)

Q. (i) Did you learn any thing from them, which were unique in teaching and learning situation?

; (ii) Did you use those learning experience in improving your lessons for them?

; (iii) Do you have any learning experience from your university students?

'I learnt to adjust the pace of learning as we went along with the lectures, because I could quickly see whether they understood the topics or not. If they did not understand the matter was explained in another way(s) until they understood.

'There were very good two-way communication which was unexpected. I also learned from their culture and realised that they were working very well together as a class (all ten of them) and that they always knew the whereabouts of the rest of the group'. (2003, A4 Ans., Lecturer 2, App.B8.6.3)

'I never encountered students before who would prepare work on their own as pre-arranged. The module was such that the students had to prepare the work before the official lecture on it. Even at the University of Pretoria one can ask students to read paragraph between the lectures and you would not get a single one out of 300 to do that. (2003, A4, Lecturer-2, App. B8.6.3)

Q. Towards the end of the project, I saw, you were still actively engaged in the project. Please tell some aspects of attitudinal changes in teachers regarding their professional behaviour as compared to when you started.

'They were much more at ease with the work, with the lecturers and it was a pleasure to work with. A professional relationship developed between the learners and the lecturers' (2003, Q 6, Ans., Lecturer-2, App.B8.6.3)

'They speak with confidence. It has been reported from the MSSSI project that they have been noticed that they act differently. They are more professional; they sit down and get their job done. So there is other evidence to support the view that what I have seen and my impression is supported (2003, 35Pr, App. B8.7 Pr.)'

In another comment it was said:

'Our expectation of having them as passive learners was totally eliminated. They [teachers] did work extremely hard on their assignments and they learned from us as requirements that individuals need to have achieved as well.' (2003, 21Pr., App. B8.7 Pr.)





## Interpretation

In this project learners (trainee teachers) appreciated the UP staff (lecturers) for their leadership role. Teachers also found the lecturers creative in the classroom, punctual at work, self-disciplined in their profession and always motivating with their personal behaviour. Teachers accepted that all these made them responsible and accountable. In a similar way, the lecturers showed appreciation for teachers' sticking to the project until the end. Depending on learners (teachers) positive attitude towards their learning the lecturers prepared quality and valuable learning material. Lecturers were influenced positively by Teachers' working on their own in their clusters as pre-arranged. Together a professional relationship between lecturers and teachers developed which ultimately led to the achievements.

### 4.5.7 Formation of functioning clusters of teachers

Ms Ndlalane has described her definitions of a cluster of teachers based on her experience during the SASEN project as follows (during a workshop for principals held at the University of Pretoria's Groenkloof campus):

"A cluster is individuals, various schools or different communities working together with a common vision and outcome. Clusters meet regularly and have specific tasks. It is a group of school educators meeting on a regular basis to discuss whatever interests them with respect to developing each other and thus attaining certain stipulated goals, in our case it is more on teaching and learning strategies. It is a group of individuals who share the same vision, goals and who meet and work together to achieve goals" (*Ndlalane, 29.07.2005, Workshop for Principals, University of Pretoria Groenkloof Campus*).

Asked to compare the clusters of the SASEN project with those introduced in the second phase of the MSSI project, Dr Ndlalane (who was involved in the implementation of clusters in both projects stated) "The [SASEN] cluster is a bottom-up community structure" (*Ndlalane 31.05.2005*)

Teachers who were members of the SASEN project clusters reported:

**Q.** In your opinion do you think the organisers also learned something from you?

"Thembi Ndlalane from UP initiated the cluster but we designed it ourselves as a working cluster, how should it function? Through consultation and caring for each other's interest. Theory came from UP staff and practical aspects came from local teachers." (*2003, 39T, App. B8.1*).

**Q.** Let us see the fourth one. "Learning together" Tell your views.

"Clustering made it possible to happen everything just to learn together. I will need to say that when we talk of clusters, we were grouped in where we feel comfortable. What needs to indicate is



what I have learnt in clusters. And what they learned there, shared with us. So there was an exchange of ideas, what we have done to check with others. Therefore it was easy to grow together". (2003, 85 T, App.8.1)

**Q.** I want to know why did your cluster work while many other clusters did not? Give examples.

"The way we behaved it was like somebody controlling our work. In fact it was not somebody but ourselves. We were all committed. So to say we were able to choose leaders and with chosen leaders we made policies and each and every member should be liable to follow the accepted policies (2003, 117T, C1-2, App. B8.2).

"We also kept a register. If you are not attending then we simply write you absent and you have to be answerable why you did not attend. When you don't attend the cluster members will hold a meeting and the particular member will be asked to come and answer" (2003, 118T, C1-2, App. B8.2).

"And also we were not very cruel on that member who did not attend or did not do his/her work. But he/she has to feel the pinch of it that he/she didn't cooperate in doing a common job" ((2003, 119T, C1-2, App. B8.2). "In a cluster we were empowering one another. If you perhaps have a wrong perception or misunderstanding of a particular concept you will be immediately corrected by other colleagues and you will not wait until perhaps the examination comes and then you see that your understanding was wrong and you were in danger." (2003, 117-123 T1 + T2, App. B8.2)

**Q.** 'Learners as your sons and daughters' what is your attitude? Any change in attitude towards that?

"In our cluster, if one of the member[s] does not attend regularly and if you say we don't want to help that person, you end up disintegrating the whole cluster. But if you are trying to accommodate the person, if you are trying to find out what happened, then you grow together. I took that introduced to my class also." (2003, 55 T, App. B8.1)

A popular cluster leader replied, to the question "Q. You have been appreciating cluster formation as a good structure, which kept you going very well. How did it work? Please throw some light.

"... if we are doing problems, we meet regularly doing problems. We look at the problems as a group and we are ready to share. It is much more convenient because we are almost located at the same place..." (2003, 23T, App. B8.1)

**Q.** Do you feel free to ask questions?

'One more thing I found that they don't take us as their juniors . They respect our feelings and us. That we are teachers, we are there it doesn't mean that we don't know anything. In this we come together in form of clusters. We meet and discuss our problems and solve it, otherwise we never meet. This has brought teachers very close to solve the problems collectively. When we are



together we are able to discuss the problems together, share experiences and develop. That makes this project a success.’ (2001, 132T, CL-1, App. B3.2.2)

UP Lecturers and departmental officials acknowledged the role of the clusters at several different occasions when interviewed:

“They (teachers) were able to manage the work, because they met regularly. We actually found that they were meeting twice a week each of three-hour duration, Tuesday and Thursday.” (2003, 21Pr, Pr., App. B8.7)

“Clustering of teachers has become more advantageous to our teachers in general. When they have problem they come together and sort it out. For example: how to organize CASS marks for moderation, computer programme, learning and teaching issues etc.” (2003, 16D, DO-2, App. B8.8.2)

“We did get some protest from teachers saying that we are science teachers and we don’t know much Mathematics and Mathematics teachers who don’t know Science. We said that is okay, the fellow teachers will help you out. So we created a need system depending one on the other. And this way a good management system was required, particularly in a bigger cluster at Elukwatini, it proved to be positive” (2003, 13Pr, App. B8.7)

”What did happen [is] that the clusters gradually come together and had time to develop, based on group work, that cluster themselves developed and came as clusters, when individuals at the end did badly, they reacted and realized that they needed to stimulate the individuals as well and don’t just depend on grouping to do something together” (2003, 19Pr, App. B8.7)

‘Clusters gave a support role to teachers, since the UP was far and teachers were to work alone on their assignments. ... This certainly included the idea of group work and group assessment. (2005, 60T, App. B8.6.2)

### **Interpretation**

Clustering the teachers in suitable venues to learn, discuss, do the homework and assignments was probably the best feature of the project, which produced excellent results. Gottesman’s (2002) idea of systemic development of school through peers, and Fullan’s (2001) concept of limited boundaries seem to be a base for the SASEN project’s clusters. SASEN clusters were based on relationship and location of the teachers.

The SASEN cluster, as seen by a teacher, was the centre of cooperative learning through sharing and reflection on the knowledge learnt with their colleagues, in a sense echoing Borghi et al. (2003).



We see evidence from the above that the SASEN clusters for teachers took care of all activities and that aspects of teachers' behaviour had to change. They needed to learn, perform and practise in totality. Clusters took care of its members' interests from their families to the achievements in the project and continued to keep them together after the project much like the members of a family.

The District curriculum coordinator expressed her feelings as if the clusters were solving the problems of the curriculum unit of the district. Accordingly:

“Clustering of teachers has become more advantageous to our teachers in general. When they have problems they come together and sort it out for example how to organize CASS marks for moderation, computer programmes, learning and teaching issues etc. The project has given a very positive impact on the community”. (2003,16D<sup>(iii)</sup>, App. B8.8.2)

It is found that the success of a cluster lies in its being a bottom-up community structure. SASEN clusters were created in the beginning as top-down, but the clusters did all the remaining work as a bottom-up community structure in the delivery and working stages. Ms Ndlalane has expressed a strong feeling that top-down approaches don't work because once the top is not there the bottom will collapse waiting for top instructions. Clusters should be given latitude and facilitation from the top to work as freely as they [clusters] like to achieve the set out goals.

The philosophy that clusters would be part of the SASEN project was present in the design of the project. Clusters were clearly important in allowing the teachers who were rather distant from the University to establish an independent learning support environment that suited their cultural needs and expression – as the participants accepted full responsibility for their community. Ultimately the clusters transcended the period of the project itself, and became the basis of a supporting network for SASEN teachers with other provincial activities, such as the continuous assessment practices of the province, CASS.

It can be concluded that the role of clusters role was critical in promoting the success of the SASEN project.

#### **4.5.8 The SASEN project was a ‘Learning Organisation’**

The SASEN project was a learning organization in two ways. Firstly, it was an organisation where learning took place. The teachers came to learn and improve.

The second meaning attached to this notion is that the organization itself is busy learning. Senge defines that ‘learning organizations’ are organizations where people continually expand their capacity to create the result that they truly desire, new and expansive patterns of thinking are



nurtured, collective aspiration is set free, and where people are continually learning how to learn together. It is this second meaning of the Learning Organisation that was specifically assessed for the SASEN project.

The three cluster leaders gave their rating of the project as excellent for the five characteristics of a learning organisation (2003, 69T, 72T, 74T, 83T, 85T, CL-1, App. B8.1. 2003, 92T, (a, b, c, d), CL-2, App. B8.2)

The evaluation was required to determine whether SASEN did have a system, mechanism and process to create and enhance capabilities through organisational learning.

Learning to learn together was a very common feature appearing with trainees as well as with UP staff:

**Q.** Did you learn anything from them which was unique in teaching and learning situations? Did you use those to improve your lessons for them? Do you have any learning experience, which you can compare with your University students?

‘In this project a *‘two way learning process’* was noticed to be a common occurrence. It means components of the project learned from each other. For instance lecturer ↔ teachers, teachers ↔ students, teachers ↔ colleagues and so on. Many other behavioural and cultural aspects of learning took place in informal interactions but within the activities of the intervention e.g. during tea break, lunch break, cluster meetings, visits, formal and informal interviews and observations. “The entire experience was a learning experience, what was important in the first instance when I was not teaching was the negotiation process of managing the group and of stimulating them in learning. It was a two-sided process of how the students would learn and we would support them in doing so.” (2003, 21Pr, UP, App. 8.7).

The presence of an evaluator as a deliberate element of the project design is itself an additional item of evidence that the organisation was designed for learning to take place. Report backs on internal matters of the implementation of the project were done as informal reflections based on daily observations and experiences. The Director implemented alternatives where indicated.

There is evidence of change of process having been implemented as the project progressed. In the SASEN project evaluation results were used and the initial purpose to establish a point of exclusion was changed to become a means of earning inclusion for the participating teachers and thus enhanced motivation and the purpose of the project namely individual learning. This also serves as an indication that the SASEN project was resilient in having the capacity to bend without breaking and the capacity to spring back, often improved in some significant way, once bent.



Assessment of trainee teachers after the first year (at the 15 month period) proved to be disastrous. After examinations, only four teachers qualified to be registered with the course at the beginning of the second year programme. It was necessarily understood that the assessment had demonstrated that participants required a significant degree of learning – and agreement was reached that that was to have been expected, and the reason for the project. Two modifications were introduced to enhance individual learning. Firstly, assignments would from then on be submitted as group work – but tests on the assignments would be completed individually at all meetings. Secondly, once performance levels reached a required level, registration would be allowed. By providing extra time of three months and the group assignments that were coupled with individual tests, teachers qualified to register and the project went on with 28 registered students.

“This is not something, which we have done with the other projects. So I can’t explain the details why I think it worked, I don’t know. But my feelings are that there was a respectful situation both sides so we negotiated respectfully. Here is an example: the examination after the 15-month period was not very good. The [results] were relatively low. If we had followed our previous assumption that we would remove people from the course who did not succeed in Mathematics, Science and in Current Trends, we would have had only four students. We discussed at the centre for a while and it was my time to do the negotiation. And I said ‘So what? We know the course, and we know you. We run the course because we know that you don’t know everything here. We should measure first what you don’t know. And therefore we are not going to throw anyone out because you don’t know. But we can only register you if you achieve a certain level. So, therefore we will allow you to continue and we will have regular tests. You can show your performance and when you can reach the level required then we will register you. There was a sort of barrier but it was not a barrier. Anyone will continue staying on the course, even if you have not registered.’ All wanted full registration and all wanted recognition for the effort they were making. And so it is assumed anyway. And this immediately diffused the situation and turned it around from a very tense situation into a situation of tremendous enthusiasm to continue. And this was the beginning of the second year, when we had to start the real Science consisting of the Chemistry, Mathematics and Statistics and well that made a difference”. (2003,21Pr, App. B8.7)

Negotiation rather than imposition with the people affected was the order of the day in the life of the SASEN project. This avoided any deadlock when changes had to be implemented.

Cooperative and group-work in Clusters became very determined after the changes. “They (trainee teachers) began to meet in their clusters. They were able to manage the work because they met regularly we actually found that they were meeting twice a week each of three hours duration, Tuesdays and Thursdays. Our expectation of having them as passive learners was totally eliminated. They did work extremely hard on their assignments and they learned from us, as





requirement that individuals need to have achieved as well. And they said that if someone contributed to the programme they were credited for that. Their names would be listed as contributors to do the assignments”. (2003, 21Pr, App. B8.7 Pr.) This assessment of clusters showing unique unexpected behaviour of teachers is another example of observation, feedback and change in the system, which might give an insight for planning the sub-systems of a purposeful activity.

Lecturing methods were adapted. “I introduced some skills and drills programme later on. First I worked from the textbook, I prescribed to read and do assignments which we then discussed in our classes. And other point was that I said look, we have got to address some skills shortage, we said you know some of the work, but we are not happy with the skills e.g. speed of working. So we introduced skills programmes, which were originally used with bridging students in the past. I adapted some of them for specific work, which we were now doing. I used work sheets and edited them in order to cover the specific work when I moved from a lecturing situation to work situation in a group they would work and then report. We started getting a very positive success. This happened with my Physics course and it was true to some extent with the computer literacy course, when I needed to present things.” (2003, 21Pr, App. B8.7 Pr.)

Answering the question: “Q. What went better on the part of the implementers? The programme worked for 3 years; I hope you remember. How did they work?”, teachers confirm that:

‘The commitment that was shown by the implementers depended on the commitment of teachers. Teachers were not going there just to receive, but they were contributing to the project.’ (2003, 35T, CL-1, App. B8.1)

‘I would say that all learned from the inter cluster sharing of ideas, when all are present together to solve problems. This sharing was not very common to University staff. When they listened to these, they took it and used in other areas.’ (2003, 39T, App. B8.1)

**Q.** Should a teachers be very sensitive to learner’s criticism or go as he/she likes?

‘While you are a teacher you are still learning. You can learn even from your learners that you are teaching them everything they tell you, look into it carefully... If you don’t learn you will be doing the same mistake every year. Therefore you have to hear learners and change yourself. You have to learn from them.’ (2002, 12T, Sch-5.T3, App. B4.1.1)

**Q.** You were around four years with the implementers of SASEN. Did you observe anything that they learned from you?

‘I think they did learn from us something like I remember, one day some said let us start with prayers and one of us lead the prayer and it was adopted. I remember they will come there and then I will say that let us stand and sing. I think they learned it from us.’ ‘Again we behaved ourselves,





the way we conducted ourselves in the clusters. I think it is very rare to find people working on Saturdays and sticking to the time schedule. I think they learned something from our cluster management also.’ (2003,131T1, CL-2, App. B8.2)

**Q.** Do you think the lecturers from University of Pretoria [gained] knowledge and skills from teachers?

‘I always learn from my students, it was a two way traffic, they (lecturers) also were learning from us e.g. our way of working in groups at the clusters, changing their methodology, which suits us as students.’ (2003, 189T, CL-3, App. B8.3)

**Q.** What was your contribution? As a director and as a teacher what did you contribute the SASEN to be a learning organisation.

‘While work was done I am always present as far as possible. We expected results so we designed the accountability progress from the people contributing. This was particularly important, I think. My conceptualisation of structuring was there. There was a lot of flexibility which allowed learning to take place.’ (2003, 33Pr. Pr., App. 8.7)

‘When it goes to good organization it was largely Thembi’s planning, where there was a spirit of accountability of negotiation, it was Thembi and Max Braun, I think.’ (2003, 33Pr, App. 8.7, *Lecturer-2 interviews*):

### **Interpretation**

Calder (1994) assigned importance to the evaluation of a learning organization as a mechanism to support its success. Argyris & Schon (in Calder) asserted that evaluation is used, or should be used, to enable the institutions to operate as learning organizations. The importance of the role of the detection and correction of error is the basis for the ideas in organizational learning.

The SASEN project used feedback and discussion opportunities to adapt. Through the evaluation process these adaptations have been recorded – there is thus an institutional memory.

The SASEN project was flexible in assessment, teaching approaches, learning skills and methods. Venues were negotiated and shifted according to the requests of teachers. Wherever it was necessary the project negotiated, adapted and proceeded but the standard required and quality of delivery and achievement were not compromised.

The project used negotiation and two-way learning in its processes. It was open to comment by stakeholders and implemented negotiated decisions. All involved were seen as owners of the project, in practice.



The evaluation system, negotiation, informal meetings, formal reporting and informal feedback opportunities were all designed as part of the project. The project was deliberately a learning organisation, and this was the basis of its ability to adapt – and survive – over the long period.

#### 4.5.9 Appropriate courses, content design, negotiated and upgraded from time to time.

Teachers' needs were acknowledged and the programme was designed accordingly. It attracted teachers and kept them motivated for almost four years to receive their FDE/ACE qualification.

Teachers' affirmed:

**Q.** What made you not to be deterred from all these things and you continued with the project for so long until the success was achieved?

‘Initially when I looked at the course outline, I saw that there was Computer literacy; there was Mathematics and Science. There I saw that was my line. In fact this way of doing things for nothing not paying anything and so on, people think that you are not serious. In fact paying money for the transport and lunch you mentioned of it, was just to show that we are serious it was for us to achieve the goal with SASEN which gave opportunities to achieve our goals at our door. And this is what we are looking for’. (2003, 107T2, CL-2, App. B8.2)

‘I joined because I wanted to enhance to my capacities in the subject I am teaching i.e. mathematics and science. If I tell you the confidence after being the part of the project that I have built is unbelievable. There were so many concepts that I was afraid of too much when I was alone, now I am doing freely with all confidence. (2003, 104T2, App. B8.2).

‘... In fact the aim was to empower. If you are a teacher you are to learn forever. There are new things (knowledge) taking place outside. As a teacher you should be the first person to learn about that. We learnt among other things computer literacy, which was new to us and it opened a gate where the treasure of knowledge can be accessed’ (2003, 105T2, CL-2, App. B8.2) ‘.... ‘Exactly, especially people are now talking about systemic change, we talk about changing the whole institution: The parents should be proud of the whole development’ (2001, 28T, 32T, App. B8.6.1)

#### Interpretation

The curriculum of the project was designed to suit the needs of teachers. The content of the academic subjects as well as the course “Current Trends”, and computer literacy proved to be fascinating for teachers and even to other stakeholders. It enhanced the confidence level of teachers. Mattheoudakis & Niccolaidis (2005) report similar appreciation by the trainee teachers and resulting benefits in an INSET programme characterised by flexibility in implementation.



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#### 4.5.10 Desirable constructive role of foreign donors and the SASEN project

In 2003, the cluster leaders, three principals, a colleague and union leader and two departmental officials were asked to answer a questionnaire to establish their views on the acceptable roles of foreign donors regarding educational projects for which the donors have provided funds.

“The foreign donors should be part of the implementation and management so as to monitor the progress. They should ensure that the aims of the project are achieved while working hand in hand with South African stakeholders”. (2003, Q4, Responses, App. G).

Some of the stakeholders felt that the terms, conditions and limitations of donors sometimes become very difficult to meet. They were of the opinion that donors should not exploit the weaker South African situation in their favour, even though we need help.

“We welcome them to support as long as there are no strings attached to the donation”.

“Their programme, sometimes, do not address the need at its root level. They run for a while and then disappear. Sometimes there are certain limitations/restrictions that cannot be met by all of us” (2003, Q4, Responses, App. G).

Stakeholders suggested that the donors should consult the local stakeholders for needs to avoid repetition of interventions (and failures), work hand in hand with stakeholders, and give preference to rural areas where development needs were greatest. Respondents wanted the donors to monitor the funds but not to be involved in daily affairs of the running of the project (2003, Q4, Responses, App. G).

#### **Interpretation**

The SASEN project did not have unwanted strings attached. The only expectations were sixth-monthly financial and activity reports and the annual report back about the project at the SASEN conference at the University of the Western Cape. That this was acceptable to all parties is evident from the proceedings of the 2001 and 2002 SASEN conferences in which presentations by the Director, lecturers, researcher, participant teachers and funders were published (Braun, 2001; Braun et al. (2002). According to the Director of the project the donors always had their eyes on the progress of achievements and proper utilization of funds. Funds provided were audited twice a year for their proper and fruitful use in the project. Academic performances were left for CSEUP to manage and deliver results (2003, 32Pr, App., B8.7).

Respondents also agreed that no strings (other than sound financial management) should be attached to their donations.



#### 4.5.11 Role of the CI as ongoing evaluator and MDE representative

Ongoing evaluation of the project by a participant researcher (the author of this thesis) was another important feature of the SASEN project. The researcher as a Departmental representative to the project held a good advisory position, and reports and insights offered were always seriously considered and measures were implemented in the interest of the smooth running of the intervention.

Teachers knew the CI for many years as their Departmental mentor at their work place and as their advisor. Teachers felt the presence of the CI at the workshops as a support to them as well as to the project. In response to questions regarding this role some answers are reported as:

“I appreciate your work, actually, you showed us that you have to be dedicated because some of us were de-motivated, didn’t want to continue with the course. We did not understand what the course was about, but we are always there. At least even we had the second thought about leaving the course, when we saw your face we felt guilty that no we cannot disappoint your effort to help us, let us continue with the project”(2002, 286T, App. B5.2)

“SASEN took a long time. Such that there was a time when I thought just to leave it. I thought when is it going to finish? But I continued and now I have gained a lot from SASEN”(2002, 410T, App. B5.8)

“To me it has taught me don’t stop learning, keep continuing and reach the highest. Although the course is ending, but it has left its some marks on our lives very well”(2002, 311T, App. B5.3)

“It will be good for them [future Curriculum Implementers] to organize workshops because sometimes when teachers meet they discuss concepts and learn with the CIs”(2002, 334T, App. B5.4)

#### **Interpretation**

These statements of participating teachers of the District show the Curriculum Implementer’s role in keeping the teachers motivated to continue until they achieved.

In the SASEN project the ongoing evaluation had its impact on the project. Teachers and the project organisers appreciated the presence of the CI at the workshops and in the schools. In his letter to the MDE (April, 2004) the director of the project wrote:

*“It is my view that his (the CI as Departmental representative) contribution was critical to the success of the project, which ultimately earned Further Diplomas in Education/Advanced Certificates in Education for 26 teachers”.*



#### 4.5.12 Sustainability

In order to ensure sustainability and lasting impacts of the project, resources must be made available to be used by the teachers in their post-training period. This should be included in the initial planning of the project and include appropriate physical, human and financial resources.

Remarking on what the project left for them in the long term there were several items:

‘They gave us laboratory science kit, material, computer at a central point, and that is at our school.’ (2003, 211-214T, [Cluster-3] App. B8.3)

‘We got apparatus and equipment from the project, and what you do there, you come and apply to the class. It was different than other projects where you do your things in the workshop but when you come to school, you get frustrated, you can not apply anything rather you go back to square one’ (2003, 19T, CL-1, App. B8.1)

‘Now what I have realized is that the project has gone beyond the certificate, we have built now a network of friends where we come together and share ideas about science, maths and education informally’. (2003, 43T, CL-1, App. B8.1)

‘SASEN has contributed financially for the programme up to a level where teachers achieve their Diplomas. But now talking to teachers, some of them want to carry on and want to get registered at university and finish it, because they like the nature of the course we are teaching. (Nov. 2001, 22T, Lecturer-1, App. B8.6.1).

‘Our schools were supplied with some chemicals (by the Dept.) and those were not used because of lack of knowledge, but now we are using those in our laboratories and making the best use of it. So we achieved a lot which are sustainable now...’ (2003, 100T, CL-2, App. B8.2)

‘Now (after 4 years of attending the course) I can give them all new method of doing assignments, research, projects etc, from our own experience at SASEN and can make our class active and very live. A lot of resources and methods to use those were given to us to use in our classes and that is how we are sustaining our experience at the work place’ (2003, 199T., CL-3, App. B8.3).

‘Because there were portions that was I afraid of like looking at the question of Geometry but after going through that course, I now can teach them so simply, e.g. (2002, 237T, T15, App. B5.1)

‘The skills that I have obtained now from the SASEN, I didn’t have before, with these skills now I can approach problems even difficult ones and will be handling with confidence’ (2002, 299T, T9, App. B5.3)

‘Before there were some other things, which we were not used to then. But now I can use any thing that can be given to us in the school. (2002, 327-328T<sub>17</sub> App. B5.4)

‘I can say, it has done much, especially in using science kit and material’ (2002, 330T<sub>17</sub> App. B5.4))

‘They gave us laboratory science kit, material, computer at a certain point and that is at our school’ ((2003, 211-214T, CL-3 App. B8.3)



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'I mean textbooks as good resource for knowledge and information, CDs to have more information.  
(2003, 212T, 214T CL-3, App. B8.3)

### **Interpretation**

The project tried to sustain its effects after completion. This was done in many ways: teachers were capacitated to be confident teachers with solid subject content knowledge, cluster groups remained as a continuing network, each cluster was provided with computer facilities, computer skills were taught, enhanced reading materials, laboratory and apparatus skills, and science kits, standard text books and software C.D.'s were made available.

#### **4.5.13 'Why was the project successful?'**

The preceding analysis presented 12 features of the project, each of which contributed to the success of the project to some extent.

The project offered a rare opportunity to obtain higher qualifications in Science Education close to the teachers, and at an affordable cost which motivated most to work hard and succeed. The motivation was sustained over a long duration which none-the-less produced benefits that the teachers themselves perceived.

Computer literacy, which was a dream of many teachers, was made part of the programme. This attracted most of the teachers and kept them with the project. Schools benefited with computer literacy knowledge immediately and the programme and its teachers gathered support from respective principals and colleagues. It opened the door to Internet usage, CD's and many other hidden benefits of computer technology previously unknown to teachers as well as to schools.

The contact lessons with practical or computer based hands-on engagement with these teachers developed content knowledge, reflection and resulted in enhanced teacher confidence. This confidence generated further interest in the project.

Teachers were given opportunities to negotiate the teaching-learning and assessment procedures and ensured that they were accepted by all participating teachers and the University. There was a "mutually respectful situation" in the project. The project was a "Learning Organisation".

A sense of ownership which developed amongst the participating teachers was enhanced by the opportunity to discuss content and problems within clusters, and by managing these themselves, developed a confident inter-relationship amongst participants within their own culture and language. The clusters were initiated and monitored by the University of Pretoria staff and the CI as



MDE representative and familiar teacher support specialist. Clusters provided an independent learning support environment and allowed the participants to accept full responsibility for their learning. The clustering was a central contributor to the project's success.

The management (CSEUP) succeeded through relentless effort and financial discipline and accountability, planning and adapting as the need arose, to implement the project using the available resources, in spite of driving long distances while motivating others to do so.

The MDE cooperated with the project and played an active role by providing facilities and an active representative who was well accepted by the teachers as their normal subject support specialist, actively took part in all activities and regularly reported to the department at district level.

The Belgian donor was supportive and encouraged good practice regarding financial and activity reporting and accountability. The SASEN organisation also provided opportunities to take part in a national conference every year and to be able to report the progress made and to learn from other projects which were funded by SASEN. Participation by teacher representatives themselves in one of these conferences further enhanced the feeling of ownership and concomitant accountability of the CSEUP to not only SASEN and the MDE, but to the participating teachers.

The evaluator's role from beginning to end in several capacities was recognised as a further critical contributor to the project's success, particularly in the role of a communication point for the MDE and as part of the feedback role to the CSEUP.

Deliberate actions have led to a degree of demonstrated sustainability of the impacts produced by the project, the most sustained of which is the impact of computer literacy in learning, teaching and administration within the schools, and continuing supportive network developed within the clusters that serves teachers beyond the project.

Demonstrably clear from this collection of factors is that they are heavily interdependent, and one can easily accept that removing any one of these would have produced more limited success, or failure. This interdependence is further support for the recognition in Figure 4.5 of the strong systems nature of the project.

#### **4.6 Limitations and failures of the project [Question 2 third part]**

Several aspects were identified as failures or weak points in the SASEN project.





‘SASEN for instance has provided limited resources. I am talking about, they have taken teachers to computer literacy and now some teachers learnt to use computers, but now the teachers don’t have computers, where they are teaching’ (2001, 22T, *Lecturer-1. App. B8.6.1*)

The main identified promise which was not accomplished was to install a ‘satellite dish antenna’ for computer oriented learning, although a valid and acceptable reason of unreliable and uncertain technology in the field was forwarded by the Director: “We could not deliver on all our promises necessarily. It was not quite easy to deliver all infrastructure. We had to make some financial decisions, ... a satellite computer dish where the technology was uncertain out in the field anyway [thus fell away].” (2003, 33Pr, *App. B8.7*).

The project had a plan in the initial proposal presented to SASEN organisers to send the researcher to visit a university in Belgium. This was not supported.

A goal which was changed in the middle of the project was to qualify both Mathematics and Science teachers with a single qualification addressing both subjects equally. However, as teachers expressed some difficulty with achieving both specialisations, a second qualification for teachers of Mathematics (ACE in Mathematics and Computer Literacy) was introduced. The following interview with a cluster leader reveals that this shift was not necessarily welcomed by all participants.

Question: “Do you think learning opportunities provided by SASEN were fully utilised and goals realised? Or goals were unrealistic and SASEN therefore partially realised it. Give your feelings.” To which was responded:

‘Their goals were realistic and the opportunities were fully utilised. I think the goals were not fully realised because, initially the project aimed to give us equal knowledge of Mathematics and Science. But somewhere it was diverted a bit from the goal that was set and we had to specialise only for one of the two (Mathematics and Physical Science).’ (2003, 89-90T, *CI-1, App.B8.1*)

It did not continue to a second term and disappointed teachers in the queue. An original stated intention was that teachers who completed the first presentation would be drawn on to assist a second intake within the established clusters. This continued involvement would have formed a continuing after-care programme. Encouraged by the successes of the participating teachers and positive impacts on education in the District many other teachers were queuing for the second batch to join the project in its next round but were disappointed. A principal made his remark in a desperate mood when a question on evaluation of the project was asked to him.



‘... Therefore we expected that it should be a continuous project. This year the other teacher should have gone to take up the course.’ (2003, 4P, P8, App. B8.5.2) This may reduce future support for a similar project.

The project did not plan for teachers who dropped out because of change of dwelling due to marriage or transfers. This factor lost four teachers to the project. One got married and had to move to her husband. Three others dropped out because of their transfer to schools far from the project’s venue.

Graduates of the Project were not given further opportunities or financial support to access further studies in higher education. Such an aspect does not necessarily fall within the scope of a project beyond its existence, yet some aspirants were expecting a post care arrangement of some sort. At the end of the project information pamphlets were provided regarding distance education courses related to Science and Science Education qualifications at the BEd(Hons) level which were offered by the University of Pretoria and the University of South Africa. From a long term view, the project successfully improved competences of the 28 individuals who took part, but did not address a long-term systemic improvement and thus only had limited impact on this dimension.

#### **4.7 Phase 2: SSA: Stage 6: Conclusions of the evaluation and recommendations**

Stage 6 of the SSA formulates what has been learned from the previous stages into action plans (in the case of a continuing project) or in this case which is an evaluation, into generalisations and recommendations for future projects.

##### **4.7.1 Successes**

The successes of the project were extensively discussed in section 4.4 and summarised in 4.4.2.11. These are that the project:

- graduated 93% (26 of 28) of registered participants
- 1/3 of participants achieved promotions within 2 years
- enhanced self-efficacy beliefs
- improved professional behaviour
- improved Science and Mathematics teaching and perceptions
- developed computer literacy
- developed competences in roles of teachers
- left a legacy of sustained impact



Skills as educators, knowledge of their subject, their belief in their personal efficacy and their changes towards more professional behaviour must be rated as significant successes of the project.

#### 4.7.2 Contributors to successes

Major contributors to successes were extensively discussed in section 4.5 and summarised in 4.5.13. These are that the project:

- provided for a locally recognised need and had responded to a local initiative to seek a formal programme of teacher skilling close to participating teachers
- had affordable cost to participating teachers
- extended period over which the project was presented which teachers found beneficial
- instituted and empowered clusters for locally independent learning support
- stimulated a sense of ownership amongst participants
- practised effective management, financial discipline and accountability
- respected local culture
- used mutually respectful negotiations and inter-dependency with two-way learning
- practised as a Learning Organisation
- provided inspiration with computer literacy and computer assisted learning
- had active local support in authority structures
- had a donor who demanded financial discipline and accountability for activities, but allowed the local agenda
- integrated feedback through active formal and informal communications channels and continuous evaluation
- had the characteristics of a soft system with adaptive control and accountability with participants working towards common purpose [Figure 4.5]

#### 4.7.3 Limitations and failures of the intervention

Weak points of the project were discussed in section 4.6. These were primarily expectations which arose but were not realised:

- Insufficient resources for a computer for every school
- Financial decisions limited potential infrastructure development such as satellite based communications
- Academic association with the University of Leuven was not realised
- The programme could not qualify teachers equally in Mathematics and Science, beyond the preparatory level



- The project failed to be extended beyond one group of teachers and further follow-up could not be implemented
- The project could not accommodate teachers who had moved from the district
- No financial provision could be made for teachers to study further

#### 4.7.4 Recommendations

Recommendations are grouped into two classes namely lessons from successes and lessons from failures. One seeks here not to be exhaustive, but to highlight some important considerations. Others may interpret the analysis and find an expanded list of lessons, and consequent recommendations.

From the successes one can conclude that the local support in the form of facilities, strong communication lines and the consistent presence of the CI created the opportunity for the development of the strong sense of ownership held by the participating teachers. The project adequately sustained and grew this through active communication, instituting clusters that were required to be active through the cooperative tasks and assignments, and hence challenge, of the courses. The project directly addressed an expressed need, but also went beyond the defined need by providing school level equipment and a programme that developed a high level of computer literacy. The computer literacy was not only developed in isolation, but as part of the demands of several of the courses, and became computer proficiency.

The recommendations to other projects derived from the success factors are thus that projects:

- must address locally established needs
- must have a strong local champion able to access resources and good will
- must be structured, depend on and be seen to respect the participating teacher
- must go beyond the directly expressed need and set enthusiasm for related skills that transcend the immediate needs
- must inspire a belief in the excellence of what is presented through credibility and commitment of the lecturers, as well as through the credibility of the certification outcome, preferably a desired qualification
- must have strong financial and academic accountability to ensure completion and recognition
- must be adaptable and able to respond to changing resources, needs and potential failures along the way (these are elements of a learning organisation)



- develop the significant inter-relatedness of activities for efficiency and to achieve goals not achievable through a divided effort – must be structured, managed as and recognised to be a soft system with inherently strong communications channels

The failures were largely failed expectations. It is clear that success breeds further expectations (and for example the expectation that there would be repeated projects), but also some of the expectations were part of initial plans (possibly seen as “promises”) that were not realised.

- To avoid the project directors being associated with the failure of an expectation which is a consequence of success they should be seen to be evaluating the project fully during the process [continuous soft systems analysis], and once evidence of likely success is available seek sponsors for a repeated project. With the very strong case of local support and evidence of success funding a repeated or expanded project should be possible in all but the most stringent of economic conditions.
- The reasons for discontinuing processes or installation of planned equipment should be communicated as soon as it becomes evident that they were no longer achievable or needed.

#### 4.8 Discussion of the soft systems analysis

In Phase 2 the research aim was to evaluate the project to sufficient depth by using all information available to a project insider but in a way that would reduce the effect of the bias of the insider. Specifically, the research sought to achieve sufficient understanding of the success factors, strengths and weaknesses of the project and thus to answer the questions [Section 1.3.32]:

- To what extent was the project successful in its purpose of satisfying the expectations of participants?
- What supported the project’s success (success factors)?
- Limitations and failures of the project.

The potential effect of the bias of the participant researcher was reduced by requiring the researcher to establish (and thus justify through direct information and specific definitions) the structure of the project by explicitly applying the tools of the Soft Systems Methodology. The structure itself then determined the investigations that needed to be performed and of whom to request information, by its identification of key communication lines and points at which decisions are made (and thus by whom). The formal process has been described in sections 4.3.2 to 4.3.5. This arose from unstructured information of Stage 1, to structuring of the available information in Stage 2, formulation of clear definitions of functions in Stage 3, and ultimately a structural diagram of the



soft system, its controlling decision makers and the communication lines of process and feedback were identified in Stage 4.

The information gained through the initial, more traditional, approach of Phase 1 in which implied changes of attitudes and professionalism and that participants ascribed the changes to the project, was not discarded. The value could be extended through obtaining more information from school principals and colleagues. It was established that self-efficacy beliefs were developed by the participating teachers, which in turn led to marked strengthening of professional attitudes and behaviour.

Several dimensions that would be relevant to the various role players, participants and decision makers in both the project itself, and the controlling system could be identified in Stage 4. In Stage 5 of the analysis these relevant dimensions were measured through structured and semi-structured interviews of the people who were concerned with the project. In section 4.4, the dimensions of success were determined and presented, while in section 4.5 the success factors which were obtained through the interviews of stage 5 were identified.

In section 4.6, the failures, in the view of participants and decision makers, were presented as the last part of stage 5.

Stage 6 of the Soft Systems Analysis presented in Section 4.7 integrated the successes, failures and success factors and presented the conclusions of the evaluation itself. The research questions, which were the drivers for the evaluation, were directly addressed in this section. The final outcome of the Soft Systems Analysis is the recommendations that are made. As the project was not a continuing programme, but a single intervention that would end after the graduation of the participating teachers, recommendations must be in the form of broad and tentative recommendations for future projects, rather than proposals for change of a continuing project.

#### **4.9 Discussion of the 2-phase evaluation: A research overview**

The research was a case study for the evaluation of the SASEN project. Being a participative case study, and its inherently limited population, the sample of participants who voluntarily contributed their opinions and experiences was not amenable to statistical analysis. Qualitative analysis dominated the research and the responses obtained were analysed.

During the life of the project in Phase 1, data were collected by administering questionnaires, performing observations and conducting interviews. Phase 2 was begun towards the end of the



project and continued well after the project was completed. Interviews with stakeholders, many of them decision makers in the wider system, formed the major part of the data collection in the post-project evaluation.

#### 4.9.1 Strengths

The analysis of Phase 1 was focussed on a carefully delimited aspect of the project, during which the attitude and professionalism with classroom behaviour of trainee teachers were measured as a proxy of the project's progress. It is a result of the Phase 1 analysis (obtained from the reports of teachers, learners and principals and specific observations that allowed triangulation) that positive attitudes were created and professionalism enhanced by the project, as expressed by teachers themselves and their principals. Teachers became more confident through enriched content and enhanced skills of (self-) learning and teaching. It was also evident that the teachers were able to comprehend, and often apply in their teaching, methods and ideas of modern trends provided in the project courses and reading materials. Phase 1 was completed by further triangulation with information which was obtained through the processes of Phase 2. In its turn, Phase 1 provided information for Phase 2.

The Soft Systems approach of Phase 2 analysed the project as a human activity system intended to produce a transformation (or change) in the subject-specific content knowledge and skills of participating teachers. As the purpose was a summative assessment of the project, the formal stages of Checkland's (1999) Soft Systems Analysis were modified. The analysis led to an understanding of the actual structure (stakeholders, role-players and the relationships and communication lines between them) that existed during the project, and so gave rise to the measurement tools that needed to be used to actually assess the project's performance. The specification of the elements and relationships of the system at the conceptual stage required identification of the components of a system. Thus, during the stage of creating the conceptual model, the transformation subsystem was specified. Controlling subsystems and how the various subsystems interacted to adapt the mechanisms of the transformation subsystem were included in the model. The feedback channels and the measurements that gave information to the control subsystem were identified and formed a part of the model.

The analyses influenced one another. The Phase 1 analysis benefitted regarding its completion and plausibility from triangulated results of the Phase 2 analysis. In its turn, the Phase 2 analysis used the results of Phase 1 and was able to extend the insights gained from Phase 1. The analyses together allowed a description of the impact of the intervention on the teaching community in aspects which were both expected (in the design of the intervention) and unexpected, particularly





when the national Department of Education's specification of the seven roles of educators and the associated competences were examined.

The first analysis used questionnaires, interviews and class observations as the tools for data collection and found that there were changes in the attitudes of teachers, improved confidence through enriched content knowledge, enhanced opportunity to access advanced standard textbooks, ability to use computers etc. Teachers began practising relevant methods of teaching such as a more learner centred approach suitable for OBE. Teachers became more caring for learners' interests by extending the teaching time into what they termed "quality time".

The second analysis applied a novel adaptation of a soft systems analysis framework to gain sufficiently wide understanding of the project to address the question of why the project was successful (and the extent of its success and limitations). Several success factors were identified, and the extent of successes and failures were established, which have been summarised in section 4.7. Extending the findings of the Phase 1 analysis, the development of strong self-efficacy beliefs amongst teachers, and consequent changes of attitude and behaviour was well established in Phase 2. Potentially of lasting value, the evaluation yielded recommendations for future projects in section 4.7.4.

#### **4.9.2 Weaknesses of the research**

The research formulation of Phase 1 did not include a pre- and post- intervention assessment with consistent instruments to determine change in attitude or practice through the instruments directly. The first phase thus relied largely on self-reporting by teachers, although supplemented by interviews with colleagues, principals and learners and classroom observation that provided triangulation information. Consequently, Phase 1 conclusions only gained a basis of credibility when supported by the later interviews of the second phase.

Classroom observations were performed twice during the process, in the second-to-last year of the formal programme (the year after the initial "bridging" period had been completed), and in the final year of the formal programme. Observations of prepared lessons in clusters, were only performed once, and then with only two of the three clusters contributing. Follow-up classroom observations beyond the end of the project were not undertaken. These limited the validity of these observations, a fact which is acknowledged when they are reported and their implications determined. Once again, these at most have a supporting role in the triangulation of impacts.



If one had used the “attitude” proxy to record change from the beginning, in addition to regular application of soft systems analysis with stakeholders one would have had the benefit of a detailed understanding early on, and a single report incorporating both analyses would have been appropriate. Nevertheless, the power of the soft systems approach has been demonstrated in its adapted form as a post-completion evaluation framework.

The post-completion evaluation of the project required locating the various stakeholders and this was a challenge. To make the data sufficiently representative the three cluster leaders and most of the departmental officials involved in the original conception, approval and monitoring of the project were interviewed. So were principals of schools whose teachers attended the project as well as two lecturers of UP who had presented courses in addition to the director and other staff of the Centre for Science Education. Even then, not all stakeholders could be met for interviews. This included some senior officials of the Mpumalanga Department of Education who had moved away because of changes in their positions in the Department. Their views could not be known.

Seven teachers left the project in the early stages without expressing their reasons. These teachers could not be met during the period of research. Information about four of them was collected indirectly from those who knew them as colleagues. It is possible that interviews with them may have been able to give more information about weaknesses of the project, or may at least have provided stronger information about why they left.

The funders are under-represented in the interviews, and the degree to which they were satisfied by the progress of the project was inferred indirectly as a result of the SASEN (network) annual conference, biennial reports and continuation of funding.

In spite of these shortcomings which impact more on a quantitative analysis than on a study seeking explanations, it is felt that the in-depth determination of the views and impacts on the major clients of the project, namely the participating teachers and their employers (the school principals and the schools), coupled with the teachers’ rapid career progress within a very short period after completion of the project provide a sufficiently strong basis for confidence in the conclusions of the analysis.

### **4.9.3 Conclusion**

In the closing chapter (Chapter 5) the research process is summarised and discussed further in an integrated form, the major results and outcomes of the research are integrated, and limitations are identified.



## Chapter 5

# Summary and Conclusions

### 5.1 Overview

The SASEN teacher development project was implemented in a rural district of Mpumalanga province in South Africa from October 1999 to April 2003. According to the research findings the project did contribute to improved teaching, and in many cases more than what was expected. In addition to a conventional focussed method of evaluation, this study employed an adapted form of a ‘soft systems’ analysis (Checkland, 1999; Sherwood, 2003) as a framework to evaluate the project holistically. The first part of the evaluation was conventional and was performed during the project to establish impacts (if any) on the attitudes and professional practices of participating teachers as self-reported and as observed in model and actual lessons presented by teachers. The second was a broader evaluation begun in the closing stages and continued beyond the completion of the project. The latter investigation sought to create a picture of the project of sufficient richness to provide bounds on the success of the project, and some depth of insight for the rather open-ended search for factors that led to the project’s successes. The Soft Systems Analysis produced a rich systems model of the project. This indicated where information was required, and thus which detailed analyses needed to be done. Appropriate interviews were consequently performed to gather the needed information.

Interviews were held with a range of stakeholders, which included lecturers from the University of Pretoria, officials from the Mpumalanga Department of Education, a teacher union representative and school principals. The researcher was a facilitator from the Department of Education for the project, and thus was a project participant.

The phase 1 assessment was guided by the research question (Question 1): What were the effects of the intervention and upgrading of their qualifications on attitudes and professionalism of educators? The specific areas investigated were (i) self-reported change in the attitude of participating teachers, and (ii) change in professional behaviour of educators in school and classroom practice, as self-reported, observed in lessons and as reported by colleagues, supervisors and learners.

In phase 2, the soft systems analysis, a fuller understanding of the project was sought. As well as augmenting the first question, Question 2, which guided the analysis in Phase 2, was expressed in three parts to establish: (i) the extent to which the project was successful in its purpose of satisfying the expectations of stakeholders, (ii) factors that supported the project’s success, and (iii) limitations and failures of the project.



The intervention was designed primarily to improve teachers' content knowledge and working skills in a classroom situation. To this end, a formal qualification for the '*Further Diploma in Education*' or '*Advanced Certificate in Education*' (as its name changed during the period of the project) was the academic vehicle. These courses are recognised as professional educator qualifications.

The features of the project included i) the participatory nature of the researcher who had the additional role of representative of the Mpumalanga Department of Education as Curriculum Implementer in the region where the project was implemented; ii) the complexity of the project itself – being an intervention over several years that addressed many aspects of teaching, content knowledge and classroom practices; and iii) the project was designed from the outset to have the freedom to adapt to circumstances.

The insight gained from studying relationships within the systems approach proved to be valuable from an explanatory point of view.

## **5.2 Impacts of the project — an integrated view.**

The phase 1 investigation addressed research Question 1 and sought to establish the self-reported change in the attitude of participating teachers, and changes in professional behaviour in school and classroom practice, as self-reported, observed in lessons and as reported by colleagues, supervisors and learners. The conclusions from the Phase 1 analysis are given in 4.2.4.

The phase 2 investigation was broader in its scope and added Question 2. The phase provided further information regarding the extent to which the project was successful in its purpose of satisfying the expectations of participants, as well as limitations and failures of the project. These additional successes are given in 4.4.2.11 and limitations are discussed extensively in 4.6 and summarised in 4.7.1 and 4.7.3 respectively.

Quantitatively, the project's major achievement was that 93% of participating teachers obtained their Diploma (FDE/ACE) within the period of the project. One third of participating teachers achieved promotion within two years to positions of Heads of Department, Deputy Principals and as Curriculum Implementers in the Department of Education. These positions were not accessible prior to their achieving the new qualifications. Several principals have ascribed the promotions to the increased confidence of teachers as a result of improved knowledge of the subject and skills in the related field.



The research found evidence that teachers improved their attitude towards and practices within their profession. Early questionnaires (self-reports) showed that teachers knew what was required of them as professionals, but observations showed that they did not confidently act according to those expectations. The improvements included willingness on the part of teachers to attend to the education of learners even out of the class and after school hours with added skill and knowledge perception they now feel that they are spending more “quality time” in schools. Learner centred teaching with activity-based classroom practice within the normal school curriculum became a more popular teaching approach with SASEN teachers during the project and appears to have been sustained after the project. An analysis in terms of the national department’s “seven roles” has shown that all roles were enhanced, and at least three were strengthened significantly in addition to the role of subject specialist which was the focus of the project.

The school learners’ responses to interviews and the questionnaire reported improved mutual trust between themselves and their teachers of Science and Mathematics. Learners confirmed what principals had noticed, namely, that Science and Mathematics have become more popular in contrast to the traditional attitude that ‘science and mathematics are difficult and not for all’; Exposé participation by learners was increased in schools of the District consequent to improved encouragement by teachers.

The project produced confidence amongst teachers by strengthening their conceptual content knowledge and skills and their computer skills. The teachers strongly expressed enhanced belief in their self-efficacy and they have continued to take care of their own learning even beyond the end of the project with support from the cluster groups that continued to function as a support network after the project ended.

The use of computers in school activities in many cases began with the teachers who participated in the project and has spread and been sustained.

The stakeholders raised hopes that the intervention would be continued to other groups of teachers awaiting their turn. This is evidence that expectations of the project itself amongst these stakeholders were fulfilled. (However it is to be seen as a disappointment and limitation that the project was not repeated for a further intake.)

Limitations may be grouped into three sections, academic limitations, those caused by financial constraints and unachieved post-care. The format of presentation, namely contact sessions held at a large distance from the University of Pretoria, while providing the benefit of face-to-face contact and thus continued motivation for participants, did limit flexibility in the programme.



Academic limitations include the decision made after the start of the project that teachers would not be qualified equally in both Physical Science and Mathematics. While both were developed to an equal level in both disciplines prior to the actual registration for the formal qualifications (after the first year of the project) and a first Mathematics module and the Computer oriented courses were taken by both groups, the groups specialised thereafter. Disappointment was expressed at least by more ambitious participants. A second academic limitation was that a formal academic link with the University of Leuven was not developed during the project. This may have provided further opportunities for academic exchange visits and academic cooperation.

Financial constraints resulted in some disappointments. An intention which was not implemented was the placement of a satellite receiver dish in the teacher centre at eMpuluzi, where the project was presented, for the purpose of transmitting lectures from Pretoria to the centre and also for computer communications. The cost of the technology of actually using such a facility together with the uncertainty of the reliability of the technology ultimately motivated that decision. The computers and printers that were purchased for the project were provided to centrally located schools in the district after the project ended. There were too few to provide a computer to each school which had a teacher participating in the project.

Post project care through which a second intake could have been accommodated by offering the project a second time, and using the first group's successful participants as a resource for them (and thus offer further development to this first group) was not implemented. It is conceivable that strong evidence of success might have been used to obtain further funding and thus continue the project beyond a single implementation. This was not done, however, and must be seen as the greatest missed opportunity.

No financial support was available to assist those who successfully completed the project to continue with further degree studies, although information on study opportunities was provided.

The format of presentation itself, while showing distinct advantages, provided no opportunity for accommodating the few initial participants who left before the point of registration through moving home or workplace.

On balance, the project was a successful project that generated significant career improvement opportunities for participating teachers. Limitations were largely due to financial constraints, although failure to develop a second funder for a repeated or overlapping intervention was a definite opportunity that was missed by the organisers, the CSEUP.



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### 5.3 Success factors of the project — an integrated view.

In phase 2, primarily the second question was addressed which in addition to the successes and limitations required the identification to factors that led to the project's success.

The contributing factors may be grouped into motivational and operational factors.

#### *Motivational factors*

- The project was an outreach intervention within an hour's travelling time for participating teachers. Thus long distance travelling and expenses by participating teachers were avoided.
- Participating teachers paid reduced fees which did not exceed 50% of the formal course fees. Other course components were provided free.
- A bottom-up cluster system allowed teachers to motivate one another and work on assignments together. The clusters ultimately became a strong support network for teachers.
- The curriculum which was designed was relevant and suitable to the expressed needs of the community, and agreed to by key stakeholders, including the departmental authorities and school and teacher representatives. The curriculum included approaches for teaching within the OBE requirements of the (then) new curriculum and computer literacy in addition to the content subjects Physics, Chemistry, Mathematics and Statistics.
- The active support of the Mpumalanga Department of Education through providing access to schools, the site at the eMpuluzi Teachers' Centre and a participating link through the Curriculum Implementer for Physical Sciences lent a significant profile and legitimacy to the project.

All involved developed strong feelings of ownership towards the project. This research has presented evidence that the direct response to a need which was defined by the community itself, at the macro-level together with the bottom-up approach of clustering teachers so addressing the micro- and meso- levels of the teachers' needs and environment contributed significantly to this sense of ownership/

#### *Operational factors*

- The project practised "two-way learning" amongst project leaders and participants. Adaptability, was the order of the day. Record keeping (including the parallel research project) acted as an institutional memory and the donor-imposed biannual financial and activity reporting and annual national conference together with active communications lines, both formal and informal, characterised the project as a learning organisation.





- A situation of mutual respect was evident in the project with regard to cultural and language diversity. The project leaders chose the route of negotiation rather than imposing decisions. This kept the decisions relevant, and accepted.
- A donor that required financial discipline, reviewed activity reports and organised annual reporting but without political or social agendas, ensured that the project remained relevant to local needs, active and accountable.
- The CSEUP managed the project within the needs of the participants and with the financial and planning discipline requirements of the funders. Lecturers always arrived on time and facilities and equipment were brought and set up when needed. Transparent management ensured the project was perceived as professional and effective.

The contributing motivational and operational factors were strongly interdependent and contributed together towards success of the intervention in meeting its purpose. This alone is evidence that treating the project as a soft system was justified.

The evaluation based on an adapted form of the Soft Systems methodology has been able to provide an evidence-based response to the second research question.

#### **5.4 Limitations of the research**

The research was a case study for the evaluation of the SASEN project performed from a qualitative point of view.

Evidence of impact on teacher attitude and professional behaviour relied largely on self-reported change and was supplemented by interviews with colleagues, principals and learners that provided triangulation information. Some credibility was gained later when interviews of the second phase provided supporting information.

Several weaknesses accompanied a post-completion evaluation of the project when funders, some senior officials of the Mpumalanga Department of Education who had moved away because of changes in their positions in the Department and teachers who had left the project in the early stages without expressing their reasons could not be interviewed. Interviews with them may have been able to give more information about weaknesses of the project.

Flecknoe (2009) recently critically examined the extent to which INSET projects can be convincingly or effectively evaluated by project presenters for “impacts”. Quoting the British



Office for Standards in Education requirements (OFSTED, 1999:Appendix 3 as quoted in Flecknoe (1999:122), Flecknoe lists:

“The impact of provision will be judged by the extent to which providers, drawing on a range of sources, demonstrate that:

1. participants have extended their professional knowledge, understanding and skills;
2. participants’ intended outcomes, targets and success criteria have been met;
3. participants have become more effective in teaching and/or leadership and management.

Evidence accepted comprises evidence from:

- direct observation of participants’ and providers’ work;
- discussion with participants, providers, stakeholders;
- documentation about completion rate, reasons for withdrawal, and tracking of past participants to show how they might have benefited.”

In the project case described by Flecknoe as being “a very favourable case” for evaluation, there none-the-less remains whether the evidence could be regarded as “*watertight despite many attempts to introduce internal validity checks on the data*”. Flecknoe also notes that even the depth of evidence collected and analysed (in Flecknoe’s, and by extension, the SASEN project) “would, if imposed rigidly [*on other projects*], paralyse all professional development of any profession”.

It is important to note that all and more of the sources of evidence specified by Flecknoe formed essential components of the two-phase evaluation reported here and that progress by the participating teachers in the various dimensions has been convincingly demonstrated, both quantitatively through the academic objective graduation criteria, and the triangulated yet more subjective reporting of stakeholders, within the limitation that “*watertight*” proof is not achievable within reasonable effort and time. From a perspective of the need to adequately reflect the voices of the beneficiaries, this is more a statement of the role of a particular epistemological context which reflect a particular strength (in the sense of McKay (1999)), rather than a weakness, as any epistemological stance has particular advantages or limitations.

Nonetheless, the information that was gathered which was focussed on the participating teachers and their employers provided confidence in the conclusions of the analysis.

### **5.5 Possible generalisations: Recommendations for policy makers and project stakeholders**

The phase 2 investigation yielded several recommendations in section 4.7.4. Some of these may be tentatively generalised. These are:



Content knowledge as a focus: The locally identified need of this and many programmes is subject specific content knowledge. A programme for teacher development which equips the teacher with subject content knowledge has significant benefits on confidence and on the additional roles of the teacher. It was found that teachers developed *confidence* when they were able to practise and use in their schools the knowledge and skills that they had learnt concurrently. The confidence of teachers brings strengthened *efficacy beliefs* in teachers, which in the end make teachers stronger teachers, better planners and better managers. A caveat must be that the knowledge and skills must be accessible to the teachers, which may necessitate a deliberate period of bridging.

Addressing a valued skill: The addition of an immediately transferable and valued skill (such as computer skills in this project) rapidly gains interest and supports the addressing of other needs. This can thus be a strong motivator.

Project as a Learning Organisation: Senge's (1990) listed five disciplines (personal mastery, mental models, building a shared vision, team learning and systems thinking) for a successful learning - organisation. Being a learning organisation means an organisation where all involved are sensitive to using information gained during its processes and has practices which record, review and adapt according to new information.

Local champion: The project was a response to a locally identified need. This meant that the local infrastructure and communications lines and support were directly available throughout the project. The presence of local champions in the form of the CI and the cluster leaders was the foundation for a sense of ownership.

Effective structuring to establish a sense of ownership: The assessment of the project has shown that the project was structured effectively to ensure interaction of all participants as equal partners, for benefit but particularly for responsibility. In particular, the ownership of the project was balanced between the funder (through its sound financial principles, and annual project review processes through the annual conference), the project presenters (through their responsibilities of punctual and effective delivery at the distant site), the Mpumalanga Department of Education (who provided the physical location and accepted responsibility for facilitating and monitoring the project by a curriculum implementer) and, most critically, the participating teachers (who accepted the responsibility for their learning and learning support, both as role-players in clusters and as individuals). This has thus exceeded the partnership intention of article VII of the Jomtien declaration. As emphasised by Vickers (1968, 1970, cited in Checkland, 1999), a soft system functions through its human inter-relationships. These human inter-relationships were the strongest aspect in this project's success. Deliberate planning and structuring of projects with a strong role for local ownership is a strong recommendation.



Strong financial and academic accountability: This project was fortunate in having these disciplines established by the funding organisation (SASEN) and the University of Pretoria, yet the funder did not impose an agenda on the project which thus retained its focus on the local needs.

Two-way learning: In a project both the project implementers and the beneficiaries should learn and improve the environment of the learning situation.

Cluster formation: In this project major credit was given to clustering of teachers as interactive and mutual support group for the achievement of their goals. The clusters were managed by teachers themselves as a bottom-up community structure. To achieve the desired successes in such ventures elsewhere the project implementers may try this where significant visible goals have to be achieved

Commitment to excellence that is evident through continual practice. The project must establish credibility through the professional behaviour and clear commitment of its staff. Here, one may expect that university driven programmes linked to specifically accredited qualifications may lay the foundation for such enhanced credibility.

Finally, one should not be surprised by success when this breeds further expectations. It is necessary to be ready to deal with such expectations that arise as a consequence of success.

## 5.6 Usefulness of the research

This research has contributed in two ways. Firstly, it directly produced insight into the functioning of an academically-driven INSET project in a very complex environment. The complexity of the environment arose from the diversity of committed role players. These included the Mpumalanga Department of Education with its central organisation, supportive local regional authorities, schools and teachers, local economic and union interests, the University of Pretoria's Centre for Science Education and its interactions with academic departments, the South African Science Education Network and its Belgian funder at the University of Leuven. Project complexities are summarised in a systems model in Figure 4.5.

The aspects examined were wide ranging, and the evaluation results, which were aimed at gaining understanding of the project, have given rise to a number of principles which are potentially of general value.

Secondly, the actual method of evaluation was introduced as a novel adaptation of a very general methodology underlying the continual scoping of an operating organisation, the Soft Systems



Methodology. The efficacy of this approach, in particular the steps that lead to an adequate systems description of the project and hence the identification of points of control (and thus potential change) and corresponding points at which information could be gathered, has been demonstrated. The rather challenging question of asking why the project worked did yield answers that are acceptable, with hindsight. It is not easy to imagine another approach that is significantly different that would have been as rich in its findings, while retaining focus.

The soft systems evaluation approach was used in addition to (and complementary with) a more traditional approach which had several deficiencies including poor design and was unable to provide sufficiently convincing evidence to deliver general recommendations alone. One would have learned very little that was not in a sense already obvious, even if all instruments had been developed and applied with greater rigour.

The study thus adds both a new purpose of establishing reasons for success with a view to improving designs of future projects, to the range of evaluations traditionally performed (see for example, Nentwig, 1999 Table I) and an appropriate novel methodology.

Necessarily, being novel, only further applications of the methodology to the evaluation of education projects in complex environments can actually “prove” its superiority or complementarity with other approaches. Similarly, there is the challenge to actually improve the approach, again through further application.

Thus, like any academic research endeavour, the research has not only provided answers to the questions asked, but in the process has given further opportunity for enquiry.

### **5.7 Possible future research**

A Chief Director of Mpumalanga Department of Education put forward a suggestion (interviews, 2005) that a thorough base-line study of teachers should be done before declaring that they have poor conceptual knowledge of the subject or that they have negative attitudes towards their profession and/or that schools are dysfunctional etc. It becomes demoralising for educators to be characterised as inadequate in some way until they take part in the process and accept the findings. The qualifications of the cohort of teachers who participated in the SASEN project were obviously available at selection and registration and satisfied the requirements for the project and registration on the FDE/ACE qualification programme, while early test outcomes of participants showed that depth of knowledge of subject areas was indeed poor.



The suggestion nevertheless raises the question whether there is a true link between level of qualification, confidence and efficacy as a teacher. If one has sufficient self-confidence and academic literacy skills, there is little to stop one obtaining books and learned articles in the content areas one has been assigned to teach, and so develop the knowledge, teaching insight and mastery of pedagogical content knowledge and teaching methodology by oneself. Beyond the weakness of content knowledge then is the dimension of academic literacy and empowerment. A qualification alone may not be sufficient explanation for ineffective, whether absent or present, teaching. Although the current research focussed on an intervention whose prime benefit was the upgrading of qualifications, the success factors that appear to have led to positive impacts on teacher attitudes and professionalism could be further investigated in other projects as contributors separate from the qualification itself. Essentially, one asks whether the success factors identified in the analysis of the SASEN project are able to transfer to other projects; or are present in other successful projects. Are the success factors able to be generalised from this single case study in a specific context?

The work of Borghi et al. (2002) has shown that deepened subject knowledge, confidence and efficacy beliefs produce beneficial changes in classroom practice in a developed country. This hypothesis was supported by the current research in the severely underdeveloped context of the SASEN project but over a significant period of time. The role of INSET programmes with such an aim opens an opportunity for further research.

The Soft Systems Analysis methodology is a general framework for assessing the needs, contexts and processes in operating organisations designed to be used on a cyclic basis within an organisation. The process stimulates awareness by participants of the organisation's characteristics (internal and environmental), and is by its design intended to provide a common understanding that leads to change. Here, the methodology was adapted to allow the development of a model of a project functioning in a complex environment, with many owners. From the model, lines of communication and points of decision could be identified and guided the choice of interviewees. As this approach to evaluation was an innovation, there is scope to examine the optimality of the soft systems analysis process used in this work. It should be expected that the process can be somewhat improved by further attempts to apply this to other projects. Thus the use of an adapted Soft Systems Methodology for evaluation needs to be further investigated for efficacy, adapted and improved by applying it to a range of projects.

In South Africa and many developing countries foreign funding is provided to support educational projects in many cases. Many respondents raised genuine fears and from the point of view of the funders' established interests. Issues of concern may be political, economical or cultural or something else. Funders may be covert stakeholders, whose primary intention for example is direct profit, while hidden stakeholders may be the politicians behind the allocation of state funding or





may be the agents of economic or cultural interests. Ogawa (2002) termed foreign funders 'powerful stakeholders' who certainly influence every negotiation process. While we have provided details of the interaction between the foreign donor and the SASEN project in the contextual and analytical sections, we have neither sought to characterise the funder through a framework such as Ogawa's, nor have we sought to generalise to the potential impact of a less supportive or more interventionist funder, in the absence of robust demonstration of the sufficiency of such a framework. We have provided an example of how Ogawa's framework may be used in Appendix D and section 4.5.10. More generally, however, research should be performed about foreign agencies, the interests that lie behind their generosity, conditions which are attached to the implementation, and how and who should be the role players in the implementation of extended educational enterprises. By developing Ogawa's framework and applying it to developing some answers to the major question of which contexts should embrace, tolerate or eschew particular donor characteristics would be useful.

Mastery of the scientific discipline-related content knowledge was the most important goal of the SASEN project, as well as its cardinal achievement. It is none-the-less appropriate to further examine the way the natural world and the environment are actually perceived (Cobern, 1996), before and after such a project. While the intention of the school curriculum is to provide knowledge and skills within the context of modern physical, chemical, mathematical and Earth sciences, the Eurocentric, indigenous or neo-indigenous world views of teachers and their learners and their way of knowing the natural world may be expected to both influence their acceptance of the transnational science concepts and promote or impede their learning of process skills and values (Aikenhead & Ogawa, 2007). This opens a fascinating and highly relevant research opportunity into the extent to which teachers and learners accommodate or change their cultural view of the natural world and that of the sciences during such an educational project (Aikenhead, 1996, 2001). In addition to affecting learning, science education produces potentially deep cultural impacts on the learning population, whatever its context. The opportunity to bring this dimension of cultural interaction into the Soft Systems Analysis phase during the determination of measures of success, or even earlier, during the Phase 1 "attitudes" analysis was totally missed and could form a valuable part of any future soft systems based evaluation of a science education project.

Clustering teachers for their academic development and interactive teacher to teacher learning for better performance in INSET and in school practices has been found a major contributing success factor in this study. Since this finding is based on a particular case study, for the generalisation further research is needed regarding the deliberate structuring and facilitation of such learning communities.





Finally, from a policy perspective, one may question and investigate how teachers may remain in the schools, rather than be lost to promotion after gaining new qualifications and confidence. It is noted that the promotions gained after the achievement of the qualification associated with the SASEN project were within the teaching profession, and not a route out of the teaching profession, as is often experienced with teacher upgrading routes (Ottevanger et al., 2007).

## 5.8 Closure

Research has been presented which was conducted as an evaluation of an in-service project whose aim was to enhance the science, mathematics and computer skills and knowledge as well as the professional skills of teachers. The project was implemented in a rural district of the Mpumalanga province in South Africa from 1999 to April 2003.

In addition to showing the successes that were achieved and some limitations of the intervention, the analysis identified some expected and unexpected impacts, and several aspects that led to the successes were found. The insight gained from studying relationships within a systems approach proved to be valuable from an explanatory point of view. Very important, was that the soft systems based evaluation process developed in this work identified several classes of stakeholders through the approach, which may not otherwise have been identified and consulted.

The research had limitations. Not all stakeholders could be met for interviews and these may have provided further information and tempered or enhanced the sense of success. The funders are under-represented in the interviews, and the degree to which they were satisfied by the progress of the project was inferred indirectly.

These shortcomings were balanced by in-depth determination of the views and impacts on the major clients of the project, namely, the teachers in particular and their schools in general. In this way the intentions of a participatory evaluation in the sense of McKay (1999) were largely achieved, within the resulting non-realist epistemology, although not to the extent envisaged by McKay.

Several factors which acted on macro-, meso- and micro- levels (in the sense of O'Sullivan, 2001) were identified as contributors to the success of the project and may be tentatively generalised as being beneficial if deliberately addressed in future projects and that these be addressed in other projects is an important recommendation for project stakeholders. These include (i) that the project addressed a locally identified need and was structured to develop a strong sense of ownership and commitment by all participants (in particular, participating teachers themselves), funders, the local



authorities and the project presenters; with a strong local champion and active formal and informal lines of communication (ii) subject specific content knowledge as a focus with an extra initial year which provided immediately useful hands-on work to prepare teachers for the demands of the more formal courses and for their roles in clusters had significant benefits on confidence and strengthened *efficacy beliefs* in teachers; (iii) the project addressed an immediately useable additional skill which rapidly gained the interest of participants and was a strong motivator; (iv) the project established credibility through being academically driven and had a commitment to excellence that was made evident in practice; (v) there was strong financial and academic accountability demanded by the funder and the university, yet the funder allowed the project to retain its focus on local needs without interference; (vi) the project was able to adapt to circumstances and experiences of the participants through being a learning organisation in the sense of Senge (1990), (vii) the resources provided could provide a visible opportunity for some sustainability. These are somewhat interdependent factors that together led to the project's success and reflect the systems nature of the project.

A general warning was derived, namely, that continual monitoring *for success* is also necessary, as expectations which arise from successes need to be addressed by identifying and finding further opportunities for funding to enable repeats or extensions of the project to other participants.

Further research opportunities have been suggested in addition to the question of the applicability of the (speculative) generalisations of this case study. The role of a qualification in motivating teachers, or in changing their knowledge, skills and classroom approaches should be further investigated. The success factors that appear to have led to improvement of teacher attitudes and professionalism could be further investigated in other projects as contributors separate from the qualification itself. Specifically, the effect of enhanced content knowledge on the practices of teachers, and the extent to which this is a necessary or sufficient condition for change is an important further investigation. The evaluation framework developed here as an adapted form of the Soft Systems Methodology must be further assessed for efficacy; adapted and improved by applying it in a range of projects. Further developing a framework (originally proposed by Ogawa, 2002) for assessing the interests, motivations and political power of funders and applying it to assessing which contexts match with particular donor characteristics is an important further research opportunity. Totally missed here and needing understanding is the dimension of cultural interaction in such a project and this could fruitfully form part of any future (continuous) soft systems analysis based evaluation of a science education project.

This work has seen several contributions made to the body of knowledge associated with planning, implementing and evaluating in-service teacher development projects in difficult circumstances. These contributions include:



- the potentially generalisable success factors, particularly the achievement of a sense of ownership by the most important participants, the teachers themselves, which exceeded the concept of partnership of the Jomtien declaration (Jomtien, 1999),
- the novel adapted soft systems methodology for evaluation, and
- value and potential benefits of a strong academic focus for INSET, an approach for which the SASEN project (and network) proved to be a successful pilot project for a pattern which may be repeated in other environments.



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## Appendix A

# Instruments (questionnaires, observation tools & interview questions).

### A1 Written Questionnaires

#### A1.1 May, 2000.

Please write the codes against each statement. Use the following codes.

**SA** (strongly agree)

**A** (agree)

**U** (undecided)

**D** (disagree)

**SD** (strongly disagree)

No.	Questions	Codes
1.	From very start I wanted to be a teacher, and so I am.	
2.	I like teaching job because there is ample free time to do other businesses.	
3.	I don't like to be a maths / science teacher because trying to do well is awfully hard and no extra payment.	
4.	I am very happy to be a science / maths teacher because there is less work, few learners and a lot of respect.	
5.	I love my school because it is next to my home.	
6.	I am happy to be a teacher because my school is far, little or no policing from the Department and no direct accountability for poor performance but I get my full pay.	
7.	I like to work even, when severe conditions are prevailing, if I can perform better.	
8.	My school is well equipped and has a strict principal. I work hard, and even put extra hours to produce the best result.	
9.	I produce excellent results because only selected learners are admitted.	
10.	My learners trust me because I can lay a solid foundation for their future	
11.	Most of my learners get university endorsement even though I don't do practical.	
12.	When asked for extra classes my learners attend in full force.	
13.	A science teacher must always be a good maths teacher.	
14.	I always find daily life examples useful to understand conceptual ideas in science.	
15.	I don't like physics because of too much comprehension of the real life happening and sharp understanding of mathematics are needed.	



16.	A school-science teacher builds the scientific concepts in the minds of learners.	
17.	Teaching science is the easiest job, even though I don't have a laboratory.	
18.	Maths makes me think I'm lost in jungle of numbers and can't get out.	
19.	Studying maths is a waste of time.	
20.	I seem to have a head for maths.	
21.	I am happier in maths class than in any other class.	
22.	I wish to be in a library daily to improve my scientific knowledge.	
23.	School should buy textbooks and helping book for teachers, if a better performance is expected.	
24.	I buy my own books to teach in school.	
25.	Even for an experienced teacher daily preparation is a <b>must</b> , before entering a classroom.	
26.	I would not teach if principal does not provide me with the stationery and textbooks at the beginning of the year.	
27.	I don't like SACE (South African Council for Educators) because it registers only qualified teachers.	
28.	I love the code of conduct prescribed by SACE.	
29.	"Every teacher should behave like parents of learners in their school" is a hypocritical slogan.	
30.	When I am asked to attend a workshop I feel it is a waste of time and energy.	
31.	Workshops are valuable, because I interact with other colleagues on several teaching and learning aspects, which help me upgrade my teaching in the school.	
32.	Workshop and training keep me updated with current developments in education.	
33.	I wish to attend upgrading qualification workshops so that I can get upgraded my salary position and get better job.	
34.	I don't want to upgrade my qualification only to get a meagre "cash bonus", it is all wastage of time and money if vertical promotion is not on agenda.	
35.	In any further training programme, slots on information technology and OBE will certainly attract teachers.	
36.	Most of the science teachers don't know how to conduct practical activities, and find excuses for their theoretical teaching as no laboratory or no equipment in the school.	
37.	I have so many misconceptions and weak theoretical base of Physical Science, therefore I just pass time in the class and results will never improve. I need appraisal.	
38.	Developmental appraisal is very good for science / maths teachers, therefore I advocate for it.	
39.	In new South Africa science and maths teachers must be retrained because they were trained by a weak and poorly planned teacher-training system in the past.	
40.	The matric results of physical science in my school were good because of my good teaching.	
41.	The maths result of my school was bad because of learners' poor background, parent's neglect and poor departmental support.	
42.	I can improve the result drastically, if I get facilities e.g. textbooks, equipment, laboratory etc.	



43.	I need regular refresher courses and training on subject content and good teaching.	
44.	I don't like inclusion of project work for standard 9&10 learners in continuous assessment (CASS) process.	
45.	CASS is just to overwork teachers without much gain.	
46.	EXPO-SCIENCE is the best place to learn what the project is all about.	
47.	Too many practical, projects, tests etc. leave little time for real teaching and learning of science and maths.	
48.	Continuous Assessment is a way to enhance the performance because most teachers manipulate their marks as they wish.	
49.	Science and maths teachers should sacrifice their time to organise extra lessons with learners, to improve their subject results.	
50.	Many feel that poor culture of learning and teaching are contributing most to have poor performance in standard 10.	
51.	I enjoy myself being most of the time in school.	
52.	When I am in school I usually feel unhappy.	



### A1.2 Aug., 2001

Questionnaire for Teachers (Modified/developed by Ms. Ndlalane, T., Centre for Science Education University of Pretoria. from Prof D. Grayson/Mapula Ngoepe, Faculty of Science Education Project, Unisa.

Administered on SASEN teachers on 15.08.2001.

I analysed and used it because it became the part of this project

#### (a) Your opinions about what should be expected of a teacher.

For each of the following actions, say whether you think it is reasonable thing to expect of a teacher, and if so, how often. Write down reasons for your choice, giving an example if appropriate.

<i>Possible teacher Reason</i>	<i>Should be expected of a teacher</i>
1. To write a lesson plan for each lesson	(Circle one) (a) always (b) sometimes (c) rarely (d) never <b>Reason:</b>
2. To mark pupils homework, assignments, providing detailed feedback to people.	(Circle one) (a) always (b) sometimes (c) rarely (d) never <b>Reason:</b>
3. To mark pupils' tests and hand them back quickly.	(Circle one) (a) always (b) sometimes (c) rarely (d) never <b>Reason:</b>
4. To produce work sheets and hand outs for pupils.	(Circle one) (a) always (b) sometimes (c) rarely (d) never <b>Reason:</b>
5. To buy their own reference books.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
6. To attend meetings called by the principal in the afternoon after classes have ended.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
7. To attend special school related activities after classes end or during the weekend.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
8. To attend professional development activities.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
9. To visit the parents of the pupils in their homes.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
10. To attend evening of weekend meetings with parents and/or members of the community.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
11. To spend time in the evenings and over weekends on school work.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>
12. To spend time during vacations on school related work.	(Circle one) (a) Always (b) sometimes (c) rarely (d) never <b>Reason:</b>


**(b) Your views on teacher conduct**

Below is a list of possible teacher actions. For each one, say how often you have known a teacher to this action, say what you think could have been the teacher's reason(s). Also say whether you think such actions are permissible acceptable: (i) often, (ii) occasionally or (iii) never, and explain your reasons.

<b>Teacher Action</b>	<b>How often have you heard of teachers doing this?</b>	<b>In your opinion to what extent are such actions acceptable?</b>
1. A teacher comes to class late.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
2. A teacher comes to class drunk	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
3. A teacher stays in the staff room when he/she is scheduled to be in the class	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
4. A teacher hits a pupil.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) <b>never acceptable</b> . <b>Explain:</b>
5. A teacher comes to a class without preparing for the class	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
6. A teacher goes away to attend a workshop and leaves pupils to do work on their own.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
7. A teacher scolds a pupil for asking question in the class.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
8. A teacher leaves the school early without asking the permission of the principal.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
9. A teacher makes sexual advances to a pupil.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>
10. A teacher gives higher/lower marks to pupils they do/don't like.	(Circle one) (i) Often (ii) occasionally  (iii) never. Possible reasons for the action:	(Circle one) (i) Always acceptable (ii) acceptable occasionally (iii) never acceptable. <b>Explain:</b>




**(c) Your views on teacher pupil interaction and classroom practice.**

For each of the following questions, circle the number that most closely matches your opinion. There are spaces for comments after each question if you wish to add anything

Views items	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1. Teachers should know their subjects very well. <b>Comment:</b>	1	2	3	4	5
2. Teachers should spend most of their class time presenting good lectures. <b>Comment:</b>	1	2	3	4	5
3. Getting children to do science experiments is a waste of time. <b>Comment:</b>	1	2	3	4	5
4. Pupils do not need to have textbooks. <b>Comment:</b>	1	2	3	4	5
5. Teacher should prepare worksheets for pupils' questions. <b>Comment:</b>	1	2	3	4	5
6. It is important for a teacher to always know the answers to pupils' questions. <b>Comment:</b>	1	2	3	4	5
7. A teacher's role is to teach, not to deal with pupils' personal problems. <b>Comment:</b>	1	2	3	4	5
8. Pupils should not ask questions during class. <b>Comment:</b>	1	2	3	4	5
9. The main role of the teacher is to impart knowledge to pupils. <b>Comment:</b>	1	2	3	4	5
10. It is important to maintain strict discipline in a classroom. <b>Comment:</b>	1	2	3	4	5
11. A person who does not love children should become a teacher. <b>Comment:</b>	1	2	3	4	5
12. If a teacher does not understand a section of the curriculum, well it is okay to skip that section. <b>Comment:</b>	1	2	3	4	5
13. Pupils who misbehave should be punished. <b>Comment:</b>	1	2	3	4	5
14. A teacher should be concerned about the general well being of a pupil. <b>Comment:</b>	1	2	3	4	5
15. If teachers do not understand a section of the curriculum, it is their responsibility to study and learn that section themselves. <b>Comment:</b>	1	2	3	4	5
16. If a pupil needs extra help after school, parents must pay for extra lesson, not expect the teacher to help after school hours. <b>Comment:</b>	1	2	3	4	5
17. Examinations are the best way to find out who the brightest students are. <b>Comment:</b>	1	2	3	4	5
18. Pupils who misbehave should not be punished; they should be helped to understand why their behaviour is wrong. <b>Comment:</b>	1	2	3	4	5
19. Only bright pupils are able to do well in mathematics and science at high schools. <b>Comment:</b>	1	2	3	4	5
20. Boys are better than girls at science and maths. <b>Comment:</b>	1	2	3	4	5

**Any other comment you would like to make:**

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**Thank you for assistance**


**A1.3 Third questionnaire on attitude: administered on 22.11.2002**

Name: .....

School.

Give your views on the following statements

1. Based on your experience on marking the assignments and homework by the University of Pretoria and giving you feedback, give your views on marking pupils' work and prompt feedback of the outcome.
2. Even if the feedback is given a bit late, it does not make much difference because learners are not serious about doing homework and assignments until the marks are to be added to the final year mark total.
3. Are there some areas of Physical Science / Mathematics of grade 12, which are still problematic for you/ Give few examples.
4. Did you gain enough experience and knowledge to address the conceptual issues yourself without external assistance? Write yes / no.
5. Support your answer in Q 4.
6. **Give your views** by ticking the level to which you agree with the statement in the following table:

SA: Strongly Agree, A: Agree Dis: Disagree (In each case write your comments under the statement)

Statement	SA	A	Dis.
Conceptual understanding is a product of putting science into the context.			
Learners learn due to fear of punishment.			
Teachers use the chalk and talk method because it drills the memo and avoids time-consuming practical work.			
Science and Mathematics class is boring for learners			
I don't allow a learner to enter my class when I have started teaching.			
Learners don't submit their assignments and homework on time because of their genuine reasons. Due dates or a cut off time is anti student.			
Learners need support, protection and care in school.			
When school is closed I feel very lonely.			
Even if there are no learners left in the school my presence in the school till late makes a difference to the image of the school.			
Those who don't prepare their lessons delay in the staff room and go to their classes late.			
I cannot sacrifice my private time for school for no monetary gain.			
Only empty teachers run away from their class.			
After school I want to grow myself and not waste my time with unruly learners of the day.			
Learners should show concrete interest and be ready to pay if they want me to teach them after the school.			
No one likes to teach after the school without any incentive.			
Teachers always produce some excuse when they miss their classes and they don't compensate.			
A capable teacher who knows the subject never gets tired of learners.			
Teaching science/maths is dull job.			

SASEN has given us sufficient reference material, which equips us to address conceptual problems with self-study.			
I don't like to be inspected.			
Respecting authorities has nothing to do with the performance of a teacher in the classroom.			
It is SMT's job to put learners in the class. Teachers have only to teach.			
Performance of learners is directly related to time spent by the teacher with learners fruitfully.			
I feel guilty if my school does not do well in my subject.			
Teachers are responsible for keeping the science laboratory clean and conducive for practical work			

7. When I don't honour my period in the school, it happens because:  $\checkmark$  your possible answer from the options given below.

- I am physically not well
- Due to disrespectful behaviour of learners
- I am defiant because: I am not promoted, My HOD is a female, and/or learners don't cooperate.
- I am not able to prepare the topic, because I don't know the topic very well
- I don't like the teaching profession
- There is too much class work and at the same time practical working in the laboratory and no
- Lab assistant.
- I lack confidence in what I have to present.

8. After FDE, the following changes have occurred in my daily working at the school. ( $\checkmark$  Where you agree, X where you don't)

- I am fully confident
- I can prepare for any class professionally and present
- I am not only always ready to attend to my class; rather I am waiting for the bell to ring.
- I am motivated because I know the subject and I am capable of handling any question asked by learners.
- I have developed better reading skills and improving conceptual understanding.
- Still I don't like to remain in the school after hours.

9. After FDE I am a new maths / science teacher because of 1. 2. 3. ....

10. As a maths / science teacher complete the following table comparing before and after you have participated in the SASEN project (FDE) regarding your attitude and behaviour as a teacher.

No	Attitude / behaviour	No change	Major change
1.	Punctuality		
2.	Respecting authority		
3.	Trust of learners		
4.	Respecting the profession		
5.	Preparing the lesson plans		
6.	Improvising the apparatus for practical work		
7.	Confidence in the subject		
8.	Being methodical		
9.	Devoting more time to school work		



11. It is hoped that you have made a good impression on learners to gain confidence in Maths and Science and they feel more confident to go for higher-grade examination. Please complete the following table with the number of registered learners in respect of your school in grade 12.

Subject	1999		2000		2001		2002	
	SG	HG	SG	HG	SG	HG	SG	HG
Physical Science								
Mathematics								

12. Name the teachers who have been promoted recently and they are / were FDE trainees from your school.

Name of teacher	Promotion Post	Post held before promotion

Do you think the employers credited the FDE (SASEN project), because they have chosen these teachers against the others for promotional appointments? Add your views: .....


**A1.4 Post SASEN Assessment, Eerstehoek District August 2003**

Interviews with Stakeholders e.g. Union members, Colleagues, Departmental officials, principals

1. Name few activities in which you/your organisation would like to take part in promoting science education. Throw some light on the level at which you/your organisation would be interested to be involved.

**Table: Interest of stakeholders towards each of the activities (Based on:Ogawa, 2002, p230)**

Scope of activities	Personal	Regional	National	Global
National policy development				
Programme development				
Curriculum development				
Teacher education				
Textbook development				
Facility development				
Classroom teaching and learning				
Content selection				

2. We are interested in your views on: science, schooling, school science and its aim, relationship between science education and development, and S. A. socio-cultural instance of science.

Please express your views about many other stakeholders who are involved in developing science education in South Africa. Where should the other stakeholders be most involved?

**Table: Stakeholders Views on other stakeholders.**

Views about other stakeholders	Science	Schooling	School science and its aim	Relationship between science education and development	SA Socio-cultural instance of science education
Department of Education					
Science educators					
Practicing teachers					
Parents					
Students					
Community leaders					
Science advisors					
Funding agencies					
Large Industries					
Parastatals					

Questions for stakeholders about the trainee teachers:

1. How was your science/maths teacher with staff before the SASEN project and after the training has ended?
2. What changes you have observed in your science teacher after the course?
3. Please comment on:
  - Adaptability of dealing with science without enough facility



- Managing the school problems
  - Relationship with staff-members in terms of sharing knowledge
  - Any other statement that shows that there was a change at the school, which may be due to the science/maths teacher having been on the SASSEN project.
4. Do you expect any gain (viz: political, socio-cultural or socio-economic) from your help as an outcome for your organisation? Tell us briefly.
  5. What are your general expectations from a project busy in developing science education?
  6. What feedback are in your mind about the project implementers?
  7. As a South African stakeholder in developing science education, highlight your views on a foreign donor (e.g. JICA, Denmark, Swedish Government, Belgian govt, European Union etc.).

N.B. The stakeholders were asked to write their answers/views for a space was provided at the end of every question.




**A2. Classroom Observation Instrument.**

A Physical Science / Mathematics Class:

1. TOPIC.....
2. TIME OF LESSON.....
2. NUMBER OF LEARNERS...

**Classroom environment.** Tick one box in a row

1. In the classroom is/are there:		
(a) Usable chalkboard?	Yes	No
(b) A table for the teacher	Yes	No
(c) Sufficient seating and desk or writing Surface per learner	Yes	No
(d) Sufficient space for the teacher to organise his different activities e.g. practical or group work	Yes	No
2. Does the teacher pace the lesson / use of materials effectively, efficiently and appropriately in terms of time available	Yes	No
3. If so specify:	.....	
	.....	

**TEACHER PREPAREDNESS:**

- By looking at the eagerness, presentation and doing some practical work etc. rate the teacher's preparedness for the lesson. (Give rating in %).
- Does the teacher seem to care about presenting a good lesson? (Give rating in %).

**USE AND AVAILABILITY OF MATERIAL.**

1.	If teacher uses material / equipment to demonstrate, does the teacher demonstrate to:		
	a) All (i.e. whole class)	Yes	No
	b) A group of learners at a time	Yes	No
2.	Are all learners able to see the teacher's demonstration	Yes	No
<b>LEARNERS PARTICIPATION AND INVOLVEMENT.</b>			
1.	Do learners participate actively in the lesson		
	All (i.e. whole class)	YES	No
	Most (at least three quarters of the class)	Yes	No
	Some (at least half of the class)	Yes	No
	Few (less than half of the class)	Yes	No
	None	Yes	No
2	During the lesson do learners		
	Work individually without assistance from the teacher	Some	Most None



	Work individually with assistance from the teacher	Some	Most	None
	Work in pairs or small groups with assistance from the teacher	Some	Most	None
<b>LANGUAGE</b>				
1.	Does teacher use or encourages the use of vernacular (Siswati) to explain few concepts to learners.	Yes	No	
2.	Does teacher use different teaching aid material to explain concepts, develop skills and values? If yes, to what extent?	Yes	No	
<b>METHOD OF APPROACH.</b>				
1.	Does the teacher try to establish the existing background knowledge amongst the learners, needed, for the lesson to be presented	Yes	No	
2.	Does he realise at any point that the scientific knowledge is not just transferred but learnt through construction on existing knowledge?	Yes	No	
3.	Does the teacher conclude his lesson by giving some homework to do?	Yes	No	
4.	Does the teacher talk or seem to take interest in personal or individual problems of his learners? If yes, to what extent: Does he wish to solve Does he sympathise Write your comment:.....	Yes	No	
5.	Could any common problem of learners be surfaced? If yes, what was the teacher's attitude towards solving that problem?	Yes	No	
6	<b>Does he use chalkboard?</b> If he/she uses the chalkboard, is there any evidence that he wants his learners to be able to read his writing and a note be taken. <b>COMMENTS:</b> .....	Often >75%	Few times <50%	None <10 %


**RATING (SUMMARY)**

1.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher talks Most of the time.	Students talk Most of the time.	
2.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Student often ask questions	Students rarely ask questions	
3..	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher makes all the classroom classroom decisions.	Teacher helps students make decisions	No classroom decisions are made decisions
4	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher reacts with personal criticism	Teacher reacts with performance feedback	
5.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher is cold and critical	Teacher is warm and accepting	
6.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher is conventional and non-creative	Teacher is original and creative.	
7.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher is passive	Teacher is forceful and energetic.	
8.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher is disorganised pre-occupied.	Teacher is organised and alert	
9.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher maximises barriers between self and students.	Teacher minimises barriers between self and students.	
10.	(9) -----	(8) -----	(7) -----	(6) -----	(5) -----	(4) -----	(3) -----	(2) -----	(1) -----	Teacher does not monitor students' progress.	Teacher monitors students.	
	(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)			




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11.	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Teacher limits activities to those that are pre-designated				Teacher does not limit activities to those that have been pre-designated				
	(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
12.	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Teacher appears confident and trusts his learners				Learner have confidence and trust in teacher.				



### A3 Interview: (Guiding Questions)

#### A3.1 For the Teachers (First round), *September 2001*

- 1 Generally Maths/Physical Science has poor results in our schools, what contributes most for this performance? What is situation in your school?
- 2 Would you get enough time to meet the demands of CASS and complete the syllabus?
- 3 A school principal should put a maths / science teachers to task when the learners don't go beyond 40%, and recommend for demotion? Please comment.
- 4 I hope you joined the FDE programme by your own choice and free will. Give some feelings about the project.

Do you like it?

What do you expect from it?

Will it make you a better teacher?

Are you happy with the staff of the University of Pretoria?

- 5 Suppose you are asked by the principal to attend a meeting after school. Would you be prepared to attend?
- 6 A maths/science teacher felt that his learners are testing the teacher's subject competency in the subject by asking questions from other books and resources which is not used in that school.  
Imagining yourself in that situation, elaborate your reaction to those learners. (Include your liking and disliking).
- 7 Teachers should plan and prepare a lesson in full with work sheet and then only go to the class. Don't you think this to be the wastage of time when CASS and vast syllabus are already demanding so much time? Comment.
- 8 A maths/science teachers' role is to teach, not to deal with pupil's personal problems. Do you agree? Comment.
- 9 Can I say you have changed a lot compared to before the SASEN course and now? I want to hear from you about the impact of the course on you.

Thank you very much for your support and cooperation.

#### A3.2 Second Round Interviews, *April 2002.*

1. How do you want your students to be?
2. Those who don't teach in their normal classes, go for extra classes. Comment.
3. 'A teacher remains a student through out his life' how do you react on this statement?
4. Give an image of a maths/science teacher in a school.
5. Some people say teachers have plenty time to use for other things than the teaching.  
Comment
6. Should a teacher be sensitive to learners' criticism and satisfy them or ignore them and do what he/she wants to do?

**A3.3 Third round on November 2002 (The course ended on this day)**

*(To ascertain the sustainability of the effect of the course after the course has ended))*

1. Did you do Geometry/ Electricity course (by Prof. Braun) this year?
2. Tell me the course outline (scope) of the course in (1) that you undertook.
3. Which part of the course was very interesting to you?
4. Could you grasp it conceptually? (Some follow up questions were added)
5. Did it add some of your conceptual misunderstandings of the past?
6. Did it capacitate you enough and made you able to develop conceptual understanding yourself?
7. Can you say you can go very well to teach on yourself without asking for much help?
8. Are you in a position to study and use the standard materials given to you to sustain you during the course of the project?
9. It is an impression that materials are supplied to school, and in the absence of skills and knowledge teachers keep the boxes unpacked. Now after this training, what is your position?
10. What is the impact of the course in handling the materials in your teaching career?
11. Now the course is ending, can say something more about the project?
12. What is your message for the CI's and especially for me (the CI and the researcher)?

**A3.4 Fourth round of interviews after FDE was awarded, August 2003**

**Selected schools** *(one school per cluster Sch-1, Sch-5, and sch-10)*

1. What did you expect would be different after the project in you as a science teacher?
2. Why did you join the project?
3. Did any thing change with you after the project ended?
4. What made you to remain with the project even when the transport, meals and part of tuition fee were on your shoulders?
5. Did you have any computer experience before joining the project?
6. Why did your cluster work? State your challenges you faced from time to time to meet in your clusters.
7. What went well on part of the implementers?
8. In your opinion, did implementers learn any thing from you and showed any change in their behaviour during past three years as regards to teaching?
9. Up to what extent, did the project influence to have new or changed attitudes towards?
  - i. spending more time in school
  - ii. teaching science
  - iii. going for learner centred science teaching
  - iv. learners as your own sons and daughters
  - v. Science teaching as an interesting job
10. Tell us, if there be any other changes in your academic behaviour or in your life due to the SASEN project?

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**SASEN as a ‘Learning Organisation’**

**Interview with Teachers:**

1. “Organisations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where **Collective aspiration is set free, and where people are continually learning to learn together.**”  
**Senge (1990)**

Rate SASEN project as a learning organisation as expected above.

- i) creating capacity to achieve the desired result.
- ii) innovative thinking nurtured.
- iii) collective aspiration set free.
- iv) learning to learn together .....

(Use the rating scale as: Excellent 1, Good 2, to some extent 3, Very low level 4)

Give supportive statement to your ratings.

2. In your opinion did SASEN have system, mechanism, and process to create and enhance capabilities? Elaborate your experience of SASEN.
3. Did SASEN organisers put enough energy and material to sustain the objectives of communities (schools and teachers) and at the same time theirs (SASEN organisers)? Give your views.
4. Do you think the learning opportunities provided by SASEN were fully utilised and goals realised? Or goals were unrealistic with SASEN therefore partially realised? Give your feelings based on your experience.





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## A4 Interview Questions for Principals

### A4.1 Aug, Sept. 2001

1. Is your Science/maths teacher readily available when you need to assign some official duties after school time or otherwise?
2. Is science/maths teacher popular among his learners and colleagues? Give instances to support your statements.
3. What is his/her role in creating 'COLTS' at the school? Did any one of them come to you with any suggestions or initiative regarding creating COLTS in the school?
4. What is your expectation from the FDE programme, which your teacher is currently busy attending with University of Pretoria and Department of Education?
5. Do your teachers (science/maths) come to school by a group taxi? How to get help from such commuters when there is need during after school time? Please tell your experience.
6. Did you observe any changes in your teachers' behaviour and attitude after two years of attending the FDE programme? For example: giving more time to school, prepared to work after school, confidence level, lesson planning and preparation, finishing the curriculum on time etc.

### A4.2 April / May 2002

1. In a school a poorly equipped laboratory or no laboratory might motivate teachers negatively towards good teaching. Have you observed anything like that with your maths / science teacher?
2. People talk of improvisation in science. Do you think it doesn't work?
3. Do you approve of theoretical Science teaching in place of practical teaching?
4. Is your science teacher popular among his colleagues and learners?
5. What is the trend about registration of students in HG in maths / science subjects?
6. Do your teachers honour their duties assigned to them?
7. What is your expectation from the FDE programme that teachers are attending?
8. Did you observe any changes among your teachers' behaviour and attitude that have attended the course for two years already?
9. What about devoting extra time for extra classes and time for the school by these teachers?
10. Do they do lesson planning and lesson preparation?
11. Do they finish curriculum on time?
12. Do they have respect towards their profession and authorities of the school?
13. Did you enjoy their cooperation?

### A4.3 Aug. 2003

1. Your school participated in the SASEN project and now the project has successfully ended. What were your expectations from SASEN project and what do you think it did?
2. Why did you choose your (particular teacher) teacher to send to this project?

3. How did other teachers that he was sent for the training receive it?
4. Why did you join the project? Give motivations.

Other questions were included from the 'Stakeholders Interviews'.

#### **A5.1 Interview Questions for Students. 2001**

1. How satisfied you are with your maths/science class? I hope you like the way your teacher presents the lesson. Tell us more.
2. Is he/she strict in the class and takes no nonsense? Do you like it? Support your statement.
3. Do you trust him/her? Do you feel like telling him/her all your personal problems to get proper solution? Do you remember any instances when you went to him for your problems?
4. If you have trouble in learning something, do you ask a friend for help rather than going to the teacher?
5. Are you satisfied with the content of your subject? Do you think your teacher knows the subject very well?
6. Do you like to attend extra-classes of your science/maths teacher, even though it might be after the school time? Tell us more reasons.
7. Does he encourage you to do scientific projects and give enough guidelines?
8. Does he/she remain in school for the full time and attend all the classes fully prepared?

#### **A5.2 Second Round of Interviews April / May 2002**

1. How should a Mathematics / Science teacher look like?
2. What should he do in your class?
3. Do you want to be like your teacher one day?
4. Do you see Maths/Science as a difficult course, which you cannot do?
5. Do you think Science and Maths should have more classes?
6. What is your ambition in your life?

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**A6 Interview Questions: University of Pretoria Staff. (Oral)****A6.1 Lecturer-1, Nov. 2001**

You have been for some time with your FDE aspirants of Eerstehoek District, and it is expected that you have some relevant knowledge about the work, achievement and behaviour of the teachers and schools involved. Kindly answer some questions to establish the attitude of such teachers regarding the issues around the training programme.

1. As part of the teacher Development programme in this rural area of the country for science and mathematics what are your goals, which these teachers should achieve in the end.
2. In which area do you think they need most support?
3. Do you see any attitudinal problem?
4. Do you see any success regarding the achievements of targets set out in Q 1? (The questions with the answers will follow)
5. What more should SASEN or Department of Education do so that the programme is called a good attempt?
6. Generally people think that our teachers have a negative attitude towards their profession. What do you say about the attitude of the teachers based on your experience with them?
7. Is SASEN a right forum to achieve the right attitude? Or we have to try in another way as well.
8. What is your assessment about relevant content knowledge and what are you trying to make them achieve?
9. Is this programme sustainable?

**A6.2 Evaluation Interviews: University of Pretoria, Lecturer-1 (1999-2003) on 31.05.2005**

1. In your opinion, was SASEN a successful project? Elaborate.
2. What do you think led to achieve those successes?
3. You visited many schools in the beginning to explore the situation on the ground, which might help organising the project relevant to those. Give an account of that.
4. You really created and made the clusters to work and perform. What do you think were the major factors considered in working and performances?
5. What do you think about the role of building relationships and maintaining these when it comes to run a project like SASEN towards achieving the success?
6. Did you notice some places where the project failed? What do you think could have been done to avoid those failures?

7. What was your role in management team and how were you contributing?
8. Do you see any complexity in secondary teacher development issues like interacting, overlapping relationship, not knowing the weaknesses etc?

### A6.3 Lecturer-2, Sept 2003

1. Before you started teaching Eerstehoek teachers at eMpuluzi teachers Centre, tell your pre-expectations from participating science and maths teachers from Secondary Schools of that rural area. You may choose the following heads for the purpose.
  - Teachers' attitudes towards their profession.
  - Teachers' attitudes or willingness to improve in their profession
  - Teachers' background as rural teachers regarding the culture of teaching and learning.
2. What were feelings on your expectations after a month or so being with those teachers? Did you find anything unexpected?
3. Your main aim was to prepare those teachers for Further Diploma in Education. How easy or difficult was it in reality?
4. Did you learn any thing from them, which were unique in teaching and learning situation?
5. "Learning organizations are those where people continually expand their capacity to create the results they truly desire, where new and expansive pattern of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together."

In the light of the above definition of the 'learning organisation', where the four given ideas should get opportunities to flourish:

Kindly rate the SASEN project as a learning organization.

Was there any contribution from learner teachers?

What was your own contribution?

May be you could have done more but because of 1. 2. 3 you could not do that much. Please tell those factors which contributed negatively.

6. Towards the end of the project, I saw, you were still actively engaged in the project. Please tell some aspects of attitudinal changes in teachers regarding their professional behaviour as compared to when you started.

### A6.4 The Project Director for SASEN, University of Pretoria. 23 Sept 2003

1. Before you started teaching Eerstehoek teachers at eMpuluzi teachers Centre, tell your pre-expectations from participating science and maths teachers from Secondary Schools of that rural area. You may choose the following heads for the purpose.
  - Teachers' attitudes towards their profession.
  - Teachers' attitudes or willingness to improve in their profession
  - Teachers' background as rural teachers regarding the culture of teaching and learning.
 (Few follow up questions were designed and asked on the spot).
2. When project started, you were in already. Did you find any thing unexpected?



3. After few months, when they (teachers) have attended already few times, some of them left the course. What do you say about them?
4. Your main aim was to prepare those teachers for Further Diploma in Education. How easy or difficult was it for you in reality?
5. Did you learn any thing from them, which were unique in teaching and learning situation?
6. Did you use them (learning experience) to improve your lesson for them?
7. Do have any learning experience, which you have compared with your University students?
8. How do you rate the SASEN as a learning organization on these four aspects?
  - Creating capacity'
  - Innovative thinking nurtured
  - Collective aspirations set free
  - Learning to learn together(You may give your ratings on a scale of 1-5).
9. Was there contribution from learner teachers?
10. What was your own contribution to SASEN to make it a learning organization?
11. What can you say about the attitudinal change among teachers from beginning to the end?
12. Any other experience which you would want the researcher to know on the project regarding the teachers' behaviour and the attitude as professionals.

#### **A7 Interview Questions With The Chief Director GET, MDEducation Date: 25.08.2005**

Viewpoints of the Department of Education Point of View:

1. What do you think about the stakeholders' expectations especially when a foreign agency is involved.
2. Why do you allow the projects, in few cases even invite the interventions?
3. What do you need from the project when it has ended?
4. Are the achievements of SASEN in the line of your expectations?
5. What more, SASEN project, should have done to meet the expectations of the Department?
6. According to you what should be the criteria of evaluation of a project working to uplift the science and maths education in South Africa?
7. SASEN succeeded and established its goal of training effective and well-motivated work force of Maths and Science teachers in Eerstehoek sub-region in four years. Why can't the Department think to establish an INSET institution in Mpumalanga closer to schools, which could be a mix of the realities of SASEN and wishes of Prof Nagao who directed the MSSSI project, before these beautiful ideas, fade away or sleep in the books?



## Appendix B

### Transcripts of Interviews

#### B1 Interview (*August and September, 2001*)`

Symbols used: [I - Interviewer; S - Student T – Teacher P – Principal

Q - Questions A: Answers D – Departmental officials Pr – Professor  
 (Project director)], (Subscripted S<sub>1</sub>, S<sub>2</sub> ... represent students, and T<sub>1</sub>, T<sub>2</sub>, teachers who took part in the interview).

Interviews were organised through a letter to the principals two weeks in advance. When I reached students, teachers and the principal were almost waiting for the interviews with curiosity. I could arrive only 10 minutes before. Quickly I traced my interviewees. They helped me getting a free room where I had electricity and a peaceful environment. We agreed to have students to be the first interviewees because they shouldn't be delayed after school hours. However, S<sub>1</sub>, S<sub>2</sub>, Principal and then the two teachers agreed to follow the order. After formal greetings it was always an attempt to make the environment of the room pleasant, natural and friendly for talking. It was a sunny and fine day. Before starting we shared some fruits and cold water to make us more cool and natural while talking. The interviewees signed a permission to tape their talk. Interviews started plus minus on time.

#### B1.1 Sch-1: Student S<sub>1</sub> (*August 2001*)

1. I Which grade do you go to?
2. S Grade 11.
3. I What is D. J. teaching you?
4. S Mathematics.
5. I Okay. How satisfied you are with your mathematics class?
6. S In my maths class I am very satisfied because my teacher taught us many things about maths. He knows about what he taught us about maths and I like it all.
7. I I hope you like the way your teacher presents the lesson.
8. S Yeh, I do.
9. I Can you tell how does he present it?
10. S He presents good lessons.
11. I How do you know it is good?
12. S I know because he told us something about maths and may be if we are writing a test we pass, all of us.
13. I Oh you pass, all of you.
14. S Hum.
15. I While he is teaching in the classroom, do you ask questions?
16. S Yes we did.
17. I And do you feel all right?
18. S Yes. Yes.
19. I What can you tell us more about his teaching?



- 
20. S Teaching is very good. Yeah.
21. I When you say something is good, how do decide he is good?
22. S I see... at is good..
23. I O.K. O.K. Don't worry, you have said what you wanted.
24. S Yes...
25. I Let us take second questions. Is he strict in the class and takes no nonsense?
26. S I see he is not strict in his class, yes, he does his work in the class.
27. I But about learners, learners can talk, laugh?
28. S No.
29. I Then, learners can go outside and come in.
30. S No, he doesn't say that.
31. I Then you should say how is he in the class, he is strict, does he?
32. S He is strict and wants to do his work.
33. I Yes. But how? suppose learners are talking nonsense does he take it or...
34. S No they are not taking nonsense (laughing).
35. I (A laughter) Learners talk always good?
36. S Yes.
37. I It's the...
38. S They show very much respect to him!
39. I Yea!
40. S Yes!
41. I Can you tell few examples in your class?
42. S Can I tell ...
43. I Can you tell something from your class that they like him?
44. S When we write a test and few learners miss the test, he feels bad about it. He feels like crying.
45. I Yes.
46. S Yes!
47. I And what does he tell to learners?
48. S Oh! He tells us to study everything.
49. I O.K. Do you trust him?
50. S Yes I trust him.
51. I O.K. Can you tell your secrets to him?
52. S Hum.
53. I Do you go anytime to tell your secrets to him?
54. S Yes.
55. I What did you tell?
56. S (laughing) I did not tell him, but if I had a chance I would tell him.
57. I Hum.
58. S Yeh.
59. I Because you trust him.
60. S Yeah.
61. I Can you feel like telling him all your personal problems to get proper solutions?
62. S No, not all the problems.
63. I So whom do you feel to tell.
64. S My mom.
65. I Your mom.
66. S Yeh.
67. I O.K.! Do you remember any circumstances when (anytime) you went to tell him about your problems?
68. S No.
69. I Yeh! If you have trouble sometimes in your learning you prefer going to a friend rather than going to your teacher?
70. S I will ask my friend.
-





71. I Yes.  
72. S my teacher also.  
73. I Why not first go to your teacher?  
74. S No! first I will go to my friend to help me then to my teacher.  
75. I If your friend doesn't help you?  
76. S Yes if he does not help me then, I will go to my teacher.  
77. I Did you go anytime to your teacher?  
78. S No.  
79. I How many years you are with him?  
80. S For 2 years.  
81. I So far 2 years you did not go to him to ask anything. Why didn't you go?  
82. S Because I didn't have any problems.  
83. I You don't have much problems?  
84. S Yeh.  
85. I O.K. But always there are some problems when you solve questions? Questions are not easy always?  
86. S I don't have much problems that make me ask.  
87. I O.K. Sixth question. Are you satisfied with the content of your subjects?  
88. S Yeh, I am satisfied.  
89. I Which book do you study?  
90. S What?  
91. I Which book?  
92. S Commercial group.  
93. I O.K. Do you understand everything, you know the content of the book?  
94. S Yeh. (laughing), I don't understand everything.  
95. I You don't understand anything?  
96. S Somewhere we do accounting.  
97. I Yeh. I am talking of maths.  
98. S I am sorry.  
99. I am talking of maths.  
100. S I understand everything.  
101. I In maths?  
102. S Yes.  
103. I So maths is so simple for you?  
104. S Yeh is very simple.  
105. I Good. Do you think your teacher knows the subjects very well?  
106. S Yeh.  
107. I He does not hesitate while teaching anywhere?  
108. S Yes.  
109. I He knows.  
110. S Yeh  
111. I All right. Do you like to attend extra classes of your maths teacher, even though it might be after school time?  
112. S Yeh I would like to attend the extra lesson because I will get more knowledge about maths.  
113. I If he asks some money for extra classes would you pay him?  
114. S Yeh I will ask my parents.  
115. I (Laughter) But has he asked you to attend the extra class anytime?  
116. S No.  
117. I No so far?  
118. S Yes.  
119. I Why? Does he finish the syllabus before there is a need for it?  
120. S Yeh.  
121. I Does he remain in the school for full time and attend all classes fully prepared?



122. S Yes.  
123. I How do you say this one just?  
124. S Okay.  
125. I Did you see him here?  
126. S What?  
127. I Did you see him till late in the afternoons?  
128. S Yes.  
129. I Hum.  
130. S Hum.  
131. I When do you come to school?  
132. S In the morning.  
133. I Do you find him here?  
134. S Yes.  
135. I And when you leave, is he still there?  
136. S Yeh.  
137. I So do you like your maths teacher or you don't like him?  
138. S I like him.  
139. I Do you like him?  
140. S Yes.  
141. I Can you say anything else about him?  
142. S I will say he is very good teacher to me I don't know about others but to me he is good.  
143. I Thank you very much.

**B1.2 S<sub>2</sub> (Second student)**

144. I Now we are with the second student taught by Maths teacher  
145. S Yes.  
146. I Are you comfortable Mr. S<sub>2</sub>?  
147. S Yes I am comfortable.  
148. I O.K. Yes. I invite you for my interview and I hope you will tell me what you feel like.  
149. S Yes.  
150. I Thank you very much. How satisfied are you with your maths class?  
151. S I am fully satisfied because the maths teacher is always in class.  
152. I Hum.  
153. S And he teaches well.  
154. I Hum, Are they always there to teach?  
155. S Yes, seriously so.  
156. I Yes! How do you say he is serious?  
157. S I understand maths.  
158. I Yeh.  
159. S He is answering his/her questions.  
160. I So you like the way your teacher presents the lesson?  
161. S Yes I like it.  
162. I O.K. Is he strict in the class and takes no nonsense?  
163. S Yes.  
164. I What does he do? Is he strict?  
165. S No, not strict, yes.  
166. I Yes.  
167. S We respect him.  
168. I Are there no students in the class who disturbs him?  
169. S Some other?  
170. I Hum.  
171. S They talk in the class.  
172. I What does he do?



173. S To cool them down, he does not beat anyone, but tries to give them solutions to the problems.
174. I Okay, doesn't he chase any learner out of the class?
175. S No.
176. I Do you trust him?
177. S I trust him.
178. I How can you say you trust him?
179. S I trust him? The way he likes.
180. I Hum.
181. S I see him in good faith.
182. I O.K.
183. S Yes.
184. I Do you visit him?
185. S Yes, he welcomes me at home.
186. I Do you feel like telling him all your personal problems to get the proper solutions?
187. S Yes I do, I trust him.
188. I Did you tell him anything?
189. S No.
190. I So far?
191. S I did not.
192. I Whom did you tell?
193. S My friends.
194. I Do they bring you solutions?
195. S Yes.
196. I Yeh. So when will you go to your teacher to tell him?
197. S I will think when I cannot do.
198. I Okay! If you have any trouble with your learning will you go to your friend for help rather than going to the teacher?
199. S Yes I go to my friend, but if he doesn't understand then I go to my teacher.
200. I Hum.
201. S With friends.
202. I O.K. Are you satisfied with the content of the subjects?
203. S Yes I am satisfied.
204. I How do you know you are satisfied?
205. S I am satisfied because when I study they may bring job opportunities.
206. I Do you think your teacher knows the subjects well?
207. S Yes I feel so.
208. I How do you say so? Did you test him any time?
209. S Yes, I test him, I ask him questions, and he answers.
210. I So he knows the subjects?
211. S Yes he knows the subjects.
212. I Do you like to attend extra classes of your maths and science teacher?
213. S Yes, I like it.
214. I Did he ask you?
215. S Yes he asked, but other students don't want to attend.
216. I But you want to attend.
217. S Yes.
218. I Why? Because he does not teach in regular class?
219. S No, because he teaches sometimes fast and wants to revise in his extra class.
220. I Does he encourage you to do scientific projects and gives enough guidelines?
221. S Yes I try but could not do very well.
222. I But he helped?
223. S Yes he helped me to apply for the science project.
224. I Does he remain in the school full time and attend all the classes fully prepared?



225. S Yes.
226. I Tell us more.
227. S He attends all the classes, especially the maths teacher. He is always in his class.
228. I So in your school there is no problem with your science and maths teacher?
229. S No.
230. I O.K. So your result should be very good?
231. S Yes, I got star i.e. 90%.
232. I How many of your friends failed in your class?
233. S Half of the class.
234. I Half of the class failed?
235. S But many of them got 'A' or 'B'.
236. I O.K. Nkosi! Thank you very much and do the best in your class. Thank you, go well.

### B1.3 Sch-5: Aug. 2001, S<sub>3</sub>

237. I How satisfied are you with your Maths/Science classes?  
(Repeated) Are you satisfied in Science class?
238. S Yes.
239. I Yeh! Tell us more about that class?
240. S I am satisfied with the class because our teacher is a Christian man, he helps people in many things.
241. I What are those many things
242. S Like when you have problem in a class you can come to him and he will help you.  
I Okay I was talking about the subject. Does he teach the subject well?
243. S Yes, he teaches us very well Science.
244. I All right. (Continues). Do you like the way he presents the lesson?
245. S Yes I like it, because I understand some not all.
246. I Hoon? So what should he do so that you understand all?
247. S If I don't understand some thing I will go to him and he will help me and I am sure I will understand.
248. I Do you go to him?
249. S Sometimes, not always.  
I Is he strict in the classroom and takes no nonsense?
250. S He is not strict as much, because when he teaches us he can cut some jokes so that we understand.
251. I Okay! Do you trust him?
252. S Yes I do trust him.
253. I What makes you to trust him? I mean there should be something, which makes to trust him.
254. S In most cases my teacher is present. After school classes and in assembly he is there, therefore I trust him.
255. I Do you feel like telling him your personal problems?
256. S Yes. I can tell him because when he finds you sad, he will call you and ask why? Are you in terrible problem, what happened, why are you so?
257. I Did you go to him anytime?
258. S No! I didn't go myself but at least he called me to ask.
259. I O.K. If you have trouble in your learning something, do you ask a friend for help or you go to the teacher?
260. S I will first go to my friend if he also doesn't understand we two go to teacher together.
261. I Are you satisfied with the content of your subject. Do you think your teacher knows the subject well?
262. S Yes I am satisfied but Chemistry is difficult to me. I don't understand it.



263. I Why don't you go to teacher then?
264. S I go and he explains. In some cases I understand but in some I don't.
- 267 I Okay! Do you like to attend the extra classes of your teacher, even though it might be during after school time?
- 268 S Yes. I will like to attend because during extra classes they will like to help you. May be you didn't understand during class, may be you will understand in extra classes.  
I Are you not in hurry to go to home?
- 269 S It is not good to be in hurry to go. I think to stay back until the afternoon classes, you will get more than what you get at home.
- 270 I Okay! Does he encourage you to do some scientific projects and give enough guidelines?
- 271 S Yes! He has been asking us to do projects from January. Even now he has been asking learners to do projects.
- 272 I Why?
- 273 S I don't know why? They take the project as if it is useless.
- 274 I Does he remain in the school for the full time and attend all the classes fully prepared?
- 275 S Yes. He did that. Unless he has some workshops. In that case he explains us that he will not be attending the class and will attend the workshop.
- 276 I Yes. Thank you very much for attending my interview session. I enjoyed having a talk with you.
- 277 S I too enjoyed talking to you.

#### B1.4 Student, S4

- 278 You are most welcome. Please feel free and tell us whatever be your answer.
- 279 Yes
- 280 Are you happy to be with me?
- 281 Yes I am happy.
- 282 (A laughter breaks) Good. How satisfied you are with your Maths teacher?
- 283 Yes I am satisfied because Mathematics is my subject, I like it.
- 284 (A big support) Yes.
- 285 Yeh!.
- 286 I So you are satisfied (continued) I hope you like the way your teacher present the lesson?
- 287 S Yes I like it. Because Maths is the key of any subject.
- 288 I Hoon!
- 289 S Because at the end of the year I am serious I want to pass it.
- 290 I With what symbol?
- 291 S A or B.
- 292 I Better A (encourages).
- 293 S Yeh!
- 294 I (clears the throat and continues). Is he strict in the class and takes no nonsense?
- 295 S Yes. He is strict. He is free. He wants to facilitate all students. He attends all his lessons. He is free and jokes and enjoys with the students.
- 296 I What type of enjoyment in the class, when you says '*he is free and enjoys*' in the class?
- 297 S Sometimes he is sitting in the free periods then he talks of guidance. What type of work will support the life?
- 298 I Do you trust your teacher?
- 299 S I trust him. Because always he guides me and tells me the clues about what is life.
- 300 I Do you tell him your personal problems of life?
- 301 S Yes, I am here because of him, I failed in 1998. When I found him, he brought me back again.
- 302 I If you have trouble in learning something do you ask him or you go to your friend first?
- 303 S Yes I first go to the friend but I will also go to teacher again.
- 304 I Are you satisfied with the content of your subject.?



- 305 S I am satisfied because I want to complete it.
- 306 I Tell me one thing. How do you like calculus?
- 307 S I like algebra most, but calculus also. Geometry is difficult (A laughter breaks).
- 308 I Do you feel the teacher knows the content very well?
- 309 S Yes.
- 310 I He never gets confused in the class?
- 311 S No. He explains clearly.
- 312 I Do you attend extra classes after the school hours?
- 313 S Yes May be after school or Saturdays, I attend.
- 314 I Hoon!
- 315 Yes. Attend, I like it.
- 316 I Does he encourages you to do some scientific projects and give enough guidelines?
- 317 S Yes. He guides me for the project and other things.
- 318 I Did you prepare and go for any Science Expo.?
- 319 S Yes. I went to District Expo and got Bronze.
- 320 I Congratulations. Thank you. You are doing good work (continues). Does he remain in school for the full time and attend all his classes fully prepared?
- 321 S Yes he spends more time in the school.
- 322 I Mr. S<sub>5</sub> thank you. I enjoyed talking to you.
- 323 S Thank you.

### B1.5 Sch-6: Aug. 2001, Student S<sub>5</sub>

- 324 “If you don’t like your teacher, you don’t understand that subject” S<sub>5</sub> (a student). Most students they don’t understand the subject and they don’t want to attend his class.
325. I You are most welcome to my interview session. Please talk loud so that I can hear you well.
326. S Yes.
327. I (Although you have the question but I will read them also for your understanding). How satisfied you are with your Maths/Science class? I hope you like the way your teacher presents the lesson?
328. S I am satisfied. My teacher first teaches the chapter and then he takes us to questions and completes it.
329. I Is he strict in the class and takes no nonsense? (Again explains the meaning of strict and nonsense)
330. S Yes, she is strict. When she presents her lesson and there is someone who makes noise, she used to tell him the listen carefully because she is presenting very important lesson.
331. I Do you trust her?
332. S Yes I trust her.
333. I If you trust her, do feel like telling her your personal problems? (Explaining again)
334. S I didn’t find any personal problem so far. But if I find I can tell her.
335. I Why will you tell her?
336. S Because I trust her.
337. I Okay! If you have trouble in learning something do you ask a friend for help rather than going to your teacher?
338. S I will go to teacher because she is more competent and responsible. I trust her.
339. I Did you go to her anytime?
340. S Yes. Many times.
341. I Are you satisfied with the content of your subject? Do you think your teacher knows the subject very well?
342. S I am satisfied with her content knowledge. I think she knows her subject. She used to solve even difficult area of Science.





343. I Do you like to attend the extra classes of your Maths /Science teacher, even though it might be after the school time?
344. S We do attend, especially for Science and Maths. We love it.
345. I Does she/he encourage you to make scientific projects and she guides you?
346. S I do present projects on my own interest.
347. I Does she remain in school for full time and attend all the classes fully prepared?
348. S Yes. She attends full time. She is fully prepared.

#### B1.6 Student: S<sub>6</sub>

349. I Interviewer (welcomes her to make her free and non hesitant). Will you be happy to tell me about your Maths/ Science teacher? Thank you very much. How satisfied you are with your Maths/Science teacher?
350. S I am quite happy with his class.
351. I How does he present his lesson?
352. S Very well I like him.
353. I Is he strict in the class and takes no nonsense?
354. S Not always. Sometimes he sends the noisemaker out sometimes he doesn't say anything.
355. I Do you trust him? Do you feel like telling him all your personal problems to get proper solution?
356. S I trust him. Sometimes I feel to tell my personal problems to him. I feel very friendly; he is a very good man.
357. I If you have trouble in learning something, do you ask a friend for help rather than going to the teacher?
358. S Sometimes I go to my friends when he is not available I can go to him even if he is in the staff room, he always welcomes me. He takes it as a part of learning.
359. I Do you like to attend extra classes of your Maths teacher, even though it might be after the school time?
360. S Yes, I would like to. During holidays we do it. Our school is growing very well.
361. I Does he encourage you to do scientific projects and give enough guidelines?
362. S Yes he is always there to help us. He help us if we are doing any project.
363. I Does he attend all the classes of the school fully prepared and remains in the school?
364. S Yes he always remains, sometimes he even comes early and is available for us.
365. I Thank you very much. I hope you were happy while talking me. I am very happy.
366. S Thank you.

#### B1.7 Sch-8: Sept. 2001, Student no: S<sub>7</sub>

367. I How satisfied you are with your Science classes?
368. S He is my first Science teacher. I like him very much. He tries to bring forth the student's background knowledge. He does not move until he is sure that student have already taken the chapter in their mind (He poses as if he doesn't know it and want to know it from students). He wants students to ask many questions before he talks.
369. I Is he very strict in the class and takes no nonsense?
370. S (Please repeat, I don't understand)
371. I Interviewer explains the question again.
372. S He is not like that. He continues his lesson until he realizes that he can't do so because of a student. He then calls the student outside talks to him until the student is all right, then he comes back very good and continues the subject.
373. I Do you trust him?
374. S Yes, I trust him.
375. I Give few examples, which shows that you trusted him.





376. S I trust him in his teaching. I trust him in always. And thing we tell him he takes it up and solves. Is not that he is a teacher and he looks us down, it is not like that. Always he talks our things more serious than his, he guides us for education and soon.
377. I Are you ready to tell him about your personal or private problems?
378. S Yes. Because he has the heart to love us and protect us therefore I can tell him everything.
379. I Do you think all students are like that as you are telling about him?
380. S I can see most of the students think in the same way.
381. I If you have trouble in learning something, do you ask a friend for help rather than going to the teacher?
382. S I don't like friends. I trust my teacher. My friend may trouble me one day but the teacher I trust him, but the teacher will never do bad.
383. I Are you satisfied with the content of your subject? Do you think the teacher knows the subject?
384. S Yes. If I don't understand, I come back to teacher and explains it to me.
385. I Does he know everything?
386. S Yes. He answers all questions that I can ask. Last time I asked the question of a soap bubble, which I could not understand from the book. My teacher explained it and now I understand. I am very happy.
387. I Thank you. Do you like to attend extra classes of your Science and Maths teacher, even though it might be after the school time?
388. S Yes. In afternoon we mostly come and do projects and question answers.
389. I Does he encourage you to do Scientific projects and give enough guidelines?
390. S Yes! he encourages.
391. I Does he/she remains in the school full time and attend all the classes fully prepared?
392. S Sometimes he goes for workshop for one or two days but he let us know in advance and give work to do during the period.

### B1.8 Sept. 2001, S<sub>8</sub>

393. I S8! You are most welcome to my interview to tell information about your Science/Maths class and about the teacher. Feel free and talk how satisfied you are with your Maths class?
394. S I am very satisfied with my Maths class and with my Maths teacher because he does his job the best he can with his ability.
395. I O.K. Doesn't he frustrate you in some way in your class.
396. S Not in anyway.
397. I Is he strict in the class and takes no nonsense?
398. S He is academically strict and may be personally strict. Because he makes sure that he teaches well without disturbance in the class. He asserts the importance of Science and Maths in life and teaches very well, that makes us to work in class perfectly.
399. I Do you trust him?
400. S Very much. I don't want to miss his class. He is one of the best teachers in the school who attends all his classes and never dodge his class. We also don't want to miss him anytime. I trust him.
401. I If you have trouble in learning something, do you ask a friend for help rather than going to the teacher?
402. S Yes, I will go to my teacher. Because at this stage I will like to have the right information from the teacher only. He is the best person. Even I go to him and he helped me.
402. I Do you think he does help to everyone?
403. S I am very sure. He helps everyone. He is a very good teacher.
404. I Are you satisfied with the content of the subject? Does he know the subject very well?



405. S Yes! I am very much. He can teach the whole syllabus, he never skips. He knows the subject very well.
406. I Do you think his project (what he attends) is giving him more new knowledge or he was like this even before?
407. S Yes. I can say he is gaining a lot of new knowledge from the project because when he comes back after attending he knows more and teaches better. He is improving day by day. I say the project has given him so much.
408. I Do you like to attend the extra classes of your Maths/Science teacher even though it is after the school?
409. S Yes.
410. I Does he encourages you to produce projects?
411. S Yes.
412. I Does he attend all the classes fully prepared?  
S Yes.

**B1.9 Sch-9 Sept., 2001. (Student) S<sub>9</sub>**

414. I How satisfied you are with our Maths and Science learners?
415. S I am satisfied, but not that satisfied with the Science teacher.
416. I Are you happy with your Science teaching?
417. S Yha I am happy. Not much very well happy, but I am happy.
418. I How does she teach you in the class?
419. S She teaches me but I am not well satisfied with the subject because this subject is very difficult. So may be I need a brilliant teacher. So that we can learn more. With the present teacher I am not satisfied.
420. I I hope you like the way your teacher presents the lesson. How do you wish he should do?
421. S I like the way he teaches me the lesson.
422. I Do you do any practical?
423. S Yes, we do, I don't understand, but I think she is not a brilliant teacher.
424. I Is she strict in the class and takes no nonsense?
425. S Yes.
426. I Tell me more.
427. S Yes doesn't take nonsense in the class, and I think it. Some of my classmates have problem may be when she teaches us, and she explains to everyone and everyone understands. So she is very strict and I like it.
428. I Do you trust her?
429. S Yes I trust her but a little bit.
430. I Do you feel like telling her your entire personal problems to get proper solution?
431. S Pause.....
432. I Do you understand the meaning of personal problems?
433. S Yes.
434. I Do you want to tell her?
435. S No.
436. I Whom do you want to tell?
437. S Sometimes I like to tell male teacher, not female teacher, because I am also male.
438. I If you have trouble in learning something do you ask a friend for help rather than going to the teacher.
439. S Yes I ask my friend and teacher, but sometimes I become very afraid to ask teacher, very afraid.
440. I Why, if you go to ask will she punish you?
441. S Because sometimes I think she will not answer me, because may be she doesn't know, and get angry on me.
442. I OK, are you satisfied with the content of your subject?



443. S Yes.
444. I Do you think your teacher knows the subject very well?
445. S No, sometimes, if we are doing practical and she is writing on the board you can see that she is not confident.
446. I Do you like to attend the extra classes of your Science teacher even if it is after the class hours?
447. S No, not here, I like to attend if we were taken some where else, to an industry that are very good in demonstrating practical but not here, may be at some other town, because we have shortages here. Our labs here we got old compounds, old ions, old minerals nothing is new. So I don't want to attend the classes here.
448. I Does she encourage you to do Scientific projects and give enough guidelines?
449. S No.
450. I Have you done any project so far?
451. S No, she sometimes talks about the project but she really doesn't want us to do projects. She says do projects but doesn't participate in them to help us out.
452. I Does she stays in school full time and attend classes fully prepared?
453. S I don't know.
454. I But when she goes to your classes is she fully prepared?
455. S Yes.
456. I How do you know?
457. S But according to my knowledge No.

Thank you very much.

#### **B1.10 S<sub>10</sub> [Interviewer-I].**

458. I Welcome to my interview session. I hope you will be free to talk during the session.
459. S Yah I will.
460. I How satisfied are you with your class, Science teachers, are you happy?
461. S I am happy because she explains what she teaches us, she doesn't just come and write notes, but she explains whatever she writes.
462. I Is she strict in the class and takes no nonsense?
463. S No, she is not strict, but she is in the middle, she doesn't like us when we make noise.
464. I Do you trust her?
465. S Yes I trust her.
466. I Do you feel like telling her all your personal problems to get the proper solution?
467. S Yes I do, because she comes and asks us whenever we have problem and even if we don't understand something she tells us to come and ask her, if we didn't understand what she was teaching.
468. I OK, I am asking a personal problem, suppose that you have not eaten, or you are not well, or your parents are not happy, do you go and tell her?
469. S No, I don't.
470. I Why don't you tell her?
471. S I am afraid.
472. I If you have trouble in learning something do you ask a friend rather than going to the teacher?
473. S Yes, I ask my friend the one in my class, when they can't explain my problems then I go to the teacher.
474. I Did you go to the teacher anytime (for help).
475. S No.
476. I Are you satisfied with the content of your subject?
477. S Yes I am satisfied.
478. I Do you think that your teacher knows the subject well?



479. S Yes she knows the subject very well. It is only us who don't want to listen to her. We always make noise when she is teaching.
480. I But she knows?
481. S Yes she knows.
482. I Do you like to attend the extra classes of Science, even though it might be after the school time?
483. S Yes, I will like, because I think I can get more information from those extra classes.
484. I Did it happen anytime in your presence?
485. S At school.
486. I Yes.
487. S No, not for Science. It happens with other subjects such as Maths.
488. I OK, second one does she encourages you to do Science projects and give enough guidelines?
489. S Yha, she does , do Scientific projects.
490. I Do she remain in school for full time and attend all the classes fully prepared?
491. S Yes, she does, may be sometimes she doesn't attend all he classes, may be she have some problems.
492. I OK. Thank you very much and I hope you enjoyed the interview.
493. S Yes, I did. Thank you.

**B1.11 S 11, [Interviewer- I].**

494. I Welcome to interview.
495. S Thank you.
496. I Who teaches you Math sans Science?
497. S My Maths teacher is A and Science teacher is B.
498. I OK. Tell me about, how satisfied are you with your Science teacher?
499. S I am very well satisfied with my Science teacher. He is very good teacher, when he is teaching he makes sure we understand everything, and if we are not satisfied then he goes back to the subject and tries to cover everything all over again and makes sure we understand by all means.
500. I What do you mean by all means?
501. S By all means, I mean he tries to explain us every well and slowly so that we can understand.
502. I Is he strict teacher in the class and takes no nonsense in the class?
503. S Yha, he is strict, considering like when we play when he is teaching, then he makes us give answers to make sure that we do not understand what he has taught.
504. I Do you feel like telling him all your personal problems to get some solution?
505. S I think to me Mr. B is like a parent, he is so friendly that whenever I am with him I feel very comfortable.
506. I So you can tell him, did you tell him any problem anytime?
507. S Yes, I remember test no. 4 in class, I didn't pass so she asked me what was the problem, then, I told him I didn't understand the whole subject, then he tried to help me by covering the ones is missed.
508. I If you have trouble in learning something, do you ask a friend for help rather than going to the teacher?
509. S I will say, I prefer to go to him because, he explains things very well to me.
510. I Are you satisfied with the content of your subject?
511. S I am very well satisfied.
512. I Do you think your teacher knows the subject very well?
513. S I think he knows more than he thinks.
514. I OK, do you like to attend the extra classes of your Maths teacher even though it might be after school time?



515. S Yes, I love too, because if we learn in periods we learn very well, but I think we need some extra time if our teachers say that we are meeting after class, I will be the first one to attend the extra classes.
516. I Does he encourages you to do Scientific projects and give enough guidelines?
517. S Yes, He does, he encourages us very well and then if we fail in some kinds of projects, he doesn't become happy because he wants us to do these practical to make sure that we understand the things that he teaches us.
518. I Do he/she remain in the school for the full time?
519. S I doesn't make any mistake, always he comes to the class in time.
520. I Thank you very much for your time, I enjoyed every moment.
521. S It is a pleasure Sir.

### B1.12 Interviews with: S<sub>12</sub>

522. I Welcome for the interview.
523. S Thank you.
524. I How satisfied are you with your Science class?
525. S I am satisfied with the class, everything is fine.
526. I Do you understand everything very well?
527. S I understand everything very well whatever he teaches.
528. I Didn't he beat you anytime?
529. S No he don't do that, he just tells you don't do this or that.
530. I I hope you like the way your teacher presents the lesson.
531. S Yes, I like it because she is very experienced teacher. She teaches very well, if you have problems sometimes she helps you personally.
532. I Is she strict in the class and takes no nonsense?
533. S Yes, she is, she always want you to be in discipline in your work, always keep your concentration, just concentrate on what she is teaching.
534. I Do you trust her?
535. S Yes I do.
536. I Do you tell your personal problems to her?
537. S Because sometimes other children have problem, because sometime their parents abuse other children, she always cares for those children and tell them the right thing they must do.
538. I You didn't tell him your problems?
539. S I didn't tell him my problems because I have no problem.
540. I But if you have.
541. S If I have I will tell him.
542. I If you have problems in learning something do you ask a friend rather than going to the teacher?
543. S Yes sometimes I ask my friend to solve the problem but if the problem becomes difficult I ask the teacher and the teacher makes sure that we get the right solution.
544. I Are you satisfied with the content of your subject?
545. S Yes I am satisfied, because whenever I write the test I pass very well and when I got problems I sort it. I am satisfied.
546. I Does she remain in the school for the full time and attend all the classes fully prepared?
547. S Yes, she attends all the classes fully prepared. She doesn't make any mistake, whenever she attends the class she makes sure we doing our work.
548. I Does she encourage you to do Scientific projects?
549. S Yes, encourages us when we do something, she provides us with projects and tells us that we must do projects, because it is very important.
550. I Does she give you guideline how to do projects?



551. S Yaha. She says that we must go and use our commonsense in making that project and she asks questions why did we do this... then we can answer.
552. I Thank you very much.

**B1.13 Sch-8: Sept. 2001, Student<sub>13</sub>**

553. I How satisfied are you with your Math's and Science Teacher?
554. S I ma very satisfied.
555. I Who are your teachers?
556. S Mr Science teaches us Science and Mr. Maths teaches Math's.
557. I So you will talk about Mr. Science Teacher?
558. S Yeah!
559. I So , I hope you like the way your teacher presents the course?
560. S Yes.
561. I Tell me more about him.
562. S He is very good teacher, he teaches us very well.
563. I Is he strict in class and takes no nonsense?
564. S Yes, he is very strict in class, usually when he is busy teaching.
565. I So, do you feel to ask questions? You said he is very strict.
566. S Yes, but not all the time.
567. I Do you trust him? Do you feel like telling them all your personal problems to get the solution?
568. S Yes, I do feel comfortable in talking.
569. I If you have trouble in learning. Do you ask your friends for help or you would like to go to the teacher?
570. S I would like to go directly to the teacher.
571. I Why? You don't feel feared?
572. S No.
573. I Are you satisfied with your course content?
574. S Yes. I am very satisfied.
575. I So, what he teaches you, you understand it very well?
576. S Yah, I understand everything.
577. I Do you attend extra classes?
578. S Yes, because when I attend extra classes I learn more.
579. I What about your classmates do they also want to attend?
580. S Yes, my classmates always attend extra classes.
581. I Does he encourages you to do scientific projects and give you enough background?
582. S Yes, he encourages us.
583. I Did you make any projects?
584. S Yes, we did a science project.
585. I Does he/she remain in school full time and attend all the classes fully prepared?
586. S Yes, they do.
587. I Thank you, Brilliant for coming to my interview.

**B1.14 Student<sub>14</sub> :**

588. I Ok, S<sub>14</sub> you are welcome to my interview and I hope you will feel happy and free to talk. How satisfied you are with your Math's and Science class?
589. S I like the classes very much.
590. I Are you talking about Mr. Maths Teacher?
591. S Mr. Teacher is a Maths teacher, that teaches me in the right way.
592. I Ok, is he strict in class and takes no nonsense?





593. S No, he is not very strict but he does not like nonsense.
594. I Do You trust him?
595. S Yes.
596. I I want you to talk about Mr.Maths teacher
597. S Mr.Maths teacher, I like him very much because he teaches me in the way that I like and there is not a bad relationship between him and the students.
598. I Do you feel like telling them all your personal problems to get the solution?
599. S Yes, but not every thing.
600. I If you have trouble in learning . Do you ask your friends for help or you would like to go to the teacher?
601. S I prefer to go to my friends.
602. I Are u satisfied with the content of the subject?
603. S Yes I am.
604. I Do you think your teachers knows the subject very well?
605. S Yes.
606. I Tell us more.
607. S yes I feel because I do very well in that subject.
608. I Okay, does he encourage you to do scientific projects.
609. S Yes.
610. I Does he/she remain in the class full time and attend all the classes fully prepared.
611. S Yes, he attends the classes.
612. I Ok. Keep well study well.

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## B2 Second Round Interviews: April 2002

Introduction of each other and welcome from the interviewer made the student interviewees feel free and comfortable while answering the questions. Most of the time two students came together in a group setting and participated in the interview. In a group of school setting in transcription the learners are indicated by  $S_1$  and  $S_2$ , but as a school representative the numbering increases to indicate the number of learners count fro the preceding school.

### B2.1 Sch-3, Students: $S_1$ & $S_2$

1. I Today I am in your school to see the teaching and learning of Science in your school. I will like to here from you some of your ideas. Are you happy to see a visitor like me in your school, and are you ready to answer my questions.
2.  $S_1$  &  $S_2$  Yes. We are quite happy and ready to answer your questions.
3. I Beautiful. Tell me how should a Maths/Science teacher look like and what should he do in your class?
4.  $S_1$  He must look clean, he must be friendly when he is in the class and he must teach loud so that we can hear him.
5. I Is your Science teacher like that as you want?
6.  $S_1, S_2$  Yes.
7.  $S_1$  He should dress very well like us or like you in a class. If he wants to do something in the class he should do like student do so that we can understand.
8. I Do you want to be like your teacher one day?
9.  $S_1$  If I don't get other job like Engineer, Doctor then I will be a teacher and if I am a teacher I will like to be a good teacher like him.  $S_2$  I will be like him.
10. I Why you like him?
11.  $S_1$  I see some beautiful things in him like he is friendly, he respects children and teaches us very well.
12. I Do you see Maths/Science a difficult course which you can't do?
13.  $S_1$  No. Science is a busy subject and I can do it.





14. S<sub>2</sub> It is a good subject if you see your teacher and follow him, it is a good subject and makes you great.
15. I Do you feel Science/Maths should have more classes with you?
16. S<sub>2</sub> Yes I want to have more classes.  
S<sub>2</sub> We want to have more classes.
17. I Does he or she remain all the time in school and attend the periods fully prepared?
18. S<sub>1</sub>, S<sub>2</sub> Yes he comes on time and go when he finishes the period very well
19. I What are your ambition in life?
20. S<sub>1</sub> I want to be alone, I want not to marry and enjoy peaceful life (a big laughter). I want to be free. S<sub>2</sub> I want to be a Doctor to save peoples life.
21. I For that you have to prepare and visit your guidance teacher to know how you can become a Doctor. I wish you a success in reaching your ambitions. Thank you very much

### B2.2.1 Sch-6. S<sub>3</sub> & S<sub>4</sub>

You are welcome to my interview for today feel comfortable and answer my questions.

22. I How do you want your Science and Maths teachers to look like or to be?
23. S<sub>1</sub> He must be reasonable and in the class he must be giving examples from India and make us understand.
24. I What is the example, is it written in the book?
25. S<sub>1</sub> Like horoscope, mathematics and daily life, if it came to us we shall be happy and it will look like Indian example  
S<sub>2</sub> He should be a good teacher whom we understand and learn.
26. I Do you want to be like your teacher one day? Why?
27. S<sub>1</sub> I want to be a Science teacher because Science has brought us Electricity, Computer, Cars and alike. My teacher teaches us very well and that is why I like him. He knows the subject very well.  
S<sub>2</sub> I like his attitude towards us. He remains with us for longer time, teaches until we understand and even teaches Computer use for us. He gave us new light in many fields.
28. I Do you take Maths/Science as difficult subject?
29. S<sub>1</sub> I feel Maths a bit difficult than Science. If you practice it many times it goes well.  
S<sub>2</sub> I go to my Maths teacher and she helps me then it becomes simple.
30. I Do you feel free to go to her?
31. S<sub>1</sub> Yes, she welcomes and is friendly to us.
32. I Give example of Science knowledge, which you use in daily life?
33. S<sub>1</sub> At home I have electric appliances, hi fi etc. When there is electric problem I use my knowledge and make them work.  
S<sub>2</sub> At home I use iron my cloths. When there is any problem with it I repair and use. I help my Mom to do right things while cooking etc.
34. I Does your teacher remain all the time in school and attend all classes fully prepared?
35. S<sub>1</sub> Yah when in the school he attends all the classes fully prepared. He is always ready.  
S<sub>2</sub> He attends classes always when he goes for a course or something he gives us work to complete at school.
36. I What do you want to be in your life?
37. S<sub>1</sub> I want to do Engineering.
38. I To be an Engineer, do you know what should you do?
39. S<sub>1</sub> I think Physical Science and Mathematics.
40. I Did you consult your teacher anytime?
41. S<sub>1</sub> I am going to consult him in future.
42. I What do you want (S<sub>2</sub>)?
43. S<sub>2</sub> want to be a Doctor.



44. I Yes, very good. O.k. Did you go to your teacher anytime to get help how to proceed to be a Doctor?
45. S<sub>2</sub> Yes I will go and after I want to help my people in the community.
46. I You are very good students. I wish you luck in that.

### B2.2.2 Sch-6. Other set of two students S<sub>5</sub> & S<sub>6</sub>

47. I I welcome you for my interview.
48. I Tell me what should a Maths/Science teacher look like, how should he be?
49. S<sub>1</sub> She is o.k. she is a good teacher.
50. I Do you want to be like your teacher one day?
51. S<sub>1</sub> She is educated teacher but I want to be more than that.
52. I Do you think Maths/Science a difficult course which you can't do?
53. S<sub>1</sub> No it is not difficult but it is depending on me now, how do I work and get through. S<sub>1</sub> No it is not difficult.
54. I Are you scared of your Maths/ Science teacher?
55. S<sub>1</sub> No. She is good to us. I can approach her anytime and get help. S<sub>2</sub> The same.
56. I Give examples of Science and Maths knowledge which you use in daily life?
57. S<sub>1</sub> At house in cooking on stoves.
58. I does he/she remain full time in the school?
59. S<sub>1</sub> Yes. S<sub>2</sub> Yes.
60. I What are your ambitions?
61. S<sub>1</sub> I want to be electrician. S<sub>2</sub> I want to be engineer.
62. I All right, thank you. Did you see any change in attitude after the course he/she attending?
63. S<sub>1</sub> They are very senior teachers, they teach very well, we are happy with them.
64. I O.K. Thank you very much, good luck for you.

### B2.3.1 Sch-5, S7 & S8 (April – May, 2002).

65. I What should a Maths teachers looks like?
66. S<sub>1</sub> He should look happy and understand what do we need and what we should do.
67. I Does he do that?
68. S<sub>1</sub> Yes.
69. I For example!
70. S<sub>1</sub> When we had problem he said when he is free he will help us. S<sub>2</sub> He shows us his sympathy because we failed his test. After that he called us for two afternoon studies. So that we pass in next test.
71. I How should the person look like?
72. S<sub>1</sub> He is friendly.
73. I Do you want to be like him one day? He has been with you, you know him. What are his qualities, which you like most?
74. S<sub>1</sub> He does not like those who are fighting. He shows us better ways that makes us to understand him.  
S<sub>2</sub> He is a good person, he doses not like violence. He punishes us when we do wrong, he wants us to be good person in our lives.
75. I Do you see Maths as a difficult subject and you can't do it?
76. S<sub>2</sub> Maths is a good subject but I don't want to be an accountant. I want to be a lawyer so I want to study History. S<sub>1</sub> Maths is not difficult, if you concentrate it is most easy, I like it.
77. I (Goes back to S<sub>2</sub> for confirmation) You never liked Maths?



78. S<sub>2</sub> For me it is also easy. I don't like it because of my career. I want to be a lawyer.
79. I Do you feel Maths should have more classes than what you have?
80. S<sub>1</sub> No. We have enough. S<sub>2</sub> We are satisfied with him.
81. I Are you scared of your Maths/Science teacher?
82. S<sub>1</sub> No I am not scared of him.
83. I But you said he punishes you.
84. S<sub>1</sub> Yes, punishment is a way to success, and I am happy.
85. I Do you want to invite him at your place or want to visit him?
86. S<sub>1</sub> Yes he treats himself as our parents. S<sub>2</sub> He never scares us, he treats us as his child and he wants to see us in good career in future.
87. I Give examples of Science knowledge you use in your daily life?
88. S<sub>1</sub> When we connecting the bulbs at home we connect in parallel circuits. Light and Electricity use Maths to count cattle and money.
89. I Does your teacher remain in school full time and comes to class fully prepared?
90. S<sub>1</sub> Yes.
91. I Does not he leave and go away? Like today he is gone.
92. S<sub>1</sub> He leaves when it is necessary. He is always prepared. He tells us methods of Maths. S<sub>2</sub> I see him when he comes to class he teaches us well as he was not doing before. That is why I say that he is studious. He works hard.
93. I What are your ambitions?
94. S<sub>1</sub> I want to be a social worker.
95. I I thank you all. I enjoyed talking to you. Thank you.

### B2.3.2 S9 & S10 (April – May, 2002)

Another set of two students for Science teacher.

96. I Tell me what should your Science/Maths teacher look like and what should he do in the class?
97. S<sub>1</sub> He should not be only Science/ Maths teacher. He should also tell us about career not only Maths. S<sub>2</sub> Mr. teacher is a nice person
98. I Does he look like a Principal or Science teacher?
99. S<sub>1</sub> He looks like Principal and he is Science teacher.
100. I (Asks the other student) What is your view?
101. S<sub>1</sub> He is friendly, and he never punishes us, he always helps.
102. I Do you want to be like him one day?
103. S<sub>1</sub> If I wanted to be a teacher, I will be like him but I want to choose another career. S<sub>2</sub> My teacher is good but I don't want to be a teacher.
104. I Tell me some qualities of your teacher, which you like most?
105. S<sub>1</sub> I like his style of living and working. He teaches me a lot and he is never angry.
106. I Do you see Maths/Science a difficult subject which you can't do?
107. S<sub>1</sub> No! actually I don't see it as a difficult like most of the students run away from it. They don't know that Physics will help them in future, like most pupil they go for Arts, Culture, Accounting but they don't know that these lack scope. S<sub>2</sub> Maths/ Science is not difficult, you can do it.
108. I Do you think Science/ Maths should have more classes with you?
109. S<sub>1</sub> I don't see much need. Many times teacher come to teach in afternoon but there is no learner. S<sub>2</sub> I think we should have more classes in Maths because we don't understand it, when teacher teaches us. The period is too short. He needs to explain many things for which we need more extra classes.
110. I Are you scared of your Science/Maths teacher?
111. S<sub>1</sub> No. When they come in class they behave like good teachers. Even if they are angry sometimes they don't consider it. I will like to invite him for a dinner. S<sub>2</sub> I like them like my parent and I want to invite him at my home.



112. I Do you use your Science knowledge in your daily life?
113. S<sub>1</sub> Exactly we do it. Sitting on a chair Science is everywhere. S<sub>2</sub> To me it is everywhere. Medicine and technology we use for our health. Life is because of Science.
114. I Does your Science teacher remain in the school for full time and attends all your classes fully prepared?
115. S<sub>1</sub> Yes he remains in the school, even in afternoon you can find him, if we need help. He does not say I am busy etc. He makes time for us and he is prepared. He does not come without preparation.  
S<sub>2</sub> He enters prepared, he always attend.
116. I O.K. Thank you.

#### B2.4 Sch-1(Three students in a group)S11, S12, and S13, (April – May, 2002)

117. I How should your Maths/Science teacher look like and what should he do in the class?
118. S<sub>1</sub> I want them to be strict.  
S<sub>2</sub> I want them to be honest.  
S<sub>3</sub> I want them to be confident, so that when they teach we take it and understand it.
119. I What is position now?
120. S<sub>1</sub> No! they look to be confident.  
S<sub>2</sub> They are teaching as better as we wanted.  
S<sub>3</sub> He should show interest that he is going learners to teach.  
S<sub>1</sub> He should be patient with his students until they understand, he must be serious.  
S<sub>2</sub> He/she should show openness and pleasant so that we feel free to ask when we don't understand.
121. I Did you noticed any change in your teacher compared to previous years?
122. S<sub>2</sub> He is very strict, I think he will never change from that.  
S<sub>1</sub> He seems to change. He is talking to those students who couldn't do well last year to perform well in this year.
123. I Do you want to be like your teacher one day?
124. S<sub>1</sub> I want to be like him. I love his style. Most people want to be afraid because he is so open and gentle.  
S<sub>2</sub> (His advice) When he advices you, It appears those things one coming from your heart to take the decision.  
S<sub>3</sub> He is a good teacher, he takes care of his pupils, we like him.
125. I Do you think Maths/Science is a difficult course, which you can't do?
126. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub> (together) No. It is not difficult. It needs more practice and time.  
S<sub>1</sub> I practice at home, when I found it difficult, I come to school and ask the teachers and now I can solve and I am happy. I can pass excellent.  
S<sub>2</sub> Like yesterday we did some problems at school, we could not do it until 16:00 H. Then I went home and started again. I found the solution. So I think Maths is not a difficult subject.  
S<sub>3</sub> Use your mind and study hard, Maths and Science becomes easy.
127. I What is your teacher's story in making Maths/ Science easy?
128. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub>: He teaches us well. Then he writes other problem on the chalkboard and gives us chance. When we succeed to solve it we feel encouraged. We no longer have any fears with Maths/Science.
129. S<sub>2</sub> I will try to score good level of performance and will do Engineering.
130. I Are you scared of him?
131. S<sub>1</sub> No. they are easily approachable and they are ready to help anytime. Most of the time they are in the school even if the school is earlier and don't go home.
132. I Do you want to invite him at your home?
133. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub> (All together) Yes. We love him.
134. I Did he invite you anytime?



135. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub> Not yet, but he will when there is some occasion.
136. I OK. Do you think he will accept your invitation and come to your family?
137. S<sub>1</sub> Yes. We believe so.
138. I Give examples of Science/Maths knowledge you use in your daily life. Do you see any other person doing that?
139. S<sub>1</sub> Thinking. S<sub>2</sub> (Now both) yes I use it. Sometimes when I meet my friends I tell them I learnt in the class and I use it. S<sub>3</sub> Yes. I am using it. Some of my friends but not in this school, they choose Mathematics and they are doing grade but they call me to help them.
140. I Good. Does she/he(your teacher) remains at the school full time and attend your class fully prepared?
141. S<sub>2</sub> Yes. My Science teacher does it. They look very hard working and fully prepared.
142. I Can you tell me anything about your school, which you think I should know?
143. S<sub>1</sub> O.K. I can say that our Science/ Maths teachers never say '*I am busy*' but they attend immediately and makes themselves available.
144. I Do you think they have good attitude to help learners?
145. S (All together) Yes.
146. I Suppose you are sick in your classroom. What do you expect from your Science/Maths teacher?
147. S I expect him to take me to hospital.
148. I O.K. Bongani, Mathew and Linah do well in your classes and achieve your ambition. (Interviewer gives some career advices).

### B2.5 S<sub>14</sub>, S<sub>15</sub> and S<sub>16</sub>. (April –May, 2002)

149. you are most welcome to my interview, feel free to talk, it will remain confidential. (Two girls and one boy). They nodded and showed signs of concurrence with the interviewer.
150. I Tell me what should a Maths/Science teacher look like and what should he do in your class?
151. S<sub>1</sub> He should look neat and teach well. I want him to be sober so that he can teach well. If there is something wrong in the class he should ask the class what are you doing.  
S<sub>2</sub> Whatever he is teaching he should make sure that we understand. In Maths there are a lot of formulas, which we should know and be able to use it. He should explain this to us.
152. I Is he doing these things?
153. S<sub>2</sub> He is doing these things. So far he is o.k. If I don't understand he gives me time to ask questions. He is committed to his work.
154. I Do you want to be like your teacher one day? What makes you to be like him?
155. S (All together) I don't want to be a teacher but I like the way he does his work. First: he knows what he is doing. The way he is doing Maths in the class, I find Maths very exciting, and may be I decide to be a teacher.
156. I Hoon!
157. S<sub>1</sub> He offer discussions, and he does very clear work on the board. All these good work influences me and sometimes to be like him one day.  
S<sub>2</sub> He teaches me Maths, Science I want to be Engineer where there is needed.
158. I Engineer! That is what South Africa need? Do you see Science/ Maths as a difficult subject, which you can't do?
159. S No, it is not difficult. It is tricky. You have to understand it and practice very well. Maths is very tricky, you have to be committed to it.
160. I What do you mean by tricky?
161. S Like expansion of Algebraic brackets, there are rules and tricks e.g. -x-, -x- etc.





162. I So if you know the tricks, it is no more tricky and becomes easy/ Not so.
163. S<sub>1</sub> If you know the tricks, you can play your cards very well. Then you pass it well.  
S<sub>2</sub> Teachers has helped me and it has become easy.
164. I Do you think your teachers knows Maths?
165. S<sub>1</sub> He knows it. I find it easy with the help of my teacher. My parents also help me.
166. I Do you think Science/ Maths teachers have more classes with you?
167. S<sub>1</sub> In South Africa is long to cover it and understand it very well we need more time. We should have more classes in Maths/ Science.  
S<sub>2</sub>,S<sub>3</sub> My teachers should have more classes.
168. I Do you think your teacher is ready to spare time for your extra classes?
169. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub> Yes, I am sure he will be happy.
170. I Are you scared of your Maths/ Science teacher? Do you want to invite him or being invited?
171. S<sub>1</sub> No he is an open teacher. I have no problem to go to him.  
S<sub>2</sub> I too am not scared.  
S<sub>3</sub> Yes, we are free, I am not scared. I will invite him and tell my parents.
172. I. Give examples of your Science/Maths knowledge you use in your daily life. Explain.
173. S<sub>1</sub> Me I am using it. I tell my friends to like that.  
S<sub>2</sub> I use in counting. I use Science also.  
S<sub>3</sub> During night I look at stars, Jupiter, Moon.
174. I Does he remain full time and teach very well?
175. S<sub>1</sub>,S<sub>2</sub>,S<sub>3</sub> He remains full time and does work. If he does not come he gives works/assignments for tomorrow.
176. I O.K.,What do you want to be in your life?
177. S<sub>1</sub> I will do marketing. S<sub>2</sub> I do Science and Maths so I want to be a social worker. My teacher guides me. S<sub>3</sub> I want to be Engineer.
178. I I am happy that you gave your feelings about the learners. Thank you very much.

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### **B3 Interviews of Teachers of Secondary Schools, 2001**

#### **B 3.1.1 Teachers from Sch-1, [(T<sub>1</sub>) Mathematics teacher]**

I welcome you for my research interview on the impact of FDE on the behaviour and attitude of teachers. Thank you for your attendance. If you are pleased and ready, should I start asking some questions? Thanks.

1. I Generally Mathematics and Physical Science has poor results in our school, what contributes most for such performance.
2. T<sub>1</sub> Yeh, in fact our schools are affected by environment. They are situated where science is not popular. It is not like in town, when you talk about power station they see a power station, when you talk about a gas station, you can touch the gas cylinder where they see gas stored and most of all learners de-motivated from science.
3. I What makes them de-motivated?
4. T<sub>1</sub> A number of things for example, the situation or statements that surround them. You see but we don't know what to do and what is correct which will motivate them, but we are trying.
5. I Is the situation is not good because of the learners side or is there responsibility of the teachers also.



6. T<sub>1</sub> I think, it is on the learners' side, if a teacher asks them for extra-classes they are dragging. Some come, some don't. Even some of them are not ready. So teachers are really putting effort to create good environment.
7. I Are teachers motivated?
8. T<sub>1</sub> There are a number of issues that de-motivated teachers. You know that terms of the work conditions, a number of things, lack of facilities. When you want to do some experiments for example in my class we are running short of text books, mostly learner go and do their work on their own referring from other text books. They are sharing the books. At times where one is staying the other one is not there. They are sharing and if he is not at the school, others have nothing to do.
9. I A school principal should put Maths /Science teachers to task if the learners don't go beyond 40% and recommend for demotion? Your comment please
10. T<sub>1</sub> I think this will be unfair to the teacher because you know the passing of a learner much depends on teacher but a lot of other factors also. And it also involves the time that you spend with them. You talk and talk if the student does not appreciate them it becomes an elusive exercise.
11. I Clearing the throat
12. I So you think that performance of the learner should not be a reason to punish the teacher?
13. T<sub>1</sub> No. Teachers do their best, teach, give test etc. but the learners don't do their work and the result is not good.
14. I I hope you joined the FDE programme by your own choice and free will give some feelings about the projects. Do you like it? What do you expect from it? Whether it made you better teacher? Are you happy with the staff of UP? So Mr. Mthethwa I will like you to throw some light on each aspect of the above. There are four aspects about the project and while you are throwing light be critical, and I expect that you are free and fair.
15. T<sub>1</sub> O.K. I would start by saying that I did join on my free will and on my own choice and yes! I do like it. I like the project.
16. I (Interruption) You like it (I am sorry to interrupt) is good but your liking should be based on something.
17. T<sub>1</sub> Yeh, Since I joined the project, I made a number of things you know. We are working in groups. In fact the things which we want take to our learners are discussed in the groups. With all these I see the impact in a good way. When I do something at home on my own alone I find it difficult and if I go to the group I find clarity. I find that the difficult part is answered and at the same time we are gaining some skills e.g. computer skills, I have been typing my work just now, I am able to prepare my work faster, I am keeping my work up to date. I am able to catch up a number of things and the teaching style has changed, I find myself as a new teacher now.
18. I Thank you very much. O.k. the second one.
19. T<sub>1</sub> Yeh, the second one I expect that at the end of the project I will have become a very good teacher. Yeh, The method I have changed, Notes giving I will have changed the values of number of facilities i.e. I will be able to use the Internet value it. I will cross the boundaries, which I have in teaching my learners. Now I know the other stuffs, when I have any problem we meet, discuss and sort out the things, which were not happening before. Then with the last one, I am very happy with the staff of UP, we become one while working, they come to our school, they encourage in our classes. We submit the assignments and do well with them.
20. I So the staff of University of Pretoria make you always happy and active
21. T<sub>1</sub> Yes, Yes.
22. Do they waste your time?
23. T<sub>1</sub> I would not say that. They come fully prepared. They know exactly what they have come for and they keep to the timetable and keep us always busy according to the time schedule.
24. I So they are ideal for teachers in the making?





25. T<sub>1</sub>. Yes.
26. I Suppose you are asked to attend a meeting after school, would you prefer to attend?
27. T<sub>1</sub> We most of the time remain behind after the school to catch up Mathematics and Science classes. So this one remains a routine.
28. I O.K. Don't you feel that after school is your own time and why should you give it?
29. T<sub>1</sub> Yeh. Normally school hours don't end by stopping teaching and that I know very well. So I should stay up to 18 hrs. So such meetings don't disturb me.
30. I The Maths/Science teacher felt that his learners are testing the teachers, the teacher's subject competency by asking questions from other books and resources, which are not used in that school. Imagining yourself in that situation elaborate your reaction to those learners include your liking and disliking.
31. T<sub>1</sub> Although it is not a good thing to ask questions to a teacher to test him/her but they do that and we should accept it and try to attend to that at least it is some information regarding the subject. (Interruption due to recording tape to be changed)
32. I Mr. teacher let us continue, you were talking on teachers reaction on Q. 10.
33. T<sub>1</sub> I was saying that though it is not a healthy thing to test the teacher but if such situation comes the teacher should be ready to answer. Teachers should be learning more and more and not be afraid of problems, like in our group in a project when we are together we are preparing for learning dynamics, the changes which have taken so far and developments so that teachers are aware of the development that has taken place so far, so that if learners have asked such questions we should be able to present ourselves well but we should feel free and keep busy. If anything comes we should face it.
34. I What you are saying, do you do alike in your class?
35. T<sub>1</sub> Yes
36. I Do you find yourself anytime in such situation?
37. T<sub>1</sub> Yes I did a few times.
38. I What did you do?
39. T<sub>1</sub> No, I tried to answer some of the questions that they asked. I also took some questions with me and contacted the groups and after getting them all right I came back and gave the answer.
40. I So you came back again.
41. T<sub>1</sub> Yes.
42. I Teachers should plan and prepare a lesson in full with work sheets, then only go to the class. Don't you think it is a waste of time while the class and vast syllabus is already demanding so much time?
43. T<sub>1</sub> I feel there should be a lesson plan, not necessarily the work sheet alone. It depends on the type of the lesson to be presented. The type of the lesson will guide whether it needs work sheets or not. But if it demands you should prepare the work sheet for the information to pass to the class, it should be done before hand.
44. I So how would you manage the time, I mean, there is so much work to be done, it will be a bottle neck home work, class work, CASS, syllabus etc. how would you manage.
45. T<sub>1</sub> Yes, it will be difficult, you know, considering the number of learners you are handling, I am going to set time aside for CASS, for adjustment. They do everything but for record purposes you cannot do everything. Then for projects I think we have to give time after normal school hours. During the week ends and after classes extra classes should be organized for such activities, the normal school time teaching can not be over loaded so much, it will affect the other classes. While you are pushing the teaching forward.
46. I. A maths teacher's role is to teach and not to deal with pupil's personal problems. Do you agree?
47. T<sub>1</sub>. No, I don't agree. They must do more than teaching. In fact you are required to do more than teaching. You are human beings, spiritual being, social being, if the child is not physically well, don't puzzle the child to achieve their goal. Teacher should give chance to know, discuss the problem and solve the problem so that the learners can learn well. I am a



- member of SGB, at times problems come and I am required to look into the matter and take part in public hearing to.....(Interruption).
48. I Can I say you have changed a lot as compared to before the SASEN project and now?
49. T<sub>1</sub> Yes, in fact this course has been an eye opener as far as I am concern, I have acquired a lot of skills, computer skills and Internet skills. I have now many more ways to get information and I feel the projects, some are so informative that it should be kept going, so that all the teachers around can benefit from the course in a right direction.
50. I O.K. thank you very much for your support and co-operation, I hope you will succeed with flying colours in your FDE.

### B3.1.2 Sch-1 (also a Mathematics teacher). T<sub>2</sub> (Aug., 2001)

51. I O.K. Mr. Maths teacher, I am here for the project's interviews. You are most welcome. I hope you have given permission to record your sound. Please feel free and give answers to the questions in a natural way.
52. I Generally Maths/ Physical science has poor results in our schools, what contributes most for this performance?
53. T<sub>2</sub> In my view I think the attitude with which we speak to our learners, some of them told that Maths are difficult and Science is difficult, so as a result they don't put much effort to commit, and that contributes to their poor result. But more than that Maths and Science results needs more effort, now a days. Our learners don't put more effort during their studies, they are happy and think what contributes to this most is the requirement for the pass rate for example say 35% pass rate. I think is contributing a lot across the country, since the effort of our learners is deteriorating day-by-day getting low and low!
54. I What is the teacher's role?
55. T<sub>2</sub> Well! Teachers, I don't think that they are playing that much role for high failure rate in Maths and Science. Since day in and day out they are going for workshops training, so it means their standard is being uplifted. So I don't have that feeling, they are playing a major role.
56. I What is situation in your school?
57. T<sub>2</sub> Well in my school is not much different from other schools.
58. I Would you get enough time to meet the demands of CASS and complete the syllabus?
59. T<sub>2</sub> Well! That is a different question. As far as I see the two are not tallying. In fact CASS demands a lot of paper work. And syllabus on the other hand requires somebody to be in the class almost all time. Now there are portfolios which has to be filled by the learner and the teachers himself, so that takes most of the time and effort has been changed from the syllabus to CASS, so I feel syllabus wouldn't be finished on time.
60. I A school principal should put a Maths/Science teacher to task when the learners don't go beyond 40% and recommend for demotion? Please comment.
61. T<sub>2</sub> I don't think that the Maths and Science teachers should be crucified based on the results of the learners. Since I have said learners have got that poor back ground concerning Maths and Science. I don't know whether it is a paradigm or whatever; they only know that the Maths and Science are difficult. Even their brothers and sisters have failed in Maths, why they can't fail in Maths. So they don't see the reason why should there be cry when they fail in Maths. So with that in mind I don't think they are putting enough in their performance. Therefore I don't think Maths or Science teachers should be demoted for that.
62. I Thank you. I hope you joined further diploma in Education programme by your own choice and free will. Give some feelings about the project. Do you like it? What do you expect from it? Will it make you a better teacher? Are you happy with the staff of University of Pretoria?



63. T<sub>2</sub> O.K. Yes! I like the project, because it enhances my knowledge, it is also giving me light about the present curriculum i.e. C2005. So it also tries to equip one to be in line with what is happening today in other words upgrading. Yes it will make me a better teacher because if one is accorded what is expected today, I think that type of teacher is better, and the staff is presenting the project from UP and feeling very good about them.
64. I Don't they waste time?
65. T<sub>2</sub> Well there is no time wasted, because I have gained a lot of knowledge, since I have joined the project.
66. I Hun! Do you wish to join UP. one day?
67. T<sub>2</sub> Yes, why not.
68. I O.K. thank you.(continued). Suppose you are asked by the Principal to attend a meeting after the school, would you be prepared to attend?
68. T<sub>2</sub> Yes. I would prepare to attend yes! You know time wasted during school hours will never be brought back. If you are teaching Maths and Science, once you lose some minutes it will be difficult to recover it.
69. T<sub>2</sub> Hoon.
70. T<sub>2</sub> Yes, if you attend after hours it helps us.
71. I Don't you feel that afternoon is your private time and the principal is encroaching your freedom?
72. T<sub>2</sub> Yes, it is my private time, but at the end one ends up losing his private time on Saturdays or on free days to cover up for the syllabus, therefore it is better to use that time of after hours. That will be much better because you don't have to come back on Saturdays for the same matter
73. I O.K. A Maths/Science teacher felt that his learners are testing the teacher's subject competency in the subject by asking questions from other books and resources which is not used in that school. Imagining yourself in that situation, elaborate your reaction to those learners (Include your liking and disliking).
74. T<sub>2</sub> Learners can ask something which is from other books and resources because a library is always there to provide information to the learners and the teachers. So if learners go to the library and find a book and ask the contents from the book, I think he/she must answer about that. It is their right to know.
75. I You mean that teacher should not panic at learner's testing?
76. T<sub>2</sub> Yes the learner is not testing, the learner is in the need of information. He has got one but he needs more information on it.
77. I Thank you. Teachers should plan and prepare a lesson in full with work sheet and then only go to the class. Don't you think this to be the wastage of time when CASS and vast syllabus are already demanding so much time?
78. T<sub>2</sub> I don't think so. For everyone to do anything he should prepare. So preparing is part of your daily life. You can't just go to the class without a thorough preparation. On top of all demands of CASS, yes you need to prepare. Although all these are the matter of record you need to prepare. Even for CASS you must know what you are going to do in class. What project will you do, if you want to add on your class work?
79. I Hoon.
80. T<sub>2</sub> (continues) Yes every time preparation will be of great help. Thanks.
81. I A Science/Maths teacher's role is to teach, not to deal with pupil's personal problems. Do you agree?
82. T<sub>2</sub> I don't agree with this. You can't just teach the learners without looking at their personal problems. You know, some learners have their personal problems; you can't just teach them while they have their personal problems. You have to attend to them but you have to find out what is wrong with them, so that you can approach your conscience to what the problems are there. If you are not aware of the problems the learners have, you can't solve it and no learning will take place.
83. I How will you make a learner to come to you?



84. T<sub>2</sub> It is difficult to let him come to you, unless you identify that he has a problem. They normally don't come to us. But once you identify that this learner has a problem, sometimes in class the learner is not writing the work. Sometimes he does the homework but the performance in test is opposite what he does in the class, then you see that here is a problem. Then you go to the learner try to persuade him, so that he can tell you what his problems are, and then you help.
85. I Can I say you have changed a lot compared to before SASEN course and now?
86. T<sub>2</sub> I can tell exactly, whether you have seen a change or not.
87. I Well I have seen some change but do you also agree that your teaching style before and now, we see a lot of change
88. T<sub>2</sub> Yeh! According to my view that has changed.
89. I. In which case?
90. T<sub>2</sub> In my approach, you know in the past I was the only person giving the learners information. But of late I also get their views. They give me what they know. Then I know their views also. I feel I have also learned something. It is no longer teacher centred.
91. I Thank you for your co-operation and support.

### B3.2.1 Sch-5

(Maths Teacher, 4 Sept. 2001)

92. I Mr. teacher I am aware that you attend the SASEN project and you are there for two years now. This is for research purposes so I will like your true feeling.
93. T Yes.
94. I Generally Maths/Physical science has poor results in our school. What contributes most for this performance? What is situation in your school?
95. T I think the most contributing factor is "*the attitude the learner has for these two subjects*" for example in lower classes the learners ignore the importance of practice in these subjects. In turn in higher classes trapped in the situation where they are missing the skills and information to continue these subjects further: Secondly the overcrowding. In Maths/Science they need much individual attention from the teacher. So when there are many students it becomes more difficult to pay attention to every learner.
96. I Yeh! How do you try to improve these things?
97. T First I make learners to work in groups, so that they can assist one another, after teachers have helped them. Then having extra classes to help them.
98. I Do you think that CASS consumes a lot of time?
99. T The way it has been introduced to the teachers, it consumes a lot of time. It does serve the purpose, it was meant for. For example some of the teachers they feel that this is a tool to make them do extra work, in that way they try to achieve quantity in place of quality. In that way it doesn't serve the purpose.
100. I Can you give an example where quantity is more important than quality?
101. T Yeh! For example If you are doing Mathematics they tend to say work so much per week, so much home test works per term, you will find that there are some problem that will make the teacher to be a less slower in terms of achieving the numbers in terms of that. In such cases the teacher rush to cover the number and not to do the work thoroughly, which affects quality.
102. I A school principal should put teachers to task if his learners don't go beyond 40%, and recommend for demotion? Please comment.
103. T I think it is not right to challenge a teacher for the result what he has produced and recommend him or her for demotion. The principal has to look for many things and assess the whole situation. So that he can find where the problem lies. Because you may look at the teacher at the present only to find the problem is not with the teacher. The problem may come from other teachers before. Therefore the principal has to look for other possible factors.



104. I I hope you joined further Diploma in Education programme by your own choice and free will. Give your feeling about the project. Do you like it? What do you expect from it, will it make you a better teacher? Are you happy with the staff of University of Pretoria?
105. T. Yeh! This project has good things for the teacher, I hope so. It helps teachers to grow themselves. If you do some learning as a teacher definitely it is going for your improvement. I have improved myself. I have improved in much of the content knowledge, which I was not aware of in Maths and learning and teaching strategies as well. Again this project definitely will make me a better teacher. I will improve my content, strategies as well as result of my learner. Again I am happy with staff of UP. Yes I will say that. Initially they assumed that as a teacher we know many of the things but factually we didn't. Now they have changed and they are doing excellent work with us. I am very happy.
106. I Suppose you are asked by the principal to attend a meeting after the school. Would you be prepared to do so?
107. T Yes of course, why not. A teacher is teacher for 24 hours. If a teacher is asked to do some job of a teacher, he has to do it unless there is some problems.
108. I A learner asked a subject question in Maths/Science class and teacher is not sure of the approach to answer. Put yourself in that situation and suggest what the teacher should do?
109. T It is true that you as a teacher should be able to satisfy with everything the learners, but it happens sometimes that you are not sure of the response you have to give to learners. I think it is a right thing to indicate to the learner that I have to go and find out what exactly the response is, while tell them what you know as relevant.
110. I O.K. Teachers should plan and prepare a lesson in full with worksheets and then only go to the class. Don't you think this to be the wastage of time when CASS and vast syllabus are already demanding so much time?
111. T Yeh! This is a very important part of our work of as teachers, we need to prepare yourself thoroughly so that we can face any challenge that is brought forward by learners in a class and satisfy your learners. It is not wasting time rather to be fully prepared to do the best. It saves time also.
112. I A Maths/Science teacher's role is to teach not to deal with pupil's personal problems? Do you agree?
113. T. As a teacher yes, we have to teach. But again I would say that learner's personal problems we have to look into because we can't do excellent work while the learners are disturbed with their problems. So we must find out and help them.
114. I Can I say that you have changed a lot compared to before the SASEN course and now? I want to hear from you about the impact of the course on you.
115. T Definitely, I have changed I would say. Now I prepare my lesson with new strategy, which I didn't know earlier. But now I have learnt a lot. Some new strategies and some more things, which I was not aware. So I changed many things. So I would say I am another teacher compared to before.
116. I Did you learn computers?
117. T Yes.
118. I Did that play any role?
119. T Yes. It is always good to know the new technology and to know what is happening around. Yes SASEN has given the opportunity. It is a nice thing.
120. I Thank you very much for your support for the interview. Still we are together.

### B3.2.2 Second teacher T4

121. I Mr. teacher you are welcome to the interview session of the evaluation of SASEN.
122. T Thank you Sir.





123. I Generally Maths and Science has poor results in our school, what contributes most for this performance?
124. T I believe here to be the poor background from where these learners come in Physical Science and Mathematics. In lower classes the teachers do the courses just for a pass the basic concepts are not grasped properly. In Maths it is even a big disaster.
125. I Would you get enough time to meet the demands of CASS and complete the syllabus?
126. T Particularly this year because of too many OBE workshops and engagements we have lost much of the teaching time, so there is a pressure but we welcome CASS.
127. .I A school principal should put Maths/ Physical Science teachers to task when the learners don't go beyond 40% and recommend for demotion? Please comment.
128. T I don't think this will be helping, because it is a quality issue. I advice that the principal should sit with the under performing teachers and discuss what are the weak points, where something could be done. Disturbing the teachers would mean affecting the result again in the following year.
129. I I hope you joined the FDE programme by your own choice and free will, give some feeling about the project. e.g. Do you like it, what do you expect from it, will it make you a better teacher, are you happy with staff of University of Pretoria?
130. T Firstly, I would say that this is a very good project. Because in previous years we just get the programme without the contact of the lecturers with us in contact. I would expect from the programme to address the needs what teachers have. Because you find among teachers that one is good in Maths and poor in Physical Science and vice versa. So I believe after this the teachers should be balanced. It helped me to become a better teacher. What we have covered in Chemistry this year, I am much more confident than before. What I didn't know how to explain, I brought the problem to our FDE classes and Professor would deal with that and make us confident. The staff we have from UP. we are very happy with them.
131. I Do you feel free to ask questions?
132. T One more thing I found that they don't take us as their juniors . They respect our feelings and us. That we are teachers, we are there it doesn't mean that we don't know anything. In this we come together in form of clusters. We meet and discuss our problems and solve it, otherwise we never meet. This has brought teachers very close to solve the problems collectively. When we are together we are able to discuss the problems together, share experiences and develop. That makes this project a success.
133. I Suppose you are asked by the principal to attend a meeting after school. Would you be prepared to attend?
134. T I always do attend. I believe that every event has a purpose. I attend. I know that in teaching line we must have a sense of code. Sometimes we are doing something in class and take it home to work there. I have no problem with that.
135. I A Maths/Science teacher felt that his learners are learning the teacher's subject competency in the subject by asking questions from other books and resources, which is not used in that school.
136. Imagining yourself in that situation, elaborate your reaction to those learners (include your liking and disliking).
137. T If they ask questions, you are fortunate. The problem these days with learners is that they don't ask questions and that tempts a teacher to come to class unprepared. But if learners come with inquisitive mind, you are always on guard, otherwise caught in a corner. You read more. If you don't know then there is time to go with the question research more and then come. It should be welcome idea.
138. I Teachers should plan and prepare a lesson in full with worksheet and then only go to the class. Don't you think this to be wastage of time when CASS and vast syllabus are already demanding so much time?
139. T That is what is expected of us that we must have a written preparation. I believe that I should not prepare just to file or to show others only. My preparation should be a guide



- reflecting what I have to do in the class, at the same time it should be given a base for improvement on it during coming years.
140. I A Maths/Science Teacher's role is to teach, not to deal with pupil's personal problems. Do you agree?
141. T How can a teacher only teach and ignore learners' problems. Because some of their problems might affect their performance, therefore, you have to inquire and see that it is sorted out. Sometimes even the problem can be you, yourself as a teacher, enquiring will help improve.
142. I Can I say you have changed a lot compared to before SASEN course and now?
143. T I will say yes. I have changed. Although it is too early to say that I have changed a lot. I am now much more confident than before, my learners also reflected it several times. I can stand and debate things in Science. I can stand and present lessons in Science, before I used to be shy and may be undermining. Also to have the resources, I have developed a lot.
144. I Thank you very much.
145. I Is there any change in attitude?
146. T I am a positive person. So I don't have many problems, but many had negative attitude about the project, when we met in the clusters but now they are becoming positive.
147. Thanking each other.

### B3.3.1 Sch-6, Maths Teacher, Aug. 2001

148. You are most welcome to my interview about your SASEN interview.
149. T Yes.
150. I Generally Maths/Physical science have poor results in our schools, what contributes most for this performance/ What is the situation in your school?
151. Learners are not exposed enough to the required standard in their previous classes. They have a negative attitude towards the subject.
152. I Would you get enough time to meet the demands of CASS and complete the syllabus?
153. T Yes. If we do some extra classes and learners attend.
154. I Are you willing to do that?
155. T Yes, we are willing.
156. I A school principal should put Maths/Science teachers to task when learners don't go beyond 40% and recommend for demotion. Can you comment?
157. T I think the principal should be involved at classroom situation, he should depend on what we are doing in the class and not on the final results of learners.
158. I I hope you joined the FDE programme by your own choice and free will. Give some feelings about the project. Do you like it? What do you expect from it? Will it make you a better teacher? Are you happy with the staff of the University of Pretoria?
159. T I like the project very much, because I am exposed to other Science teachers and interaction with other gives me much confidence in what I am doing in my class. I also believe that the project is going to make us good teachers. The staff of UP. are very good. They are giving us everything what we wanted.
160. I Suppose you are asked by the principal to attend a meeting after the school. Would you be ready to attend?
161. T Yes I attend any meeting asked, even on weekends I do attend.
162. I A Maths/Science teacher felt that his learners are testing the teacher's subject competency in the subject by asking questions from other books and resources, which is not used in the school. Imagining yourself in that situation, elaborate your reaction to those learners.





163. T Well learners can ask questions from other books they are taught in the school. It means that they are exposed to other resources and teacher should also be exposed to many other books. This is a very good idea.
164. I The teachers should plan and prepare a lesson in full with worksheet and then only go to class. Don't you think this to be the wastage of time when CASS and vast syllabus are already demanding so much time?
165. T A teacher can present the lesson if he knows what has to be presented with the worksheet or without. Because most of the time to produce worksheets and handouts are not easy.
166. I A Maths/Science teacher's role is to teach and not to deal with pupil's personal problems.
167. T Teachers have to see that learners problems be sorted out. Sometimes even you have to visit their homes to know exactly what is worrying the kids. Learning will not occur if learners have problems.
168. I Can I say you have changed a lot compared to before the SASEN course and now? I want to hear the impact of the course on you.
169. T To me I have changed a lot because of the resources and knowledge learnt in the course. The guides and information have helped me a lot. The computer skill also created a lot of confidence.
170. I Thank you very much. Keep well. I wish you luck at the SASEN course.

### **B3.3.2 (Science and Maths teacher). Aug, 2001**

171. I You are most welcome to this interview. Please feel free and answer in a natural way.
172. T Yes.
173. I Generally Maths/Physical science result in our schools are poor. What contributes most for this performance?
174. T Yes Mr. teacher may be one has to look into the approaches in which we teach Maths and Physical science to our schools. Usually when a teacher introduces a chapter, it is too theoretical is not enough practical.
175. I Would you get enough time to meet the demands of CASS and complete the syllabus.?
176. T Yes. Most of the schools mix the classes in one for this purpose at the same time. Most of the time CASS comes from team effort, but scored individual.
177. I A school principal should put a Maths Science teacher to task when the learner's don't go beyond 40% and recommend for demotion?
178. T Yes, I can agree but I would say that the school principal should not look at the result only. He should see the work of the teacher in the class as well as out of the class and then may see the result.
179. I I hope you joined the FDE programme by own choice and free will. Give some feelings about the project. Do you like it? What do you expect from it? Will it make you a better teacher? Are you happy with the staff of University of Pretoria?
180. T I have to say that 'FDE' programme has helped us, I like it very much (Repeats the same again). One greatest advantage is that we are working in team clusters. When I have a problem in class, in my cluster it is solved. And again we are doing practical things. I expect that if I pass my FDE, I will be a very good teacher here in the secondary school. I can even help others around the school. I will be a better teacher in Maths and Science. They are good lecturers from UP. and they are working in a team, they are hard workers.
181. I Suppose your principal asks you to attend a meeting in the afternoon. Would you be prepared to attend?
182. T I am very happy. I am always able to anything for the school at anytime even at 6 pm.
183. I A Maths/Science teacher felt that his learners are testing the teacher's subject competency in the subject by asking questions from other books and resources, which is



- not used in that school. Imagining yourself in that situation, elaborate your reaction to those learners.
184. T It is a very normal situation and it is happening in our classes. I take the question down and ask the learner its reference. I take the problem to my clusters and collectively someone will solve it and it is done. Next morning I will explain to my learners.
185. I Teachers should plan and prepare a lesson in full with worksheet and then only go to class. Don't you think this to be the wastage of time when CASS and vast syllabus is already demanding so much time?
186. T Well it will be a waste, if the school can't afford in terms of papers and other resources. If one is not prepared to give class work, where will you get the CASS. Both go hand in hand.
187. I A Maths/Science teacher's role is to teach, not to deal with pupil's personal problems. Do you agree?
188. T I disagree. Totally disagree.
189. I Han.
190. T Because as a teacher you are like any teacher in the school, at games you are like parents. You can't teach if your child has problem. You have to solve the problems of the child.
191. I Can I say you have changed a lot compared to before the SASEN course and now? I want to hear from you about the impact of the course on you.
192. T Yes, it has done a lot for us. It has changed the inner approach to Science education, the personal approach to the needs of a child. It has made us international. Now I teach my learners beyond and make them competitive in any field.
193. I Thank you very much for your support and co-operation Mr.teacher. I wish you luck in the programme.
194. T Thank you.

### B3.4 Sch-7, Cluster 3

#### B3.4.1 Science Teacher *Aug 2001.*

Introduction:- This interview is to find out more about SASEN project, which you are attending.

195. I Generally Maths/Physical Science has poor results in our school, what contributes most for this performance?
196. T Yes. This is true. Teachers need more training for their better performance. We need to be linked with the other countries, so that we know how other teachers do.
197. I What do you think is the role of the learners?
198. T Learners are positive as far as Mathematics is concerned. Even though some students have got the attitude that Mathematics is difficult. With the help of knowledgeable teachers the students do change their attitude from negative to positive.
199. I What is your position in the negative attitude of the learners towards Mathematics?
200. T SASEN project has been successful to provide me with conceptual vision regarding Mathematical knowledge. Now I am able to handle with confidence any question in class. Calculus and its application, which I learnt through SASEN, have made me more confident and I am able to generate a positive attitude among children.
201. Comment: SASEN-Conceptual knowledge-Delivery (as an impact) in terms of changing the attitude.
202. I What is your view about continuous assessment?



203. T I think CASS is also important. This will help us to assess learners only once in the end. CASS provides us with opportunities to find the immediate weakness of the learner as well as of the teacher and student both can be remedied.
204. I Do you help as a role model teacher for other teachers and do they accept it?
205. T Yes. I am not teaching grade 12, but I have made plans held meeting with the teachers to help. So that he can teach his classes well, because I am teaching grade 11.
206. I A school principal should put Maths Science teachers to task when the learner don't go beyond 40% and recommend for demotion? Please comment.
207. T I think in this case there are many other causes around this, which may cause low rate of success. Learners are not well motivated, they need motivation by the teachers, and they need to be positive to pass the subject.
208. I You mean he can't recommend for demotion?
209. T I don't think so, but he can recommend for a demotion or instead for an improvement plan.
210. I O.K. I hope you joined the FDE programme by your own choice and free will. Give some feelings about the project. Do you like it? What do you expect from it? Will it make you a better teacher? Your opinion about the UP. staff.
211. T Yes, I joined it because I like it. I expected a lot and received also a lot. I learnt how to approach and teach Mathematics, how to assist learners. I think it is going to make me a better teacher.
212. I Suppose you are asked by the principal to attend a meeting after school. Would you be prepared to attend it?
213. T I can attend it because I have to satisfy the need of the school.
214. I A Maths/Science teacher felt that his learners are testing the teacher's subject competency in the subject by asking questions from other books and resources which is not used in that school? Imagining yourself in that situation elaborate your reaction to those learners.
215. T I think in this case you can't expect them to remain with only one book, they may go to other books also. So the teacher should acknowledge it as a challenge. The teacher should try to attend to it. If it is in my case I like it. I should find solution and help the learners. I welcome it and appreciate it. I myself was asking such questions from other books when I was a student.
216. I The teacher should plan and prepare a lesson in full with worksheets and then only go to the class. Give your opinion. (Time consuming)
217. T I think planning matters a lot. If you work without planning, at the end you don't know from where you came and to where you are going. So of course this will help me better in my work. I welcome it.
218. I a Maths/Science teacher's role is to teach not to deal with pupil's personal problems. Do you agree?
219. T I say it is not right, just to concentrate on teaching because learners with problems will perform poorly in the class. So it is the responsibility of the teacher to also cater for the problems that the learners are having. I do and have done it several personal and serious problems with learners. And I found that my help really improves their situation.
220. I Can I say that you have changed a lot compared to before SASEN course and now?
221. T Yes, Yes, Yes. I do agree that I have changed. The way I approach problem and I teach learners I am no longer teaching as before but now I use many strategies, which I didn't know before, I entered to SASEN project. Now I am different. Example like working in groups, and at the same time not forgetting the individual learners.
222. I I thank you very much for the co-operation.

#### **B3.4.2 Mathematics Teacher, Aug, 2001.**

223. I Welcome here in the interview.



224. T Generally Maths/Physical Science has poor results in our schools, what contributes most for this performance?
225. T Our children have got the attitude that Mathematics is difficult. Most of them they fear and don't attend the periods. They have an attitude of not attending Mathematics.
226. I How are you sure about their negative attitude?
227. T When we collect them and ask the reason for not attending and performing they say so and this they got from their seniors.
228. I Do you get enough time to meet the demands of CASS and completing the vast syllabus?
229. T Sometimes.
230. I A school principal would put Maths/Science teachers to task when the learners don't go beyond 40% and recommend for demotion. Please comment.
231. T She agrees to employ more people and improve through teamwork.
232. I I hope you joined the FDE programme by your own choice and free will. Give some feelings about the project. Do you like it? What do you expect from it? Will it make you a better teacher? Are you happy with the staff of University of Pretoria?
233. T Yes I like it. I expect it to be more developing. It has laid a foundation and more development is needed. It has made me a very good teacher. I am happy with them, I have never understood Mathematics before this project.
234. I Suppose your Principal asks you to attend a meeting after the school, would you like to attend?
235. T I would like to know the agenda and then I will decide compared to my other engagements, but I will attend because he is my superior.
236. I A Maths/Science teacher felt that his learners are testing the teachers subject competency in the subject by asking questions from other books and resources, which is not used in that school. How do you take it if you are the teacher?
237. T I would like to hear such questions from my learners, but I will ask time for doing more research on the topic and then I will deliver.
238. I Teachers should plan and prepare a lesson in full with worksheets and then only go to class. Do you think it is wastage of time?
239. T I don't think so because when you have prepared the lesson you don't waste your time in class.
240. T A Maths/Science teacher's role is to teach and not to deal with pupil's personal problem. Do you agree?
241. T I don't fully agree, because sometime you find the real problem with the student and they can't concentrate on work, we must solve it. I must attend to it and not to ignore in any case.
242. I Can I say you have changed a lot compared to before SASEN and now? I want to here from you the impact of course on you.
243. T Yes I can say I have improved very much because since I am at the school I have always taught standard seven students never changed to others. It was not challenging, instead it was boring for me. But now when I am doing this course I am a new person. I can teach any standard, I am never bored and I have confidence.
244. I I thank you very much for your support.

#### **B.3.4.3 Science Teacher, Aug, 2001.**

245. I (Welcoming him for this interview).
246. T Thank you.
247. I Generally Maths/Physical Science has poor results at our school what do you think contribute most?
248. T I think the facilities like ever from apartheid time there is no laboratory, useless old equipments and untrained or unqualified Science staff. Another factor is that learners are told that these subjects are difficult and that demotivates them.



249. I Who do tell the learners that Science/Maths are difficult?
250. T Teacher who teach them in lower classes. I remember when I was in grade 10, teachers asked us how many of you can go for Science and Maths to cope with the demands of them. Only two learners (including myself) answered in favour.
251. I But who did tell them that the two subjects are difficult?
252. T Those teachers teaching in lower classes.
253. I Did you tell to your learners anything?
254. T No. I tell them that these are nice subjects with lots of opportunities for life. If you succeed you don't suffer for jobs with Maths/Science.
255. I Would you get enough time to meet the demands of CASS and complete the syllabus?
256. T CASS is good. If it is used effectively and if it is not cooked, it will help.
257. I A school principal should put Maths/Science teachers to task when learners don't go beyond 40% recommend for demotion? Please comment.
258. T I don't agree. Try to mould and develop the teachers.
259. I Give your feelings about the SASEN project. Do you like it? What do you expect from it? Will it make you a better teacher?
260. T I like SASEN very much. Because now I have a problem for that Diploma senior primary teachers Diploma, which doesn't qualify me to be a teacher of Secondary school. But because of SASEN and the knowledge that I am receiving I can manage my work well. I expect to get more skills and any thing, which can help me to help learners become responsible adults. It will make me a better teacher because what I learn from SASEN I practice in my class and also help Science group problems. I also come with my problem and solve together to have togetherness.
261. I About University staff I am very happy. They give us everything and if we have problems we are not afraid of telling them, they help us actually. I like SASEN project very much.
262. I Do you feel that doing the same with your learner in your class?
263. T I like it so much and encourage them to come to me from any other book also. I try to get the answer. If I don't have an answer ready that time, I go with the problems, prepare at home and come back second time to tell them and it is going well.
264. I If principal ask to attend a meeting after the school, would you like to attend?
265. T I will do so freely.
266. I Don't you feel that it is encroachment of your free time?
267. T Education, I take it first.
268. I Teachers should plan and prepare a lesson in full with worksheet and then only go to the class. Is it not wastage of time for you?
269. T According to my belief a teacher must not go to the class without fully prepared. Because when you prepare you know the contents, method to deliver in the class. If you don't do that you leave the learners astray. You have to manage your time accordingly.
270. I A Maths and Science teacher's role is to teach and not to deal with the pupil's personal problems. Comment.
271. T No, No, No! I disagree with it. You have to take care of your learners because the learners understand you if they have encountered problems at home and can't solve themselves.
272. I Can I say you have changed a lot compared to before SASEN course and now. I want to hear from you about the impact of the course on you?
273. T There is a great change. I have learned to using computer and to work on my own. Even to work at school in my class there are skills. If I carry on further I have developed an ambition to be a Professor one day or Doctor.
274. I Thank you very much for your achievements, keep it up. I wish you all the best. Your research findings are very important.




**B3.5 School, Sch-4 : First Round of Interviews Aug, 2001**
**B3.5.1 MathsTeacher**

275. I Welcome to my interview session and want you to feel free and comfortable.
276. I Generally Maths and Physical Science has poor results in our school what contributes that, what is your situation in your school?
277. T What I think which usually contributes this is may be I can attribute it to crowding with teachers not having individual attention to the learners. Especially in Science we need facilities, to do experiments because we don't have necessary equipments and it becomes really difficult for teachers to teach in that situation. I think lack of discipline in learners can be a problem contributing to our poor results of Science and Maths because when we give them work, they don't do it because they know it does not count for their final works, but so far in our school I can say the result have been average, but it fluctuates.
278. I Would you get enough time to meet the demands of CASS and complete the syllabus?
279. T Yohoo... it is very hard here, because we have to cover the work in std. 9 and together with std. 10, becomes a hell lot of work, which must be done and at the same time we need to record to do our service in time. So I think may be it need little bit time, it will happen with time, because at the moment we writing a trial exam and if I am not finished, then what I am going to do, and finish it toward the end quarter of the year.
280. I A school principal should put Maths and Science teachers to task and when the learners don't go beyond 40% and recommend for demotion?
281. T That's an interesting question, I don't think the performance depends on teachers, alone, there are many factors that influence the learners to get the right marks. So I don't think it will be a problem for anyone or the principal to recommend promotion of teachers, unless some investigation are done, and may find out that he is not going to the classroom at time, or I don't know, I don't think that will be a good move, unless all the situations are considered.
282. I I hope you joined the FDE programme by your own choice and free will, give some feelings about the programme. Do you like it? What do you expect from it? Will it make you a better teacher? Are you happy with the staff of the University of Pretoria? One by one please.
283. T I do like it. Why do I like it is because people really work, there is not individual thing. They discuss things wherever I have misconceptions, I have my colleagues to explain me that is why I like it. May be if I know something and when I say to my colleagues they correct me, what I expect from it, is that I must make me a different person. I attend the course and I will say this course has made me a better teacher than last year, I have improved.
284. I Did you improve?
285. T Yeah, I think so, it has reflected my teaching, and it is different the way I use to teach two years ago.
286. I Can you point out some prints?
287. T I used to be a kind of teacher, who usually wanted to give lectures to teachers, but now I love to explain everything to them.
288. I Suppose you are asked by the principal to attend the meeting after 2 O' clock, would you be prepared to attend?
289. T Yes, I will be prepared to attend, depending on the whole nature of the meeting and some commitments I have made or if I have some very important work to do, it depends on the situation.
290. I Is there any change in your attitude, on this point before?
291. T No I don't think so, because I believe I plan my activities before. So therefore if somebody wants me to do something else, I must be informed in time, but things coming suddenly will make some inconvenience.



292. I OK, A Maths and Science teachers felt that his learners are testing the teacher's competency in the subject by asking questions from other books and resources, which is not used in that school. Put yourself in that situation and elaborate your reaction to them, include your liking and disliking.
293. T I don't feel pressurized, I am not a genius, I don't know everything, If they ask me something I don't know but what I usually say is that when the question is being asked and I don't know the answer, I usually say I don't know the answer and I feel disappointed that I was unable to answer the question, then I give myself time to go and do it. Sometimes I ask the learners to come to me and we will look at it in the spare time.
294. I Teachers should plan and prepare a lesson in full with worksheets and then only go to the class, do you think it to be the wastage of time?
295. T It is true that the teacher should come to class fully prepared, you can't go to class without knowing what you are going to teach, you can't go to class and just start teaching, we need to learn, with me it is not negotiable. We need to have a direction, if we come to class without planned we don't have a direction, you won't know what you are talking about.
296. I Are you not affected by time constraints?
297. T No, because after school in my free time I do my things. I know the timetable because, what has to be taught in the class so I prepare myself.
298. I A Maths, Science teachers role is to teach not to deal with the learners' personal problem, do you agree?
299. T No, why, because learning takes place when child is normal socially, physically and emotionally, when the entire situation around the child is normal. So if a pupil has a problem, I think I have to attend to that problem, because if I teach a learner and he/she has some other problems, they won't concentrate in the class. So I think it is essential, if I can, to attend to their problems.
300. I Is it your personal view or you say it for other teachers?
301. T It is a personal view, but at the same time I think that it is what all teachers do.
302. I Can I say you have changed a lot compared to before the SASEN course and now?
303. T Yes, before when I used to have problems I used to tackle them myself, but now I think of other colleague who can help me and attend the problem. It is not true that if I don't know something other people don't, so it is better to ask them than remaining ignorant.
304. I Point out the impact of the course.
305. T On my teaching or.....
306. I Anything.
307. T I think my teaching has improved, as I said before.
308. I Any other thing I like computer literacy.
309. T Yes, Computer literacy has increased, before when ever I used to sit, I didn't know a lot of programmes but now I know.
310. I I heard your principal is struggling to get computer, when he gets it, what will be your role?
311. T My role, last week I went for the basic computer course, I was chosen by the staff to go there. If we get computer, then I hope the other teachers and pupils will get the knowledge from me of what I know.
312. I Thank you.

### B3.5.2 Science Teacher

313. I Generally Maths and Science has poor results in our schools. What contributes most for this performance?
314. T I can just say, a lot of reasons can contribute to it. I can say lot of teachers don't get he right education at high school and college. So the teachers are not that competent, so they



- are not confident, if the learners are getting what they are teaching. For Physics yes some teachers did have the right Physics but the attitude of the learner towards Physical Science does make a difference. Most learners think that Physics is difficult and because of that stigma they don't perform to their level best. And the second reason, why most of the schools have low Maths and Physical Science pass rate is because the management of teachers is not done properly. The syllabus is not finished on time in most schools because the teachers don't go for most of their class, and most of the work is left up to the student.
315. I So you think pressure should come from Principal?
316. T Not necessarily, you have the syllabus, you can just say that I can complete the syllabus by end of September or if it is going slow say may be I will finish in October. It doesn't matter when you finish the work, but if you are having problems in explaining some concepts then there is no help for us from management. Let's say here if we are having some problem in Science and we go and ask some other Science teachers from other schools, the head of the department will request immediately, so they need to have some one on the top of the management, they need to have someone to make sure all the principals have control over their school staff and know what is going on. If teachers have problems they can go to University and colleges to understand the concept clearly.
317. I Do you get enough time to CASS and complete the syllabus?
318. T For CASS, I need to have a lot of time because what you do in one day, you need to record everything the next day.
319. I Should the Principal put Maths/Science teachers to task when the learners don't go beyond 40% and recommend for a demotion? Please comment.
320. T I don't think the teacher needs to be blamed at the end of the year, if the learners don't pass. If there are problems, the Principal should communicate with the teachers and try to improve them or to have an in-service training for teachers, where he is lacking than in the end the finishing has to be done.
321. I So to punish a teacher based on the end of the year result, do you think is not right?
322. T Ya, it is not right, if the teacher is not experienced enough, and then the Principal should know by the first quarter.
323. I The teacher have to report it to the Principal that my learners are not doing well.
324. T The teacher have to report yes, and the teachers report that the learners are not doing well that is what has to be done before?
325. I But who is responsible for this?
326. T The failure of the learner can't be entirely the responsibility of the teacher. The learners might have a contribution in the case where they are taking lesson from another teachers, who didn't give learners enough background for the next grade. Then the teacher will have a problem, than the teacher will come and say, suppose if the learner's are in grade-11, and have not done something which they should have done in grade 9 or 10. So it is impossible to move with those learners in grade-11 work. That means we need a co-operative work among teachers.
327. I I hope you joined the further diploma in Education by your own choice. Give some feelings about the project. Do you like it, what do you expect from it, will it make you a better teacher, are you happy with the staff of University of Natal?
328. T Yah, I like the project, although I have uncertainties, there are of a number of things which are not clear. There are changes now and then, there are always uncertainties. I am talking about the year 2002. Um, what do I expect from it, what do you expect from Maths and Science, that it will improve my Maths and Physical science because they are used in everyday life. I guess I got that from the project and I think that has made me a better teacher. Concerning the staff I am happy, with the stuff they provided us.
329. I Can you manage classes?
330. T First, I could manage classes, but now it has started getting difficult.
331. I Suppose you are asked by the principal to attend a meeting after the school hours. Would you be prepared to attend?



332. T It depends on my plans because, I am a mother I sometimes have to consider my family, and so if I am not committed to my family then I can make it.
333. I But you have signed a contract to work for 7 hours, sometimes 24 hours.
334. T Yah, I agree on it but I can't say that I can leave my kids alone, I will make arrangement if the schedule of the meeting is given in advance. I will make arrangements and I will attend it, but if the meeting was not scheduled then I have to consider.
335. I A Maths, Science teacher felt that the learners are testing the teacher's subject competency by asking questions from other books and resources which is not used in that school. Imagining yourself in that situation, elaborate your reaction to those learners.
336. T If you are having such learners, who need to be tackled, you should think that you are going to answer directly or not, and as a teacher you must always take the responsibility and be prepared for their answers. Once I also had such experience.
337. I What did you do?
338. T Actually what I did was I told to the learner you got such and such answers, and if I know the answer then I will give a clue in the answer and postpone to other day.
339. I So again you are trying to protect your integrity?
340. T I have to do so that they can trust on me as a teacher.
341. I Teacher should plan and prepare a lesson in full with worksheet and then only go to the class. Don't you think this to be the wastage of time when CASS and vast syllabus are already demanding so much time?
342. T I think the teacher before he goes to the class should be fully prepared and he/she must have their lesson ready. That is what you really want the learner to achieve and you can't do it without preparing yourself.
343. I What about the time?
344. T About time, I don't think it takes much time to prepare because if I want to prepare a one hour lesson. In order to complete, I have to prepare, I have to come to class thoroughly prepared, so that I won't waste much time being uncertain of what I have to teach. So I have to get rid of all these issues. And how you can be sure? You can only be sure if you prepare in advance. And you will have more time discussing and answering their questions if they have problems.
345. I So you mean if you plan for a lesson you plan for test also?
346. T Yes.
347. I Do the learners come with the personal problems to the teachers?
348. T Yes, they do and all the teachers try to solve their problems, which they can't go and tell their parents. Myself I had a student from grade 9, he was having problem with studies and the same time started smoking and drinking during class hours. I had to be with him and tried my best to talk to him out of this habit, expect this there was another problem with a girl, she used to be very quite in class, I called her and asked her what is the problem, she had family problems. Her parents were getting divorced so she was very upset. Then I tried to explain her that let it not be your problem, try to find yourself where you going to be comfortable between two of them. The only way is to concentrate on your studies, only this way you can stand on your own, and can come out of this situation later in your life.
349. I So I can say you have changed a lot compared to before the SASEN course and now.
350. T Yes, I have changed. Comparing the approaches that I used to before I gained a number of them, I am teaching Science at the moment I have learned a number of different approaches to different section of work, which I teach so I think I have gained.
351. I What major skills you have got?
352. T Group skills and the other one is to use worksheets when I am not teaching.
353. I Regarding computer literacy.
354. T Regarding computer literacy yes, although we are not using computer, but now I know how to use a computer. Last I didn't know anything about computer, but I can try and can do a lot of things.
355. I Statistics?



356. T No, I am not doing statistics, I am doing Chemistry. The people who are using computer most of the time are Statistics people, and they think we should also get involved in computer.
357. I Do I see that you will complete the course in spite of difficult situation?
358. T I feel that I will complete the course, but at the same time we do have uncertainties about the course because we tried to know how long it is going to take, at the same time we need to know their whole curriculum.
359. I Thank you Ms. Mejini
360. T You are welcome.

### B3.6 Sch-8

#### B3.6.1 Science Teacher Aug/Sept. 2001

361. I Mr. Teacher you are most welcome to my interview session. Generally Math's and Physical Science have poor results in our school. What contributes most for this performance?
362. T I think the first thing is the learning attitude toward the study. For example learners do not do work if you give homework. One student does it and the others just copy it. This way they do not understand.
363. I What is the situation in your school?
364. T the situation is almost the same. They do not do class work and homework themselves but when teachers explain they understand.
365. I So, it is the task of the teacher to change the attitude of learners?
366. T Yes the teachers encourage the students to learn and give them the right way.
367. I What is your attitude about Science and Maths?
368. T I like Science and Maths.
369. I the attitude what learners have now, when you were young, that time did you also have similar problems and now you became positive?
370. T In my case it was the old system where things were forced and we had to study hard and that made us positive. But this time it becomes difficult.
371. I So in your opinion forced work made you to go for deeper knowledge of the subject.
372. T Yes the force makes you to go and study in turn you know the subject and do better.
373. I Do you get enough time to meet the demand of course and the syllabus?
374. T The demand is huge, but with the education it can be done because when it is the priority. Education has to be done.
375. I Do you take it as your priority?
376. T Yes, I do take it as priority, As I said before when you give a learner a project to go and do it. When he comes back we mark, record it and keep it in the record as a part of their progress report. The learner will go home and try to find more information, how to get more marks. In that case he is constantly assessing the member to find information. Working together and putting it together.
377. I Do you think this will help the lazy teachers some how who do not mark and keep record.
378. T I do not think it can help them, because they only go to classes once in a week and they can't get the project notes, assignment from them.
379. I No, do you think these classes will help the lazy teachers to improve themselves?
380. T Yes, I do think it will help them to improve.
381. I The Principal should put the Math's and Science teachers to task when the learners do not go beyond 40% and recommend for demotion.



382. T I do not think this is correct, because if the learners get below 40%. It is not only the teachers who should be held responsible. Even a good teacher can get less than 40% average if the learners are not dedicated to their work and the other thing that the principal should also try to back up the teachers. May be trying to see what experiments were done and what has to be done.
383. I What is your view about COLTS? The culture of teaching, learning and services.
384. T Yah, there are cultural codes. Even though the teachers are in mood to teach, but when the learners do not want to learn, the teacher also gets de-motivated.
385. I So do you say that “*teachers attitudes are linked with learners.*”
386. T Yah, the teachers' attitudes are linked with the learners attitudes and vice versa.
387. I So both should join and become positive and have positive attitude?
388. T Exactly that is why we talk about culture of learning.
389. I Did you try anytime to look what makes it negative.
390. T Yah, what makes it negative as what I have said, if there is no good relationship between the teachers and learners. But we can improve that by becoming professional.
391. I So do you think attitude has to play a great role?
392. T Yes, attitudes have to play a great role that is why we correct our attitudes and learners correct theirs.
393. I Ok I hope you have joined FDE programme by your own choice and free will, give some feeling about the programme. Do you like it, what do you expect from it? Will it make you a better teacher and are you happy with the staff of University of Pretoria?
394. T Firstly, I have joined the project on my own because I like it. The first time we went there, they explained how the problems are solved and what is going to be learned in the future. I like it very much and I think what I expect from it that when I come out of it then I must come with the knowledge, which I can apply in teaching.
395. I Are you getting there?
396. T Yah, I am getting there because for instance one article about “The Learners self approach”. The article I still have in my mind, whenever I go to the class I like to be more like learners and try to understand their problems and come up with answers, which can be understood by them.
397. I Can you remember what skills you got, which you did not have before the programme?
398. T Yah, to conduct a discussion processes like coordinate and discuss it, give them the question that will make them think not just the question that they can get in the text book and just give them the answer.
399. I suppose that principal asks you to attend the meeting after the school would you prepare to attend?
400. T I will be prepared to attend it.
401. I So would you sacrifice your group Taxi?
402. T Yes.
403. I But this attitude what you are saying now, does FDE have to do anything with this?
404. T Yes, it got to do with it because in FDE many of our personal meetings are after 3:00.
405. I So you mean FDE is encouraging to sacrifice the time in the interest of school and learning.
406. T Yes, in the interest of the school, in the interest of the learners and school.
407. I A Math /Science teacher felt that the learner are testing the teacher subject competency in the subject by asking questions from other books and resources which is not used in that school. Imagine yourself in that situation, elaborate your reaction with those learners including likes and dislikes.
408. T There is nothing wrong with the use of different test book either from the school from the different school that should be there in the situation. It is also the opportunity for the teacher to see that his students are not depending on one textbook and he himself should not depend on one textbook.



409. I Teachers should plan and prepare in full with worksheets and then only go to the class. Don't you think this is wastage of time when CASS and syllabus are already demanding so much time?
410. T It is taking some time in planning but when presented it takes less time and provides more understanding to learners, in the end we save time. Planning is done according to the need and understanding ability of the learners. Since learners change every time therefore there should be new planning.
411. I A Maths/Science teacher's role is to teach and not to deal the problems of the learners. Comment.
412. T I don't think so because learners' personal problem also affects learner in their learning. Therefore a teacher must try to solve learners' problems as far as he can. If problems are bigger and the teacher cannot afford then he should direct the problem to others who can solve it.
413. I What should principal do, if everything is done by the teacher?
414. T As I have said that the teacher can direct the learners to the right person who can help the learners. The first person to help the learner is the principal in case the teacher has failed. In any case the problems of learners must not be ignored.
415. I Can I say you have changed a lot as compared to before SASEN course and now? In fact I want to hear from you the effect of the SASEN course on your professional behaviour.
416. T Firstly the impact is about the approach to teaching. As I have said before also that previously the approach was not learner centred. So we are changing that aspect. Now we are looking at more involvement of learners than before. Secondly the preparation of the lesson has become a sincere point. Now I cannot jump into the class without preparing for it i.e. what and how I am going to present, although I cannot claim that it would be a thorough preparation at this stage.
417. I What about your computer knowledge?
418. T Yes I have learnt some computer. Actually the SASEN project has helped improve my knowledge about computer meaningfully.
419. I What can you say about the future impacts of SASEN project?
420. T I am very positive about the project.
421. I Thank you very much for your time and feelings presented for the interview.

### **B3.6.2. Mathematics Teacher, Aug/Sept. 2001**

422. I Mr. Teacher, you are welcome to this interview. The points made will be kept secret and will be used for research work only. I hope you give your free and honest ideas about the project.
423. T Yes. I am fine with you.
424. I Generally Maths and Physical Science has poor results in our schools, what contributes most to this performance.
425. T Mr.C.I.people like to compare Science and Maths, but most pupils run away from the fact that Science is a more interesting subject. Maths and Science in most cases people doing standard 10 say that they just want their certificates; they mean that they have done Maths, not to say that they have passed Maths. Even if they can fail they don't care. Another factor is that if those students can pass with excellent marks they don't have an opportunity to go somewhere.
426. I So you mean children have a negative attitude.
- T Yes most of them have a negative attitude towards their subjects.
427. I What is your personal opinion.
429. T Yea well.





430. I I will like you to remember your school days and think that you also went to school and how did you look at it.
422. T Yea, you see if I can compare with my school days, it is other way around. Even if I remember where I studied till in standard 10 there were not enough apparatus for Science, but we did work very hard so we follow that path.
423. I So, that time despite all those weak points you had a positive attitude and you intended to learn.
424. T Of course yes. I wanted to do something; if that thought is not in your heart you can't do well.
425. I So these learners they lack it.
426. T These learners they have lack of that knowledge.
427. I Do you get enough time to make the demand for continuous assessment and complete the syllabus.
428. T I can say, I didn't get enough chance, because most of the time when I arrive at the school where I am teaching, I normally use holidays to take STD 10 but my problem was that the attendance was very poor. And when the whole class was there I had to start refresh because everybody didn't understand.
429. I A schoolteacher should put a Maths Science teacher to task.
430. T I don't have lot of comments about that one, but I don't think so.
431. I So, we mean to say the result should not be the main criteria.
432. T Yes I don't think so.
433. I I hope you join the Further Diploma in Education.
434. T The project now I'm taking at the moment.
435. I There are four options here, do you like it.
436. T Yes I do like it.
437. I Why do you like it.
438. T Ya, this project has improved me a lot for instance, since we have started doing this project on Science and Maths the knowledge I had before does not compare to the knowledge I have now.
439. I What about skills?
440. T Ya, even the skills I have learned skills from this project.
441. I What do you expect from this project?
442. T I expect that this project also it will make my future advance maybe in the sense to teach the learners.
443. I Will it make you a better teacher?
444. T Of course, of course. I will, it has improved me, I'm not like before.
445. I Are you happy with the staff of the University of Pretoria?
446. T Yes, I have no problem with the staff.
447. I A Maths/Science teacher felt that learners are testing the teacher's subject competency by asking questions from other books and sources which are not related to the subject. Imagine yourself in that situation and elaborate your reaction to those learners.
448. T Yah, you see there can learners put different questions. If maybe a child asks a question irrelevant to what I'm teaching than I wouldn't answer but if the learner asks a question which is related to the subject being taught, then definitely I will answer the question.
449. I Here the point is, should the student test the teacher's knowledge? Sometimes they attempt to test. They will ask so many questions and the aim will be to see that if the teacher can answer them.
450. T The point is, the learner should not test the teacher's knowledge but try to get whatever knowledge they can get from the teacher.
451. I Teacher should plan and prepare a lesson in full.
452. T Yah, he should prepare his lesson before he goes to class.
453. I I hope with this enthusiasm you can complete the course



454. T Yes of course.  
 455. I Ok, thanks for the interview.

## **B4 Second Round f Interviews (April – May 2002)**

### **B4.1 Sch-5**

#### **B4.1.1 Maths Teacher.**

1. I How do you want your learners to be?
2. T1 Yea! I teach the learners to be independent adults, I want them to be Doctor, Teacher and Professional to help others.
3. I Those who don't teach during normal classes go for extra classes. Comment on it.
4. T Yes. It depends on the work the teacher is doing, he can go for extra classes. Normally extra classes are needed to help learners, there is lot of information needed to be given to the learners.
5. I A teacher remains student throughout his life. Give your reaction.
6. T Definitely, we should be a learner can be a teacher. A teacher has to update with researches and new skills in the field. Consultant and improvement is necessary.
7. I Give an image of good Maths /Science teacher in your schools.
8. T Yes. Be creative and more practical. You should be able to help other when they need it.
9. I People says teachers have enough time to go around and do things on their own?
10. T I don't agree. Because preparation, marking and so many school requirements don't leave time.
11. I Should a teachers be very sensitive to learner's criticism or go as he/she likes?
12. T While you are a teacher you are still learning. You can learn even from your learners that you are teaching them everything they tell you, look into it carefully. So that you are able to learn from them and improve the area where it is needed. If you don't learn, you will be doing the same mistake every year. Therefore you have to hear learners and change yourself. You have to learn from them.
13. I So you accept that the learners are the best critics?
14. T Not all learners are a like. You have to see who is doing constructive criticism. Some are creative, some really want to destroy you so you have to be creative.
15. I Mr. Nkosi! I enjoyed your talk you really contributed to my work. Thank you very much.

#### **B4.1.2 Science Teacher April 2002.**

16. I How do you want your learners to be (image) in your class?
17. T2 Learners have to be positive. I mean learners should be willing to learn, when they don't understand they should be free to ask questions. Have inquisitive mind and research.
18. I Those who don't teach in their normal class go for extra classes. Your comment.
19. T It depends on the situation. It is duty of the teacher to teach all his classes. But still all learners are not similar, they still could be needed to go for extra classes to complete, explain and practice. When I see teacher not teaching during his classes and ask for extra classes on Saturday I don't like it.
20. I A teacher remain student throughout. Comment.
21. T I believe this should always be the case. In Science new discoveries are there and you have to learn the new knowledge and skills.





22. I Give an image of a good Science teacher?
23. T A good Science teacher is always prepared, and does practical work also. He should give learners a chance to have hands on experience and not always demonstrate in the class.
24. I So you are advocating learners centred education.
25. T Yes, I believe that should be the case. Such learners are not afraid to be faced with the challenges. Learners should be able to choose their right path of progress and career themselves.
26. I Some teachers say that teachers have plenty time to use for other things. What is your view.
27. T I don't believe this. I think only time teachers have at their disposal is after you have closed for December holidays. Otherwise learners and teachers have no free time. Much work even is done until 10 p.m. I don't believe that teachers have plenty of time.
28. I Should a teacher be sensitive to learners criticism and satisfy them and go as he/she wants?
29. T Some learners want spoon-feeding for everything. When we use new methods they don't understand and appreciate but we have to adopt them and make learners understand why we do new things with them.
30. I What is your attitude about lesson preparation
31. T I think lesson preparation is a good approach. It guides the presentation and prior readiness for the class requirements. You have a prior knowledge of weaker parts of your lesson also help you.

## B4.2 Sch-1

### B4.2.1 Maths teacher *April 2002*

32. I Mr. teacher I welcome you for the interview. Kindly feel relaxed, free and close to answer.
33. I Are you ready Sir?
34. T Yes! I am ready.
35. I How do you want your learners to be? Have you any vision about learners?
36. T Firstly I want them to be disciplined, because if they are not disciplined they will not learn what I am going to teach them. Secondly I want them to be dedicated to do the work what I gave them to do. Thirdly after completing their journey if they have successfully acquired the skills what I wanted to in still in them, I want them to be responsible adults, so that they are accountable for their deeds and be proper professionals.
37. I Are they in the direction what you wanted them to be?
38. T Not all of them. Only few are disciplined other I love to discipline them.
39. I The vision given by you regarding to learners, is there any impact of the project?
40. T Yes! Yes! It does have an impact you know. From our course we have been told that we are shifting from the old approach where the teacher was the source of everything, now the learners are supposed to be the source of information. And if you allow the learners to be the source of information, then you give them time to think about the topics and concept you have given them in a group and you need them to be more disciplined. And learners were used to that style, so they have changed and they have to adhere to the new one.
41. I Now according to you what is the impact of the SASEN project?
42. T SASEN is leading us in a 100% positive change direction. There is a great change. Now there is a completely new teaching style than before. For example: now I have more confidence.
43. I Those who don't teach in their normal classes they only go for extra classes. Comment.



44. T There may be few like that, but in my school situation is not like that. Those who go for extra classes, like Mr. teacher for example, who is teaching grade 12 extra classes right now, he always attend his every class and go for extra classes also, so I don't agree 100%, I may agree partially. It is not the case throughout.
45. I A teacher remains a student throughout. Comment.
46. I I agree. Since learning is a life long activity. There are new things that are coming out and teachers have to know that before to be able to teach.
47. I Is it valid in your case?
48. T Yes, I am busy in learning while I am a teacher. When I will finish I will join another course to finish.
49. I Give an image of good Maths/Science teacher.
50. T Who is devoted, doesn't dodge the class. Does practical work and teach learners. He is supposed to be exemplary not only in the school but out of the school also.
51. I Should a Science teacher be sober always.
52. T I think so. I have seen some teachers, who perform better after they smoke, but in any way I favour to be a sober Science person.
53. I People say teachers have plenty time to do their private things. Your comment.
54. T I don't agree with this statement. Like in my case I don't have time. For example yesterday I went home 18:30 hrs. Other day I went home 15:40 H.
55. I But school closes at 14:00 H but I must work for my work for tomorrow for next day.
56. I Were you doing before also or it is a new change in yourself?
57. T Yeh! I think it is a new change in my life because before I did not have a computer skill. Now I am skilled in computer. When other go I stay behind and do my preparatory job.
58. I May be the statement for the other teachers who don't have computer skills or otherwise have nothing to do and go round here and there and create the impression.
59. T May be about some. But for Science teachers it is never the case, because they don't have laboratory at home and they don't have equipments also to prepare a lesson at home.
60. I As an HOD do you preach this to your teacher?
61. T Yes. May be that is how I reached at this place and got popular and got promotion.
62. I O.K. Should a teacher be sensitive to learner's criticism and satisfy them or go ahead as she/he wants?
63. T Teachers should be sensitive or if I can say if the criticism in fact may be educational or if learners criticise teacher should do introspection in the favour of learning.
64. I Give your comment on SASEN project because soon it is going to end. Your comment is valuable.
65. T It is a very good project especially the way it is structured. It has done a lot of things for school. The knowledge I gained, I used at the school, we prepare certificate for learners and lesson plans etc. So I say we learned a lot from SASEN.
66. I Other than computer your achievement is Science, Maths, Physics, Chemistry etc. how did it go?
67. T Even there we learned a lot content, concepts and we learned more in our individual discussion and sharing the knowledge from each other in our clusters. In presenting a topic in a new way, which is needed, otherwise I would present in a traditional way, which is not wanted.
68. I Thank you very much Mr teacher. I am happy to have you in my interview and thank you for co-operation.

#### **B4.2.2 Mathematics Teacher April 2002**

69. I Mr teacher you are welcome again for my interview second time. We are part of SASEN project we want to investigate it. (Puts up a question) How do you want your learners to be? Your vision about the learners.



70. T The type of learners I am envisaging are those that are researching, they should asking questions, about what they don't understand bring new information about me, my teaching for example: I am a new teacher, I may make mistakes, they should be free to point out the mistakes and make me aware of those. I will take it and correct it, I will like them to co-operate. They should have positive thinking about their studies and career. This makes them to be a good student. All in all they should have positive thinking to succeed about what they are doing.
71. I What is the contribution of SASEN in this what you doing?
72. T The information that I have got the teaching strategies, the knowledge that I have got acquired for example that of grouping learners, in teaching involve them, at times ask for volunteer learners to come and do something. The more they talk about the material being taught, the more gets into their mind. They don't become ashamed in talking before people and your friends. Now after using these strategies they are open, they are asking me. It is not only in classroom even outside I move with them.
73. I Thank you. Those who don't teach in their normal classes they go for extra classes, what is your comment.
74. T What extra classes I organise for my learners is not for pleasing the authorities or replacing the missed classes but it is for specific purpose like enhancing knowledge and covering the courses, extensively. I don't approve of the other side. Even learners don't come to extra classes, if they feel there is no need.
75. I A teacher remain student throughout. Comment.
76. T Yes, I agree with the statement. Information changes, methods of teaching changes and we have to get the information and update ourselves. For example this era is the era of technology, we must be able to use technology in our classes e.g. computer to process our things, Internet. That is sufficient for us to learn and to be a learner.
77. I Give an image of the good Science/Maths teacher, how should he be seen?
78. T A Science should be consistent in his practice in a class. He should prepare well in his class and it should be regular. What you say you do otherwise it is not effective.
79. I Do you think SASEN project has given image of Science teachers?
80. T Definitely yes. The type of confidence that I have acquired that I will get nowhere else is tremendous. You know I had many misconceptions at times. It is destructive to your image, if you are sitting with those and don't perform well in front of your learners, so it is great that our confidence level has been rebuilt by SASEN project.
81. I Some people say teachers have plenty time to use for other things.
82. T I don't understand what do they mean by saying plenty time. In fact the time is limited. I was thinking the other day that as a teacher you are teaching during the day and there is certain amount of work that I have to take home from school. Other than this I have to attend SASEN work on Saturday and Sundays. I have no time for any other thing.
83. I Should a teacher be very sensitive to learners criticism and satisfy them or go as he/she wants?
84. T They criticise in two ways. Learners may criticise just to destroy you; you must take it seriously and always be sensitive. If they want to learn they must encourage them to be free in asking questions and clarify them than going home with the problem.
85. I SASEN is about to end now. Can you say something about it, which drew your attention during the years? What did you feel and what made you to change?
86. T
- a. 1st it should continue because as it has taken us far for such a good work. It should take others too who could not join it and are left behind.
  - b. It was a good project from start as I told earlier on. Who so ever came with the project have done us good thing. Misconceptions cleared and we have learnt more depth of the theoretical knowledge.
  - c. I am planning my lesson in a totally different way. Previously when I planned my lesson I did not involve the learners the way I want to involve them now. The



problem was I did not know the impact of involving the learners on let them do together.

- d. Changing from lesson preparation strategies (SASEN project) involving learners has better impact. Group work, practical work many learned to do better because of their different perspectives and angles of viewing. It improved my learner's understanding very fast.

87. I Thank you very much. I have enjoyed talking to you. Thanks. It will have a view on SASEN and I will make sure to report it.

### B4.3 Sch-3 (17 April 2002 or 20 April 2002)

#### B4.3.1 Maths Teacher

88. I Are you comfortable Sir?
89. T I am very comfortable.
90. I O.K. How do you want your learners to be?
91. T I will love my learners to be 1. Disciplined 2. Punctual and do their work 3. Be responsible inside and outside the school 4. Have some leadership qualities and innovative and creative.
92. I Those who don't teach in their normal class go for extra class? Can you tell me about this.
93. T Time is important, so every time should be used wisely particularly when one is not in the class and goes to extra classes. Going for extra classes for a teacher means to update his/her learners in terms of getting necessary information. I don't agree that when a teacher misses a class, he should go to extra classes.
94. I A teacher remains student throughout? React.
95. T I agree with this because the education, knowledge grows everyday, it is gained everyday. If you don't update yourself, you will find not in a position to cope up with the expectations of the students. And you can't upgrade your student and you stand still at a place. You become a social dwarf.
96. I O.K. Give an image of a good Science/Maths teacher.
97. T He should be a hard worker, although every teacher should be a hard worker. Also he should be creative, he should be seen making teaching a reality through practical, he should bridge the gap between theory and practice.
98. I He should wear a white coat and identify himself. Why don't we implement it here?
99. T I don't think that that it will help much but it is a good idea.
100. I Some people say that teachers have got a lot of time to do other things than teaching. Comment.
101. T Not necessarily. Teachers have got a lot of work at school, even I take work at home to finish for tomorrow to present a good lesson. Preparation, marking CASS etc. so much work.
102. I Do you go to your class always prepared?
103. T Of course! Yes.
104. I When do you prepare?
105. T Afternoon time.
106. I Should a teacher be very sensitive to learners criticism and satisfy them or go as he/she wants?
107. T (He laughs and then proceeded) Yes he should satisfy them although they look young but they feel big inside them and they are human beings. If they something is not



- going right and if their feelings are not taken care they might as well loose your period and not grow. SASEN project has helped me a lot. In terms of now one in a position to deal with the large number of students in a class, giving numerous methods. And new information that we got from SASEN since I have started. I shall say particularly the courses that are offered at SASEN, current trends and Science that deals how other people think about Science and teach and do Science. What are other people views about teaching Science in their countries, that actually shaped my thinking about Science and how the Science should be taught in our schools.
108. I Would you practice this learning in your life also as a Science teacher?
109. T Yes, we do practice it.
110. I O.K. Mr. teacher I will take your message and views with me and present those where it is needed.
111. Thank you very much.

### B4.3.2 Teacher of Science

112. You are most welcome, I invited you to answer some research questions regarding SASEN.
113. I How do you want to be your learners to be?
114. T I want my learners to be professional and specialised in Science.
115. I Those who don't teach in their normal class, go for extra classes. Comment.
116. T I usually engage them during the classes as well as afternoon also because the laboratory remains too busy during class hours, it is class actually to say. So I work with my practical in afternoons.
117. I Is teacher remain student throughout his life?
118. T Yeh. Teacher is busy like a student. I am still learning. You may teach a topic this year, the next year the same topic has changed and you have to learn it again before you present it again.
119. I Give an image of Science/ Maths teacher in schools.
120. T He/she should engages learners in their classes, do practical with them in laboratories and be committed to his work.
121. I Do you feel Science teachers should dress in another way?
122. T Not necessarily. They can dress like other teachers, may be special in lab and should wear the lab coat. I wear it in laboratory working conditions.
123. I Some people say teachers have plenty time to do other things than teaching? Comment.
124. T I don't have time. Especially when I am engaged with SASEN project. I have lot with OBE also, CASS etc. I have not even time to complete my job.
125. I Should a teacher be sensitive to learners criticism and satisfy them or ignore them and he/she want to do?
126. T Yes teacher should be sensitive to his criticism. Children do criticise teachers. Teachers Should be sensitive and satisfy them.
127. I Thank you very much.

### B4.4 Sch-8

#### B4.4.1 Mathematics Teacher April- May, 2002

128. I How do you want your learners to be?
129. T Anyway I want my learner to be like inquisitive Science learners who ask questions.
130. I Those who don't teach in their normal class go for extra class. Comment.





131. T They do. I don't know much about. Personally I want to teach during afternoon and during holidays but children don't like this they hardly come to attend.
132. I 'A teacher remains a student throughout' How do you react.
133. T I have completed my degree and Diploma. I can't go for higher course now. But I do feel to be updated with extra.
134. I Give the image of a Maths/Science teacher in a school.
135. T Yes. As I have started the course of the University now Science has become simpler. Now I myself feel that I am many times better than before. Many things got better, the experience with other colleagues, the knowledge I gained.
136. I Some people says teachers have plenty time to use for other things. Comment.
137. T Yeah, you see for some it may be but for many it is wrong. In my case I have no time. Even at school I have many things to do in the classes, and at course they give a lot of work to do, so there is no time.
138. I Should a teacher be very sensitive to learner's criticism and attend to it or he should ignore and go as he/she wants?
139. T I don't think if you are a teacher you should be criticised. But if it is to improve on some points it should welcomed.
140. I Thank you very much; I got your point.

#### B4.4.2 Science Teacher April 2002

141. I I am to interview you second time regarding the SASEN project. I hope you are happy in your new position.
142. T2 Yes I am.
143. I Thank you. Some people say that those who are in SASEN project have become so good that the chances are coming to them. Hw do you see that?
144. T2 I am not sure, because with SASEN not much management is done but what SASEN has contributed is confidence. When you talk to the panel you say with confidence.
145. I Thank you. How do you want your learners to be?
146. T Bottom line for what you said is discipline. Learners should be dedicated, willing to work, listening to the teacher, taking instructions from the teachers in such a way that there is communication. That is how the learner should be.
147. I Suppose a learner is not like that what will you do?
148. T It is to sit down with the learner and show him/her the way that should they progress. Because motivation is most important key during learning. Motivation should come by giving learners guidance and counselling. Most of the counselling should not be done in public but privately as his/her patron, and then it works.
149. I Some teachers don't teach during their normal lessons but they go for the extra classes to be seen as a hard worker. Comment.
150. T That is very good. Sometimes you find that some learners are behind and to complete the syllabus has to be completed, then you go for extra classes. Sometimes administrative work might have engaged me and now I am compensating in extra classes. This is right than not attending to them at all. But this should not be a regular practice.
151. I Thank you. A teacher remains student throughout his life. Comment.
152. T That is true. Knowledge is changing, method of teaching is changing. We have to learn and try to apply in classroom to change the learners in positive way.
153. I Do you want to be like that?
154. T Yes I am. I am doing the same in SASEN to improve Maths/Science inside the class.
155. I Okay! Give an image of a good Maths/Science teacher.
156. T Is it external image or his knowledge and presentation in the class? He should be presentable to the class to the staff that should be wearing teacher's uniform. A tie is always presentable but without it also a teacher may be presentable. At most important



- factor is that teacher should present a topic at the level of learners, so that they can understand and can discuss amongst them. That is why we have joined the SASEN to improve or increase our level of understanding to present the task very well. I would recommend Science teacher to wear white jacket while they are in laboratory. He should be sober. A teacher has to prepare always a lesson plan because learners are not the same so you have to prepare yourself for different learners with different strategies.
157. I Some people say teachers have plenty time to do other things.
158. T Yes, teachers do have time, even if they are committed but one needs to be creative. Like we are busy with SASEN work, it is wrong to say that we have plenty time, we created time from our busy schedule because we want to make the best use of it, like preparing lessons, planning activities, making home works and class works, helping learners in project work etc. we are never free. Maybe other teachers might be free.
159. I Should a teacher be sensitive to the criticism of learners and satisfy them or go as he wants?
160. T He should be sensitive in the class because if he is not sensitive learners lose interest. If a learner says, he didn't understand he should help the learners to improve, so he must be sensitive.
161. I What attitude do you have towards the learners?
162. T They look at me just as an educator. Me as well I should look at them just as my learners. That is the relationship how should it be. They should be able to approach me and be able to present their problems to me with free and fair mind. If I am not approachable then they stay with their problems and it will never be sorted out.
163. I Do you feel anyway to visit learners homes and talk to them in front of their parents?
164. T Yes, I support it. First I want to start writing a letter to the parent of the learners and write about the views, then I visit.
165. I With all these contact programmes with the University did you feel anything their contribution towards particular changed in your life?
166. T Yes the University of Pretoria in SASEN project did really contribute. We learned a lot through discussion, that they recommended as one of the learning methods as well as teaching methods. They helped with doing practical of concepts which they taught and widened the knowledge, so that we also do the experiments with our students without any problem, which were really a problem before. At our clusters we discuss each other's problems, which they face in their respective school and find practical solutions, so we don't suffer in isolation alone rather we share.
167. I I again congratulate you for your time and congratulate you for your promotional post. You may grow further.
168. T Thank you.

## B4.5 Sch-14

### B4.5.1 Science Teacher *April 2002*

169. I How do you want your learners to be?
170. I I think I want my learners to gain knowledge and be curious to know and explore as it goes. To have better understanding of what they are learning in relation to the practical work. I want their active participation in my lesson.
171. I Those who don't teach in their normal class go for extra classes. Comment.
172. T Even those who go always for their normal classes go for extra classes, it depends on their subject they are teaching. Some teachers want to give extra information and practical work guidance etc. that they can't be able to give during normal classes they go for extra classes.
173. I O.K. Where are you yourself. I mean do you organise extra classes in spare time?





174. T Normally, I draw my classes under the time frame I have to cover normally I don't go for it but if there is need and I feel, I don't deny to have extra classes for our learners benefit.
175. I O.K. 'A teacher remains student throughout his career'. Comment.
176. T As a teacher you have to discover the new growing knowledge as your learners. You have to gain more understanding in some other criteria so you have to go through the new developments. So I suggest that to be a good teacher you need to remain a student throughout, you have to keep alert all the time.
177. I Do you need preparation before you go to teach even though you have a lots of experience?
178. T I think you can't conclude that you don't need lesson preparation because you have a lot of experience, because you are meeting different types of learners from different backgrounds, so you have to prepare according to the new learners and situation in your class.
179. I Give an image of a good Maths/Science teacher in your school.
180. T Who is committed, who motivates his learners and encourage them to work on their own most of the time. Make Maths and Science a subject that learners will love it because most of the learners are scared of the subject as compared to their potential. He should behave like a parent especially in a learning situation. He might not be somebody whom the learners might disrespect in the course of their behaviour. In totality you are a role model to the learners that you are teaching. So your behaviour inside and outside the school counts much for the future of the learners.
181. I Thank you, lets proceed. Some people say teachers have plenty time to do other things than the teaching.
182. T personally I don't buy this idea because you are not just only the teacher for the time you are employed for certain hours. If you are committed teacher you have to put in some extra time to your teaching. Say for example you might have some learners who have some problems in Maths/Science. Normally they come in groups in afternoon and you have to teach them and clarify the concepts and ideas problematic to them. So most of your time you spent for schoolwork. I am always busy.
183. I Should a teacher be very sensitive to the learner's criticism and satisfy them or go as he/she wants?
184. T As a teacher you need to be a good listener and understanding person because that only will make you a good teacher in time. Sometime you as a teacher don't realise your weakness like you might be too fast, your language might be difficult, if you hear the criticism you will change it and will help learners to understand better. Let learners always benefit. Let us accept criticism open.
185. I If I say learners are best critics, do you agree?
186. T I agree, yes. Because learners most of the time they see you what you are and compare with other teachers. Normally they say truth about what you are.
187. I Now as a final question I will ask you how did the SASEN project affect you in your school and academic life and so on?
188. T It was effective a lot to my teaching career because I have been giving my learners to do most of the work from the book, which I was criticised by others, who didn't understand it. SASEN has empowered and strengthened me to my work. I must know learners position and background knowledge before I start teaching. I think that is OBE and I could understand it well at SASEN. I know what my learners know and what and where I can fill the gaps. So I have developed myself in many ways where I was weak and I did know the right way through my attendance at SASEN.
189. I Any change in attitude?
190. T Yes, I gained more confidence to the work and most of the time I am sure what I am doing now which was not before. I managed to learn and use skills and knowledge. I gained at SASEN that I did not get at my college. So I can say that it is an addition of knowledge, which has its impact on attitude towards teaching in form of motivation.



191. I O.K. I am happy that I got you and took your precious time. Thank you for your co-operation, I wish you had a good luck in SASEN project.

#### B4.6 Sch-6

##### B4.6.1 Science Teacher *May-2002*

192. Mr. teacher you are a teacher in the school, and I am here to talk to you about the SASEN project you are attending and for that are you comfortable?
193. T Yes I am.
194. I How do you want your learners to be?
195. T I want my learners to be good in Science, so that they learn and help South African needs a national level. We have good students who can do this. Some of them are quality but some of them need much help. So method and strategy should be changed for others.
196. I Those who don't teach in their normal class go for extra classes. Comment.
197. T I prepare a good lesson suitable to their standard and present well in the class. When need arises I do go for extra classes in the morning, in the afternoon, it is not so much practical.
198. I A teacher remains student throughout. Comment.
199. T Yes, I agree. Because Science changes and to catch those changes a teacher must upgrade him. This we do in our clusters as well as with professors in the University of Pretoria. They come with so many instruments and preach us. At the same time they promised us to give many.
200. I Give an image of the good Maths/ Science teacher.
201. T Teacher should be always ready to help students, prepare well and help them.
202. I Some people say teachers have plenty time to do other things?
203. T As a Science teacher I don't have time to do other things than the work of the school. If I am running away from the school and doing other things it means I am going to encounter many problems with my work at the school tomorrow. So I am not for that.
204. I Should a teacher be very sensitive to learner's criticism and satisfy them or he/she should go as they like ignoring?
205. T I can go for both. If because of me learners has problems and if I attend to him and his issue are sorted out I would attend to him. But I am here as his parents he/she should not criticise us rather come forth with problems and get it solved.
206. I Yeah (smiling). Thank you very much.

##### B4.6.2 Mathematics Teacher *April 2002*

207. I You are welcome to my interview, and I hope you are free and comfortable to talk to me, regarding the SASEN project. Tell me how do you want your learners to be?
208. T They should be co-operative, hard working and ready to learn. After SASEN I bother myself much about my learners. Before it was not so much.
209. I Those who don't teach in their normal classes go for extra classes. Your comment.
210. T It is much needed for a teacher to go for extra classes so he/she is sure about the learner's understanding and co-operations. In Science/Maths normal classes are not enough syllabus is large. CASS has to be done and many things of the school also.
211. I A teacher remains student throughout. Comment.
212. T Yeah. It is true. You have to upgrade yourself either from your colleagues or from friends or from course.
213. I Give an image of the good Maths/Science teacher.
214. T Teacher should be able to solve the problems of the learners, he should be confident and don't dodge the classes.
215. I Some people say teachers have plenty time to do other things. Your comment please.



216. T I don't believe in this. I am busy with my learners in the morning, afternoon and even over weekends, giving them work, marking, project, work etc. for CASS, I don't know where is time for other things.
217. I O.K. Should a teacher be sensitive to learner's criticism and satisfy them or ignore them and do as he/she want to do?
218. T Both ways it depends on their criticism. We show always listen to their criticism and help them. But sometime if it is not creative, we can ignore them but they should be told the reason. Don't overlook as if they have been ignored.
219. I what changes have come in your attitude before and after the SASEN project?
220. T We have developed a very good attitude towards our teaching. I am confident now and I want to give all my information to learners. Before I was going just straight to the class but now I go only after full preparation of planning content, methods and strategies to be used. No class without being fully prepared because learners change.
221. I thank you very much.

### **B5 Interview. November 2002**

*(These interviews were organized on the closing lecture day of the project in November 2002. This aimed to sense the impression of the project on teachers before their examinations).*

#### **B5.1 T15**

222. I Good after noon.
223. T Good after noon.
224. I I would like to know your view regarding the project and welcome you for my interview. I hope you attend plane geometry course.
225. T Yes I did.
226. I Tell me the scope of that course what was taught to you?
227. T We are looking at how to approach Geometry and teach effectively in our schools.
228. I OK. Scope I wanted to know some chapters like.
229. T Geometry for the.....
230. I No. in the course that treated some theorem.
231. T OK. We look at the mid point theorem and we further looked at Ceba theorem and question of equilibrium Geometry and spherical geometry.
232. I OK. Did it address to conceptual understanding that you wanted to understand?
233. T OK. Attending the question of theorem we looked more especially the logic whereby you got to prove it on the question of the spherical Geometry. Now I got another understanding of not all triangles' angles sum is 180 degree in the spherical geometry, there are some greater than 180 degree.
234. I Now do you feel capacitated enough to develop conceptual understanding yourself?
235. T Yes I can say so.
236. I How do you say?
237. T Because there were portion that I was afraid of looking at, e.g. the question of geometry but after going through that course now I can teach to them quite simply.
238. I Are you in a position to say that "Now I know geometry and can go on myself?"
239. P No, I got no problems with geometry so far now it is matter of going back

#### **B5.2 T16.**

240. I I welcome you to be an interviewee teacher. Are you ready to answer some of my questions?
241. T Yes.
242. I Are you comfortable?
243. T Yes.



244. I Feel comfortable we are known to each other. Of course your voice will be recorded, I hope you have no objection. Did you do geometry course in Mathematics this year?
245. T Yes.
246. I Tell me the scope of that one that was given to you in that course.
247. T We did Geometry specifically when they were introducing through computer to us, doing and proving some of the theorems from the computer. Especially the parallelogram theorem, the other quadrilaterals, such as cyclic quadrilaterals.
248. I What else? Several theorems?
249. T Yes, Ceba theorem. and we did a little bit of Mannelous theorem but more of Ceba theorem.
250. I Mid point...
251. T The mid point theorem, Yes we did it, spherical Geometry, comparing it with the plane geometry.
252. I Which part was very interesting to you?
253. T The part where there are no parallel lines in a spherical geometry, yes it was very interesting that one.
254. I Could you grasp it conceptually?
255. T It was tough.
256. I Why are there no parallel lines?
253. T Hum.... Because in a sphere the lines they end up intersecting each other twice.
257. I Good, did it address some of your conceptual understanding of the past, which with you had a problem and now you are addressed.
258. T Which on the spherical geometry...
259. I No, the geometry portion.
260. T Yaha...
261. I Did it help you addressing some of your conceptual problems which you had?
262. T I had a problem for sometime to understand, how they have to make 180 degree. Why there have to be a complementary, but when we did it on a computer, I understood because I did it myself.
263. I Can you rate quality given to us.
264. T For the geometry...
265. I Yah (good, better and the best) sometimes like that.
266. T Yah. It was good.
267. I Are you in a position to say that I know geometry and can go on myself?
268. T Not Necessarily, because like there were stuffs, that I ask you about given statement like we have to draw, there are things that are still hanging for me.
269. I But can't you address them yourself?
270. T I though I can, but it is tough, but in a given time I can.
271. I Always geometry was a difficult area in Mathematics to many, I mean that now if you are capacitated that when such problems come and then you tackle and then you go or you still need some support.
272. T No, No, No, I don't, Geometry is tough but this course has helped me a lot because there were things that I didn't know before and now I know like the, especially when we are given sketches and asked questions then I feel I can handle them, but I can struggle with those statements that I have to draw myself, but I think I can handle that.
273. I Are you not thinking that, those Science kits and Maths kits and material in form of books and handouts, given to you are very difficult and you are not in a position to use it.
274. T The learning material, it was ok, and it was far simpler, because as I said there are things that I could not explain in the area that I didn't understand, but given time with this material now, I did discover using the material that, ohoo...(this is why they says, it is like this), that is why I can say the material is good.
275. I The book of statistics is thick book, can you handle it?
276. T You know Mr. CI. I was not having a group and I was studying alone, and I didn't had a study guide, so I was using the book, but I coopered. So, I can't say it was difficult, and I



- can't handle it because I only cooped with the textbooks and I passed the test. So I think if you give yourself time you can do it with the textbooks.
277. I How fine are you in Computer literacy?
278. T With the computer, we didn't do much, because if I have.....
279. I But can you handle your work?
280. T If given an assignment, say do this, yes I can, but we didn't do much.
281. I Because you are in Carolina.
282. T Yes, I didn't have access to computers but the group at, Elukwatini, they are very good at computers because they have computer access.
283. I Thank you, since we are ending this course in December what you can say finally to SASEN project.
284. T Oh..., I can say that thanking you very much, they have helped us a lot. They have developed us to handle situation in our classrooms schools, they have given us skills.
285. I Do you appreciate my work, regards of that I started this project.
286. T I appreciate your work, actually, you showed us that you have to be dedicated because some of us were demotivated, didn't want to continue the course, we didn't understand the course, what was it all about, but we are always there. At least even if we had the second thought about attending the course, when we saw your face we felt guilty that no we cannot disappoint you and your effort for us, let us continue with the course.
287. I Do you think that other curriculum implementers also should take part in such endeavour?
288. T I think so from my point of view.
289. I Teacher! Thank you very much to appreciating my work and I hope I keep your words with me for my inspiration and be truthful to my work.




**B5.3 T9 (Nov. 2002).**

290. I Mr. teacher you are welcome to my interview session, I hope you feel comfortable and answer the question.  
Did you attend the electrical course given by Professor Brown this year?
291. T Yes I did.
292. I I am interested in knowing the scope of that one what was given to you in that course?
293. T Amm, we did there the conductance which was may be the first time when I did that. Also we did the resistance, Ohm's law and anther method, which was first time I saw as Kirchoff's law.
294. I Did it address some conceptual understanding, can you give some example that you were clarified conceptually and now you can say that you know it?
295. T Yah, with regards to potential difference and its relationship with resistance I was a little bit doubtful sometimes ago but now I am sure about this.
296. I Now you are feeling capacitated enough to develop conceptual understanding yourself by self-reading?
297. T Very much, now going to the class I used to work hard but I am even more motivated now that I was before. The course capacitated to me much more and I am very confident now in everything I do.
298. I Even if a new concept comes, will you be able to do that with the same confidence?
299. T Yes. The skills that I have obtained now from the SASEN, those I didn't have before. With these skills now I can approach problems even difficult ones and will be handling with confidence.
300. I Are you in a position to say that now I know conceptually the Electricity chapter?
301. T I can say that now I know 100%.
302. I Thank you very much Mr. teacher. Another question Mr. teacher is that you have been given a lot of materials like book of Physics, Chemistry, Statistics, Calculus, Maths and Science kits etc. All these are standard books, are you in a position to use that ones?
303. T I find these very useful resources given to us to use and before it were given we used those with Professors and got training and some practice out of those books.
304. I My main question is can you use them independently?
305. T Yes that is what I want to say, those are important resources given to us. Some of the problems that I had before those all are addressed and now I can very well use those for our purpose.
306. I Even those are of international standard and quality of University level, can you use them?
307. T Yes I can do that.
308. I Are you excited, even to go further and buy books and material yourself?
309. T Yes I see that these books are a little bit advanced to our daily textbooks, which are in use in the classes.
310. I Mrteacher! We have been together for four, five years and some year with SASEN. What is your reaction n this, when we are ending with these project?
311. T Amm. To me it has taught me that don't stop learning, keep continuing and reach highest. Although the course is ending, but it has left its some marks on our live very well.
312. I Thank you very much.

**B5.4 T17**

313. I You are welcome teacher to my interview. You have been in the workshop for 3-4 years. I hope you attended the Electricity course, presented by Professor B?
314. T Yes.



315. I What was the scope/content given?
316. T Mostly it covered standard 10 syllabuses. There were some even beyond e.g. Kirchoff's rule.
317. I Did the course address some of the conceptual problems which you had with you?
318. T Yes it did.
319. I Give some examples.
320. T Momentum we did very well. In Electricity Ohm's law I understand well.
321. I Did it capacitate you enough and made you able to develop conceptual understanding yourself.
322. T Yes I can do. O.K. with the help of material that were given us for use.
323. I Can you say you can go very well to teach on yourself without asking for much help?
324. T I can say I am more confident than before.
325. T Are you in a position to study and use those material of good quality and standard?
326. T Now I can use them. Some of the material which we didn't have before, and were given to us, I am in a position to study and make use of those.
327. I It is an impression that materials are supplied to schools, and in the absence of skills and knowledge teachers keep the boxes unpacked. Now what is your position?
328. T Yes it is true. Before there were some other things, which we were not, used, but now I can use any thing that can be given to us in the school.
329. I So what is the impact of the course on you?
330. T I can say it has done much especially in using science kits and materials.
331. I Now the course is ending. Can you say more about the project?
332. T This course has helped us a lot. Before we had some misconceptions, but now we have been helped.
333. I What is your message to other curriculum implementers?
334. T It will be good for them to organise workshops because sometimes when teachers meet they discuss concepts learn with CI's.
335. I Thank you very much.

### B5.5 T18, Nov. 2002

336. I I am glad to have you with me. I hope you are comfortable and answer some questions for me. Did you attend Geometry course or Professor Brown's course on Electricity? What was the scope?
337. T Yes I attended Electricity. He taught us how to connect the rheostat in parallel, series, how to calculate resistances, current and voltage from a circuit, and also the overall effect of these types of connections i.e. parallel and series.
338. I Did the course address misconceptions, which you had before?
339. T Yes. It did very well. I had very serious problem in Electricity as such. When it came to teaching that position, I had to take someone to come for assistance and to lead the classes. But as far this year, I am doing myself and I have improved it with confidence.
340. I Do you think you can go on as individual and you don't need any help from others now?
341. T No. As far now I don't need any help. I am well placed now. I am fully capacitated.
342. I Are you in a position to say that 'I know Electricity' and I can go on myself?
343. T Yes. Now I can go on myself.
344. I There are materials like Science kits, standard text books, Computers etc. Are those materials user friendly; can you use them for your future?
345. T Yes. Those are user friendly and in fact very important to me. All are user friendly except some CD<sup>S</sup> for Computers because I don't have a Computer of my own. But soon I will try<sup>to</sup> have a Computer and use them also.





346. I We are going to give computer to this circuit for your use.
347. T O.K. No. I will use it. Even we may ask school to buy and give us for use, we shall try.
348. I Don't you think to buy good books of standard yourself and keep for you personal learning?
349. T Yes. I do have that in my mind. I will do that and ask school also to keep such good reference books in Library too.
350. I After being with SASEN for so long, can you say something about the project when it ends today?
351. T Although the course took a very long time to finish. But time we have been here with Professors and with our colleagues as such, I can say I gained a lot.
352. I I as a CI brought such a project to you? What can you say about me?
353. T It gives me inspiration to be a CI one day and take you as a role model for my acts.

### B5.6 T8, Nov 2002

354. I Mr. (T) you are most welcome to my interview on the day of closing. Which course did you do? Did you attend Professor Brown's course on Electricity? Tell me the scope covered.
355. T Yes. He taught us many things and many concepts that are essential to solve problems in Science. Now I can complete most of the exercise without relying on any external help. Yes.
356. I Did you address with him some conceptual problems also which were long waiting for such opportunity?
357. T yes, especially on the part of Electricity, I had some problems. But after solving problems given by Professor Brown, I find it very much exciting and now I am going to use those with my learners.
358. I What was his methodology? Was it a learner centred? Was he giving a lot of work sheets to use? How did you like that part?
359. T Yes! I like it and I am going to use it next year to help my learners.
360. I Was it not difficult for you as a student to cope with?
361. T It was challenging but at the end I was happy with all those. It was learner centred which take you to achieve your goals.
362. I Are you capacitated enough to address some other problems also which were not treated in these lectures?
363. T Yes. With the course I have a number of things and now I am not afraid of teaching Mathematics and even Physical Science at grade level because we did it and now I have confidence.
364. I What is making your confident to tackle all those issues and concepts coming before you, you have not dealt with in the course?
365. T With the tools that I have got here, nothing can stand up in my way. I have learned a lot here as knowledge, Methodologies even some of the principles. I never knew like Kirchoff's principle that you have to solve to guide the current in a number of batteries in a circuit in many difficult situations.
366. I So you want to thank Professor Brown for giving good knowledge and book to you.
367. T Yes I like to thank him very much today because I would not be where I am today and I wouldn't be confident as I am. He helped me a lot to build Science and Maths for me. Now I can do Maths in my school up to grade 12.
368. I Good. Are you not thinking that these materials that were given are difficult material like International book on Statistics, Physics etc. Are you not afraid of these materials?
369. T No. I am not afraid of these, because now I have learned the style they use even their terminology is the same that we are using only a slight difference. These are



- of great importance, and some of the problems here can be used as problems in our classrooms.
370. I What about the Science kit given to you?
371. T I will like to thank SASEN for it and it is very much helpful. It is going to help me at school because at my school there are many learners, and I used to suffer.
372. I I want to know your views about the whole SASEN project before we conclude.
373. T SASEN has upgraded us and we have enriched ourselves because some of the material we have here, we may not use at school but for enrichment. Even for those pupils who want to go to Universities they will get a lot from these.
374. I I worked with you for sometimes. Did I do something good for teachers of the district?
375. T Yes. You did many things for us in Physics and Maths. For us you are as role model.
376. I Thank you very much for this remark.

### B5.7 T19, November 2002.

377. I Can you tell me what did you gain from Professor Brown's Electricity course you attended?
378. T Electricity, Ohm's law and Kirchoff's law, these were the new concepts.
379. I Did it address some of the misconceptions, which you had in anyway?
380. T Yes! Misconceptions clarified and some new correct concepts were learned, like series and parallel connection, it addressed the problems.
381. I Do you feel you have capacity to address new problems which might come yourself?
382. T Very much, I am capacitated now and developed confidence to deal with those problems. It can be circuit problem or any other I can do it myself.
383. I O.K. Are you in a position to say that you know Electricity at High school level very well?
384. T Yes I know it I am o.k.
385. T You don't need any external support anymore.
386. T Well further support may come. But what I have now is quite standard.
387. I O.K. Lastly, all those materials given to you in form of Science equipment, standard text books etc. Don't you feel these to be difficult to understand and handle? And may be useless to you?
388. T These are not useless, rather are very important to me. These books are going to help me a lot as a reference. The Science kit is going to help me doing Science practical easily, I have gained a lot.
389. I So can you use them perfectly?
390. T Yes with a lot ease.
391. I Will you like to buy some more standard books on your own and like to use a reference?
392. T Yes if available I will love to buy. But I am quite happy with Giancoli's one. It will help us. I will buy more books.
393. I SASEN project is going to end this year. What can you say about the SASEN project?
394. T (excited...) Oh! SASEN! It has put a lot in my life. As I have improved my knowledge, now I think I have developed the capacity to understand and conceptualise the subject matters.
395. I What can you say about my work at the District as a C.I.?
396. T Oh. Mr. CI! You did a very good job at this side, by improving the standard of Science in this area. Because you are the one who brought all these to us. We are very much happy.


**B5.8 T11, November 2002**

397. I Yes Miss teacher you are welcome to this interview on the last days of the SASEN training. What was the scope of the course on Electricity done by Professor B and your achievement?
398. T It was static electricity and current electricity that we use in our classes. It included some more principles, which we didn't know e.g. Kirchoff's law and complex circuits.
399. I Did the course address some conceptual problems?
400. T Yes! There were problems which were addressed but at the same time little bit of confusion. Because the method which we have been using before was different than that of the present one.
401. I Which, method do you think is superior or better?
402. T This one is superior but when you think of using it in class I think it might confuse the learners because it takes long to reach the final conclusion, so some of them may not follow it well.
403. I Can you use these methods to address your problems in other areas which were not covered by this course?
404. T Yes, with the worksheets, handouts and materials that we have that capacity to develop us ourselves.
405. I Can you say you know Electricity now?
406. T Electricity is the chapter, which I hate it. But now it is changed. I understood it and now I can do it very well.
407. I Are you not thinking that books and materials given to you are not very difficult and are not user friendly?
408. T No! Although the level and standard at which the materials and books were given is beyond metric but still these are user friendly because we are using them and we can understand it.
409. I What can you say about SASEN project now it is going end?
410. T SASEN took a long time. Such that there was a time when I thought of just leaving it, I thought when it is going to finish, but I have gained a lot from SASEN.
411. I Thank you very much.

**B6 Interviews of Principals (First round Aug. Sept. 2001).**
**B6.1 P1.**

1. I Mr teacher you are most welcome to my interview. I hope you are not very tired this afternoon and will be able to give me your answers. Your interview will be recorded for which you have given permission.
2. I Is your science/maths teacher readily available if you have to assign some official duties to your teacher?
3. P Yes. One is HOD and other one is member of SGB they make themselves available. They come before and go after the school is over.
4. I Is science/maths teacher popular among his learners and colleagues? Give instances to support your statements.
5. P I think so. Nothing comes to me from others, so I presume it should be the case. Learners seem quite happy with them.
6. I What is his/her contribution in creating 'COLTS' at the school? Did any of them come to you with any suggestions or initiative regarding the creation of 'COLTS' in the school?
7. P One is HOD and the other one is SGB member, both are always present in our school management meetings and put their views and suggestions. They are real pillars.



8. I What are your expectations from the FDE that your teachers are currently attending.
9. P After completion I would expect them to assist the other teachers as they are doing right now. I am the witness or rather say evidence, that there are some programs in the computer, they are happy to bring them here and are showing others how to use.
10. I Yeh. So do I think that your expectations are coming right?
11. P I should think so.
12. I Here is a typical thing, which may not fit into your situations? Do your teachers come to school by a group taxi? How to get help from such commuters when there is a need to get help after the school. Please tell your experience.
13. P Well fortunately they use their private cars in this school.
14. I So they can wait till any time?
15. P Yes till any time.
16. I Have you heard from any other school like Inglandi Ekulindemi etc. is there any problem?
17. P No, I have not really. I have no idea, thanks.
18. I Did you observe any changes in the behaviour and attitude in teachers after attending two years of FDE. programme? For example (Giving more time to school).
19. P ah! I indicated earlier on they are the last people to leave the school; they are always working, if the program that they need to use on the computer in our school, they remain and if you need help from them they do help in whatever field you need. And their lesson planning is superb.
20. I So this is an improvement over the previous years when they were not so much trained.
21. P Yes.
22. I Do you wish to thank the FDE. and SASEN.
23. P Certainly.
24. I Thank you sir.
25. P Hoping this should not be the last team we do have other teachers and they do need the skill what the University could do?
26. I OK.
27. P I hope you are going to give other teachers the chance.
28. I Yes. That depends on the foreign funding. But something is in offing and lets hope it will not stop. You should bless. Thank you very much for your cooperation.

### B6.2 P2

29. I You are most welcome to my interview session. The whole interview is about the SASEN project where your two teachers (Maths/Science) are taking training. The University of Pretoria organizes the training. I wanted to evaluate the project. Does it have any impact on the school or teachers as a whole on learning and teaching of the school? I would like to hear the truth. That will help us in improving the programme.
30. P Yes.
31. I Thank you very much and you are most welcome.
32. P Thank you very much Mr. CI.
33. I Is your Science/ Maths teacher readily available when you need to assign some official duties after school time or otherwise?
34. P Amm! Mr. CI first I must congratulate you for having come to our school, actually to ask some questions based on their attending with the UP, these teachers never gave me any problem even before they attended the programme. But now there is some sign of enthusiasm that I see from both of them. Well because the other one is very close to me because he is acting as deputy. Obviously he does more than the other one, but I am happy about the availability.
35. I How are your teachers teaching Science usually?



36. P I have seen the integrating theory into practice. They start with practice and integrate theory into it.
37. I Is your Maths/Science teacher popular among learners and colleague?
38. P Not always. I must be honest. This kind of learners who at times does not approve of a teacher who does more work than the others. What I have realized, particularly with my deputy principal he complains verbally that he does more with learners than the other teachers. Some of them they don't approve of that but they themselves at the later stage after results or after some years the same student do come back to appreciate what the teacher has been doing all long. Now when it comes to the colleagues, hard working colleagues do always appreciate the work done by the two teachers, of course there may be one or two teacher who may not, particularly because I gave these teachers managerial functions to perform.
39. I What is his role in creating 'COLTS' at the school? Any evidence.
40. P We have school based work-shops, two hours, two hours total 4 hours a week. For conducting work shops on OBE and during OBE work shops we mix some of the MSSSI and number of the other issues, so that in a sense to me means trying to create 'COLTS' (culture of learning, teaching and services) at the school. They actually lead and organize such workshops. They are very instrumental for such things.
41. I What is your expectation from FDE programme, which of your teacher is currently busy attending it with University of Pretoria and Department of Education?
42. P Actually my expectation stretches further than expecting my teachers to teach, to equip the learner's with knowledge and skills but I also expect to impart this knowledge and skills they have to other teacher not only in this school but even to other schools outside to benefit the boarder community.
43. I Do your teachers come to school by a group taxi? How to get help from such commuters when there is a need during after school time?
44. P When I need their presence during after school they pay separate taxi and leave the common one but they attend my call happily.
45. I Did you observe any changes in your teacher's behaviour and attitude after two years of attending the 'FDE' programme? For example: Giving more time to school, prepared to work after school, confidence level, lesson planning and preparation, finishing the curriculum on time etc.
46. P Confidence level have gone higher (because one of them told me that he now qualifies for HOD post in N.S.). Lesson planning and preparation, I would say a complete change. Because the manner how he prepares the lesson is totally different from what he used to do before. That is why in the initial stage of the course, they used to come to me and tell, please don't quarrel with us, this is how we are going to plan in order to achieve this and that. So there is quite a remarkable shift in the manner from the past. As regards finishing the syllabus they are affected by the programme of the school.
47. I Mr. principal! Thank you very much for your time and information.
48. P You are most welcome.

### B6.3 P3

49. I Is Your Science/Maths teacher readily available when you need to assign some official duties after school time or otherwise?
50. P Yes, they do avail themselves.
51. I Is Science/Maths teacher popular among his learners and colleagues? Give instances to support your answer?
52. P yes, staff and learners for their co-operation and help like them.
53. I What is his/her role in creating 'COLTS' at the school?
54. P Yes. They do promote the 'COLTS'. They come to school at 9 hours during holidays and remain until 14 hrs. And try to cover their work.





55. I What is expectation from FDE programme, which your teacher is busy attending with University of Pretoria and MDE?
56. P The education that they receive from these programmes really it does help our students?
57. I Do your teacher come to school by group taxi? How to get help from such commuters when there is need during after school time?
58. P Yes, they use group taxi but they remain behind when they are needed.
59. I Did you observe any change in your teacher's behaviour and attitude after two years of attending the FDE programme. For example giving more time to school, confidence level, lesson planning and preparation finishing the curriculum on time etc.
60. P Yes. I do realize that they have improved our results in grade 12, Maths/Science have improved compared to the previous years.
61. I O.K. Thank you very much for your support and co-operation.

#### B6.4 P4

I you are most welcome to my interview. I expect you to give me information regarding your three teachers who are attending the SASEN project at eMpulizi.

62. I How long have you been with them?
63. P For 9 years.
64. I Is your Science and Maths teacher readily available when you need to assign some official duties after school time or otherwise?
65. P They do co-operate. They avail themselves sometimes but they have problems, more especially when it is after school hours.
66. I Are Science/Maths teachers popular among his learners and colleagues? Give instances to support you.
67. P They are so. Yeah they are liked by them.
68. I What is their role in creating 'COLTS' at the school, did you find any initiative from them?
69. P These are hardworking and very positive. They are interacting with learners and I can say they are promoting COLTS.
70. I What is your expectation from the FDE programme by SASEN?
71. P I am hoping the programme to assist the learners and school through the programme.
72. I Do your teacher come to school by a group taxi? How to get help from such commuters when there is need during after school time?
73. P Our teachers are staying nearby and others own their cars.
74. I Did you observe any change among your teachers after two years of them attending the course?
75. P What I have observed from them is that they have changed their attitude towards school. Some of them, they are sacrificing; they come to school as early at 7 a.m. They have more confidence now. They prepare their class work before hand when they go to their classes.
76. I Mr. Magagula this ends our interview session. Thank you very much for attending this interview and helping the research to go. Thank you.

#### B6.5 P- P5

77. I This interview will be regarding your teachers taking training.
78. I Your two teachers are there for almost two years and you might have seen them, so whole interview is on that. Thank you very much to honour my request.
79. I Is your Science teacher readily available when you need to assign him for some official duty after school time?



80. P I would say it depends on weather or not he/she has a commitment somewhere else or not. I usually ask for support especially during the main session.
81. I Do you think Maths and Science teachers are better than your other staff?
82. P Well, depends on time, we hold talks, with the head of department Science, and the conclusion, which we come to, is that, they have to be clever because of the importance attached to than others. The results have improved from past years. It shows that teachers can achieve better results without having equipped laboratories. Which means that teachers' attitude should never be influenced by as small issue as teaching materials. A Science, Maths teachers should always improvise.
83. I Is Science and Maths teacher popular among the learners and colleagues, especially with your teacher?
84. P Direct to the question, yes I would say that Science and Maths teachers some are popular among us and some are not. Popularity of a teacher is built by for him/herself by attending and attacking a work.
85. 85 I The two teachers taking part in further diploma in Education, are those teachers popular?
86. P Yah, I don't know if I must give the names. Yah Mr. Mother is most liked by the learners and colleagues as compared to others.
87. I What is their role in creating 'COLT', did any one of them come to you with any suggestion or initiative regarding COLTS? Tell me teachers' positive and few negative attitudes, that you know of towards school teaching?
88. P Well, the issue of COLTS at school, I will say mostly the guys usually come with such questions. Especially when the learners go out of the way and when the teacher tries to teach him. I will bring some examples there, once Mr. Motha brought a child who was playing in the classroom while he was teaching, as if there was no teacher in the class. So he was dragging down the culture of learning and teaching in the school. He gave me names of some learners who were misbehaving at school and told me to take action. After this if they don't stop call their parents or give them a fail, but some called their parents, in this way the call made them alert.
89. I What is your expectation from further diploma and educational programme, which teacher is currently attending in University of Pretoria (Department of Education)?
90. P My expectation is that they become innovate to go to the learner and teachers and help in the re shaping, restructuring and redirecting Science and Maths curriculum. So that the children will be in position to meet the outside world expectations regarding Science and Maths in particular.
91. I Are you directing towards outcomes based education?
92. P Yes, the OBE system is much better than the education system at the moment. Just now they came and told us (teachers) what they are doing. It showed me that OBE is quite possible. Further they showed me that they are involved in the competency skills, which we didn't expect from them to do. But now it shows that they are doing the right thing and I think the government is doing the right things for the learners.
93. I Do your teachers come to school by a group taxi? How to get help from such commuters when there is need during after school time?
94. P Yah, the Science teachers come to school by taxies that is true. Sometimes I have to be strict with some teachers, when I see them coming late, but it is not their fault it is the taxi. Sometimes I had to drop them from school to home. Now coming to the question of how to get hold of such commuters when there is need during after the school hours. The department is not responsible for it because the department has given him the job and the teacher by signing the contract agreed that I am going to serve the department. The policies can't be changed for one person. In the contract it was not signed that the department will provide them the transport.
95. I Did you observe any changes in teachers behaviour and attitude after two years of attending further diploma programme e.g. giving more time to school, reference to



work after school, confidence level, Lesson planning, preparation for finishing the curriculum on time etc.

96. P Well, considering this one, I would be saying with Mr. Teacher it is difficult to say whether he has changed or not, because with Mr. teacher it is always the case he is the same as before. As it is said before what adds further to their professionalism is that of the use of computer and the methodical way of doing things. In doing preparation for their work, I think they cover everything but sometime they miss out topics which they think are not important, but they make sure that they cover everything the A. B. C. of the course and lastly finishing of the curriculum on time. In particular for Mr. teacher. In the year 1999 Mr. teacher was not teaching grade 12, Physical Science. In the year 2000 he was given to teach Physical Science. He was able to finish the curriculum within time. In extra time, he uses to finish some extra experiments, which could not be done during class hours. Now I can see he has a lot and the confidence level has improved tremendously.
97. I Thank you very much for giving me your time.

### B6.6 P6

98. I Yes Mr. principal I am in your school to interview you as a principal about two teachers Mr. Teacher and Mr. teacher who are talking part in FDE programme. The exercise is to judge the effect and impact of further diploma in educational programme, on the educational system, so taking that in view please provide me natural and correct answers.
99. P Thank you very much.
100. I You are welcome to my interview session that is in your office.
101. I Are Science, Maths teachers readily available when you need a kind of an official duty after school time from them?
102. P Yes, they are both freely and readily available.
103. I Give some example.
104. P Like for example there was a project that was going to take place at eMpuluzi and then we requested to Mr. teacher to prepare the students for that science project, I forgot the name of the project but he was readily available to the students who went there and the school came back with the Gold and the Silver.
105. I OK, it should be the District Science expo?
106. P Yes, Yes.
107. I Is your Science teacher popular among students and his colleague?
108. P Yes, they are popular among learners and colleague.
109. I What is the role of your teacher to creating 'COLTS'? Did any one of them come to you with any solution and / or initiative regarding creating culture of learning and teaching in the school?
110. P Yeah! Teachers are taking part in trying to bring back the culture of learning in the school in daily-life of the school, for example, we organized a school choir that performs for the community and in turn we use everyone in creative activities. In this venture the science teachers also play a major role.
111. I Did you notice any negative attitude towards school?
112. P Not at all. I am glad to say that my colleagues are very helpful.
113. I What are your expectations from FDE programme which your teachers are busy attending?
114. P As for now I did not think on that matter.
115. I These teachers have been given training on computer literacy and you can get help from them in school activities.
116. P Yes! Yes! That is very good. Every one is trying to learn computer.



117. I Do your teachers come to school by a group-taxi? If so don't you face problems with them when you need them after hours to be in the school?
118. P Both of them use public transport to come to school. But when they are needed they remain behind and don't give problems to school.
119. I So they agree with the school timings.
120. P Yes!
121. I Did you observe any change in your teachers' behaviour and attitudes after two years of attending the FDE programme?
122. P Yes! They are the only teachers who take classes of learners during vacation time and learners also attend. I have several examples of them working during their spare time.
123. I What is the confidence level?
124. P The confidence level has dramatically improved and results also have improved. They have brought much improvement to school.
125. I Thank you very much to be the part of my interviews. I am thankful for your time, which you could afford for this even though it was organized so late.

### B7 Second round, April/May 2002.

#### B7.1 P7.

Principal, I am CI and today I am in your school watching activities in Science and Maths. Interviewing students as well teachers regarding the SASEN and school activities.

126. P Yes. I am happy to be with you and gladly will answer your questions.
127. I In a school a poorly equipped laboratories or no laboratories might motivate teachers negatively towards good teaching. Have observed anything like that with your Maths/Science teachers?
128. P Yes, we do have a problem with poorly equipped laboratories. The teachers are really demotivated. They have no equipments to do practical work and they don't have place for learners to do something practically, so they have real demotivations.
129. I People talk of improvisation in Science. Do you think it doesn't work?
130. P Sometimes they say teachers should improvise, sometimes they move out from one school to other school asking for some chemicals and equipments. This they call as improvisation but it doesn't seem to solve the problem.
131. I Do you approve of theoretical Science teaching in place of practical teaching?
132. P Yes, I do approve it but it should go hand in hand with practical work depending on chapters they are teaching.
133. I Is Science teacher popular among his colleagues and learners?
134. P Yes. They are so popular. I say so because Science and Maths are becoming popular amongst learner and science teacher have no problem with other staff members.
135. I What about the registration number in HG in Maths and Science?
136. P At this moment I see that most learners are opting for registration in Mathematics for S.G. than H.G. So I cannot say that there is improvement.
137. I Do your teachers honour their duties assigned to them?
138. P Definitely, especially the Science/Maths teacher honour their duties regularly and promptly, as expected of them.
139. I What is your expectation from further Diploma in Education programme, what the teachers are attending?
140. P After the teacher have completed the programme they would be better equipped and better developed in Maths and Science, their teaching will be more meaningful to the learners.



141. I Did you observe any changes among your teachers' behaviour and attitude who attended the course for two years?
142. P Yes I can say so because after the teachers have attended the programme, you could say that they confident in preparing their work, organising their work, they can do their preparations; they do everything which are assigned to them at the school.
143. I What about devoting extra classes and time for school?
144. P Yes. In grade 12 they give extra classes but lower classes they have not yet started.
145. I Lesson planning, preparation do they do?
146. P Yes! They do it regularly.
147. I Do they finish curriculum on time?
148. P I am not sure yet because it is done by the Head of Department of Science and I am not sure how it is going to be done because the SMT has increased.
149. I Do they have respect towards the profession, authority and responsibility of the school?
150. P Attitude of teachers is acceptable in terms of the behaviour, in terms of their profession and in terms of the respect towards authority and principal.
151. I Did you enjoy their co-operation?
152. P Yes. I enjoyed very much. They co-operated me every time.
153. I Yes Mr. principal I enjoyed your co-operation. Thank you very much for your time for the interview.

### B7.2 P3

Sir your school is a participant in SASEN project and I am here to know your views about the SASEN project. Are you comfortable to answer my questions?

154. P Yes I am comfortable.
155. I Thanks Sir! A poorly equipped laboratory or no laboratory might demotivate Science teachers from a good teacher. Tell your views (negative attitude).
156. P Yes, indeed it is demotivating in a way. However we are trying at our level best to do something for that so the teachers are very motivated and innovative in their approach. So we don't have much problem as it could be. You know last year we performed very well in our Matric results in the subject for the first time ever.
157. I Thank you. Do you think it is not affecting very much.
158. P Yes. Because these teachers are becoming very confident now in thing work. When they are attending the course they came to me and told few problems but they are copying and doing their best. We are able to see the difference in teacher's confident approach even if they don't have sufficient equipments with their innovative methods with whatever is available at school.
159. I Are these Science teachers popular among their learners and their colleague?
160. P Yes. It has its serious impact on our learners. More learners are coming to register for Science and Maths because of these teachers and their work. And it has become now for the first time that more learners have registered for Maths and Science in standard 10.
161. I Thank you Sir. What are your more expectations from further Diploma in Education with which SASEN is busy with the training for teachers?
162. P I expect that this programme has to continue and assist as many teachers as possible. Those teachers who are attending it, a very clear difference are seen between them and others, not only through spoken term but also in performance at their work and in activities and their approach on daily basis. They put real life in their effort.
163. I Do they do all duties assigned to them with respect?



164. P All I can say that they are very well motivated teacher and they all jump to their work as quickly as possible. As it is happening now even the learners seemingly are not in class but the teacher is busy.
165. I Are they ready to spend extra time after the school?
166. P Yes. We start at 7:45 here at the school but Maths and Science teachers are here at 6:45 at the school giving extra coaching to the learners. They start 45 minutes extra equal to a period in the morning. And in the afternoon also they are working. So I am dead sure that these teachers want to work for extra classes with their learners.
167. I Do you think it is due to the influence of FDE programme?
168. P I can say that the FDE played a better part because it built the confidence into the teacher so that when they talk to the learners they know that they impart that particular knowledge. I believe that if one is confident, he will be able to pass this confidence to the learners and the love for the subject. I think that we are realising on the daily basis.
169. I Have you seen anytime that they want money out of it?
170. P No! Not at all.
171. I Did you observe any changes in your teachers' attitude and behaviour after two years of attending the course, for example:
- i. Giving more time to school.
  - ii. Prepared to work after school hours
  - iii. Confidence level.
  - iv. Lesson planning and preparation.
  - v. Finishing the syllabus on time.
172. P Let us focus on lesson planning and preparation and finishing the lesson on time. I hope these teachers are doing the lesson preparation and planning the work before hand. They can even lead the other staff to do so. They always have the attitude of now to finish. I can say not only finish but to see that learners are learning.
173. I What are your expectations from your teachers regarding: a. Attitude towards job, towards learners, school working time, profession, authority and responsibilities. And if they are meeting one of them what can we do to change it towards positive side?
174. P O.K. Expectation of a Maths teacher towards the job; one should have a positive attitude towards his job. Towards school working, he should always display some professionalism that is you should love your learners to learn from you a number of things. You will serve creating an example in terms of time creation and punctuality and even after school taking care of your learners. All these can be done only if you are responsible. You know our teachers are doing everything that we want but at the same time there is still a room for improvement. As regard their attitude towards learners and teaching indeed it is very positive. They have very positive attitude but as a human being there is always a way to enrich it and make more workable.
175. I Thank you very much to be with us and give your views about SASEN project.
176. P I appreciate it very much, what these Universities are doing for us in these rare subjects. I hope learners will be doing more Science and Maths in this area where need them. I appreciate your work on behalf of the department. Thank you very much.
177. I I am happy to hear that learners are getting more interested in their Maths and Science. How is the situation here?
178. P In Science HG number has increased considerably as compared to Mathematics because in Mathematics many learners do it for commercial subjects and there they do at S.G.
179. I Thank you very much. It was so interesting and encouraging to be with you.




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**B7.3 P2**

180. I As a Principal a poorly equipped laboratories or no laboratories might de-motivate a science teacher and might create a negative attitude towards teaching. Have you observed it in your school?
181. P Yes it is true. We experience this; teachers have a problem in preparing before hand. The periods are not long enough to accommodate the practical.
182. I Do you approve of Science teaching based on 'theoretical teaching' as compared to involve practical work in order to save the time?
183. P Some Science teachers are doing like that. The excuse is to finish the syllabus on or before time.
184. I Is Science teacher popular among his learners and colleagues? Give instances to support.
185. P They are popular. You find that when a Maths/ Science teacher leaves the school, learners are so much concerned and they ask questions, why was he allowed to leave the school.
186. I What are your expectations from the FDE programme? Which of your teacher is busy attending the programme?
187. P
- i. I would like to see, changes in teachers' attitude towards their profession. There are few things, which you can't change. For instance the physical structure, but if teacher has a positive attitude he will improvise and run a good class.
  - ii. I expect FDE to give conceptual enrichment to their knowledge, because such teachers have been seen working hard and succeeding. Teachers have confidence.
  - iii. To provide right qualification to teachers this is important that learners believe and have confidence.
188. I Do you see any effect of SASEN on your teachers?
189. P There is a change in attitude. The teachers who are participating in SASEN they are parting some skills to other teachers by organising the INSET activities. It appears that such teachers don't look for attending the classes; rather they try to meet the challenges in the class and go on teaching.
190. I Does he (Science teacher) honours the duties assigned to him with respect?
191. P I believe they are very honest in performing their duties
192. I Do you see any change in their behaviour of three year of attending FDE For example:
- a) Giving more time to school or prepared to work after school
  - b) Confidence level.
  - c) Lesson planning and preparation.
  - d) Finishing the curriculum on time.
193. P a) Yes, this is the case. In this school we have shortage of classes and hence overcrowding. I have examples of Maths teachers Mr. Nkosi J.J. who organises his class after school frequently. I have seen that learners also have started enjoying Mathematics. Some times even learners go to him to organise extra classes and tell him to make it available, even if he is busy.
- b) Teachers are now much more confident. Although I did not use any tool to access or measure it. This reflects in OBE classes where there is no relevant LTSM available but they design and go on. This shows an improvement in confidence level.
194. I Yes. O.k. lesson planning.
195. P Yes. I believe that this is done. I have seen and found them organising the apparatus before going to the class or a day before.
196. I Finishing curriculum in time?
197. P Yes, this is done. The Science teacher he is ready to work during holidays in order to finish the syllabus of std. 10. The tests given to learners are proof.
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198. I O.K. As a Principal what attitude do you expect from a teacher towards the job, learners, school working time, profession, authority and responsibility. How do you rate your Maths/ Science teachers against the items raised? The items, which he/she does not meet with the expectations, are there a way to develop the teachers?
199. P Let us see: Attitude towards job: They show positive attitude.
- Learners-** I think teachers should be able to work with those who are under achieving and also try to change, because there are those who still believe Maths and Science is difficult. If a teacher comes to the level of a learners and tries to understand the problems the learners have mostly in lower classes grade 8 to 10, when it comes to grade 11, number drops. If teacher comes at this level and help, their numbers may increase in higher classes.
- Profession-** They seem to be professionals. They keep their profession going. They solve their problems themselves, not complaining and creating trouble.
- Authority and responsibility-** It is interesting to note that these two teachers are serving in most of the school committee, because they are so responsible. If you give them a task to do they are very responsible. If they experience problem they come and report the problems and we all try to solve it. They don't just leave them; I think they are so positive.
200. I Mr. Principal, I got your views regarding the project. I wish to thank you for all your co-operation I got for the research.

#### B7.4 P1

Mr. principal: I welcome you in my interview to represent the Principal. I am expecting to know about your Science and Maths teachers who are attending a course at University of Pretoria. I have to ask you about them and their work at the school.

201. I A poorly equipped laboratory or no laboratory creates a bad attitude of teachers towards learning and teaching. What is the situation at your school?
202. P Although the statement is very true in many cases but at our school because of motivated and dedicated Science and Maths teachers it has minimal effect
203. I Are your teachers committed because of SASEN project?
204. P They were always committed.
205. I Are they popular among colleagues and learners?
206. P Yes. They are because most of the time they are giving proper tuitions to learners, proper programmes to be followed; they are very big asset for the school.
207. I What is your expectation from SASEN, where the teachers are busy for the FDE. This programme is done by University of Pretoria with MDE.
208. P Fully enriched and expertise to take up the Science class. Much they are doing it but there are new innovations involved in science, so they will be more equipped with this training. More so with technology, the use of computers and other facilities where we need them to be more equipped.
209. I O.K. Does he honour the duties assigned with report.
210. P I will glorify them in this respect. They have been doing their work with honesty, hard work and dedication. They are assets to the school. They are performing their duties with immediate respect and they are ever busy in the school giving more than what they are supposed to give and do in the school. Helping other teachers where they need help regarding the task assigned to them.
211. I Did you observe any change in the behaviour and attitude after two years of attending the FDE?



212. P There was not so much change in their behaviour and attitude in them because they were always committed and were working hard. Only change I can observe is that expertise they have gained. They have more simplified ways to do their task. They have improved a lot.
213. I O.K. Are you referring to confidence level in this?
214. P Yes! Yes! It has increased so much. Now both can take up classes up to grade- 12 with so much ease and confidence that was not before. Again with the lesson preparation they have put in new ways in it. This is because of FDE.
215. I Now I will like you to say what attitude do you expect from a teacher towards a) Job b) Learners c) Profession, towards authority and d) Responsibility. Just your expectation and how do you rate them?
216. P **Learners:** We have to be more patient with learners because of this paradigm shift towards innovation; trust and making them feel more free and comfortable.  
**Towards school time:** I wish if we can give more time and do improvement in the school. May be if we can give more professionalism in Science teaching and be exposed to learners, more female learners can also take part and grow. Mainly female learners are scared of Science learning because they take it as a difficult subject.  
**Authority:** Each teacher has the exercise authority in his classroom.  
**Responsibility:** It is very difficult because of the hurdles.  
**Computer skills:** Using the computer in preparing the certificates for learners, preparing lesson plans have rated the two teachers excellent.
217. I I am very happy to be with you and to have your view. Thank you very much.

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### **B8 Evaluation of the SASEN Project, August, 2003.**

These interviews were conducted with Professor Braun. He also made much of the field notes along with me.

One school per cluster was chosen as a sample criteria being (i) Representative school with two teachers. (ii) Has been the cluster leader. (iii) After the project has ended computers are allocated to those schools for use of teachers in the cluster being positioned and agreed as central approachable school. (iv) Of course finally the School should be able to participate.

With all these:

1. Cluster 1
2. Cluster 2
3. Cluster 3

Were selected for the interview.

Stakeholders e.g.

1. Union leaders (SADTU)
2. Principals of the school
3. Colleagues as teachers (if ready to come and give their views) were also asked to take part in the interviews.

Department officials who started the project like

1. D.O.-1, the District Head.
2. D.O.-2, the curriculum co-ordinator in the sequence.
3. D. O.-3. Chief Director, GET, MDE



The University Staff, representatives: 1. Pr. (project Director), from Department of Statistics (Lecturer-2) and Lecturer-1, from Science Education were also interviewed.

**The evaluation of the project had the following aspects to establish:**

**Expectations:** Based on Ogawa's 2002 paper 'Power politics Stakeholders...' "*How to make our dream come true*" it was very appealing that we find the expectations of Stakeholder and see what comes out of it.

**The Stakeholder** as mentioned before were locally available and interviews were organised. Other oral question answer style, the Stakeholder was asked to write answers to questionnaire in few cases.

**Achievements:** Direct recipients of the project were the teachers who took up the course. Therefore the achievement of these teachers was taken as basic one. Other Stakeholder who were indirectly benefiting from the course were taken as recipients through the teachers e.g. students, principals, colleague, unions, Department of Education Officials etc. The learners' achievements depended on the teachers' performance affecting everyone in the educational environment of the school where they are supposed to perform.

**Sustainability:** This aspect provides a lasting effect. Are beneficiaries able to continue benefiting out of it? Can it remain behind like a glowing candle and spreading its light or it has extinguished after the project ended. What was done to sustain it, if any thing was done? Is it working? These were few questions were to be answered by this round of interview. The project as a 'learning organisation' was also viewed. It was focussed mainly on the definition and criteria given by Senge.

**B8.1 Cluster-1, August 2003.**

**Introduction of the interviewer.**

I am a former C.I. of the Eerstehwek District. During Sept. 1999, we started the '*Science and Maths teachers development project*' through SASEN (South African Science Education Network) in collaboration with University of Pretoria and Mpumalanga Department of Education.

We shall be talking about your expectation, experiences and outcomes achieved after 3 years of hard work with SASEN project. ( It is organised in the Principal's office in the cool and friendly environment.)

1. T (Science teacher Mr. teacher introduced himself to the two interviewers). I am teachera Science teacher in this school. I joined the FDE of the project with UP majoring Mathematics and Science. In the project I was the cluster co-ordinator. As a cluster leader I really enjoyed my work with other teachers who were the part of the cluster 2. I am sure that I am in position to give a true reflection on the project during this interview. I am promising to be honest in my deliberations.
2. I Thank you Mr. teacher for this offer.
3. I I am Max Braun, who was the man responsible for the University of Pretoria contribution in SASEN project at eMpuluzi teachers centre. This cluster 'Dundonald' was one of the leading clusters managed and co-ordinated by Mr. teacher. Upfront I would like to mention that Mr. teacher came with some higher qualification than many of the others and he picked up the leadership role very effectively. From our point of view and purpose of this interview is mainly to look back, now, when the project is finished what we did, to see whether we achieved what we wanted to achieve. So we are going to ask questions Mr. teacher about

- motivations. Why you came to attend this project? Why do you think some of your fellow teachers came? Amm. Did we help you to achieve what you wanted to achieve? We also need information where we did not succeed and other things we will like to know what learning took place? Your views about us? You looked at us in a way in the beginning and later on adapt or changed your views about us later. Think about that. Because many of the things we did it was out of awareness. So we are asking for evidence did we learn from our side as part of the organisation. We will also be asking about the community of teachers around here, how do they feel about their expectations and us. Thank you Mr. Shongue for the opportunity you gave us to have this interview today. There are some prepared questions and some open ended also. Thank you.
4. I Before you joined the project, what were your expectations?
5. T Yeh. When it was advertised, we took it as other type of workshops, organised by the Department of Education. We thought that it was meant for OBE teachers who attended the previous training. But after the first meeting we attended we found it as a project with broader aim. At our place it is difficult to do Science through correspondence, because all the academic institutions are based around Gauteng and when teachers correspond they find it very difficult. Therefore the first expectation and attraction was to get a certificate at our door in Science Education.
6. I Any other expectation?
7. T Project was not just to give certificate, but for teachers to learn and get more knowledge in their different subjects that they are teaching e.g. Maths and Science. We didn't expect something like but we did it. The important thing in this regard was that the lecturers of UP did not just brought the knowledge and transferred to us but we had to share, understand and digest it. OBE methodology, which made things very well in new areas e.g. Earth Science and Statistics. Previous courses were always based on cascade (model) e.g. Top down approach. This was a bit different. It had its element of filtering the information from top down but it was from peer to peer too. That was the best of it and also the emphasis was not only the certificate part for teachers but to grasp the basics in the classroom teaching.
8. I If I say you expected few things and you got many more things, which you did not expect in the beginning?
9. T That is true, we got many un-expected ones.
10. I Can you be specific about those which you got and made teachers to change their attitude towards work, job, learners, responsibility etc.
11. T One, which I take more important, is approach. When I was in college and I received training in different way. Although we will be saying that our teaching should be learner centred, the teachers were always the source of information that brings the information to the learners, and learners learn mostly knowledge and not skills. But in this one we were doing current trends there were different methodologies, which were brought to our class and see the effect towards a change. This was unique and best part of it. Most of us had deficiency in our training at the Diploma level. So also we had the benefit to have you feel of the University staff what was needed what I liked in the project. What we were doing was relevant to what we are doing in the class. All the topics, which we are teaching in the class in old fashion, were covered in the new manner in the project. You gained more knowledge, which can be applied immediately in the classroom practice.
12. I Any attitudinal change?
13. T Yes. A big feeling that "Science is for all" what we had before was "Science is for those who are brilliant people". What was happening before in our schools, people were grading learners, categorising them who can go for science and those who cannot go for science. But now what I do, I go to learners and advertise science to



- learners. Why should they do science? Advantages of being a science student and it is up to them to choose. I don't say that you cannot do science.
14. I 'Learner centred and teachers centred' which one do you like?
15. T I think 'learner centred approach' is the best method to adopt in a classroom situation. When you view learning and teaching before, one can only learn, when one is told. After we learned from the project that if there should be a problem, I should rise up and say I want to learn. Not that someone tells the person to learn. Those are two different things. (1) A teacher goes to learners, gives the same information and learners memorise them. This type of learning is easily forgotten. (2) When the pupil are directly doing and involving him or herself, then it lasts.
16. I when you joined the project you did not know what is going to happen? Tell us few things, which kept you in the project for so long and made you achieve the FDE.
17. T 1) the commitment that was shown by the lecturers, towards learning. 2) Clustering teachers together. (If one was alone, it was easy to quit, but in a cluster where you share and you realise that you have the potential that kept the project going)
18. I Any other things which kept you? Finances and other things that affected you?
19. T I think from my point of view, the finance was not an important factor, we always benefited from the project sponsors. We got apparatus and equipment from the project, and what you do there, you come and apply to class. It was different than other projects, where you do your things in the workshop but when you come to school, you get frustrated, can not apply any thing rather you go back to square one.
20. I Okay! Sometimes you had to pay for transport, you had to struggle to reach the centre. How did you take up this obstacle?
21. T Compared to other projects where we had to go far up to the Universities, it was simple for us. Because the projects came to our place. Coming to the issue of transport, we did not pay that much. Think of those who travel longer distances and pay for accommodation etc, it was the best project because it came to us.
22. I You have been appreciating cluster formation as a good structure, which kept you going very well. How did it work? Please throw some light.
23. T We considered all of us at equal level but what we realised is that one or two things that can be contributed by different members of the cluster. If we are doing problems we meet regularly, doing problems. We look at the problem as a group and we are ready to share. It is much more convenient because we are almost located at the same place. We don't have to travel longer distances. It was easy to communicate, if we have a problem or whatever to convey.
24. I Do the same language of cluster participant's play a role?
25. T Yes! Our language and same culture, we quickly understand the problem we are facing. In our meetings we accommodate each other according to our cultural set up also. Like those who are married, we had to consider the limitations and organise meetings which suite to all of us. Some times we are working with problems which no one from the cluster can solve that particular problem. In such cases teachers will take problem with them, go to their respective schools and share with other teachers who are not in the cluster. Mostly it helped and we could even communicated with other students who are related to us and are in other institutions (Wits, RAU etc), we phone and get help. Some times when they come home during holidays we meet and share the problems we have. Sometimes we find different ways of solving the same problem. As a cluster we grew very well.
26. I Do you recommend cluster teaching for others?
27. T I think this is the best, it might be difficult in the beginning to form a cluster but when it is formed and you belong to it then it becomes simple. You make it to exist and continue, not just for name, but also to work and benefit.
28. I Did you have computer literacy before you joined the project?
29. T Not at all. Even I did not know what a computer was. To me the monitor was a computer. So the knowledge what we gained there helped us a lot. Now I can work



- on the computer, do what I like. I don't have to wait for the typist or the clerk to come and help me. So it is easier to work and complete the job.
30. I Okay, so what type of help does it give you?
31. T 1) one becomes organised. 2) You get work sheet and other documents printed by computer. 3) We take the computer skills to our learners. When they see that the teacher did not know it before, they also realise that the learning is a life long process. Some say it as 'experience of life'. In that term I tell myself that 'I am much more experienced than I was before'.
32. I which of the computer programmes do you regularly use?
33. T I use Excel and Microsoft.
34. I What went better on the part of the implementers? The programme worked for 3 years; I hope you remember. How did they work?
35. T The commitment that was shown by the implementers depended on the commitment of teachers. Teachers were not going there just to receive but they were contributing to the project.
36. I Do you remember when they were appreciating your contribution.
37. T what I can add more is:
- We were in direct communication with each other. No one ignores anyone. Every happening is taken seriously and attended to; every one is part of the project.
  - When they give us task to work, they always considered it and took teachers advice on when to submit.
  - Sometimes we also felt that the tasks given to us to complete were very taxing because we had to do the schoolwork at the same time. But we always tried our best to cover the work.
38. I In your opinion do you think the organisers also learned something from you?
39. T I think so.
- Lecturer from UP initiated the cluster but we designed it ourselves a working cluster. How should it function? That was appreciated and taken up by the University staff for example:
  - A popular cluster leader
  - Thorough consultation and caring for each other's interest. (*Theory came from UP staff. Practical aspects came from local teachers.*) Yes.
  - I would say that all learned from inter-cluster sharing of ideas, when all are present together to solve problems. Cluster leaders and others also will project their feelings that how did they go about a particular issue or a problem, it might be academic, conceptual or organisational. This sharing was not very common to University staff. When they listened to these they took it and used in other areas.
  - Human relations: UP staff was dealing with entirely a different group of people than what they are dealing with at the University. At the university they are dealing with different type of students. At this point they find us quite different type of adult and responsible teachers, altogether a different class of students.
40. I (A follow up question by Prof. Braun) did you see us doing our work in a way and after some time being with you, doing in a different way?
41. T Yes! I think there was a change in approach. I will cite an example in Physics, before when we started it was Calculus based. But the way we solve the problems at our schools it indicated that Calculus is not used in our classroom teaching then the approach got changed and Algebraic method was used.
42. I Now I will take you towards change in attitude as compare to before and after. Was there any need for change? Did you change towards spending more time in the school?
43. T Yeh!! In fact I would say that I was spending more time before also, but now I am talking about more 'quality time'. What we are doing is much more productive. I





- think before, it was difficult for us to open our class to any other person. Now I have realised that I have no problem in sharing the class with others. And also I have no problem in asking other teachers to help where I can't transfer (may be) knowledge adequately to learners. Now what I have realised is that the project has gone beyond the certificate. We have built now a network of friends where we come together and share ideas about Science, Maths and Education informally. Sometimes we pick up a phone and talk with any one I choose. Now I have so many contact numbers spread up to SASEN Universities plus locals. I will keep these numbers with me, and use when I like. Before I used to demonstrate the experiments to learners, it was easy that way, because we want to do things very fast. But now I learned that it was easier for learners to learn if we allow working on their own. It takes time for them to observe what you want them to observe. But what I learnt from the project is that if you do this course from other Universities through correspondence, it takes just two years. When I started thinking what did we benefit in three years, I found that we benefited the most with the project. The longer the project was the more we could gain and digest.
44. I Okay. (Towards teaching Science) What did you gain as a Science teacher?
45. T I gained a lot. I have the resources with me. I use these authentic books along with the local textbooks. We have also the new approaches to solve the problems. You see that with the prevailing textbooks, sometimes we use author's ideas, which are sometimes difficult and very confusing to learners. From the project we have gained different approaches to solve a problem in Science. These make us more independent in our approach.
46. I Towards Science, you have become more positive or negative?
47. T I will say, I love it now. If I had my way I would continue studying further.
48. I what is your mind set on '*learner centred Science teaching*'?
49. T If you talk about proper learning that is the only way to do it. Our teaching must be learner centred.
50. I Before training, was it not so?
51. T I will say mostly, it was not like that. One was mostly concentrating on finishing up the syllabus, by using teacher centred method.
52. I Do you think learner centred approach will not finish the syllabus?
53. T It will. But the teacher has to take extra hours to do that if needs arise. You don't confine the usual periods only. What I have found with my learners is that they have no problem in staying behind while others are leaving. On this point I have realised that it seems that they are benefiting something because they couldn't stay for nothing, even though some of them have to travel more than 10 km to their home still, but they choose to remain for extra classes.
54. I '*Learners as your sons and daughters*' what is your attitude? Any change in attitude towards that?
55. T I can say that '*I love teaching*' but before I had a problem with learners who are problematic, I could not understand them. But now I have learned to understand, why do they behave problematic way, trying to accommodate them. Because if you fight fire with fire, what you get is negative response from them, they start just hating you. Some of them even enjoy when you say don't come to this class just stay outside. But if you understand that the learner is individual, who comes from different background then I want to find out about the learners detailed background and evaluate him/her and behave accordingly like a parent. This is a new behaviour, which I learned from the project, because with us in our clustering, if one of the members doesn't attend regularly and if you say you don't want to help that person, you end up disintegrated as a whole cluster. But if you are trying to accommodate the person, if you are trying to find out what happened, then you grow together. I took that and introduced to my class.



56. I Mr. Shongwe there is a lot for you to write down as your experiences. These unique experiences we should not lose.
57. T Nodding and taking the remark positively.
58. I *'Science teaching an interesting job.'*
59. T It is interesting. I will say that this, when we look at the world we are in now, it is changing from current trends, what I liked, and I always tell my learners, I didn't know that even a policy investigation involves Science. I conveyed this to my learners that skills that they learn in the class can benefit them in everyday life. What I am saying that Science is broad and it is not only the Physical Science, but also it is related to Biology, Agriculture, Geography and many more. Science is really vast and very interesting.
60. I What is your view about examination? CASS, summative examinations, there are countries where there is no examination at all.
61. T I think with us it is going to take longer time to change the mind set. At present I think it is important that *"until our learners realise that learning is not about writing exams"*. The introduction of CASS at the moment has helped mostly with discipline, as before the learners were easily protesting for everything for no good reason, but now they know whatever they do it comes to us and they are evaluated for that. They are more serious about writing their class work, doing homework etc. I think in the longer run when people have realised the importance of learning, it will not that much be important to write the exams at the end of the year.
62. I Did you do CTA (Common task for assessment)?
63. T Yes Sir! What I saw last year in Science I looked at the exercise given there. I took it as good exercise. But the problem with the CTA that you find that the teacher whole year teaches something different and when CTA comes it altogether different. It is from every daily life observation what is happening.
64. I And that is what it should be.
65. T Nodding yes as the spirit of OBE.
66. I Let us talk more about the project. Any other change in your academic behaviours or in your life due to SASEN. Please tell me.
67. T It is true to say that when you achieve something in your life, you are far much more sure of yourself. The 'FDE' what I have received from the University, the certificate itself has contributed to me a lot. Although the financial status has not much changed. Anyway, I said already that I was not doing it for the purpose of getting more salary. I was doing it to have more knowledge of Science. As I indicated before that, the knowledge that I have now, and the confidence that I have is far much better, that I had before. As Mr. Pandey knows that my qualification was a Senior Primary Teacher Diploma, and when you are teaching Senior Certificate, at the back up of your mind you feel that may be there is deficiency in my qualification and also you are staying in a secondary school and you are not secured how long can you remain in Secondary while you don't have the right qualification. But now with the FDE, all have become past. Now I am confident and assured of everything suitable with a good mind set, looking forward to provide the proper learning to students of grade 12. This is a major difference at this moment.
68. I O.K. Please try to evaluate the SASEN as a *'learning organisation'* under the definition given by 'Senge' (1990).
69. T 1. Creating capacity... excellent.
70. I So it created capacity among the learners. As it has been indicated that with the project one has developed himself/herself as learners. When you are a teacher you know that I am there to lead the learners to learn, which they are not normally nurtured in other institutions. With this project that was emphasised again and again that we find that we have done something and now we have to go and report on what you have achieved, this gave a sense of responsibility and accountability.



71. I O.K. Second one.
72. T Innovative thinking nurtured - Excellent.
73. I Please support it. I will say that when we were doing current trends, we had to select a topic of our own choice, when we have selected it, teach it, using outcome-based education. When you look at the different materials that you have, the way those are written, they are written in an old style. Here I believe that with this project one has developed the skills of writing your own material for the school as you plan using other resources.
74. I So you were allowed to grow as you are in your own way to develop and nurture.
75. T Exactly yes.
76. I It was given opportunity to give its own shape.
77. T Yes that is what I mean. Teachers usually complain that the materials and resources they have, did not suit their situations. I believe that if I am given the chance to teach with OBE class, I will not bother myself about the given resources, I will create my own. And I am doing that. All these came as a gift from SASEN'S creative ability.
78. I O.K. Third one. That is collective aspiration set free.
79. T I rate it as excellent. We as group aspired for the same thing. Although we came from different areas, we will always come to an agreement for instance: let us look at this thing. The project was based at eMpuluzi teacher centre, because all of us wanted to achieve the same thing. We drive from Elukwatini to eMpuluzi, when we have problem with eMpuluzi we went to Elukwatini what we have just common, to see the members of the other clusters and work together.
80. I SASEN project also accepted it?
81. T Yes.
82. I Let us see the fourth one. "*Learning together*"
83. T This I will rate at '*more than excellent*' I will say that was superb.
84. I (laughter came up.) Go ahead.
85. T As I indicated earlier that clustering made it possible to happen everything just to learn together. And I will need to say that when we talk of clusters, we were grouped in where we feel comfortable. What needs to indicate is what I have learned in the clusters. And what they learned there, shared with us. So there was an exchange of the ideas, what we have done to check with others. Therefore it was easy to grow together.
86. I In your opinion did SASEN have system mechanism and process to create and enhance capacity?
87. T Yes a system was there. What I used to say that they had a plan. What I like that they first did the research about the area. They knew our strengths and weaknesses, when they designed the project they sent it to all of us. For one and half year both Maths and Science were put together and grew together although later Maths (group) and Science (group) separated. They gave us experiments to work, practice and perform. Therefore I say that SASEN has a system, mechanism and process to perform as a learning organisation. They took us step by step and not in a crowding situation.
88. I Did SASEN organiser, put enough energy and materials to sustain the objectives. As it has indicated that even if we experience difficulties we could understand that we have problems. And I have to say that it was not easy to attend for this period of time (as I indicated that it took been longer than normal FDE programmes). I think from that point it shows to the organisers that the people are serious. Although not all of us but majority managed to attend to do what they were tasked to do, that enabled the project to be sustained.





89. I Do you think learning opportunities provided by SASEN were fully utilised and goal realised? Or goals were unrealistic and SASEN therefore partially realised it. Give your feelings.
90. T Their goals were realistic and the opportunities were fully utilised. I think the goals were not fully realised. Because, initially the project aimed to give us equal knowledge of Mathematics and Science. But somewhere it was diverted a bit from goal that was set and we had to specialise only for one of the two.

### B8.2 Cluster-2, School August, 2003.

(Introduction and purpose of the interview with the interviewee)

91. I Our effort here is to see, whether it ended into a good learning organisation based on the following issues:
- i. Creating capacity to achieve desired results.
  - ii. Innovative thinking nurtured.
  - iii. Collective aspirations set free.
  - iv. Learning to learn together.

*(The teacher tries to rate the organisation looking at each criterion one by one.)*

92. T My response to the items mentioned are:
- i) Excellent: We were given opportunities to use our capacity. Having given this, one was able to use his creativity and the aim of doing that was to shift the paradigm that teacher is the only source of information. Now if you are creative you are going to be able to allow our learners to use their creativity in their learning. Looking at the way, how we were taught, I feel that was achieved excellent.
  - ii) To the second question that innovative thinking nurtured, I would say again that it was excellent. We were allowed to use our own thinking and the way of doing thing, your input in presenting a topic was not cut off, even if it was wrong, instead you were helped in your understanding for the programme. So I feel your innovative thinking was not disregarded but nurtured.
  - iii) The third aspect whether collective aspiration were set free. Yet it was also excellent. We were allowed to work in groups, and in a group each and every one was given latitude to air his views and views of every member was discussed, so I feel collective aspirations were set free because each and every one was given time to say what he or she feels to say and tell what should be done.
  - iv) Learning to learn together was also excellent. Particularly to me the way we learned in groups was excellent, of now I am unable to do something individually. Like I had a course that I took with UNISA and that course I had to do with individually, my performance was not good as before, and the drop in my performance was because I was not doing it in a group. I was used to work in a group, now learning as individual was very difficult. So I feel learning to learn together was promoted by SASEN. That is why I rate it as excellent.
93. I So you rate the programme as a whole as excellent learning organisation?
94. T1 In total yes.
95. I In your opinion did SASEN have system mechanism and process to enhance capability of its participants.
96. T1 In fact we were working in clusters. The UP lecturers were motivated as well as fully prepared to give us maximum. They used computers to give lessons in Statistics and Mathematics. They gave us books, handouts and what not. In short



- yes the SASEN has a system, mechanism as well designed process to enhance our capabilities. (T2)
97. T2 Yes I agree with (T1) when he says. The handouts, which were given to us, were so clear; with new information focussing on outcomes based Education. It took us time to achieve our goals. I think you can't teach someone today and expect him to achieve his goals tomorrow. The fact that this was done over a period so it was a process.
98. I Did SASEN organisers put enough energy and material to sustain the objectives of community (school and teacher) and at the same time theirs (SASEN) organisation?
99. T2 This project was capable in both ways. The schools and the project both were active. The lecturers were visiting us and observing what we are doing at our schools and advising us. This was to sustain the schools. The process did not end there; it aimed to provide us with the learner centred teaching and to make us achieve the Diploma. The project started well and ended well we have achieved our diploma.
100. T1 I will add that when project started the main objective was to see that teachers pass the course given to them. To add on that it is evident that SASEN did achieve the objectives. And more than that we also achieved to be Computer literate and school as a whole got benefited. We are helping the school preparing schedules and so many things. Other than this we empowered other teachers also in sharing our expertise. And more than that once on Saturday the truck people come to supply us Computers and we did not know what to do, but now we are very well versed and can get more information from Computers. In that sense I feel we have achieved the objectives. Our schools were supplied with some chemicals and those were not used because of lack of knowledge, but now we are using those in laboratory and making the best use of it. So we achieved a lot opportunities which are sustainable now. There was no Saturday, which was scheduled and not honoured. So they were all fully utilised. And I remember some other day we went there and some games were going on but the way our institution was going on it was undisturbed by those, if we schedule from 9 to 4 O' clock. It will go like that undisturbed, no excuse. This shows that we were committed and at the end we achieved what we wanted.
101. I Do you think learning opportunities provided by SASEN were fully utilised and goals realised or goals were unrealistic and therefore partially realised?
102. T1 I think the opportunities given by SASEN were fully utilised, may be so to say. When we started for the first day we were 38, and I think those who wrote were 28. As far as I know only one did not qualify. Therefore I can say that opportunities were fully utilised in my view. The goals that were set to empowering teachers and improving in their style of teaching were realised, because now we are Computer literate and empowered to work independently on our own.
103. I Thank you. Why did you join the project?
104. T2 I joined because I wanted to enhance my capabilities in the subject I am teaching i.e. Mathematics and Science. If I tell you the confidence after being the part of the project that I have built is unbelievable. There were so many concepts that I was afraid of too much when I was alone, now I am doing freely with all confidence.
105. T1 I wouldn't differ much from (T2), in fact the aim was to empower. If you are a teacher you are to learn forever, there are new things (knowledge) taking place outside. As a teacher you should be the first person to learn about that. We learnt among other things that Computer literacy, which was new to us and it opened a gate where the treasure of knowledge can be accessed.
106. I Let us see few other aspects like: you were asked to pay 50% of the tuition fees; you had to transport yourself to the centre; provide your lunch pack yourself and even to go to University of Pretoria for lab work on your own. What made you not



- to be deterred from all these things and you continued with the project for so long until the success was achieved?
107. T2 Initially when I looked at the course outline, I saw that there was Computer literacy; there was Mathematics and Science. There I saw that was my line. In fact this way of doing things for nothing not paying anything and so on, people think that you are not serious. In fact paying money for the transport and lunch you mentioned of it, was just to show that we are serious it was for us to achieve the goal with SASEN which gave opportunities to achieve our goals at our door. And this is what we are looking for.
108. I So you remained with the project because of your attachment with the goal, which you wanted to achieve.
109. T1 Yes, definitely.
110. T2 I will say if you start something as a starting point, then you must have an end point, one can't leave it just hanging. And the encouragements that we got from our lecturers and the way they presented the subject matter with us made not to fall along the way. That encouraged us to go on until its finality. It is useless to take up something halfway and leave it along the way. Although we were supposed to pay among others our transport and move towards the course, that was minor compared to what we pay for the full time course. And we had opportunity at the same time to teach our learners and continue with our class.
111. I Did you have Computer experience before joining?
112. T1 Not at all.
113. I After Computer literacy through SASEN you have mentioned so much of your achievement. Are you still willing to achieve more than that or you are happy?
114. T1 When we were graduating at the University of Pretoria they inquired whether we need something more from SASEN project. We said we were willing to do more than that what we got.
115. T2 In fact I will say we are still expecting more like myself when I am working with Computer, I want to do more and more but I don't know many things. And I realised that I am not fully versed with many functions of computer. For example I have a project, I would call it a project, that in our school we should have a database, and this we could not do. If we get such an opportunity to know it, it will be excellent.
116. I I want to know why did your cluster work while many other clusters did not? Give examples.
117. T1 The way we behaved it was like some body controlling our work. In fact it was not somebody, but ourselves, we were all committed. So to say we were able to choose leaders. And with leaders we made policy and each and every member should be liable to follow this accepted policy. For example we were using common transport to go to the teacher centre at eMpuluzi on Saturdays to attend our classes and we made the policy that if you are not attending on that particular Saturday you go or not go you must pay for your seat reserved in the transport. If you don't pay transport will fall away and what to do with future programmes. So that was adhered to. Another policy for example, when assignment was given to us as a group, each and every one was given him/her work to do. We come back as a group, I have done my part, and he has done his part. If you don't do your part, we omit you from the list and you don't get marks for that particular assignment. This made every member to be committed because you know that at the end you don't get your marks.
118. T2 We also kept a register, if you are not attending then we simply write you absent and you have to be answerable why you did not attend. When you don't attend the cluster members will have a meeting and the particular member will be asked to come and answer.



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119. T1 And also, we were not very cruel on that member who did not attend or did not do his/her work. But he/she has to feel the pinch that he/she did not co-operate in doing a common job. For example once a member did not do his part, because he said he was committed at his home for other things. But he was allowed to write a supplementary. The work was needed to be done at the eleventh hour and we did not give the work, because we wanted to teach him a lesson that if something is expected of you, you must do it. We are all family people and committed to our family work, but we also committed to this work. So we did not give him the work done by us. He was left to do the work alone at his own pace. At last when he was asked to write supplementary, we said O.K. come! Here is the work, do it and submit.
120. I In what way the cluster was superior to other type of workings?
121. T2 In fact the difference there is, that if you belong to a cluster and you are given a certain amount of work to do and you don't do that, you immediately checked for your responsible work and it is rectified other than that when you are individual, at the time when you are doing the distant learning you stay until such time when admissions are closed, last date to submit the assignment has passed etc., it will be then that you realise that I did not do this job. But if you are in a team or group, the group will immediately question you that you did not do your job. So you are liable to the particular group for the work, and by so doing you never fail to do the work.
122. T1 In a cluster we were empowering one another, in a sense if we were given a topic to handle one will prepare and present. We will argue on a particular point until we come to a common understanding. So that has taught one, that you don't take the matter as final when you say it, the other people may view it in a different manner, so you have to give rooms for the views of different people. That is what I have learnt from the cluster.
123. T2 One, another thing is that you get immediate correction. If you have perhaps a wrong perception or understanding on a particular point you will be immediately corrected by other colleagues and you will not wait until perhaps the examination comes and then you see that your understanding was wrong and you were in danger.
124. I Give some merits of the implementers.
125. T2 What they did? They were always punctual they put 100% effort behind the project. They will not say that they will not come on this Saturday and they don't come. If they say 9 O' clock start, it will start 9 O' clock definitely. Their work was always well planned and well prepared. I will like to congratulate the manager of this project. They used to give us information regarding the events on time, like the registration time, examination dates, time tables were given personally to every one so that you can't miss it.
126. T1 And also they were self-disciplined. Some other days their seniors would not be there, but they don't say that lets us knock off early. They still maintain the schedule time and the way they presented their lesson, we were encouraged and motivated. This motivation was so great that when we went there, we were just like young kids everyone wanted to say something.
127. T2 And the learning was hands on.
128. T1 Yes.
129. T2 The one would stand and explain things. At times we had to touch and feel how does it feel when you touch. Sometimes we have to present things in front of our colleagues. Because we were also given opportunities to present the matter. That is how we were practicing the matter with our students in our school.
130. I You were around four years with the implementers of SASEN. Did you observe anything that they learned from you?
131. T1 I think they did learn from us something. Like I remember, one day someone said let us start with prayers, and one of us lead the prayer and it was adopted. I
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- remember they will come there and then I will say that let us stand up and sing, I think they learned it from us. Again we behaved ourselves, the way we conducted ourselves in the clusters. I think it is very rare to find people working on Saturdays and sticking to the time schedule. I think they learned something from our cluster management also. But all in all we were committed and it was popular as a quality cluster.
132. T2 And I should think when we were learning we were discussing. And I think it was an opportunity from them to read, the entire District as one problem transpiring because we bring our experiences and share with them and in a way those experiences were given a sort of background of what is transpiring on a certain issue like computer sharing. Yes! We had only two computers for 25 members we co-operated and accepted to make the process going on.
133. I The negotiation went very well and even keeping the project that side (a comment) while majority was this side. Anything that you said, it should happen this way to presenters, they heard and adopted to use your way of doing things, if you remember and saw it. Give example.
134. T2 Yes. There were few assignments for individual we became group assignments. But it was made clear that it will be group assignments. It does not mean that an individual will sit and write the assignment as a group and present it and ultimately it was adopted.
135. T1 I agree with the previous speaker.
136. I So do you mean learning take place anywhere and in any situation. Learning is a two way process.
137. T1, T2 Yes. We agree.
138. I Up to what extent did the project influence you to have a new attitudes towards a) spending more time in school.
139. T1 I use to spent time before too now the time is extended and this has been done because I don't have time to work on computer, unless I remain behind.
140. T2 On my part, remaining behind is more encouraged because I have a tool now. I prepare worksheets using computer and do the work for tomorrow in a good way.
141. I b) Towards teaching (1) Science (2) Maths
142. T2 Attitude is positive. As I said earlier that now dealing with some aspects of the content of Mathematics and Physics is much easier and interesting than before because of increased skills, knowledge and confidence. Earlier it was difficult to understand whether I am doing wrong or right. For example when I was presenting Trigonometric graphs I was not sure but now I am very sure of every thing what I am doing e.g. Sin  $\theta$  graphs. It looked funny shaped, before it was difficult. So now I can say now we are very positive.
143. T1 Yes! I will also echo that I am very positive now on the attitude towards Maths and Science teaching. Sometimes you cannot have an extra class if you are not sure of what you are going to teach then you better reduce time. But if you have more information, you are sure of your matter to teach and you extend your time. When we work in a group and do the presentation, we find different ways of presenting the same thing and we chose the best one which will help our learners.
144. I Another point is going towards 'learner centred' Science/Maths teaching. What is your attitude? (Explain)
145. T1 There is an effect, but unfortunately on that part our learners they are not ready. When you give work to them their response is negative. Their attitude is negative, they will respond in a manner that you will finish that work in time.
146. I What is your feeling now? The Education should be teacher centred or learner centred?
147. T1 My feeling?
148. I Yeah.
149. T1 It should be learner centred.





150. T2 Yes! Even with time learners will also do, when they are motivated they do wonders. Now a number of factors are de-motivating them. For example they are not exposed. In this part of our country they are used to teacher centred education, receiving everything from the teacher. So a lot needs to be done to change things. And it is going to take sometime. But myself I am fully motivated to go for learner centred education.
151. I What is your attitude towards taking learners as your son or daughter?
152. T2 Definitely.
153. T Yes.
154. T2 I can say that 90% of my available time I spend at school and I want to be with my learners. You can't spend that much of your time until you take your learners as a part of yourself, like parents do. At times you find it more necessary to be with them e.g. when a learner is injured, you have to rush for help and give necessary attention.
155. T1 We take our learners as our sons and daughters when there is opportunity like bursary forms, we give them and feel happy when they receive it and become satisfied and have road to improvement.
156. T2 And by virtue of our position as educators, we have to work as parents.
157. I After SASEN training your attitude towards your job?
158. T2 It is very interesting and getting satisfaction, before it was not so.
159. I Do you like to remain a Maths/Science teacher to have your career?
160. T1, T2 Yes. I like to remain but I will like to add more qualification. Job satisfaction is very important, and that comes with increased knowledge of the field.
161. I Any other change in your academic behaviour or in your personal life, which were not covered by these questions, you can say?
162. T2 A lot of change in our academic life, like now I am a member of AMESA I attended the conference and many seminars which were not interesting to me before but now I enjoy it.
163. T1 And you know that in this AMESA conference I just realised that only the member who attended the SASEN, went to AMESA conference from the District. It means whatever there is to empower people are grabbing them. I feel something is happening with our group, which was not happening before.
164. I Thank you very much for your time and co-operation.

### B8.3 Cluster-3, August 2003

**We want to investigate, were we successful? If yes! why? And where we were not successful, why? Our successes are measured against the expectations.**

165. I When we started with the project, main aim was to look at the school, learners' results at the school. How the community, members of teaching staff could benefit. It aimed to develop the teachers and learners in new technology and things coming.
166. I You are talking about teachers? Who teacher you want to develop?
167. T I have to develop the teachers, with what knowledge I have, so that teachers develop.
168. I Are you talking about school-based inset or something like that?
169. T I am including them as a part of it.
170. I Are you confident to provide them with such training in Science and Technology?
171. T Not all the training but what I have gained I intend giving them at the school.
172. I Why did you join the project? What motivated you to join the project?
173. T First thing which attracted me to go there is my wish to update myself with current developed knowledge in Maths and Science, so I joined the project.
174. I Did anything change?





175. T Yes something has changed. Let me start with computer. I had no knowledge of computer before but I know enough at least to manage my work and much of the schoolwork on computer. Now I am busy in training other teachers to make use of computer. Learners are to their projects and let teachers be like facilitator. (Learner centred teaching) other change. When it comes to performance of learners in grade 12, their performance is improving and other teachers who teach them I help them improving their teaching.
176. I You went to the programme and you had to pay half of the fees of the University, your transport, your lunch and few other things on your own. What made you to continue and finish it?
177. T It was not a boring one, we learnt a lot from it, the hunger to achieve the knowledge kept us going. It told us what the OBE and how to implement it properly. It had helped us from old way of teaching to the new way of teaching.
178. I What is that new way?
179. T OBE, i.e. Curriculum 2005, is a new way I managed to benefit. Although I had problem with money, but what we got in terms of knowledge, expensive text books, Science kits etc., what we spent from our pocket was nothing and we loved this programme and continued because every day we were growing.
180. I Your cluster worked very well? How did you manage it to make so effective and workable?
181. T With our clusters we were discussing the questions and problems together, we do assignments together. Where ever encounter difficulties we brain storm and discuss those problems and get a good solution. Mostly we do the assignments individually and discuss the issue in cluster meetings. When we had any organising issue, we discuss those with lecturers and solve. So we did a lot with our cluster. We had three schools and we did very well. We all succeeded and got our diplomas. We got help from other lecturers also.
182. I Can you name those lecturers who helped you?
183. T Miss Thembi (current trends), Prof Braun, Mr. Rogen, Miss Ronal.
184. I In what way the learning in clusters, did you find superior than the individual learning?
185. T When we are together we discuss and brain storm together and home work and assignments were possible to be done together, if work alone you don't make it, I am definite on this point. It is important to meet others and take their views, if you want to succeed.
186. I I want you to look behind and tell, what went better on the part of implementers to make the project a success? And what might have gone wrong?
187. T A lot Mr. CI. There is a great change in the style of teaching. If we make use of computer to prepare our lesson it will have a good impact. Now as a facilitator learners should use 90% of the time to work and facilitator only 10%. They should be doing the activity, let them do research to do project and go on.
188. I Do you think the lecturers from University of Pretoria knowledge and skills to teachers?
189. T I always learn from my students. It was a two-way traffic, they also were learning from us e.g. our way of working in groups at the clusters, changing their methodology, which suits us as students.
190. I You learned from them and you changed your behaviour and performance in your school. When they (UP. lecturers) learned from you, did they also change in some way or other?
191. T They don't change they had their way. But they change according to the matter they had to present, e.g. Group work for clusters and us.
192. I Up to what extent did the project influence you to change the attitude from what you had before pertaining a) Spending more time in school?



193. T A great change in my life. I am always busy in making lesson preparation and work sheets staying late in the school for the next day. I try a method for few days and then I change it to another and see whether the learners benefit more. From all these I am motivated to spend more time for learners. Regarding teaching Maths and Science.
194. T Now I am trying to do more work with a good planning and preparation. Now I am sure and have very positive attitude than before. I am now confident in presenting a lesson with different methods and sure of information this has given me confidence and motivation to do Science with learners better than before.
195. I Learners centred approach?
196. T After the FDE we have a very positive feeling about learner centred approach in doing OBE, which was previously an unknown matter to us.
197. I Do you treat your learners in the school as son and daughter?
198. T Yes! I treat them as my sons and daughters to make them comfortable. If I don't do like that it is not easy to have there interest in my class and so on. I treat them equally; this creates their interest in our classes.
199. I After four years of attending the course, how do you feel about Science /Maths?
200. T Now I can give them all new methods of doing assignments, research, project etc. from our own experience at SASEN and make our class active and very live. A lot if resources and methods to use those were given to us to use in our classes and that is how we are sustaining our experience at the work place.
201. I Now do you know how to plan your class work interesting for learners?
202. T I plan well my lesson, when they ask questions I answer them well, if they get stuck somewhere I help and make myself available to them.
203. I How do you feel yourself ready for contextual teaching?
204. T Yes. I am. In planning we involve all stakeholders e.g. teacher, parents, SMT. Especially in looking for phase organisers, programme organisers while preparing for Meso-planning.
205. I What is your view the component Earth Science? Is it relevant?
206. T Yes it is relevant because it is in OBE. University did a lot for us;
- i. They managed to come to us from distant place.
  - ii. They managed to provide us with food.
  - iii. They managed to provide us information.
  - iv. They managed to provide material for project.
  - v. They managed to provide computer for us.
  - vi. They managed to provide diploma for us.
  - vii. We got skills and knowledge.
207. I Do you think they had, mechanism, system and process for the project?
208. T Yes! They did have all the three.
209. I was there any thing lacking in them?
210. T No! Nothing was lacking from their side. Every thing was organised perfect and in good order
211. I What did they give you to sustain your training outcomes?
212. T They gave us laboratory Science Kit, materials, computer at a central point, and that is our school.
213. I What do you mean by material?
214. T I mean textbooks as good resource for knowledge and information. CDS to have more information.
215. I Realisation of goals? Did they succeed in realising goals?
216. T Very well.
217. I Thank you very much.


**B8.4 UL-1, August 2003**
**B8.4.1 Union Leader.**

218. I welcome you to share views about the SASEN project and its impact on teachers and on the school. Please feel free and express your views.
219. T I too feel happy to be with you and talk on the project.
220. I Tell your views of the teachers' behaviour before and after the SASEN project?
221. T I can say he was mostly individual no team work before. After SASEN now, there is teamwork-building capacity for fellow teachers. It is even extended to other departments.
222. I What changes have you observed in your Science teacher after the course?
223. T Cooperating with other staff in imparting skills to implement OBE in the school even follow up meetings are organized. As a good leader he is helping others on getting computer literacy and using the knowledge in providing good worksheets, teaching material, schedules etc. We are very much helped. Administrative work of the school is all very organized and computer is used to save and store data.
224. I Please comment on:
- i. Adaptability of dealing with science without enough facility.
  - ii. Managing the school problems
  - iii. Relationship with staff members in terms of sharing with knowledge
  - iv. Any other statement that shows there was a change at the school which may be due to the science teacher having been on the science project.
225. T
- i. He adapts well. Even he goes to other schools to borrow equipments and building a team of science teachers. He is a hard working person.
  - ii. He is having better managerial skills than before. He got promotion as a Deputy Principal.
  - iii. Learners respect him and trust him. He remains with learners even during afternoons and help them.
  - iv. The science result has gone up our result is second in the circuit. He gives training to teachers and learners on expo-science. The project did a lot to science /maths teachers as well as to all of us as colleagues.

**B8.4.2 UL-2 (Colleague)**

226. I I am glad to have you for my interview on the achievement of science teachers due to the SASEN project. Kindly tell us your experience as achievement by the teachers, which affected others also.
227. T Their computer literacy marked a great change in general life of the school. Now we prepare certificates for learners, mark sheets and schedules and many more things in school related to schoolwork and class work. Extending support to even other schools regarding the teaching aids and skill training is given. These teachers are ready to be exposed to others with their new skills and provide necessary help. Helping the administration for maintaining the files, programmes and administration related items through computers. It has given very positive feeling towards the project from every corner.

**B8.4.3 UL-3 Colleague and Union Representative (August 2003)**

228. I You are most welcome to give your views about the SASEN project and the teachers' achievements. Kindly give your views regarding your expectations, experiences with participating teachers and outcomes of the course in practical life of the schools.

229. T They were committed to their work even before. The bonus they achieved what was not expected is computer literacy. Through this a remarkable improvement in terms of getting typed tests, lesson plans, mark sheets, schedules and other works are visible in general life of the school. They give more time after school in teaching, training others as well as preparing for next days. Now we see quality work. They are helping learners with their social problems also when the child is out of the school. They are more adapting to any situation and do well with their teaching. They give extra time for schoolwork with full support. Organising Expo-science for this school as well as supporting the other schools in the district is very common. They organized for AMESA membership and conferences. Teamwork is very much in place. It is actively visible in clusters.

### B8.5.1 P1, August 2003.

1. I I am happy to have you for my interview for the last time. Now the SASEN project has ended and the teachers are back in the school with their diplomas. We want to know the changes in teachers' attitudes and behaviours in the school, as achievements in their professional performances. Please tell us in the light of your expectations and achievements.
2. P My expectations were not so high, except that the teachers should come back with deeper knowledge of the subject and practical skills of science teaching. But we found more than the expectations like:
  - Computer literacy and its marvellous impact on the teaching and management of schools.
  - Ninety percent (90%) of the staff can do their work on computer.
  - Number of enrolment in Maths and science has increased dramatically. Number of learners in grade 12 going for Higher Grade Science and Maths also has increased.
  - Maths commercial group learners also have more enrolment and popularity in the school.
  - Word perfect, MS word, Excels, Power Point etc.
  - Whole credit goes to these teachers.
  - More group work than sitting individual.
  - Sharing the knowledge with confidence.
  - Attitudes towards other staff members are very positive.
  - They finish the syllabus on time
  - They are more dedicated with added skills and motivation.

### B8.5.2 Cluster-3, August 2003

This was the 1<sup>st</sup> interview done with the Principal of the school.

3. I I am very glad to have you for our interviews. Your school participated in the SASEN project and now the project has successfully ended. What were your expectations from SASEN project and what do you think it did?
4. P I expected that the project would not be a once off event. Because you see as a school, we sent only one person and he is the only resourced person where as there are so many standards to be covered and he himself alone can't do all the work involved with Science. Therefore we expected that it should be a continuous project. This year the other teachers should have gone to take up the course. Now



- the Science teacher who is trained is my deputy while I need such person in classroom. When there is a promotional post, we need a well versed person who has knowledge and better skills which takes such peoples to managerial post and we loose them from a class. And we remain with weaker peoples in classrooms. This is my main concern about the matter. May be now he is deputy, and during next years he might be Principal somewhere else and I may loose him completely. Therefore the teacher who should be chosen for such course should be the youngster, so that you can have them in classroom for sometime. Most of these teachers when they come with Secondary teacher Diploma, they are scared to continue with their Science teaching. They go to Johannesburg or to UNISA to have B.A. (History and Bibs) type course to get away from Science because they can't do Science course from here. That is how we are loosing Science teacher in our area. They can't continue with Science.
5. I Do you have telephone line or Internet? (Prof B)
  6. P Not yet. May be by next year, we will put in phone.
  7. I Have you noticed any change in Mr. teacher?
  8. P Yes he is very energetic and I have noticed him encouraging kids in lower classes in such a way that in grade 10 this year I have got 58 learners who have enrolled for Science subjects instead of 22, I used to have. It has impact on Mathematics also. This school has been also registered as Science school, but it was not effective. He is Science Head of Department also. He is influencing other teachers and encouraging them to be more effective. So factually we are benefited everywhere.
  9. I Why did you choose Mr. teacher to send to the project?
  10. P Because he has been all the time the man who has interest in Science. Even since he arrived in the school he has taught every Science subject that the school is offering. Because of the interest he has in Science, the school chose him from among other teachers to go for the course. We did not want a person who falls off on the way, I am happy that he succeeded and completed it. (A good laughter from all sides) He came with smile and showed me his degree that has passed. And in the end gradually we got the computer. He is an asset himself. We are grateful to the SASEN about all that.
  11. I How did other teachers that he was sent receive it?
  12. P They acknowledged that, because they all know that all are dependent on me. So they accepted and believed that they will get their turn after him.
  13. I Now it is on implementers, that they see, if they can create similar opportunity. Now, when I was outside, the other Natural Science teachers were enquiring what is with us for them? When is their turn coming?
  14. P It is really inspiring, if there is opportunity that they will join.
  15. I It appears that there is urgent need for further development. The present STD is not sufficient.
  16. P Yes. Because now other teachers are also motivated after Mrteacher development. Now the teachers are taking examples and becoming more enthusiastic in encouraging learners to learn more Science and Mathematics.

## **B8.6 Interviews with The University of Pretoria staff about the SASEN Project.**

### **B8.6.1 Lecturer-1, Staff of the University of Pretoria, (Nov. 2001).**

1. I Welcome to my interview. As part of the teacher development program in this rural area of the country for Science and Mathematics what are your goals, which these teachers should achieve in the end?





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2. T I would like the teachers to be competent Maths and Science teachers in the classroom. Most of the teachers that are teaching at the High school level don't have the qualification of that level therefore we are trying to make them competent, that is why we are providing them the materials and we are also taking them through the process. So there are major goals.
3. I In which areas do you think they need most support.
4. T I think we are more interested in context knowledge; they still need some kind of knowledge to teach the learner in primary school, that is because they can cope. Most of the teachers are teaching grade 12 but their knowledge is not of that standard and the 2<sup>nd</sup> thing, we are ready to train the teacher is methods.
5. I Do you see any attitudinal problem?
6. T Yes I do, especially when we started our program the teachers were very negative at the beginning because they take themselves as Science teachers but the program has nothing to do with Science. But they were forced to do this program. In the beginning they were not doing well but as time went on their attitude changed and which reflected on the strength of the project.
7. I Do you see any success regarding the targets set out in Q.1 above?
8. T Yes I do, because I was lucky enough to be the part of the classroom and then I observed some teachers where most of them are using the method that we are taking them through. Their content knowledge has improved. Because one of the things that we are doing is that they write a test to assess their knowledge when they meet and some of them are doing it for long now.
9. I Are those tests standardized tests?
10. T I think they are standardized tests, because the people that are actually offering the tuition to the students are the same people who are lecturing the same subjects at University at a postgraduate level.
11. I I wanted to be a bit sure that these tests given to these teachers and the tests given to university full time students are somewhere matching. Did you try to know from them truthfully?
12. T Yes, for instance if you go now and see the lectures going on, it got questions from old test papers. So we can see that the lecturers are using questions from University papers for assessment.
13. I So according to you, these tests are valid and reliable tests, to test the achievement of these teachers and content enrichment.
14. T In content enrichment, yes. The only thing I'm not sure at the moment is how much of this is transferred to the teachers. Although I was at some campuses but could not figure out how well equipped they were.
15. I But looking at the test results what you see, you are sure that they tell you the current response.
16. T Yes what I see tells me the current response, because merely looking at the marks and their performances they are very strong. And I know the pupils in the class have made the response very good too. The pupil in class are working hard because sometimes they don't get full information and work hard to find it and in the process increase their knowledge.
17. I Thanks for that observation, what more should SASEN or Department of Education should do so that the program is called a good attempt.
18. T One of the suggestions that I am having is that some of the subject advisers or curriculum implementers are not part of the programme because one of their roles is to train and develop teachers and therefore they would be learning as well, on how to do so in another area. So it is a pity that some of the teachers don't involve in such activities, it is my first suggestion.
19. I Is that for the department to decide?
20. T Yes that is for the department. The other thing to the department is that our life is not that simple it is isolated. Although they have positive links they will do some
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- incentive through teachers as soon as they finish the program. In terms of money, in terms of certificates that will make them to get to another level. I still think they can do more.
21. I And what can SASEN do?
22. T SASEN for instance has provided limited resources. I'm talking about, they have taken the teachers to computer literacy, and now some teachers learnt to use computers but now the teachers don't get computers where they are teaching. So at least what the department should do is at least provide one computer to each school, so that the teachers don't forget their skills, which they have learnt. And on the part of SASEN, I think SASEN has contributed financially for the program up to a level where the teachers achieve their diploma. But now talking to teachers, some of them want to carry on and want to get registered at University and finish it because they like the nature of the courses we are teaching. So I would like SASEN to give bursaries under which teachers can finish their courses. The other thing that the teachers can develop is class strategies, which is a very good way to start learning, where teachers themselves are assuring the classroom, their experience and professional issues, but in order to do that they need support. Therefore if SASEN continues to support the teachers the teachers will progress.
23. I Now let us see what SASEN is going to do? Generally people think that our teachers have a negative attitude towards the profession. What do you say about the attitude of the teachers based on your experiences with them?
24. T Actually I think, teachers do have a negative attitude towards the teaching profession. Firstly because of being the part of the community, they are members of the community and teachers are not respected as professionals in their community. That is why, and secondly if students are doing well all the credit goes to the learner and the teacher is left out. That is why a teacher always has a negative attitude towards his profession and community. Because of teachers are also not well paid it causes some negative attitude towards the profession. As a result you might see that the teachers who have developed themselves and have learned more have left the teaching profession to go to different professions.
25. I Did you also find similar experience with these teachers? I want some concrete points.
26. T Okay! When they started they had very negative attitude, I don't know how they were selected but they were very negative. As a result some of them had to drop out and left the classes. The reason being that some of them were saying 'what is there for me'? Why should I develop myself? But as I said one of the things that motivated them was the way in which the course was presented. It accommodated everybody and never compared anyone to anyone else. The other thing is that it really dealt with the issues, which are dramatic in classroom situations. Therefore they choose to be there, because it was useful.
27. I Thank you. Is SASEN project a right forum to achieve the right attitude or we have to try in some other way as well. I mean to say that if this project is completed, is it enough to change the attitudes or do we need to be more advanced.
28. T In terms of changing the general attitude I don't think it is the right platform but, in terms of changing the attitude of them in getting them to be more competent teachers, it is a good platform for them. But in terms of taking professional issues, where they are being serious teachers, I don't think it would be the good platform to do that.
29. I So what do you suggest?
30. T As I said earlier on, if this program is part of the policies of the department of education then maybe the attitudes will change. But as it is, it is in isolation from the other programs and secondly it is only targeting Maths and Science teachers in the schools and therefore it doesn't address the development of the whole school.



31. I So you mean to change the attitude we have to change the whole institution, not only two or three teachers.
32. T Exactly, especially people are now talking about systemic change. We talk about changing the whole institution. The parents should be proud of the whole development. So here we were just addressing the issue of content knowledge in the specific subjects like Science and Maths, but in terms of attitude these teachers cannot change their attitude. In a situation when all the other teachers leave early on Friday and come late on Monday, they will also leave because everyone is leaving. But if the whole school has developed a culture of teaching and learning then the whole institution will develop.
33. I You found these teachers with you for sometime, what is your assessment about their relevant content knowledge and. what are you trying to make them achieve.
34. T When the project started, actually our approach was not right in terms of assessment. We realized it after a year that we were trying to do two things at the same time. We were trying to develop the cluster and not giving them right methodology. We started giving them tasks to go and work on the tasks at home and in the cluster. At the end we found that only six out of the lot passed. Only then we realized that our assessment was not right because of what happened in the cluster. Those who were competent worked better than the others because they knew how to do the task. But what we are doing this year is to start every lesson with a mini test to make sure that they are going to pass.
35. I Tell me more about your observations regarding changes in terms of attitude and content enrichment.
36. T In terms of my observation for attitudes, we are talking about these teachers not their institution. What I have seen happening, when we started, was that some of them didn't want to ask questions because they did not want expose themselves and get embarrassed, but now they are open to ask questions. Even if they don't do well in tests, they write letters that they want to rewrite the test; we didn't do well because of this reason. So the attitudes have changed and they know now that they are here to improve their competency of knowledge. If they have not done well, they have other opportunity open in the OBE language, which they should utilize and learn.
37. I Last question. Is this program sustainable?
38. T OK, in terms of sustainability and here I'm talking about the 'class task', what I would like to mention is that teachers would like to change the timing and conditions of this program to suit them.
39. I Thank you.
40. T Thank you.

### **B8.6.2 Lecturer-1, Interviews, May 2005**

*(She is a Senior Lecturer in the Department of Science Education in University of Pretoria and she was part of the University team in the implementation of the project at Eerstehoek. She agreed to be interviewed on 31.05.05 regarding the SASEN project. The Interview was organized in the Principal's office at the school, where the researcher is the principal of the school. Of course this was her second Interview about the project).*

41. I. Mem! You are most welcome to this school and especially to our school. It is not your first visit to this school, you know our school even before therefore feel comfortable and free, you are welcome.
42. T Thank you.
43. I I will have some questions regarding SASEN project of which you were a very important member.
44. T Um Hoon.



45. I I hope your memories are still strong regarding the SASEN project and we will be able to have some fruitful exchange on the project. In your opinion, was SASEN a successful project? Elaborate.
46. T Thank you for the opportunity to come to your school again. I think SASEN was a very successful project. We should have continued to work with. The participants who are teachers achieved what they wanted to achieve, for instance I can mention the whole idea of qualification. They came out with a FDE certificate, which was an extra qualification on top of their existing qualification. *Secondly*, they improved their content knowledge on Science and Maths as a result they were more comfortable in their classrooms in teaching their subjects and quality of teaching science have improved in their classes. On top of that also *their attitude towards science and mathematics* has changed.
- i. I remember visiting other schools where principals were telling how committed the maths and science teachers were. It never happened before.
  - ii. All this was through the *good relationship* that we had with teachers. *The relationship* was build around small tokens that actually made our teaching easy. The first one was for instance, having the break with biscuits and tea, that was a motivation that tapped them coming and during those breaks we could talk about general things like about life, soccer etc. Through these, I developed a good relation with them. And also this relationship has developed up to now, for instance last week I had Juju bringing her learners to the University of Pretoria. On her request, I organized the Discovery Centre for her learners.
47. I You are saying that the ‘relationship’ was a major contributing factor.
48. T Exactly yes, it was a major contributing factor.
49. I What do you think lead to achieve those successes?
50. T One is *relationship* and second one is the way the *course was designed*. We actually took those teachers at workshops *as colleagues*. We started at their level where they work. It is very important to have that bridging, where we established the quality or the level of their content knowledge in science and mathematics. And as this was done they were trying to learn more and this was very helpful to us. So, the relationship that actually occurred was very useful. And the other thing that happened was that they themselves were at different levels. Those who were at some higher level of understanding of subjects were more important in their clusters; because that was the place they were leading the others in their clusters by displaying their own content knowledge.
51. I Do you think the UP staff, engaged in the project, also learned something from them? Or in other words was it a learning organisation?
52. T Definitely, it was a learning organisation for UP. Some of the lecturers from UP, who went there, never taught disadvantaged teachers, They actually assumed that the teachers at high school level would have content X, but they discovered that the teachers were actually not up to that level. I remember Prof. Schoeman, who was teaching Chemistry had actually to go and take some of the things in order to cater for what he has observed in that particular project. So they also learnt a lot.
53. I Thank you. What did you learn yourself?
54. T I like to be with teachers. But with each group of teachers, I learnt that when you give to a group of teachers the opportunity to develop themselves they could do so. Clusters actually did that. I learnt that if you create opportunity for people to do things they could be able to learn, without being aware that they are learning. For example we gave assignment to do during their cluster meetings and those assignments motivated them to do more. And also it is important for the people in the field to try and link what teachers are doing in their classes on daily basis. So some of the assignments were actually compelled to be done based on what they do in their classrooms. For me that was an experience of learning.



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55. I You visited many schools in beginning to explore the situation ground, which might help organising the project activities relevant to those. Give an account of that.
56. T I visited schools when the project had just started. At that time there were so many complaint from the teachers. The first one was that 'this project is going to take long'. It is going to take three years, which is too long. Normally, it should take only two years. Secondly, in the schools teachers to a lot of rote learning based on textbooks. They stand in front of learners and teach them without much activity. And also at that time there was no relationship between them and me. At the beginning they even don't welcome visits. They will be giving excuses that they will be somewhere on the proposed days of visits etc. That was, actually, in the beginning. But as the project went on they will be inviting many frequent visits. The school I visited then, the tone was different. They will be telling the principals about our visits and organise learners for observation. They teach we observe. Teachers themselves would be inviting colleagues of one school to visit the other and teach. This improves one another. It was a team teaching. On a particular topic, discussed at the workshop, teachers will prepare together and teach. Workshop topics are taken to classroom collectively in a particular school for exploration, all teachers will teach and they improve each other.
57. I You visited a high school; tell me your experience of that school.
58. T I visited a school and was surprised to see that teachers were not at the school, they were seated somewhere, but it was not something new, it was the culture of the school. When teachers knew that I was there some of the teachers came back and they started working and teaching. But some of them did not mind to come. This was an example in a way of their *changing attitude* and *relationship* with me that works.
59. I You really created and made the clusters that worked and performed. What do you think were the major factors considered in working and performance of the clusters?
60. T The clusters were made based on *relationship and location* of the teachers. Clusters gave a support role to teachers. Since the UP was far and teachers were to work alone on their assignments. So by giving them homework, assignments and apparatuses with which they were going to do experiments, actually, created the clusters to work even more effectively. Because one of the things that was done was the assessment in practical work, so it was for teachers to and do experiments and practice, because they never knew that which of their practical work was going to be assessed during examinations. This certainly included the idea of 'group work' and 'group assessment'. When assignment was given it was not given to individuals. There were three clusters: Elukwatini, Dundonald and Fernie clusters. So when assignment was given it was spitted into three clusters. Each cluster has to work on a particular thing, and when they come back together, they report on their part and compile a full work. They score marks on their reporting and amount of contribution on the particular activity. So this collaboration forces them to meet very often, they phone me, especially Elukwatini cluster, and say we are having the cluster meeting and it is 6 p.m. and we have this problem.
61. I How did this cluster idea came to your mind?
62. T I was myself a cluster leader for years in another K/Natal in Science Education project. I acted as a cluster leader in the whole Natal Region. And then I was chosen as the best teacher of the year for the national award in South Africa and was sponsored for a M.Sc. degree from University of London. For me that was a motivation to work as cluster leader. I knew that teachers develop, because I developed from a cluster leader.
63. I In SASEN clusters, did you have any experience like that?
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64. T They gave a different experience for me. The one that I had before had no qualification attached to it but SASEN had a specific qualification attached. For me SASEN was more attractive, SASEN had left its teacher going on their own. When we started clusters in Natal we had always a support structure. A person was always left from University of Natal who would work with us for this. When we developed it well, it took for more than three years. SASEN project was attached to University of Pretoria for exams and assignments for the University. Teachers after completing their FDE, they wanted to continue further than that with the University and will work in their clusters .
65. I So you mean SASEN clusters were very strong.
66. T Yes, Very strong. And MSSSI started having clusters, when I see people that participated in it from SASEN, I asked them to share experiences of SASEN, because SASEN was stronger and powerful. MSSSI clusters are not even working.
67. I What do you think about role of building relationships and maintaining those, when it comes to run a project like SASEN towards achieving a success?
68. T Yeh! I think, the relationship I maintained with Joe, Juju etc. are still going stronger. On Saturdays I meet them at University of Pretoria where they are continuing some higher studies. Joe is a Deputy Principal (Primary school). He said he still wants to come to UP. and attend cluster meetings. I said that is fine please come. His promotion made him stronger.
69. I Did you noticed some places where the project failed? What do you think could have been done to avoid those failures?
70. T One of the points that I can see is to engage those who were not directly involved in the project e.g. Circuit managers. If they have known the SASEN very well, they should have started something like SASEN when it is closed for the development of teaching community. ii) SASEN failed to recognise the effort f those teachers, not SASEN per say, but the University of Pretoria. I think UP. Should have selected some of those teachers and recommended some sort of bursaries for them, if they wanted to continue with their further studies. Then we would be saying that see here we have M. Sc. Or Ph D. from SASEN etc.
71. I I see you are emotionally very much attached to the part stories of SASEN.
72. T Accepting with a smile. Why I am emotionally attached is that I see them moving from point A to point B. I myself was in the similar situation moving from point A to point B and I was lucky that I got scholarship from British Council to go to University of London to my Masters at Leeds University. Sincerely my emotions come when I see that some of them want to go and study further but they don't have means to do that. That is what I say that, we should created something and picked two r three for their development and they should have proceeded further.
73. I What was your role in management team and how were you contributing?
74. T I was co-ordinating between the learners (ground activities) and the management. We were in clusters the whole idea of clusters and visiting clusters started by me I had to go to the teachers and see what the teachers are doing in their clusters. Secondly the co-ordination in a way, that I was amongst the members of UP. and I think some of them didn't understand our culture. So I was there actually to try and to be a bridge to teachers for some of the things which they are unable to tell to them, they were very free to tell me that they don't like lecture A or B, and lecturer is doing 1,2,3 etc the relationship, I became more of their sister, mother to them, I was part of them. So they didn't feel if we tell a lecturer that this lecturer is not good, the lecturer will tell the lecturer for example they were able to tell me that during break time they don't want biscuit rather they want bread. Biscuits are not feeding them, Prof Braun accepted it and charged to bread and everyone was happy.



75. I I am gathering information that because of you information were mobilised and management could know the what changes are feasible and what changes were acceptable to teachers.
76. T Exactly. Yes, Yes.
77. I And the changes that were accepted made your system better and acceptable.
78. T You know, our workshop was always on Saturdays when they play soccer and soccer starts at 15 hrs. And this point teachers will be saying the dates can't be changed, but let the class close by 15 hrs, so that they could watch the half of the match through me, which was acceptable through me.
79. I SASEN didn't give them a lot money e.g. transport was not given, main food lunch was given to them, still it worked.
80. T Yeah. (Nodding)
81. I While other projects are giving them all transport, food this and that everything (lecturer joins this and that) but the project fails.
82. T Yes.
83. I Can you say something on that point?
84. I think one of the things that made SASEN successful that SASEN was happening at a local base. We don't take teachers to far place it was happening at a place closer to their place at the teacher centre and that centre became the focus point that what was happening at their schools. Although they were coming from Dundonald, Mpuluzi, Elukwatini and Fernei etc. but still the teacher centre was local for their environment. Secondly, while it was happening on a Saturday, also the nature of life or the things at Elukwatini is different from Pretoria. If you ask teachers on Saturdays at Pretoria, then will never come. They will be doing shopping, doing this doing that but no education. But in Elukwatini, they don't have a lot of commitments on Saturdays and therefore Saturday was an ideal for them. But if you ask similar to teachers to go to Pretoria or somewhere, they will have excuses and reasons and so on because f transport.
85. I These peoples also have excuses for other projects?
86. T Like what?
87. I Like if I ask a Saturday meeting for a Science expo, they won't come.
88. T The other things are that SASEN actually addressed their need, which otherwise not seeming possible.
89. I (joins) and accepts and discussion by nodding. Another thing for these teachers they have to go to their Banking facilities to Nelspruit or Ermemlo while funerals and other commitments are the same everywhere, I tell you they are very busy. I too feel that they were attracted somehow to attend
90. T Another thing, which made them to be attracted, is the facilitation (I think). Inmost workshops the thing which stops them from attending is the way they are handled, we were facilitating teachers were engaged from morning to sunset. There was not much teachers' talk. We drew more on their experience and added more new information. Actually their contribution was valuable and that make the facilitation even easy. The other thing was computer also played another very important role. They wanted to learn how to use computer.
91. I Do you see any complexity in 'Secondary Teachers Development' issues like, interacting overlapping relationship, not knowing the weakness etc.
92. T You mean SASEN or under general?
93. I Well in SASEN because you went to them. You visited the school and when SASEN was in early stage you could understand changes (needed), this way that way, what changes should be brought. So do you think it was a complex situation and to handled that you need a good system design to succeed.
94. T Yes, when SASEN it was a very complex system. It was for all. Especially for UP. It was complexity of getting lecturers to come to teach at eMpuluzi on a Saturday morning around driving (350 km.). For them to drive and came and



- teach was a very complicated situation. It was not only to get a lecturer who understands the situation is ready to come and teach. It was the first complexity. The second complexity was the nature of learners that we were getting it was very complex. Some people grade 8 (Maths), some would std. 10, science etc, it was very complex situation. That is why in order to solve the problem we created a system f having a 'bridging course' to bring them up to the same equal standards before doing the real FDE. Another complex situation, which existed was, the introduction of C 2005, which was OBE to these teachers. It created another complication especially when we were introducing 'current trends' in 'Science and Maths', which was one of the modules. Because we have to take them to curriculum statements, the policy, what complicated that some of them were taken to a training of GTE level that were teaching grade 8-9. Where as other hand nothing to do with OBE, some didn't, so it was a mixed complexity. And this matter was to be addressed at the cluster level. Because the tasks were given, and tasks had to be done at clusters. Those that were trained for OBE had to lead the session and try and put their peers at the some level.
95. I So the clusters were the part of the systems.
96. T The clusters were the part of the systems. Complexity of people being at different levels one day Saturday can't solve all the problems. So they decided to solve problems at the clusters through doing problems as home- work and in form of tasks. But I remember the first year for them was very difficult, for them as a result of that some of them were saying it is too hard they are going to leave and this and that as they were getting very low marks in Maths. They were not doing well, but as time passed they started doing well.
97. I Some teachers left in between. Can you say something why did they leave the course?
98. T I know one lady left, but she got married and she had to change the place. And two ladies who could not cope with the work of course. The reason being that they did PTD and it was very difficult to lead them even the bridging work could not do anything to uplift their content knowledge and they had to drop. Others were lazy to do anything. Thabo didn't attend three months but when I knew I told him and he picked the course. Teachers were telling that 'my relations' were good, they felt free to tell anything to me e.g. they told 'Thabo drinks too much when he wakes up on Saturdays, he can't find himself in a position to attend', so they were free to share any ideas.
99. I SASEN Project discontinued in 2003, but there is still a demand of such programmes. Could you think that such a system can be introduced as a permanent training in the Department of Education like MSSSI. Can we understand that MSSSI is a continuation of that?
100. T Yes, No.
101. I Because MSSSI does not provide any qualification.
102. T Yeah, besides that MSSSI is very structured and is a rigid system. In MSSSI for instance I am not happy the way these clusters are formed that was my first concern with MSSSI. The clusters are formed on the basis of where you are and what you teach etc. and what level you teach. You teach GET in this area then you should combine with a particular school B. That is why we say that 'relationships' play a very important role in teacher development. Then MSSSI should have said go and form clusters of your own choice and register those clusters. Not that the CI is coming and saying 'because you are teaching GET you can't be with FET cluster'. My belief is that you cannot separate knowledge from knowledge. Knowledge is knowledge it can be in form or phase, whether you teach in grade 3 or in grade 6. Although there will be a difference in teaching in teaching but I believe as a teacher you still need that knowledge and it will be up to you to accept which level you are going to use that knowledge. MSSSI is saying you cannot mix



GET and FET teachers. GET should do just GET content. I totally agree with that and secondly schools almost similar and teachers are having better relationships with the schools across the road. But the school across the road falls in another circuit and the teacher cannot be the member of the cluster of the other circuit.

- i. And thirdly some clusters cannot meet the CI says I need CASS moderation. This is CASS moderation I need marks. If you are not there then I need the register, the register goes to Regional Office. Setting up of such monitoring tool breaks up the relationship in terms of development.
  - ii. Therefore I am saying SASEN clusters were much better compared to the present ones, which I see now. These ones cannot sustain themselves. These clusters will be waiting for CIs to come and tell them the date of the next meeting. That is not the way, how the clusters should operate. The cluster should be the self-operating bottom structure, meeting whenever the need be.
  - iii. In SASEN we brought the two ideas together: *'bottom up'* and *'top down'* structure and that worked. *'Top – down'* was saying meet and do this. We want it to be done by the *'bottom – up'* structure. They the bottom-up were doing, it was left to them to organise and to succeed.
103. I So the project in SASEN was not a *'top-down'* approach.
104. T It was both mixed in beginning, we started, we encouraged them forming clusters, we came from the top and said to teachers, we suggest that you form clusters but we never said to them that you form your cluster like this and that. As such towards the end Dundonald cluster actually combined with the Elukwatini cluster. And if we were encouraging like the Department we will be asking why did you combine with the Elukwani cluster. So it is for the teachers to think how should it be designed and done. Now in MSSI they say you should meet once a cluster a month. We found those SASEN clusters meeting almost every week. Sometimes even twice a week as the need arises.
105. I (Intervenues and said) so it means it is a basic thing that the clusters should be driven by a *'bottom-up'* approach.
106. T Yeah. It is a bottom up community structure.
107. I Not a *'Top-down'*.
108. T (Nodding) Hun.
109. I Otherwise, it could not work.
110. T Yeah it won't work. Once the top is no longer there the down collapses. The down won't do anything until instructed to do so.
111. I They will always wait for instruction.
112. T Exactly.
113. I Lecturer! Thank you very much. I got a lot of information regarding the project. I thank you for your time made available to me.
114. T Thank you.
115. I I wish that our relationship will not need much support; it will go on.
116. T It is a long sustaining relationship it will always be there (a laughter breaks).
117. I Thank you very much.

### B8.6.3 Evaluation by the Department of Statistics. Lecturer-2, Sept. 2003

This evaluation was done as an answer to formalised questionnaire in the office of Lecturer-2 as a written answer.

Q1 Before you started teaching Eerstehock teachers at eMpuluzi Teachers Centre, tell your Pre-expectations from participating science and maths teachers from secondary schools of that rural area. You may choose the following heads for the purpose.

- Teachers attitudes towards their profession
- Teacher's attitudes or willingness to improve in their profession.
- Teachers background as rural teachers regarding the culture of teaching and learning.

A1

- Since the learners were all teachers I expected that they will be qualified and that they will have a positive attitude (same as any teacher in any other area) toward their job.
- I expected the teachers to be positive and willing to improve in their profession.
- I expected that there would be lack of learning culture from the side of the learners, since that is what I encountered in previous studies.

Q2 What were your feelings on your expectations after a month or so being with those teachers? Did you find any thing unexpected?

A2 After a month expectations were the same as initially and I saw that the teachers were eager to learn more and to develop themselves to their job better. I did not expect them to excel as quickly as they did in the subject of statistics, since it was a new field of study for them.

Q3 Your main aim was to prepare those teachers for Further Diploma in Education. How easy or difficult was it in reality?

A3 It was not difficult at all since the teachers were very eager and positive, thus they caught a very quickly and the started to master the subject with great ease. The progress of the teachers at eMpuluzi was much better than other than other groups of students to whom this same material was taught. The same material was taught to the people in the MTAP1-programme and they seemed to struggle a lot with the contents.

Q4 (i) Did you learn any thing from them, which were unique in teaching and learning situation?

(ii) Did you use those learning experience in improving your lessons for them?

(iii) Do you have any learning experience from your university students?

A4 I learnt to adjust the pace of learning as we went along with the lectures, because I could quickly see whether they understood the topics or not. If they did not understand the matter was explained in another way(s) until they understood.

There were very good **two-way communication which was unexpected**. I also learned from their culture and realised that they were working very well together as a class (all ten of them) and that they always knew the where about of the rest of the group.

I never encountered pupils before, who would prepare work on their own as pre-arranged. The model was such that the students had to prepare the work before the official lecture on it. Even at the University of Pretoria one can ask students to read a paragraph between the lecture and you would not get a single one out of 300 to do that.

I also learnt that they were not afraid to try out the new concepts that they were taught. They tried to apply it in practice to simplify their work at the school.

Q5. “ Learning organisations are those where people continually expand their capacity to create the results they truly desire, where new and expansive pattern of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together”

5.1 In the light of above definition of a learning organisation, where the four given ideas should get opportunities to flourish, kindly rate the SASEN project as a learning organisation.

Ans: Excellent.

- Teachers and learners achieved the desired result.
- Teachers were able to apply their knowledge in their working environment.
- They were free to ask questions (and they did ask very good questions) and they also freely applied what they learnt to their environment at their school.
- The students learnt a lot from each other in their clusters.

5.2 Was there any contribution from learner-teachers?

Ans. The learners who grasped concepts very quickly were not afraid to help explain the work to their fellow students-learners.

5.3. What was your own contribution?

Ans: I was always positive and enthusiastic about my lectures. I was always on time, did good preparation and did good planning of learning material using all learning experience (sessions and lecturers).

5.4 May be you could have done more but because of 1, 2, 3, you could not do. Please tell those factors which contributed negatively.

Ans: I would have liked to teach the practical work in a computer Lab, where every student was sitting in front of his/her own computer.

Q6. Towards the end of the project, I saw, you were still actively engaged in the project. Please tell some aspects of attitudinal changes in teachers regarding their professional behaviour as compared to when you started.

Ans: They were much more at ease with the work, with the lecturers and were a pleasure to work with. A professional relationship developed between the learners and the lecturers.

Q7. Any other experience which you want to let me know as a researcher on the project, regarding the teachers’ behaviour and their attitude as professional.

Ans: I think that if the teachers are able to portrait their positivity towards learning onto learners (pupils in schools) it would stem the learners to become positive about their learning and then it would facilitate a positive learning environment, thus learning would take place in our schools.

### **B8.7 Pr., The SASEN project Director, University of Pretoria Sep. 2003.**

This interview was conducted in the office of the project director in his office at the University Pretoria in a relaxed environment. The aim being the summative evaluation of the project with the experiences of the Director (23 Sept. 2003). Mr. CI (the researcher) interviewed about the SASEN project. It was tape-recorded and transcript as follows:



- 1 I Before you started with the SASEN project at Mpuluzi what were your expectations from the teachers of Secondary school of that rural Eerstehoek District. You may use several headings for the purpose:
- i. Teachers' attitude towards their profession.
  - ii. Teachers' attitude and willingness to improve in that profession.
  - iii. Teachers background as rural teachers regarding the culture of reading and learning.
- 2 Pr. Mr CI! About teachers' attitude towards profession I had preconceived idea that there should be some negativity towards their profession amongst most teachers because it would not have been their first choice, if it was possible not to do and be trained for under the apartheid system. They did not have wide enough choice so they would not have necessarily told themselves as committed to the teaching as a profession of their choice, which they liked.
- 3 I You mean they were forced to take up the teaching job?
- 4 Pr. I feel that during the apartheid era many of them were forced to be teacher and not allowed to go for their first choice. The opportunities were not available.
- 5 I May be I think training also was not available.
- 6 Pr. Very clearly, the demands that they are perhaps placed now show that they are inadequately trained for the particular training.
- 7 Pr. Mr. CI! As regard the second part, my assumption was two fold. On one hand there would be a group wanting to improve on their work they did to be more satisfied on their knowledge and skills level. The second level would be the people who would want to improve their qualification to achieve promotion. In fact in other words to develop outside of the task given to them, and move towards administrative side like Principal or something of that kind. Inherently we designed in to the system the computer literacy, and opportunity of using computer. A third conception what we had, some teachers might have needed something an exciting new skills, with which they may be able to do things, better where they are and may be able to serve other purpose and probably move outside other than teaching. In other words computer ideas could have been put to attract, to some extent, even teachers who actually wanted to move out of the teaching profession because of the added skills. So, we had three ideas, why do we want to do things in that way and structured the system in that way.
- 8 I thank you. Regarding the third aspect that is background.....COLTS.
- 9 Pr. There again we assumed that to some extent the travel conditions and resources conditions in the rural areas would be inferior to that which we expect in a city school. Being broadly undeveloped, and this could be an excuse for teachers to be quite comfortable with their under achievements, i.e. under achievement of themselves and under achievement of their learners. On the other hand we thought that we would come across teachers who would have tried in what they have been doing. They were professional and educated in a community where they would stand out to some extent as an educated person and at the same time they have the responsibility of doing more as much as they possibly could to develop the community. I felt we had both type of people and expected to have more of the second type.
- 10 I Thank you for such ideas. In fact the situation is worse. Teachers don't attend classes, learners remain outside and the school looks like the crowd of unmanageable people.
- 11 Pr. We had a Senior lecture from the centre actually visiting school at various times. She reported that there were schools working actively right from 8 a.m. to 14:30 hrs. But there are other schools next door, where you can't find teachers at 11:00 hrs. May be they have already left. If you go there at 11:00, you will still not find them. And these were teachers, who were part of our programme that is why we went to visit the schools. That was an interesting feedback. I hoped that we would





- get teachers who wanted to improve their conditions due to various reasons because this programme really was real voluntary.
- 12 I When project started and you were in already. Did you find anything unexpected?
- 13 Pr. The experience we had was two fold. First one was that unexpected some of the teachers they turned up for the initial opening function. And after one month, when we met, they disappeared. A total of 42 teachers, which we saw on first day, with 35, we carried on with the programme and I found them consistent. It was a bit of surprise; I expected a higher fall out. The second thing I saw was a strong leadership that the cluster system I managed to identify. We did do the clustering and immediately there was a group of teachers who formed the management system looking at the first set of work. The work which was being done there was some elementary experimental work for the Science and the current trend programme which was hooked at the same time in order to give them some readings and some reasons and things that they could try in their schools even with the elementary scientific work. *We did get some protest from teachers saying that we are science teachers and we don't know much Mathematics and Mathematics teachers who don't know Science. We said that is okay. The fellow teachers will help you out. So we created a need system, depending one on the other. And this way a good management system was required particularly in a bigger cluster at Elukwatini. It proved to be positive.* There was another preconceived idea that we were told and we had from our own past experiences also that *if you didn't feed teachers, if we didn't provide transport and even if one didn't regularly support teachers financially to join such a programme, it will very soon run dry.* This is a pre expectation. It was already in queue with negotiations with teachers at this particular point. We reached an agreement that we will supply only light refreshments at teatime and they will do the rest. They would, particularly the Elukwatini cluster that have to travel a longer distance they would ensure that they arrive on time to the centre, regularly and this was clear within first month that they did it. It becomes quite clear that they accepted this. This is the risk we had taken out of budgetary necessity but it already at that stage was coming through. We had found a large dedicated group of teachers who are ready to do any thing but to miss the opportunity.
- 14 I After few months when they attended already few times some of them left. What do you say about them?
- 15 Pr. Mr. CI it is correct. We varied between 35 and 26 teachers at the end of first year. We had 28 teachers at the end of the first year that wrote the examination. I think what you were saying there is yes, when teachers found that we have actually delivered the computers and stored in Jan to Feb. 2000 for their use in respective teachers centres, two teachers asked to become part of the programme. So we had people coming on board later. Thirdly we did ask them to pay half of the fees of two courses, one was UNISA registration on scientific communication skills, which is a course in English language and logic. And the other one 'Current trends' was a formal course of our FDE, and the students were quite willing to pay that. This money was collected within two to three months and they continued coming. This we found quite gratifying, which we did not find with other projects.
- 16 I You were to prepare these teachers for further Diploma in Education. How easy or difficult it was for you?
- 17 Pr Mr CI! Expand this question.
- 18 I Yes! Those teachers were from a rural set up as we said and they had a Bantu Education background as well as may be they were not very trained teachers, still you had to prepare them for a good quality certificate holders. How did you manage them? Was it difficult or easy in real sense?
- 19 Pr. We had the expectations that the teachers will be under trained. On our feedback we had that some of them specialised in Mathematics only and never did the





Science and even Science teachers were very insecure in Mathematics. We put in this phase starting from very beginning Elementary Science kits work around which we develop fundamental concept in Science and we had people also at elementary level going through basic Mathematics that we needed for Science courses. So we liked the two groups together so that they would assist each other from very beginning in our design. We didn't have extremely high expectations we expected the teachers did not know much at gross root level. And we tried to structure the process in such a way that there would be gradual bringing up the teachers at similar level where they could share together. We originally had the intention to deliver a single FDE, where both groups will qualify in Science and in Mathematics with a computer literacy added on. So this was the planning on first 15 months phase. The examinations results at the end of that period were mixed. We found when we did some tests later on in the way, we did not do individual testing in a very early on, we realised on group work. We found that where individual teachers have contributed to the group work according to the reports coming back in, they never the less had mastered very little when it came to individual test. So we did have some problems as far as that was concerned. Our approach was to work in groups, let us have co-operative learning, let us have combined reports and then we have individual examination at the end. We found problems with that approach. In total we could perhaps not go at the full pace step, we wanted to go at the back of first period, we did not achieve the high mastery of the work which we hoped to achieve. What did happen that the clusters gradually come together and had time to develop based on group work that clusters themselves developed and came as clusters? When individuals at the end did badly they reacted and realised that they needed to focus stimulate the individuals as well and don't just depend on grouping to do something together. That was the situation we faced. Was it easy? I don't think it was easy and I don't think it was particularly difficult. We worked according to a particular plan of expectations and we knew only at the end of 15 months period what the effectiveness was and had to modify it.

- 20 I Did you learn anything from them which was unique in teaching and learning situations? Did you use those to improve you lesson for them? Do you have any learning experience, which you can compare with your University students?
- 21 Pr. The entire experience was a learning experience, what was important in the first instance when I was not teaching negotiation process of managing the group and of stimulating them in learning. It was a two-sided negotiation process of how the student would learn and we would support them in doing so. It was negotiated and not imposed by us. Thembi's experience for instance with SEP and other projects was used to manage and discuss in early stages. I tended to act as a person to come in with grand announcements, if discussion is needed at a point decision and resolutions. I would play that role. So I did not try to manage at those levels. We had a very strong person from the centre doing this. We regularly had two people involved in the discussion, me in the sideline and centre person in the direct discussion. This is not something, which we have done with the other projects. So I can't explain the details why I think it worked, I don't know. But my feelings there was it was a respectful situation both sides so we negotiate respectfully. There is an example: the examination after the 15-month period was not very good. They were relatively low. If we had followed our previous assumption that we would remove people from the course who did not succeed in Mathematics Science and in current trends, we would have four students. We discussed at the centre for a while and it was my time to do the negotiation. And what I said 'so what'? We know the course, and we know you. We run the course because we know that you don't know everything here. We should measure that first what you don't know. And therefore we are not going to throw anyone because you don't



know. But we can only register you if you achieve a certain level. So, therefore we will allow you to continue and we will have regular tests. You can show your performance and when you can reach the level of requirement, then we will register you. There was a set of barrier but it was not a barrier. Anyone will continue staying on the course, even if have not registered. All wanted full registration and all wanted recognition for the effort they were making. And so it is assumed any way. And this immediately diffused the situation and turned it around from very tense situation into a situation of tremendous enthusiasm to continue. And this was the beginning of the second year, when we had to start the real Science consisting of the Chemistry, Mathematics and well that made a difference. We learned that one from this group through the opportunity of negotiating with them before hand on less practical matters. They began to meet in their clusters. That was reported by lecturer's visit to the clusters. They were able to manage the work because they met regularly we actually found that they were meeting twice a week each of three hours duration, Tuesdays and Thursdays. Our expectation of having them as passive learners was totally eliminated. They did work extremely hard on their assignments and they learned from us, as requirement that individuals need to have achieved as well. And they said that if someone contributed to the programme they were credited for that. Their names would be listed as contributors to do the assignments. And so there was a two-way negotiation that was going on with the learning and a two way negotiation was going on with the organisation contributing from my own teaching components. I introduced some skills and drills programme later on in the time. First I worked from the textbook, I prescribed to read and do the assignment then we discussed in our classes. And this sort of limited time efficiency to some extent. And other point was that I said look, we have got to address some skills shortage, we said you know some of the work, but we are not happy with the skills e.g. speed of working. So we introduced the skills programmes, which were originally used with the bridging students in the past. I adopted some of them for specific work, which we were now doing. I used work sheets and re-edited them in order to cover the specific work when I moved from a lecturing situation to work situation in a group they would work and then report. We started getting a very positive success. This happened with my Physics course and it was true to some extent with the computer literacy course, when I needed to present things.

Again this fairly confirms that when the students are willing getting to them to work is a lot more effective than the teacher attempted to work. With the last one particularly the last bridging group which I got and it was called a renaissance group. One point, which was strongly confirmed from this group of the teachers, was that regardless of background once a student stay for about three months, they have become dedicated and active students with a vision to achieve. They become ambitious and they need to be respected for this. So the mutual respect situation regardless of the group was very strong regarding the SASEN teachers. There is one more thing these teachers took a greater responsibility for their own learning perhaps than my bridging students. They perhaps had more investment and maturity while the pattern there was similar. The work sheets were often presented the work before the students they need chance to read it. They did not have back ground to complete the work sheets and yet they had to show their own creativity and referring to those work sheets, but they were given support, discussion opportunity and I feel that achieving those work sheets and the assignment that they go with them, give them a very rapid feeling that they are achieving certain things. When they first say I can't do this, then later they say it was not so difficult. This progress keeps them motivated and we did have some of this in our programmes. And I will give some examples to Mr. CI.



- 23 Pr. Yeah!
- 24 I How do you rate the SASEN as a learning organisation on these four aspects e.g.  
a) Creating capacity.
- 25 Pr. I think it is true, but not at very high level but on the scale of 3-4 in the scale of 5.
- Our innovative thinking nurtured. Yes I think so. Lecturer from the centre even went out there supported them with the skills of clustering, negotiating with the teachers. The project was not a centre project but all participants owned it and all party could contribute. I will rate 3 out of 4.
- 26 I Were collective aspiration set free?
- 27 Pr. Yes very definitely it is true for me. I enjoyed the project; I was seeing the centre developed because of involvement in such type of project of this kind. So personal motivations I was achieving out by having this project run. I hope teachers also saw the progress the way programme was done. This was definitely a feedback, teachers were given responsibility or they took the responsibility they were strongly supported. They were appreciated and they knew this appreciation. So on that level we score 4.
- 28 I Learning to learn together.
- 29 Pr. It Meant to be an Educational project and that was not a learning project. It was true for teachers and they kept it going for 3 ½ years, and it was true for ourselves, and myself very definitely, we have continued learning together. We would certainly sit and discuss together various aspects of the project. Based on the new ideas and decisions on that such as negotiation which I have already mentioned etc. I would rate this aspect of the project as 4 and 5. That was probably the highest part of it.
- 30 I Were there any contribution from learner teachers?
- 31 Pr. Yes! Enthusiastic negotiations, communications process was absolutely central, explanation of their situations honestly given and respected because they were obvious commitment bias and mutual respect ruled. The clustering, their attendance was encouraging. I can say they checked on us more than we checked on them. Therefore it was definitely feed up to feed down. We learned to be on time, we learned to be ready because that is what they expected from us and they responded to that. Therefore I can say that we learned from them organisationally perhaps not on subject matter too much, but their experiences the way things work with them. This was a dramatically a learning experience from them. It was eye opening for us I said earlier we broke the rules supporting them, funding them, feeding them all of this I suppose in response because they felt they are receiving something important and seeing their progress themselves.
- 32 I What was your contribution? As a director and as a teacher what did you contribute the SASEN to be a learning organisation.
- 33 Pr. Well! My own role in the beginning was managing and deciding the resources and allocating the resources. Putting and buying decision, to put orders etc. of course managing finances. I supply things on time as far as possible, the timing decision were made on my own energies and needs as they arise. I decide to make internal assessment in the field through Mr. Pandey. While work was done I am always present as far as possible. We expected results so I designed accounting and accountability of progress from the people contributing. This was particularly important as I think. My conceptualisation of structuring was there. There was a lot of flexibility, which allowed learning to take place. The entire idea that we will be cooperative, of course, was given from the nature of the centre itself. That the centre was a network of people, those for SEP, Ronel from the University. We sit together and decide how and what to do. So from the beginning there was an attitude of co-operation of input of ideas. We did not have the answers up front

from the rigid structure. When we wanted to rigidly structure we came up against difficulties. The management times, when weeks, when the session will be presented in the organisation phase, were negotiated between teachers and lecturer from the centre. When it goes to good organisation it was largely the centre's planning, where there was a spirit of accountability of negotiation. Some negative factors we did not actually research while we were active in early stages we didn't record enough. We were actually investigating what we did now from final side rather than from up front. We did have to travel long distances, which were themselves quite exhausting. So it was difficult from some of the lecturers to continue going. It was difficult to keep up to date with marking and things like that, you could not do it the same weekends, you had your other work to do also. You lost other three days in order to deliver that one full day at the very least. We could not deliver on all our promises necessarily. It was not quite easy to deliver all infrastructures. We had to make some financial decisions, which was more necessary to deliver the computer disc where the technology was uncertain out in the field anyway. Not we could conceptualise every thing we could carry out, but I think we adopted on our way what was deliverable and would yield benefits. There I had a lot of support obviously from the SASEN organisation itself, which consisted of the people from UWC (University of Western Cape) and also Odeurs from Belgium. Three annual conferences and annual reporting requirements of bi annual reporting (twice a year) was important to keep the track of us that where we were going. We had some external structures where we had to report that what we did and what did we achieve. Some of the negative factors were counted by the external opportunities from these people that I have mentioned.

- 34 I What can you say about the attitudinal change in teachers from beginning to the end. As per your observation as Director. You are a single person who stayed from starting point to the end.
- 35 Pr. The group that stayed actually wanted to be achievers with few exceptions. Towards the end we were demanding a lot more work from them as compared to the beginning, they were doing it and achieving and continuing it. Their attitude to work after hours and their own improvement I think is something that maintained itself from the report from themselves and their fellow teachers and from the school Principal in many cases. The few that we interviewed said that to run the project that way. So wanting to achieve, is perhaps an attitude, which may spill over in to their classes. If they want to achieve they must understand that their learners also should achieve and if the learners wanted to achieve they achieve more. So I believe it are not only their personal ethic for themselves in future but also the ethic, which they will be able to deliver to others. There definitely is a group now rather a network with which they still associate and initially they were separate teachers coming along to see what they could get out of particularly from the project that promised perhaps a better salary or promotion out of better qualification. So I think they have given up on the idea that they were there for that kind of improvement, they feel that they have self-achievement, which is there when they speak with attitude, they speak with confidence. It has been reported from the MSSSI project that they have been noticed that they act differently. They are more professional; they sit down and get the job done. So there is other evidence to support the view that what I have seen and my impression is supported.
- 36 I Any other experiences which you would want the researchers to know on the project regarding the teachers' behaviour and the attitude as professionals?
- 37 Pr. What particular thing addresses Mr. CI himself as a researcher who had several interruptions in his research continuity for personal reason going to India for several months at a time? But it also provides a bit of benefit because the post intervention research role is perhaps done with greater level of objectivity at this stage. We can do things such as looking at the learning situation a looking back



question which questions might have not been asked if stayed continually along the way. So possibly there is more insight, which we got on questions of this kind than otherwise there will be more creativity now.

Secondly the opportunity to visit rural schools has given me insight and respect about these teachers. I might otherwise not have had and the stereotype could perhaps have stayed. But some of the opportunities, to see about those teachers what they have achieved and can manage such very difficult situation, have really given me very good insight into the inherent opportunities being professional and also challenges for being so.

Third comment: We know who are the leadership people involved but on the other hand they were considerably open in talking, by knowing him quite well in such a situation and we have been together for 3 ½ years. I think we are getting quite a good insight from such a situation. So we need to check a little bit and see what such an impact it could have on the answer we are getting. Before the issue we still need to know that those who did not continue could not do so. And those who completed without graduating and they are two of them. One student who did not come and do the supplementary exam, stayed with the project through until the end. And the other one who is not successful enough to complete the last subject and this student is still continuing at the moment on. MTAP programme to complete her last subject. What did they feel that they have gained that they stayed on it. Why did they not put in the quite same effort at that time? Why did they stick through? Even sticking through right up to the end is a tremendous professional achievement. I think it should be respected and acknowledged in some way. But I think we need to have interviews with them. And question them as well in order to know their information. We put all information together. Of course we have got to go and interview the senior people who made the project possible like Mr. Molai J.R. and Mr. Malaza. These were two people who were needed to take the decision and allowed the project to go ahead. We need to interview them for their expectations and also for their feedback. When we tell them what has happened when they have heard things what has happened we need to know how their expectations were met and to what extent. And what they would suggest should be done the same way and what they would suggest differently should be noted. Now the next point Mr. CI!

38 I Thank you Sir, I got your views and I am grateful that you gave so much time to elaborate all the questions and answers. And we will do our part in the whole evaluation of the project.

### **B8.8 Interviews of Departmental officials (August 2003).**

#### **B8.8.1 DO-1,**

1. I Do/did you expect any gain (viz. political, socio-cultural or socio-economic) from your help as an outcome for you/your organisation? Tell us briefly.
2. D Quality of teaching.
3. I What are/were your general expectations from a project involved in science education?
4. D Teachers are not qualified. We need better, trained and skilled science teachers who ultimately affect the performance of the learners.

They should make learners of our region competitive and more matured with others. We want broadening of horizon of science education where learners should have more competence in science and should have faith in teachers. Which will attract more registration and help for better performance.

I am glad that there is improvement in science education. Communities too are benefiting from them.

5. I What kind of reporting about the project do/did you need from the project implementers? Please give examples of matters that should be addressed in reports/closing report to assist you in achieving the goals.
6. D Report should highlight the progress report;
  - i. Enrolment, success and dropouts.
  - ii. Problems and challenges faced by the project implementers.
  - iii. Recommendations.
  - iv. Problems of sustaining and implementing in classrooms. What should the Department of Education do? I want Agriculture to be included and given chance in science education programme.
7. I As a South African stakeholder in developing education/science education highlight your views on roles of foreign donors; if possible please give examples (e.g. JICA, Denmark, Swedish Government, Belgian Govt., European Union etc.).
8. D They do good job. They are supplementing means and helping e.g. JICA, in improving maths and science through MSSSI. They are busy encouraging in school-based training of teachers in maths and science.

They are taking our CIs and teachers to Japan providing opportunity to other countries and seeing what is happening there, if found something good it should be brought to South Africa. The donors must bring good policies here which suits for our country and may be incorporated with ours. With proper policies for our rural development Japan can help achieving our goals. In some of our schools SMT is not fully constituted. Regardless of size every school must have full management.

#### **B8.8.2 DO-2. (Former curriculum co-ordinator, Eerstehoek District)**

9. I Do/did you expect any gain (viz. political, socio-cultural or socio-economic) from your help as an outcome for you/your organisation? Tell us briefly.
10. I I thought of gaining socio-economically from the programme, which was offered.
11. I How to measure the success?
12. D The way they are teaching
  - i. The way learners are getting more interested in HG (Higher Grade) science and maths.
  - ii. Previously science, technology and maths were treated as not approachable.
  - iii. Now the teachers who went for training are successful. And we see progress and a change in terms of:
    1. matric to tertiary
    2. theory to practical work in classes
    3. teacher centred to learner centred and
    4. concept building, which was not there before.
13. I What are/were your general expectations from a project involved in developing science education?
14. D. Educators to be more knowledgeable and have confidence in promoting the love for science subjects at school level.





15. I What kind of reporting about the project do/did you need from the project implementers? Please give examples of matters that should be addressed in reports/closing report to assist you in achieving the goals.
16. D. Progress of the educators who were involved in this project. How many teachers were enrolled, what percentage remained and continued, success and relationships. What did others learn from us?
- i. It has been seen that these teachers' confidence has increased considerably high. There is a sharp increase in number of learners going for sciences.
  - ii. Other than the above the participation in expo-science and MSSSI has also increased. Despite the area being pre-dominantly rural expo-science has attracted more schools and more learners involved in producing good projects. They feel proud and raise their confidence when they are going to present their projects at national level Expos at University of Pretoria.
  - iii. Clustering of teachers has become more advantageous to our teachers in general.
- When they have problem they come together and sort it out, for example how to organise CASS marks for moderation, computer programmes, learning and teaching issues etc. The project has given a very positive impact on the community.
- Systemic build up in schools, expo-science maintaining and growing with confidence, ability to using computers in teaching and learning situation etc are proofs of the impact of the project.
- Quality projects in expos and good performance in CASS are improving amongst learners. That shows the wisdom of teachers transmitting to learners.
- Some projects ran away and this science one only remained with us until it succeeded. This automatically tells the determination and commitment on the part of project implementers and teachers.
17. I As a South African stakeholder in developing education/science education highlight your views on roles of foreign donors; if possible please give examples (e.g. JICA, Denmark, Swedish Government, Belgian Govt., European Union etc.).
18. D. Their programmes sometimes do not address the need at its root level. They run for a while and then disappear. Sometimes there are certain limitations/ restrictions that cannot be met by all of us.

### **B8.8.3 Interview: DO-3, August 2005 (a senior Departmental Official)**

(The official is the Chief Director of GET Mpumalanga Dept of Education. To start SASEN project in 1998 at Eerstehoek District it was necessary to get permission and the blessings of MDE then at Middleburg. To gain this permission, Pr. of Centre for Science Education University of Pretoria had to do a presentation of the project to satisfy a panel constituted by special education project finance and curriculum unit of the MDE. Mr DO-3 represented the curriculum unit of the department in the panel, which ultimately approved the project.

To establish the expectations of the department of the project and reactions of the achievements this interview may throw considerable light on the project, therefore his interview is important for the evaluation of the project from 13 Sept. 1999 to April 2003).

The Director presented the background of the project to providing with the story of the project, and interviewer drafted the interview questions. The interview was conducted at the main campus of the University of Pretoria in a very harmonious and light environment. Sometimes it could be

named as less formal and more as a chat. The following is the text as transcribed from the Audiotape recorded on the date of the interview.

I – Interviewers: Pr. (reading the questions) and the CI (the researcher who drafted the questions  
D – DO-3

- 19 I O.K. Mr CI has asked me to read the questions. The Stakeholders' expectations especially when a foreign agency is involved. In order to give a wider stakeholders' view in the specific stakeholder being the Mpumalanga Department of Education for contextualising the SASEN project which is being completed.
- 20 D Yah umm, the Department of Education as one of the stakeholders has got a number of expectations pertaining to any project in particular when a foreign agency is involved. The first expectation is that there should be an agreement that protects both the agency as well as the department. Aaa in terms of the image of both, in terms of principles that would have been agreed to, in terms of the intentions and outcomes of the project and of course in terms of the responsibility and accountability especially where funds are involved... therefore the department would then be playing a more or less ... shall we say a protective role so that neither the agency nor the department can actually find itself in a position of disrepute. Having said that the department would also be interested in the intended outcomes of the project, especially the project design and outline whereby it will try to make sure that the project does not in anyway compromise or oppose the policies of the department. It has to make sure that the project is entirely educational and it is not also intended for any individuals to gain an unfair advantage especially when it comes to financial matters. Amm .... Another important factor is that the outcomes or the objectives of the project must be such that the people involved would gain either skills or it might even be amm. resources, like physical resources. Sometimes financial resources or learner support material. Whatever, the main thing is that it must have educational outcomes. And once the department is satisfied about those things then normally they will allow the project to continue even though they themselves might not necessarily supervise it. In many a case a person maybe allocated to be part of the co-ordination mechanism but not necessarily takeover the running of the project, but for information or other related purposes
- 21 I Thank you. The next one, why do you allow projects and in a few cases even invite interventions.
- 22 D Well I think the South African Government in particular has made it clear that it is operating in partnership with all people that have got an interest. (Interruption due to phone call... question was repeated. and Mr D continued...) First of all the policy of the government is that it will work in partnership with NGOs, with other governments and with business to promote a number of issues including the infrastructure improvement, including the skills development and so forth and so on. Now in the case of Mpumalanga Department of Education, we would allow such partners to work with us in improving the areas that I have already mentioned. Sometimes people do come and make such an offer which we then evaluate if it is in line with our intended objectives and sometimes we do then look for people that are prepared to partner us to achieve certain goals and therefore in most of the cases it would be a win-win situation. In terms of inviting partners or other governments or donors, ... sometimes as a result of those particular institutions being part of the broader developmental agencies that have got funds and would be making those funds available depending on submissions of various people who need them. And therefore since we require assistance in terms of the many developmental areas,

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sometimes we would identify these donors and then request them to undertake projects in our area.

- 23 I Thank you for that one Joe! Nice to have a complete answer. There is a third one:  
  
What do you need from the project when I have ended? Projects need as you have said earlier on that projects need closure. What do you think you need from the Departments' point of view?
- 24 D Well! There is a saying that no work is done until the paper work is done. Obviously from any ending project we would need a report. The report would then capture all the processes that took place, whether the project has achieved the intended goals. It will indicate that what there problem areas were, and most importantly of course the report will indicate some recommendations. There could be two types of reports here. One report could be here that is generated by the Project manager and his/her team and another one could an evaluation report by an independent evaluator. Both reports definitely serve the same purpose. The independent report by the evaluator would be used to gauge how persons who are not involved in it see it from a neutral and principle point of view. Where as the report coming from the management would be more or less a report based on the process and the experiences of the people that deal with the project. Both reports are very important to take the issues forward, especially the in terms of recommendations of both.
- 25 I So, Joe! You particularly point out that the recommendations would be important seen from two perspectives of the evaluator and the committed manager point of view. What kind of recommendations the Department will listen to or what would it take to heart or welcome?
- 26 D Well! I guess it would depend on the type of the project. But basically the recommendations that will be considered are those that are likely to take the Department forward in terms of good outcomes of that particular project. Lessons learned in the project would also be very useful; also very important would be the recommendations with regard to the sustainability where by if there are good outcomes then they should not just fall away by the way side. And it would then be very important to see what are the implications of the sustenance problem, if there be need to raise more funds to sustain the project or to expand to other areas or to incorporate those finding as parts of the natural process of doing things in the Department. So a whole range of issues can be taken into account here. But another important area is to look at what has not worked so that we can also learn lessons from them. Because we dot only need the report when the project has succeeded, we also need a report if and when the project has failed. We would like to know what were the difficulties; what were the problem areas where the Department should have done its support and it didn't do, why not, so on so forth. All those factors are very important in any report. And that is why we would like to have a report from you.
- 27 I Great! Next question from Mr. CI is: Are the achievements of SASEN in the Line of your expectations? To some extent I appreciate that you need to know what the original goals were, but the intention was to develop science and mathematics teachers in far eastern Mpumalanga the Eerstehoek district right at the Swaziland border. To bring a project there apparently without too much cost, because we came carrying the purse to some extent, otherwise SECOM would have carried the purse if things would have proceeded the way it was originally intended. Could you comment?
- 28 D Yeah, first of all I think we need to take into perspective that the Department of Education as earlier outlined, get into partnerships with various bodies to achieve



- certain objectives. One of the objectives of this intended project was to improve the level of expertise to develop skills in the line of mathematics and science and clearly that is a much bigger objective than you know the area in which it was, this project was taking place. In South Africa today one of the key areas that are targeted for improvement is Maths and Science. The Minister has announced an MSTP that is a Maths Science and Technology Project, and there are various mechanisms and projects to make sure that this particular area is developed and therefore this project was spot on in identifying the need to improve the expertise of educators so that they in turn have an impact on the learning and teaching situation. Earlier when we were discussing the. One of the issues that I referred to in terms of projects of this nature is that what would be the qualitative outcome of such a project. So if the qualitative intended outcomes are that educators should be better qualified, should do their work better, should have more skills, more knowledge, have relevant and you know attitudes that are going to influence the way they do their work and of course the supply of other resources to make sure that they achieve those goals and really that is in line with our way of doing things. However I need to comment that in many a case, the problem with this type of intervention is that if it is succeeds it creates a pocket of excellence which over a long term basis becomes insignificant in the milieu of other... shall we say non performing situation and areas and therefore while it is easy to deal with smaller numbers and therefore one would expect more success, it would be wonderful if the success could be province wise and rather than just a little corner of the province, but that is not the fault of the project of course, is just a comment to say that it just creates a pocket of excellence and we are interested more in the whole area operational at that level to be of a relevant quality.
- 29 I In other words you hope would be ultimately that the projects of this kind would be more generally applicable rather than as localised.
- 30 D No no. not necessarily no no. Sometimes it is not possible to implement a project at provincial on a provincial scale at a go. You know going big has got its own problems as well. The issue of capacity in that context is one of the many things. I am saying that positively yes it creates quality educators. At least in the context of this project it is very clear that it has a very good achievement. But now the question would be how to take that very same achievement and make sure that it happens all over the province, because we have got a particular corner of the province that have good educators and the rest of the province doesn't. That brings a lot of other questions. Shouldn't we then undertake projects, which we look other ways? The answer is certainly 'no'. We would love projects to be taken and where possible take the experiences and try to move on and influence other areas. How ever, we both know as we have discussed earlier that we don't get necessarily the same results. But when results are good we would wish that it would have been good all over. Yeah! That is what I mean.
- 31 I Absolutely. What more, SASEN project, should have done to meet the expectations of the Department?
- 32 D Basically I think to do more the project should have done two or three things in my opinion. One would be to see what effect the project itself has on the educators that were involved with this project vis-à-vis the same educators being involved and utilised in other similar, I don't know whether I should say competing or reinforcing projects because then it would have been possible to say what is it that the project itself has done that has not partly been contributed by other interventions. I don't know whether it will be possible but for me that is an issue. The second one would be to say that in the same area we have had the issues of cluster leadership. The issues of clusters is not reserved to Science and Math, it is an idea that we are trying to implement by using leader educators all spheres of subjects or the learning areas. Now we are not sure that the cluster

leadership is the concept only applicable to the Science and Mathematics. It is granted that the project was only for science and maths, but did we have a control group of any sort in the same area to compare that this group which did not take part in the project or clusters what happens to them vis-à-vis to those which are participating. Possibly there is an answer to that but I don't know whether it is intended or just it happened to be noticed as a matter of cause. The third aspect of the course relates to the management. It seems to me that the promises were made by the Department to assist the project in certain areas; now the question is whose responsibility was to see to it that those promises are kept. Unless perhaps that I am not well informed but what happened when the promises were not materialising who intervened who interacted with who and what was the outcome? Because in my mind that would have perhaps given us even better results, had the project received the assistance that it was promised? The fact that that assistance did not come forth as for as I am concerned it has compromised the project. And that should have been done within the lifespan of the project to make sure that what was promised to the project was given. Of course the last thing is that being a project obviously it was limited in the scale, it couldn't take it to a scale without going into other agreements, but if my information was correct this project was completed in 2003.

- 33 I Yes.
- 34 D And until now it doesn't seem that there is a report yet.
- 35 I Yes.
- 36 D Now the question is why has it taken so long? The time span between the project when it has ended and now, eventually if and when the report comes in would those factors still be relevant, will that still be within the spirit of the project to do things or to implement them. Whatever recommendations are coming out of that is it too late? Why hasn't the report come within the normal three or four to five month? That is expected of a project.
- 37 I Joe! Your last two points are extremely very relevant. One of them being what way was the promise received to the extent of creating expectations and with whom and why were those not followed up? And the second one of course being the rounding off, it is taking rather a long time at this particular point but of course we are working on that. Part of this is a follow up to ensure that it gets done, in two contexts one is academic context and the other one is operational context.
- 38 D According to you, what should be the criteria of evaluation of a project like this working to uplift the Science Mathematics education in South Africa?  
 There are wide ranges of criteria that are used to evaluate the project of this nature. The first one being that there should be a baseline studies that would define the terrain so that the project is actually based on the research findings. I think there is a tendency for South Africans and those who invite donors expertise to assume that South African educators don't have this, this and that. It is true that basically we don't. But there is a common assumption for an instance that Mpumalanga educators are not qualified. That tends to take educators for granted and some of them they get offended but they don't have power or a way to resist against that so they follow what they are told to do. Therefore for me one of the principles is that there should be a baseline study. Number two is that whenever a project of this nature is done there should be a control group through which then we can compare as we influence or put certain stimulate in those areas and not the same in other areas and so the comparison. The third principle is that the project should have a particular life span. If there be an intention to extend the life span must be based on very valid reasons. And also for a project to succeed there should be a basic fundamental structure, finance, and support, resources and so on



so forth. Because without those things you compromise the projects outcomes and the results and even the process and implementation of that particular project. So basically I am saying yes, you need some fundamental principles in order of the project to take off and do what it intended to do. At the end of the day go the results of the project must be interpreted within the context of the situation in which the project was designed in the first place. Because if it is not done in that way there is a tendency to misrepresent either the facts or the opinions related to that project.

- 39 I SASEN succeeded and established its goal of training effective and well-motivated work force of maths and science teachers in Eerstehoek sub region in four years. Why cannot the Department think to establish an INSET institution in Mpumalanga closer to schools, which could be a mix of the realities of SASEN and wishes of Nagao through MSSSI funding before the beautiful ideas, fade away or sleep in the files or reports?
- 40 D The ideas of INSET are not on priority but the teacher centres with the CIs are being pushed as in-house and outreach centres for teacher development. The SASEN project was in and now has ended with its legacies to be followed.

### Discussion:

#### DO-3: Questions and observations.

##### 1. Grass Roots vs. Top Down:

- Felt to be an important insight that bottom up was a positive contribution
- Strategically in life it rarely happens from the bottom because who (top) holds the purse.
- How do you make sure that grass roots feel themselves part of the activity even when money/resources/skills are contributed from the top?
- How do channel that effort from the bottom to link with the top: decision makers etc.

##### 2. Life span of the project

- How did it occur
- How did this function vs. other projects? How do you know that this project was the successful one while other projects were also present? How do yours isolate the impact?

##### 3. What influences by the MDE officers in the area?

##### 4. Permission?

- Administrative
- Protective
- International funds must be spent in a particular ways
- It could negatively impact on the Department
- Department officials should have been involved
- Knowledge and approval
- Why there was no catering
- How was promises made; e.g. Transport support not given, delay f process and the agreement.

##### 5. Success factors:

- Promotion of educators involved, seems to have gained something that allowed them to be recognised. (Joe would be interested in specifics that actually made them promotion able: more dedication, greater contribution to school, spending more time in school even after hours etc). Why is this group so unique? Is there a control group that does not display the same trend?

##### 1. Clusters:

A comparative study is possible with the MSSSI clusters.

- Same leaders.





- Same kind of clusters
  - Who were the cluster leaders?
  - How do the leaders get chosen i.e. after recognised by the fellows, but not by the school he works at is not supported.
  - How did it work in SASEN?
  - What were the activities of the cluster leader at the school, within the cluster, how does school grant time to attend the programmes?
  - How can a school support the cluster leader?
2. FDE: design, time limit, what about those who did not finish, can they still complete, what is the problem? Is qualification linked to the project or is it open?
3. Costs.

How much of the cost of the project for actual qualification vs. how much for the actual cost of materials etc.

How much of it being on other products would have assisted them?

How can it be available to others?

4. Measures of Success
- Quality of learning and teaching in the schools.
  - General growth in performance
  - Confidence of teachers, extended behaviour in other school, inviting other teachers to visit the classroom and after-hours classes named as quality time for learners by the teacher.

#### 10. Sustainability:

- How are gains sustained: often (usually) things collapse back, what factors have influenced the educators to keep their improved state.
- Is there any assistance to allow teachers to continue
- What are schools themselves doing?
- Did the clusters survive?
- Can it be scaled up to larger areas? Bearing in mind that it was designed locally
- Confidence
- Assistance to sustain
- Higher Education opportunity

Comparison: SASEN and MTAP (Mpumalanga Teachers' Advancement Programme) as projects

	SASEN	MTAP
Teachers who came	35	140
Registered	28	60
Succeeded	27	38
Percentage Success	97	63
Organising Body	UP	UP
Financial assistance (Transport)	No	Provided by the MDE
Clusters	Yes	Yes
Supervision	UP staff and CI	CI

Clusters: Comparative understandings of SASEN and MSSSI clusters



	SASEN	MSSI
Membership	Open for a teacher	Circuit boundary
Cluster policies are prepared by	Cluster with its leader	CI
Who should be the cluster leader	Chosen by teachers	Chosen by CI
Nature of clusters	Volunteer	Compulsory
Funding (Transport, catering)	Self supported by teachers	MDE or School
Supervised by	UP Lecturer and CI	CI

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## Appendix C

### Class observations 2001 and 2002 and Ratings

#### Table

This Appendix presents a consolidated tabular analysis of class observations of teachers in the project during the years 2001 and 2002, which was done after the first year of training.

#### SCIENCE TEACHERS

*Table C1. Observation record of individual science teachers in their normal classrooms*

Items	Teacher 1		Teacher 2		Teacher 3		Teacher 4	
	2001	2002	2001	2002	2001	2002	2001	2002
<b>Classroom environment</b>								
Usable chalkboard (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seats and desks for learners	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Space for teachers for practical if organised	Yes	Yes	N	Yes	Yes	Yes	Yes	Yes
<b>Teacher preparedness</b> (eagerness, presentation and practical work (rating in %))	65%	90%	50%	70%	60%	80%	50%	70%
Caring for a good lesson (%)	75%	80%	60%	70%	50%	70%	50%	60%
<b>Teacher Demonstration</b>								
Does teacher demonstrate to all or a group of learners	All	All	None	None	None	None	None	None
Are all learners able to see (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Learner involvement (all, most, few, none)</b>								
During the lesson learners work individually: without assistance of the teacher	Some	Some	Most	Most	Most	Most	Most	Most
With assistance of the teacher	Most	Most	None	Some	Some	Some	Some	Some
Work in groups or in pairs	No.	Yes	No	No	No	No	No	No
<b>Language usage:</b> Does teacher use vernacular to explain few concepts to learners (Yes or NO)	Yes	Yes	No	No	Yes	Yes	No	Yes
<b>Use of other teaching aid material</b> to explain concepts, develop skills or values (Yes or No)	No	Yes (A chart)	No	No	Yes	Yes	No	No
<b>Method of approach (Yes or NO.).</b>								
Teacher establishes background knowledge	No	Yes	No	Yes	Yes	Yes	No	Yes
Does the teacher conclude his lesson by giving some homework.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Does teacher take interest in personal problems of his learners	Yes	Yes	No	No	No	Yes	No	Yes
<b>Use of chalkboard</b> Often: (> 75%), Few times: (<50%), None: (<10%)	10%	50%	75%	75%	75%	75%	75%	75%

**Notes by Observer:***Teacher 1.*

(2001) The topic was preparation of Ammonia using Micro Chemistry kit. It was well prepared. Learners took part and were seen enthusiastic.

(2002) On the topic Acids & Bases again it was a good lesson. A chart was used to explain main ideas of identifying acids and bases.

*Teacher 2.*

2001: A class work on calculating  $\text{Ca}(\text{NO}_3)_2$  from 5 g of  $\text{CaCO}_3$  reacting with  $\text{HNO}_3$ . Learners were seen busy individually teachers was supporting.

2002: It was also a theoretical lesson.

*Teacher 3.*

2001: A theoretical lesson on formula mass of  $\text{H}_2\text{SO}_4$  was presented. Periodic Table was used as media. Initially the lesson was learner centred but slowly it became teacher centred as time passed.

2002: A neat handwriting on Chalkboard.

*Teacher 4*

He showed a considerable interest to improve the learning situation in the class.

When homework was given, he explained how to do the homework.

He involved learners first to have the background refreshed, then picked up the lesson and explained.


**MATHEMATICS TEACHERS**
**Table C2. Observation record of individual mathematics teachers in their normal classrooms**

Items	Teacher 1		Teacher 2		Teacher 3		Teacher 4		Teacher 5	
	2001	2002	2001	2002	2001	2002	2001	2002	2001	2002
<b>Classroom environment</b>										
Usable chalkboard (Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seats and desks for learners	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Space for teachers for practical if organised	No	No	No	No	No	No	No	Yes	No	Yes
<b>Teacher preparedness</b> (eagerness, presentation and practical work (rating in %))	50%	60%	40%	65%	40%	60%	60%	60%	55%	70%
Caring for a good lesson (%)	50%	60%	50%	70%	50%	80%	50%	85%	70%	75%
<b>Teacher's work</b>										
Does teacher demonstrate to all or a group of learners	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are all learners able to see(Yes or No)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>Learner involvement (all, most, few, none)</b>										
During the lesson learners work individually: without assistance of the teacher	Most	Most	Most	Most	Most	Most	Most	Most	Most	Most
With assistance of the teacher	Some	Some	Some	Some	Some	Some	Some	Some	Some	Some
Work in groups or in pairs	Most	None	None	None	None	None	None	None	None	None
<b>Language usage:</b> Does teacher use vernacular to explain few concepts to learners (Yes or NO)	No	Yes	No	No	No	No	No	No	Yes	Yes
<b>Use of other teaching aid material</b> to explain concepts, develop skills or values (Yes or No)	No	No	No	No	No	No	No	No	No	No
<b>Method of approach (Yes or NO.).</b>										
Teacher establishes background knowledge	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Does the teacher conclude his lesson by giving some home work.	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Does teacher take interest in personal problems of his learners	No	Yes	No	No	No	Yes	No	Yes	Yes	Yes
<b>Use of chalkboard</b> Often: (> 75%), Few times: (<50%), None: (<10%)	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%



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**Observer's notes:***Teacher 1*

2001. He chose some questions to do on chalkboard. Those he could not finish remained homework for learners. He used coloured chalks for different steps on the chalkboard.

2002. He attended undone homework of learners as a remedial work in the class. He wrote very neat on the chalkboard.

*Teacher 2. Nothing special**Teacher 3.*

2001. teacher started with his previous day's homework. He wrote his work on chalkboard.

2002. He took interest in learners' problems and helped. He writes neat and explained the matter to learners.

*Teacher 4*

2001. He went on doing his work but did not involve learners much. He did not ask questions also.

2002. He had a good lesson plan. He went table to table to see and help solve learners' problems. Learners talked their problems/issues to him.

He tried to write a clean, neat and readable writing on the chalkboard.

*Teacher 5*

2001. This class was noisy most of the time. Teacher tolerated all these noise. A class work was given to learners. Teacher supervised and marked where it was possible.

He kept learners attendance on a sheet of paper.

He did not bother much about the learners' issues. He established the background knowledge before going to subject matter.

2002. He was eager and going from table to table to know the problems of learners and help instantly.

He was seen very positive to support learners' issues to solve.

He writes neat on the chalkboard.

***Cluster presentations and observations***

These observations were performed after the Current Trends in teaching and learning and practical demonstration on working with computers were completed at the intervention



**Table C3 Cluster Presentation and Observation**

	Items	Cluster 1	Cluster 2
1.	Was the lesson learner centred? (MSSI Observation format part-1, was used)	Yes. (Learners' activities were more than the teachers' activities.)	Yes. (Learners' activities were more than the teachers' activities.)
2.	Proof of the lesson plan preparation available? Content of the lesson plan relevant.	Yes. It contained: specific outcomes; learning outcomes; strategies; teachers' role; learning activities and assessment	Yes. (As in cluster 1)
3.	Were worksheets produced and used in the class?	Yes.	Yes.
4.	Were assessment procedures and learners' care involved and practised?	Yes all through the lesson.	Yes.
5.	Observed changes in methodology e.g. from T.C. to L.C.,  More activity based (Working on worksheets in the class), Feedback and correction, Rating as % for attitude towards better performance as a teacher.	Yes there is an observable shift from T.C. to L.C. Yes Done immediately 90%	Yes  Yes Done immediately 85%

**Rating Summary:**

This instrument is based on the Tuckman Teacher Feedback Form (TTFF) used to measure teacher style. The scale was to assess the competence on 1 to 9 basis. The following analyses procedures are based on the guidelines given by Tuckman (1979) i.e. using a summary formula and score for each dimension of observational rating.

[(Item + Item + Item) - (Item + Item + Item) + an arbitrary constant]

**Table C4: Analysis of ratings done for individual teachers in 2001 and 2002.**

Teacher No	Observation year	Learner centred approach (Rated in items (9 + 10) - (1+2+5+8) on a rating scale 1-9), adding an arbitrary number 26 to get all results a positive number.	Teacher preparation (Rated in items (11+12) - (10) on a rating scale 1-9)	Attitude towards discipline items: (4+12) - (6+7+9+12)= ... Rating scale 1-9, adding an arbitrary number 12 to get all results a positive number.	Time management Items: 5 - 9 = ... Rating scale 1-9.
1	2001	$(7+4) - (7+7+5+7) = -15 + 26 = 11$	$(6+7) - 7 = 6$	$(5+7) - (3+6+3+4) = -4 + 12 = 8$	$6 - 3 = 3$
	2002	$(3+2) - (4+7+5+2) = -13 + 26 = 13$	$(3+8) - 2 = 9$	$(2+8) - (3+3+2+2) = 0 + 12 = 12$	$5 - 2 = 3$
2	2001	$(3+1) - (5+8+5+8) = -22 + 26 = 4$	$(7+7) - 8 = 6$	$(2+7) - (3+3+5+1) = -3 + 12 = 9$	$5 - 5 = 0$
	2002	Not available			
3	2001	$(3+2) - (8+6+6+4) = -19 + 26 = 7$	$(5+7) - 3 = 9$	$(4+7) - (2+3+2+2) = 2 + 12 = 14$	$6 - 2 = 4$



Teacher No	Observation year	Learner centred approach (Rated in items (9 + 10) – (1+2+5+8) on a rating scale 1-9), adding an arbitrary number 26 to get all results a positive number.	Teacher preparation (Rated in items (11+12) – (10) on a rating scale 1-9)	Attitude towards discipline items: (4+12) – (6+7+9+12)= ... Rating scale 1-9, adding an arbitrary number 12 to get all results a positive number.	Time management Items: 5 – 9 = ... Rating scale 1-9.
	2002	$(3+3) - (5+2+7+7) = -15 + 26 = 11$	$(7+8) - 2 = 13$	$(3+8) - (2+2+3+3) = 1 + 12 = 14$	$8 - 3 = 5$
4	2001	$(3+3) - (5+2+8+7) = -16 + 26 = 10$	$(7+8) - 2 = 13$	$(4+8) - (2+2+3+3) = 2 + 12 = 14$	$8 - 3 = 5$
	2002	$(2+2) - (7+3+8+3) = -17 + 26 = 9$	$(7+9) - 1 = 14$	$(2+9) - (3+4+3+2) = 1 + 12 = 13$	$8 - 3 = 5$
5	2001	$(7+7) - (8+2+9+8) = -13 + 26 = 13$	$(8+6) - 5 = 9$	$(1+7) - (3+3+4+4) = -5 + 12 = 7$	$9 - 8 = 1$
	2002	$(3+2) - (5+5+5+3) = -13 + 26 = 13$	$(8+6) - 5 = 9$	$(1+8) - (3+3+2+2) = -1 + 12 = 11$	$5 - 2 = 3$
6	2001	$(6+3) - (9+8+8+8) = -24 + 26 = 2$	$(8+7) - 8 = 9$	$(1+7) - (4+8+3+3) = -10 + 12 = 2$	$8 - 3 = 5$
	2002	$(2+2) - (9+6+7+7) = -25 + 26 = 1$	$(8+3) - 2 = 9$	$(2+8) - (2+7+2+2) = -3 + 12 = 9$	$7 - 2 = 5$
7	2001	$(2+7) - (9+9+8+7) = -24 + 26 = 2$	$(8+7) - 8 = 7$	$(2+7) - (3+*+7+2) = -11 + 12 = 1$	$8 - 7 = 1$
	2002	$(3+3) - (9+4+8+5) = -20 + 26 = 6$	$(8+4) - 3 = 9$	$(1+4) - (3+2+4+3) = -7 + 12 = 5$	$8 - 4 = 4$
8	2001	$(4+4) - (5+8+5+8) = -18 + 26 = 8$	$(7+6) - 8 = 5$	$(3+6) - (2+3+5+4) = -5 + 12 = 7$	$5 - 5 = 0$
	2002	$(4+6) - (7+6+8+2) = -13 + 26 = 13$	$(7+8) - 7 = 8$	$(1+8) - (3+3+2+2) = -1 + 12 = 11$	$8 - 2 = 6$
9	2001	$(3+5) - (7+6+7+8) = -20 + 26 = 6$	$(7+5) - 7 = 5$	$(3+5) - (3+3+5+5) = -8 + 12 = 4$	$7 - 5 = 2$
	2002	$(6+6) - (5+7+8+6) = -14 + 26 = 12$	$(7+7) - 7 = 7$	$(3+7) - (3+2+4+3) = -2 + 12 = 10$	$7 - 3 = 4$



Teacher No	Observation year	Learner centred approach (Rated in items (9 + 10) – (1+2+5+8) on a rating scale 1-9), adding an arbitrary number 26 to get all results a positive number.	Teacher preparation (Rated in items (11+12) – (10) on a rating scale 1-9)	Attitude towards discipline items: (4+12) – (6+7+9+12)= ... Rating scale 1-9, adding an arbitrary number 12 to get all results a positive number.	Time management Items: 5 – 9 = ... Rating scale 1-9.
Comments		Teacher s 1, 3, 7 & 8 showed a shift towards learner-centred learning but 4, 5 and 6 seems to remain as usual. Teacher 5 showed no shift in rating scale	All are rated towards more prepared teaching.	Teachers had good trend in improving discipline in their classes. Teacher (4) is not rated as a disciplinarian.	Teachers showed much improvement in managing time in the class to complete their proposed work for the day
Ratings were done on a rating scale of 1-9 on 12 items which are grouped on four (4) themes for analysis purpose in the following table for individual science and mathematics teachers					

### Rating Summary for Clusters

**Table C5. Rating summary on the same scale 1-9 for two clusters.**

Cluster	Learner Centred approach	Teacher Preparedness	Teachers' Attitude toward Discipline	Time Management
1	$(3+3) - (9+8+5+3) = -18 + 30 = 12$	$(7+8) - 8 = 7$	$(1+8) - (3+4+2+3) = -3 + 5 = 2$	$5 - 2 = 3$
2	$(2+3) - (9+8+7+8) = -27 + 30 = 3$	$((7+6) - 7 = 6$	$(1+6) - (2+2+3+3) = -3 + 5 = 2$	$7 - 3 = 4$
Comments / conclusion	It is true that cluster (1) were more activity based and learner centred. Cluster (1) was found more organised in all activities. It was a leading cluster in many cases exemplary for others.	The quality of lesson plan, worksheets and organising teaching aids were more emphatic in cluster (1)	Cluster (1) and (2) both did take care of their learners. In both cases it was a self-disciplined class because of active learners. No time was to play in the class or to idle.	In this example cluster (2) seems to have been rated better. Truly speaking the coverage of work in cluster (1) was a little more than (2) and numbers of teachers and observers were almost double in cluster (1).



## Appendix D

### Stakeholders Views: Post Project Evaluation

The questionnaire was given to the interviewees after oral interviews on post project evaluation. In this exercise three cluster leaders, three principals of schools, two departmental officials and one union leader completed the questionnaire.

The answers for every item are arranged in the following tables for convenience.

#### *Written questionnaire:*

**Question 1.** Name few activities in which you/your organisation would like to take part in promoting Science education. Throw some light on the level at which your organisation would be interested to be involved.

**Table D1: Interest of stakeholders towards each activity (Ogawa, 2002:230)**

Scope of Activities	Personal (%)	Regional (%)	National (%)	Global (%)
National policy development	22	22	44	11
Programme development	22	33	22	0
Curriculum development	44	33	33	11
Teacher Education	44	67	11	11
Textbook development	0	22	33	0
Facility development	33	44	11	0
Classroom teaching and learning	67	33	0	0
Content selection	22	22	33	0

#### *Written questionnaire:*

**Question 2.** We are interested in your views on:

Science

Schooling

School science and its aim

Relationship between science education and development

SA socio-cultural instance of science.

Please express your views about many other stakeholders who are involved in developing Science education in South Africa. Where should the other stakeholders be most involved?

**Table D2: Stakeholders views on other stakeholders**

Views about other stakeholders	Science %	Schooling %	School science and its aim %	Relationship between Science education and development %	SA socio-cultural instance of science education %
Department of Education	56	89	67	89	67
Science educators	89	89	89	67	56
Practicing teachers	67	100	56	67	33
Parents	56	67	33	44	89
Students	67	78	33	44	67
Community leaders	33	56	33	33	67
Science advisors	89	89	89	89	67
Funding agencies	67	56	78	67	44
Large industries	56	56	56	67	44
Parastatals	67	67	56	44	56

***Stakeholders' answers to interview questions:***

**Q. 1 Do you expect any gain (political, socio-cultural or socio-economic) from your help as an outcome for your organisation? Tell us briefly.**

“If quality is produced more sponsors would be attracted to improve on the available resources. More learners will develop interest in science”.

“Educators will be developed and they will be able to execute their duties. They will support it and recruit other members into the programme and the Union knows that SADTU was part of it in initial stage”.

“To enrich the teachers’ existing knowledge so that he could be able to teach and raise interest in our school learners”.

“I thought of gaining socio-economically from the programme that was offered”.

“Socio-cultural benefits are making a cluster of friends and be more secured. You can have science knowledge to teach science with confidence. Socio-economic advantages are to be in a position to climb up the ladder of success”.

“Yes in the form of a certificate as improved qualification. It will bring incentive in my salary as encouragement”.

“When I joined the programme first of all I wanted to have a qualification. Secondly, I should have job satisfaction coupled with confidence in teaching Science & Mathematics. And lastly be useful to help the school and the community at large”.

“I wished to have knowledge and skill improvement with accredited qualification at the end of the course”.

**Q. 2 What are your general expectations from a project busy in developing science education?**

“To assist other educators who did not get the opportunity to be on the course, to improve on science results for learners, to be able to assist the school with computer skills in administration to pass on more cooperation among educators. More learners are waiting to take science”.

“The stakeholders participated and made it through to include more educators in the science field. Another expectation was to equip the science educators with skills to teach science in the classroom situation”.

“Improvement in science learners’ enrolment, improvement of science results at the end of the year and to raise interest in science subjects’.

“We expected that educators to be knowledgeable and have confidence in promoting the love for science subjects at school level”.

“Teachers should develop the knowledge, skills and change in attitude at work”.

“The educators be more practical and apply science principles in a more easy way. Also the teachers should adhere to its goal/objectives and fulfil its mission and vision”.

“The project must pay respect to the tradition of the community which it is operating in. The aim should be to develop the community. It should put in place programmes that will prevent the destruction of the environment. The aim of the project should be to empower the community and improve the way of living’.

“We expect promotions, better qualifications, better salary and status after the project”.

### **Q. 3 What feedback do you expect (are in your mind) from project implementers?**

“As experts who have been monitoring the project I would like to get your honest reflection of the educators as you see them in action”.

“The extent to which expectations were met and the success measures of the project should be presented as feedback’.

“Success of the project, in what fields (levels) were the teachers trained and were successful as well as those they did not succeed in”.

“We need to know the progress of the educators who were involved in this project”.

“We want them to deliver quality Science, Maths, and Technology teaching. I still need contact with the implementers after the completion of the programme and to be advised of the new developments that are there in Science teaching”.

“We want strength and weakness of the project and also evaluation of the project. Was it successful or not? What should have been done to improve the project to achieve more than what has been achieved. It should also be indicated that what was not done that led to the failures and what was done which led to the successes of the project”.

“It should present a clear plan of how the project will be managed from the very beginning to the end. Implementers of the project must indicate if the objectives were realised or not. List of problems encountered during the implementation of the project and areas of improvement if there are any. Report on funding must also be part of the feedback”.

“Improvement, discoveries, successes and possible future help should be the part of the feedback”.



**Q.4 As a South African stakeholder in developing Education/science education highlight your views on foreign donors, if possible please give examples (e.g. JICA, Denmark, Swedish Government, Belgian Government, European Union etc.).**

“Foreign donors should be part of the implementation and management so as to monitor the progress. They should ensure that the aims of the project are achieved while working hand in hand with South African stakeholders”.

“We welcome them to support as long as there are no string attached to the donation”.

“Foreign donors should consult with the stakeholders what they need. They should also look at the capabilities available at the particular area to avoid repetition of one and the same thing by different donors. They should prefer rural areas which have less or no funding at all”.

“Their programmes sometimes do not address the need at its root level. They run for a while and then disappear. Sometimes there are certain limitations/restrictions that cannot be met by all of us”.

“JICA: made an important contribution to develop the teacher centres which I appreciate very much. The Belgian University made it possible for most of us to study science in a meaningful way which we never thought would be possible for the university to come to people”.

“A foreign donor is most welcomed in developing education in South Africa. The donor can only monitor the project and not to be fully involved like daily involvement. They can come occasionally to observe what activities are we busy with and ensure that the money is used for the purpose it was asked for”.

“when a foreign donor decides to fund a project in South Africa should have an aim of helping South Africans to realise their goals and not to change the conditions to suit its own situation. The aim should not be to exploit South Africa as it happened long ago during the colonial period. South Africa does need foreign donors particularly during this period where a new system of education is introduced (OBE). There should be training of educators and provision of educational facilities”.

“I expect foreign donors to proceed to give us some donations. Plan to have an audit to ensure that their money was used efficiently. They should continue helping where there is a need. Take us to overseas sometimes”.

N.B.: (The above text is presented with limited editing to improve grammar.)