

EVALUATION OF AGRICULTURAL EDUCATION AND TRAINING CURRICULA IN SOUTH AFRICA

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EXECUTIVE SUMMARY REPORT

1. INTRODUCTION

The Department of Agriculture developed the Agricultural Education and Training (AET) Strategy in an attempt to improve agricultural production through the rendering of quality agricultural education and training services.

The AET Strategy identifies certain challenges that it aims to address in order to ensure that provision of quality AET curricula. The critical challenges that the AET Strategy identifies around the issues of agricultural curriculum are:

- Lack of coordination and harmonisation of AET policy and curriculum
- Lack of coordination of AET at provincial level
- AET curricula that are not aligned to and responsive to the challenges facing agriculture in South Africa
- Disparities in agricultural skills offered to students of different races by learning institutions in South and racial disparities in the access to such learning opportunities
- Poor mobility and transferability of agricultural learning between different AET institutions
- AET curriculum that is not relevant to the needs of Extension Officers and/or not accessible to them

It is against the above background that the Department of Agriculture commissioned this study to evaluate the current AET curricula in order to assess the extent to which curricula address the above challenges and to make recommendations in this regard.

2. HARMONISATION BETWEEN AET POLICY & LEGISLATION AND CURRICULUM DEVELOPMENT

Chapter 2 investigated and analysed the perceived lack of coordination and harmonisation between AET Policy and Curriculum. In this regard the following are key findings:

- 2.1 The first critical policy shift was to change the dualistic agricultural landscape – where a developed commercial farming sector (20% percent producing 78% of total production) co-existed with a large number of subsistence /communal farmers (80% producing 22%). The AET system (including its range of education/training service providers) also reflected the above dualistic nature with marked differences in the roles of so-called Historically Black Institutions and Historically White Institutions (in terms of the range of programmes offered and target groups served).

It can be reported that the AET Provider Institutions have now largely been integrated to a large extent (refer section xx below) and that there is no longer a dualistic role and function between institutions in terms of target groups served or the range of programmes on offer.

- 2.2 The second critical policy shift in AET provisioning was the need to move from the almost exclusive focus on commercial agriculture to a more rural development and poverty eradication orientation. Related topics such as food security, nutritional issues, land care, sustainability and natural resource management, rural development and water harvesting thus became critical for consideration as common core courses/programmes.

It can be reported that generally good progress are being made in accommodating the above key agricultural issues and challenges within AET curricula – from GET to HET levels (whilst section xx below will outline some of the critical shortfalls that remain in this regard).

- 2.3 A further important policy adjustment requirement to the AET system relates to the need for a more holistic and problem solving approach to agricultural teaching programmes (this demand was particularly needed at the FET level where curriculum traditionally focussed on technical production aspects only and neglected management issues).

In this regard excellent progress has been made with the introduction of new and additional management and entrepreneurial subjects at FET level (both in the schools and in the new NC(V) Primary Agricultural Diploma on offer at the FET Colleges)

- 2.4 Policy changes aimed at addressing the proliferation of agricultural programmes and institutions (and improved coordination of education and training provided by the DoA and the DoE) was also high on the agenda since 1994.

It can again be reported that good progress has been made (via the mergers and incorporations of Higher Education Institutions and through the Norms and Standards for the revamped Agricultural Training Institutes) towards consolidation of the AET Provider fraternity and increased cooperation and coordination.

3. COORDINATION OF AET AT PROVINCIAL LEVEL

Chapter 3 investigated the extent of AET coordination at provincial level and/or the lack thereof. Key findings in this regard are the following:

- 3.1 The Provincial AET Forums (PAETFs) were created as the most important coordination structures and mechanisms at provincial level. Whilst these structures have been established and are operational in 7 provinces, it must be reported that in most provinces they are not effective as yet and have not made a meaningful contribution towards AET coordination and cooperation. In this regard the following have been identified as problems and constraints experienced by the PAETFs:
- a) A lack of implementation capacity to implement the operational plans that have been developed and agreed upon. In this regard there is widespread support for the appointment of full-time and dedicated personnel who could undertake the PAETF role and functions on a full-time basis.
 - b) A lack of operational funding – most of the PAETFs find themselves in a position where they do not have operational funds as such a budget item was not included in the provincial budgets for the current financial year. This situation should however be corrected in the 2009/10 financial year.
 - c) Numerous PAETFs have also indicated that they are not receiving the required support from stakeholders. It is however hoped that this will change once the PAETFs have operational capacity and funding to actually undertake tasks and functions that is perceived as benefitting stakeholders.

3.2 Regarding the need for regional cooperation to enhance the coordination of AET learning programmes and qualifications, the following are key findings:

- a) Good progress is being made at the FET level. In this regard coordination and standardisation policies, forums and mechanisms have brought about considerable standardisation. Examples are the new National Senior Certificate as exit school qualification (with the curriculum set by the standardised National Curriculum Statement for each of the three agricultural subjects); and the new National Certificate (Vocational): Primary agriculture with its set subject and assessment guidelines and which will be implemented at all the FET Colleges offering AET programmes.
- b) At HET level improved cooperation amongst Higher Education Institutions (HEIs) have also been achieved through the recent restructuring and rationalisation of the HET landscape (which merged and incorporated a number of the HEIs into larger merged institutions). Whilst this is a first step towards larger cooperation and coordination, the study revealed that regional cooperation is still a serious problem and that there is a large need (and scope) for improved coordination and cooperation. In this regard the following are highlighted:
 - The need for HEI academic cooperation structures with the mandate to investigate means of standardising so-called generic programmes and qualifications (e.g. B. Agric). It is recommended that such standardisation committees investigate to see how at least the first two years of academic study could be standardised to a minimum of 80% (both in terms of content and quality) to allow the horizontal mobility of learners (and accompanying portability of learning) between different HEIs of the same character and nature (e.g. from one UoT to another UoT).
 - The need for regional academic committees where the spectrum of programme and qualification offerings within a region could be discussed and evaluated against the demand for learning programmes in the region. The mandate of such committees should be to facilitate a transfer of information flow, to identify areas of duplication (over supply), to identify areas where there are shortfalls (gaps in supply), to establish means of sharing capacity and expertise in common areas (e.g. exchange of staff, curricula and learning material, facility sharing, etc.).

4. AGRICULTURAL CHALLENGES, CURRICULUM ALIGNMENT AND RESPONSIVENESS

Chapter 4 investigated to what extent AET curricula is aligned to the key challenges facing the agricultural sector in South Africa (with particular focus on the needs and requirements of emerging farmers and national priorities such as food security, rural wealth creation and sustainable development). In addition issues such as land reform, globalisation, technology development and scarce and critical skills of the agricultural sector were identified as further key challenges that AET curricula should be addressing. Each of these challenges were subsequently analysed and it was established if, and to what extent, AET curricula at the GET, FET and HET levels are responsive to the challenges.

The range of topics and spectrum of responses are too wide to do justice within this Executive Summary and the reader is requested to please work through Chapter 4 and particularly sections 4.6 and 4.7 for Recommendations towards more responsive AET curricula. The following are however provided as broad generic findings and recommendations:

- 4.1 The newly developed three Agricultural Subjects on offer at Senior Secondary level and in the Agricultural High Schools (as part of the new National Senior Certificate), has attempted to address the majority of the key challenges indicated above. Whilst most of challenges are covered sufficiently, others (such as globalisation) are not addressed at all and it is recommended that the Agricultural Subject Advisors be requested to consider means of how shortfalls in the curricula of these three subjects could be updated.
- 4.2 A general finding and conclusion is that the SAQA registered Unit Standard Programmes (which have mostly been developed in the past two to three years), have taken note of the indicated challenges in agriculture and most of these challenges are addressed by the range of Unit Standards on offer. It is however advised that the relevant Standard Generating Body be requested to utilise the findings of Chapter 4 to ensure that curricula are responsive to the key challenges identified and to incorporate new learning fields (e.g. rural wealth creation) where needed.
- 4.3 The new National Certificate (Vocational): Primary Agriculture on offer at the FET Colleges covers challenges such as Land Reform (Management), Water Harvesting/Utilisation and Technology well, whilst others such as rural wealth creation and globalisation are not addressed.
- 4.4 The range and scope of AET offerings at the numerous Higher Education Institutions (HEIs) are too wide to effectively summarise findings regarding responsiveness here. It can however be stated that the study reveal that at large there is not a conscious and structured effort on the part of HEIs to ensure that the indicated challenges are addressed within their curricula. Regarding their “moral obligation” to incorporate such issues within their curricula the following responses were obtained:
- There was general consensus amongst HEIs that they should pay more attention to the comprehensive incorporation of modules on food security, water utilisation/harvesting, rural wealth creation and land care/sustainability within the core Agricultural and Social Science qualifications
 - It was indicated that the market-directed orientation of agriculture is increasingly gaining importance in training programmes at all faculties (especially at Universities of Technology) where there is a conscious effort to align learning programmes with the needs and requirements of industry. In this regard it was proposed that Government (in the form of the Department of Agriculture) obtain representation on their Boards (as a further key stakeholder in the agricultural sector) where they will have the opportunity to motivate the inclusion of such challenges within curricula.
 - It was however cautioned that whilst the HEIs are aware of their responsibility to align curricula to the challenges facing South Africa’s agriculture, each institution must be allowed to implement their improved alignment strategies in an individualistic way. In this regard it was stressed that the DoA should respect the individuality and autonomy of each HE institution and view the diversity as advantageous and not as a threat – with the uniqueness and individuality of each faculty providing richness and specialisation opportunities to the AET fraternity as whole.

5. INVESTIGATING RACIAL DISPARITIES WITHIN THE AET SYSTEM

Chapter 5 investigated possible and perceived racial disparities that still exist within the AET System. It can be reported that remarkable progress has been made in removing racial disparities within the education and training system in South Africa over the past 14 years. There are no longer legislation and/or policies that restrict the access of black pupils and students to learning opportunities of their choice – on the contrary policy and other support measures are geared to facilitate and enhance the access of students from previously disadvantaged communities and population groups. Major strides have been made in opening access to groups disadvantaged under apartheid, especially black and women students: the portion of black students has grown to three-quarters of the student body, and 55% of students are women. The human face of South Africa's public universities has thus transformed during the past dozen years. This is also the case in the Agricultural Education and Training (AET) field with black students dominating enrollment for such programs from GET to HET level.

Whilst the above statistics reflect that in real numbers the black student population (including Coloureds and Indians) have increased to 75 per cent, the picture is less favourable when considering the proportions of young people from different race groups who enter higher education: while 60% of white and 51% of Indian school leavers access higher education, the participation rate for blacks is only 12%. The primary reason for this disparity is to be found in the sub-standard schooling that most poor black children receive (not meeting entry requirements) and the poverty amongst a large percentage of the black population group that serves as a barrier to accessing available opportunities.

Some of the more pertinent recommendations to address these and other racial disparity problems and constraints that still exist are:

- 5.1 Whilst it lies beyond the scope of the education and training system to make inroads into the widespread poverty problem in the short term (and thus address poverty related access problems to education opportunities on a nation wide scale), note should be taken of the National Student Financial Aid Scheme and other financial support programmes that exists to help worthy students to overcome financial access constraints. In this regard NAET and the various PAET Forums must actively pursue such financial support schemes and ensure that prospective agricultural students receive their "fair share of the cake". Current efforts to promote agricultural careers amongst students must be continued and expanded and high potential students must be recruited and facilitated to access available bursaries and other study related financial support and assistance.
- 5.2 Towards overcoming location barriers to accessing AET opportunities (distances that especially the rural populations has to travel to provider institutions), it is recommended that mobile training providers be revived and encouraged (especially skills training providers offering on-farm training services).
- 5.3 The study revealed that there is a lack of knowledge amongst prospective students regarding the network of AET providers, who they are, where they are located, what they offer and what recognition and accreditation their programmes enjoy. This lack of knowledge, coupled to the relatively poor image of agriculture among a large proportion of the black population, reduces the uptake of available AET opportunities and is thus viewed as an access barrier. A need thus exists to, via the AgriSETA and the PAET Forums, provide information to prospective students and learners on the AET provider network and the programmes on offer. The efforts of the DoA in promoting agriculture as a career must also be supported and expanded.

- 5.4 English language proficiency amongst many black students were identified as the most important moderator of performance and the largest factor responsible for students failing to complete their studies in the minimum time. The scale of the problem is such that both quantitative and qualitative corrective measures are required. On the *quantitative* side a more rigorous selection system is required which goes beyond the current practice of accepting matriculation exemption results and a mere interview as being sufficient. In this regard various stakeholders propose the inclusion of the International English Language Testing System (IELTS) as a critical selection tool to be used by tertiary institutions towards a more accurate prediction of candidates with the potential to be successful. On the *qualitative* side it is evident that a large proportion of rural black students will require a comprehensive support service to help them to overcome the language and cultural barriers that they are bound to encounter at traditionally white universities. Whilst many institutions offer some type of support service, it is believed that the current size and scope of support is insufficient when considering that the poor pass rate is costing the government in excess of R 1,5 billion per year in lost subsidies.
- 5.5 An access barrier to the science based agricultural programmes (B Sc and the agricultural engineering programmes) is poor subject choice of pupils at school level. In this regard a relatively small number of black pupils take subjects such as mathematics and science in the senior secondary phase and generally do not do well in these subjects as a result of a lack of good teachers, poor laboratory facilities, etc. Given the entry requirements for the above agricultural programmes at tertiary level, it is found that many black candidates are denied access to such programmes. Towards addressing the root of the problem it is necessary to improve the quality of education in mathematics and science at school level. Whilst most of the HEIs offer a variety of student support services (e.g. extra classes, supplementary instruction, bridging courses, the Extended Curriculum Programme, etc.) it is believed that more could and should be done. In this regard an overarching strategy should be developed and more resources should be made available to institutions to assist students who experience in English language and subjects that demands a good command understanding of mathematics and science.

6. EXTENSION OFFICER EDUCATION AND TRAINING NEEDS AND CURRICULUM RESPONSIVENESS

Chapter 6 investigated to what extent current curriculum on offer at the various AET provider institutions address the learning and development needs of Extension (Advisory) Staff. To this end the ideal knowledge and skills repertoire needed by Extension Personnel to undertake their role and functions in a competent manner were established; this ideal knowledge/skills repertoire was then compared to the actual qualifications and skills profile of Extensionists currently in the system; and the extent to which current curriculum on offer at the various AET provider institutions address such needs. Finally some recommendations towards improving the responsiveness of curricula to the identified needs are made.

Summarised the key findings and recommendations include:

- 6.1 It was found that there are at least 19 Agricultural Extension Programmes / Qualifications (of NQF level 5 and higher) registered on the SAQA database (15 Exit Level Outcome Qualifications and 4 Unit Standard Based Qualifications). Whilst it was not possible to evaluate and compare each of these qualifications within the ambit of the assignment, a peer review amongst the HEIs however revealed that those universities with specialist and dedicated Extension Departments (e.g. University of Pretoria, the University of Fort Hare and University of KZN) are generally deemed to be of high quality.

It is however recommended that a *Panel of Extension Experts* be established under the auspices of the Department of Agriculture (DETES) to undertake the following:

- Evaluate and compare the range of programmes and qualifications on offer to establish best practices and components of each and to combine such in a new “generic” programme that could be made available to all HEIs and would be favoured by the DoA when enrolling its staff for retraining and upgrading (and/or when DoA bursaries are allocated to prospective students). This should serve as a motivation to the HEIs to offer this new programme.
- To specifically consider the merits of the so-called shortfalls in existing curricula (refer point 6.2 below) when developing the new “combined” programme proposed above

- 6.2 In evaluating the relevance of current Agricultural Extension Curricula to the changing agricultural and educational landscapes in South Africa, use have been made of the results of an earlier study (undertaken by S H Worth – Senior Lecturer, Centre for Environment, Agriculture and Development, University of KwaZulu-Natal). Interpreted within the context of this assignment, the evaluation was done from the following perspectives (Worth 2006):

a) *The degree to which curriculum reflects changes in agricultural policy and priorities.* In this regard Worth found the following related to the alignment and appropriateness of curricula to changes in agricultural policy and the agricultural vision and mission of the DoA:

- Despite policy changes to develop a single integrated extension service (serving both the commercial and emerging/small-holder farming sectors) most educational institutions offering agricultural programmes still have commercial agriculture as their primary focus.
- Issues related to small-holder farming, food security, rural livelihoods and sustainable agriculture hardly feature in the agricultural curricula.
- Existing extension qualifications still follow the traditional approach and philosophy of extension where the focus is on production related knowledge and skills, technology transfer and negotiation/persuasion and subsequent behavioural change to adopt and implement new technology.

b) *To what extent does Extension Qualifications accommodate critical non-agricultural and technology knowledge and skills.* Worth’s research found that the current extension curricula falls considerably short in preparing Extensionists for their critical role as learning facilitators, as the catalyst responsible for getting farmers involved in participatory research and technology development, as development agent ensuring that a conducive development environment and sustainable development systems are created within which the farming venture will operate, etc.

- c) **To what extent Extension Modules and Skills are accommodated in Agricultural Qualifications:** A further important finding was that there is a marginalisation of agricultural extension “subjects” and content in the majority of agricultural qualifications offered at the institutions that formed part of the research. It was found that “extension modules” were totally absent in the majority of cases; it featured as an elective in few programmes and as a required area of learning in a very small number of qualifications. This thus implies that the current agricultural education system is not producing agricultural graduates that are geared and skilled to work with the majority of farmers in the country (namely land reform beneficiaries and emerging and resource poor farmers) within an extension context. This is deemed to be out of pace with the agricultural policy and the extension reform introduced by the DoA. Serious attention should subsequently be given to the inclusion of appropriate agricultural extension education and training as a compulsory learning component of **all** agricultural qualifications in the tertiary system.

- 6.3 Against the very big demand to upgrade a large number of existing extension personnel (close to 80% will have to upgrade from their current diploma qualifications to the new requirement of 4 year degrees), a practical and affordable way of scheduling and undertaking such upgrading will have to be established. For vast numbers of existing extension staff to be upgraded from diploma to degree qualifications. Whilst it would have been ideal to enroll a considerable group of Extensionists on learning programmes of longer duration towards upgrading and/or attaining new qualifications, it will neither be feasible nor affordable. On the one hand withdrawing Extensionists from their workstations (and thus the farmers and farming projects that they currently support) for extended periods of time will be detrimental to such projects, and on the other hand the magnitude of development needs and the costs of formal tertiary training for all will be extremely costly. It is thus recommended that the above Extensionist Expert Panel also consider practical means of offering such upgrading programmes on a part time basis and/or scheduling training on a block release basis to allow larger numbers of staff to be enrolled.

7. AET STANDARDISATION, MOBILITY AND ARTICULATION ISSUES

Chapter 7 investigated problems related to the mobility, portability and transferability of AET learning and the subsequent difficulties experienced by students in articulating between institutions and qualifications.

Due to the complexity of these issues and the different manner in which it is addressed at the FET and HET levels and at each different institution, it can not be done justice within this Executive Summary. The following are however a few remarks regarding the size and scope of the problem together with broad recommendations towards addressing major mobility and portability problems experienced:

7.1 At FET level there are three different learning pathways, namely:

- a) The **General pathway** (leading to the NSC qualification offered mainly in schools). Standardisation, articulation and portability issues have largely been addressed at this level and the NSC (General) qualification offers mobility and articulation to tertiary education institutions. There is however no formal recognition (credits) given for learning attained within the three agricultural subjects and as such there is no particular advantage gained in having taken such subjects (as opposed to other subjects that facilitates entry to tertiary education institutions).

- b) The **General Vocational pathway** (leading to the NC(V) qualification offered primarily in FET colleges). With regard to the standardisation of curricula the new NC (V): Primary Agriculture has largely addressed the former problem related to a lack of standardisation and quality assurance and horizontal mobility between FET Colleges is greatly enhanced.

Whilst attainment of this qualification in theory permits articulation with other learning pathways (and access to higher education), it should be noted that the non-agricultural subject choices (e.g. mathematics and science) to be taken in combination with the agricultural subjects are more important in ensuring access (meeting the entry requirements) at tertiary institutions for study fields such as BSc Agric. There is also no credits given for the agricultural knowledge gained through taking subjects such as soil science, plant production, animal production etc. as part of the NC(V) and students will have to enrol for all the courses specified for degree studies.

- c) The **Trade, Occupational and Professional pathway** (leading to unit standard based qualifications such as Learnerships under the auspices of SETAs). Whilst there are portability of learning between relevant Unit Standards at NQF level 4 and the NC(V) qualification offered at FET Colleges, it should be noted that at present there are little if any recognition for such qualifications at the HEI's and the vertical mobility and articulation of students who wants to further their studies towards attaining a degree is problematic.

7.2 At HET level the new Higher Education Qualifications Framework (to be implemented from 1 January 2009) provides the basis for integrating all higher education qualifications into the NQF and its various structures responsible for standards generation and quality assurance (which in turn should facilitate the articulation of qualifications and the future ability of students to move from one programme and institution to another).

It must however be noted that historically the academic freedom allowed to HEIs have resulted in a very large number of AET qualifications and programmes that largely differ both in content and in quality. Whilst the framework and the policies and guidelines of the HEQC are thus designed to facilitate vertical, horizontal and diagonal progression, it must be noted that the general principle still adhered to is that the admitting institution must be satisfied that the applicant has competence in the appropriate field of intended study at the appropriate entry level of the target qualification. The decision to admit a student thus still remains the right and responsibility of the HEI concerned and in addition to the NSC (which is the minimum admission requirement) their admission policies and practices could demand additional entry requirements (e.g. a minimum pass rate in subjects such as mathematics and science). To date this has placed considerable constraints on student mobility and the portability and transferability of learning and it will take some time before these barriers have been removed.

It is also important to note that some tertiary institutions are more closely aligned in course content than others. In this regard course content of Comprehensive Universities is generally more aligned with the Universities of Technology and therefore mobility and transferability are achieved more easily between UoTs and CUs than between either of these institutions and traditional Universities.

Against the background that the current level of standardisation, mobility, transferability and articulation at HET level remains a serious problem and constraint, section 7.5.6 of the report proposes a large number of recommendations towards addressing current constraints. As example one of the recommendations that could make a particularly large impact is the establishment of a Deans Forum (comprising of the Deans of Agricultural Faculties from all HEIs offering agricultural programmes). The Deans Forum should meet at least twice per annum and should establish various working committees to typically undertake the following:

- The identification of “generic” programmes (e.g. Agricultural Diplomas and the B Agric degrees) which lends itself to standardisation in terms of structure and content. Suggestions made was that such “generic” programmes be stripped of the specificity of modules at least in the first year of study (preferably the first two years) which will greatly enhance horizontal mobility between the HEIs offering such programmes.
- Such an independent committee (comprising representatives of both UoTs and Universities) should also investigate and overcome vertical mobility problems of students (from UoTs to Universities) through ensuring that the content of these generic programmes are similar and aligned.
- Obtain agreement on standardised norms, minimum entry qualifications, criteria, conditions and procedures that will be applied across all institutions offering “generic” programmes to facilitate and enhance the mobility of students between institutions (minimise the red tape that currently inhibits mobility).

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1 INTRODUCTION

1.1 BACKGROUND

The Department of Agriculture developed the Agricultural Education and Training (AET) Strategy in an attempt to improve agricultural production through the rendering of quality agricultural education and training services. Whilst there are various challenges that hinder the improvement of agricultural production, constraints in the provisioning of quality education and training has been identified as a critical issue to be addressed.

The imperative to transform South African society by making use of various tools stems from a need to address the legacy of apartheid in all areas of human activity and in education in particular. Social transformation in education is aimed at ensuring that the educational imbalances of the past are redressed and of providing equal opportunities for all sections of our population. To achieve social transformation, all South Africans must receive an education which recognises their potential and removes artificial barriers.

Against the above the Department of Agriculture developed the AET Strategy in 2005 in response to the challenges that face agricultural education and training. The Strategy is a culmination of a consultative process, research and greater collaboration of Provincial Department of Agriculture that started as early as 2001 that gave birth to the strategy. The AET Strategy identifies certain challenges that it aims to address in order to ensure that provision of quality AET curricula. The critical challenges that the AET Strategy identifies around the issues of agricultural curriculum are:

- Lack of coordination and harmonisation of AET policy and curriculum
- Lack of coordination of AET at provincial level
- AET curricula that are not aligned to and responsive to the challenges facing agriculture in South Africa
- Disparities in agricultural skills offered to students of different races by learning institutions in South and racial disparities in the access to such learning opportunities
- Poor mobility and transferability of agricultural learning between different AET institutions
- AET curriculum that is not relevant to the needs of Extension Officers and/or not accessible to them

It is against the above background that the Department of Agriculture commissioned this study and appointed a service provider to evaluate the current AET curricula in order to assess the extent to which curricula address the above challenges and to make recommendations in this regard.

1.2 OBJECTIVES OF THIS STUDY

The objective of the study is to explore the AET curriculum in South Africa in order to develop and maintain an effective and well coordinated AET that is integrated at all level and responds appropriately to South African agriculture.

The project scope and project objectives are thus to undertake a thorough analysis of the current AET provisioning at intermediate, GET, FET and HET phases or levels and present a final analysis report to DoA which is explicit in terms of:

- To what extent is the AET policy and curriculum development coordinated and harmonized in South Africa. What inhibits harmonization, where and what are the barriers
- How well coordinated is the AET delivery at provincial level
- To what extent is the AET learning mobile and transferable from one AET institution to another and to what extent does it articulate with hierarchies of AET qualifications and are there disparities in standards.
- To what extent is the AET curricula aligned to the urgent challenges facing the agricultural sector (including issues such as sustainable agriculture and land care; household food security and water harvesting; rural wealth creation)
- Are there disparities in the production of agricultural skills based on different racial groupings by institutions of learning. What are these racial disparities or access barriers
- What is the relevance of the current curriculum to agricultural extension and advisory workers

1.3 METHODOLOGY ADOPTED

The methodology used in undertaking the assignment, taking into account the budgetary and time made available for the study, comprised of the following:

1.3.1 DOCUMENT AND DATABASE REVIEW

A review was undertaken of existing documentation that could provide information relevant and useful to the study. In this regard the various databases of the Department of Education (e.g. EMIS) and numerous reports on earlier studies undertaken by DoE and DoA were interrogated and used in establishing data and statistics.

1.3.2 INTERVIEWS AND/OR FOCUS GROUP MEETINGS

Interviews were held with selected key stakeholders and sources of information. In this regard relevant officials and staff from numerous interest groups and stakeholders were interviewed and consulted. These included staff of the DoA, the DoE, SAQA, CHE, APAc, SAATA, and representatives of various provider groupings at the School, FET and HET levels.

1.3.3 QUESTIONNAIRES

Questionnaires were developed and administered to the Higher Education Institutions (HEIs) offering AET programmes and qualifications. These questionnaires were followed up and discussed with a sample group of HEIs on an individual level. The sample group consisted of 4 Universities of Technology, 5 Traditional Universities and 3 Comprehensive Universities.

1.3.4 REPORTING

The information obtained via the above data collection processes were subsequently collated and analysed and captured in a Draft Report. This Report was submitted and presented to the DoA and the NAET Executive Committee for consideration and feedback. Further inputs thus obtained were subsequently worked into this Final Report.

1.4 STRUCTURE OF THE REPORT

The Report has been structured as follows:

- Chapter 1: Introduction
- Chapter 2: AET and Policy Harmonization
- Chapter 3: Coordination of AET at Provincial Level
- Chapter 4: Agricultural Challenges, Curriculum Alignment and Responsiveness
- Chapter 5: Racial Disparities in the AET System
- Chapter 6: Extension Officer Education and Training Needs and Curriculum Responsiveness
- Chapter 7: AET Mobility and Transferability – Disparities in Standards and Articulation Problems

2. HARMONISATION BETWEEN AET POLICY & LEGISLATION AND CURRICULUM DEVELOPMENT

2.1. INTRODUCTION

This section of the assignment aims to investigate and analyse the perceived lack of coordination and harmonisation between AET Policy and Curriculum and to develop recommendations and means of solving the lack of coordination and harmonisation where such exists.

To achieve the above this Chapter is structured as follows:

- Background – environment setting within which AET policy are being developed and implemented
- A review of AET policy

It should be noted that a review of the extent to which there is coordination and harmonisation between AET policy and curriculum development is an integral component of each of the main themes and topics addressed by the study. Whilst this chapter of the report *Chapter 1: Coordination and Harmonisation between AET Policy and Curriculum Development*, thus aims to summarise some of the main AET policies, each of the other chapters in the report also considers relevant policies related to the specific AET topic addressed in that chapter and how the policies are implemented and addressed. To avoid unnecessary duplication all the policies and policy related aspects are thus not repeated in this chapter and as far as AET policy is concerned the report should be read as an integral whole.

2.2. BACKGROUND

The changing agricultural environment (e.g. the large drive and accompanying support programmes of government to address skewed racial access to agricultural resources, the land reform programme resulting in a large increase in the number of full-time small-scale farmers, market liberalisation, globalisation, technological development, etc.) demanded a number of agricultural policy changes. In this regard a critical policy shift was to change the dualistic agricultural landscape – where a developed commercial farming sector (20% percent producing 78% of total production) co-existed with a large number of subsistence /communal farmers (80% producing 22%). Commencing with the BATAT initiative, the government has implemented numerous policies and programmes to change the above dualistic nature (and subsequent dualistic service rendering) to a single amalgamated sector with a single integrated service.

The AET system (including its range of education and training service providers and output) also reflected the above dualistic nature. Table 2.1 below reflects an evaluation of the dualistic roles and functions (target groups served) of AET providers under the previous political dispensation. Various AET policies and directives were subsequently introduced to address the negative impact and results of this dualistic AET provisioning.

A further policy shift in AET provisioning was the need to move from the almost exclusive focus on commercial agriculture to a more rural development and poverty eradication orientation. Related topics such as food security, nutritional issues, land care, sustainability and natural resource management, rural development and water harvesting thus became critical for consideration as common core courses/programmes.

Other policy adjustment requirements to the AET system relates to the need for a more holistic and problem solving approach to agricultural teaching programmes (this demand was particularly needed at the GET and FET levels where curriculum traditionally focussed on technical production aspects only and neglected management issues).

Policies towards addressing the proliferation of agricultural programmes and institutions (and improved coordination of education and training provided by the DoA and the DoE) also became increasingly important to address system inequities on the one hand and enhance the optimal utilisation of scarce funding and resources on the other.

Table 2.1: Differing role of AET Providers – situation up to 1994.

Institution	Sector	
	Role of Historically Black Institutions	Role of Historically White Institutions
Schools offering agricultural subjects	Offered primarily in “Black Education” and relatively large number of pupils enrolled – perceived as an “easy” subject choice at Standard Grade level and providing skills for home-based food gardens.	Relatively small number of pupils enrolled – mainly those interested in following a career in agriculture
Agricultural High schools	Attract students to pursue careers in agriculture	More favoured in the “White Education System”. Training of farmers’ sons and others who wish to farm or take up a career in agriculture
Agricultural Colleges	Train extension officers, nature conservation and home economics officers	Train future farmers and farm managers
Technikons	Train agriculturists from developing areas	Train agricultural technicians
Universities	Train professional agriculturists for public and private sector. Limited post-graduate studies	Train professional agriculturists for public and private sector – emphasis on research and strong on post graduate studies.

Source: Agricultural Policy Reform in SA: J v Rooyen, et al, 1998

2.3. REVIEW OF AET POLICY

It should firstly be noted that policies (guidelines, strategies, etc.) related to AET do not stand in isolation but are compliant to (or guided by) the SAQA Act, 1995 (Act No 58 of 1995) which gave effect to a unified and nationally coordinated system of qualifications in South Africa known as the National Qualifications Framework (NQF).

From section 2.2 above it is evident that whilst some AET policies are of a general (cross cutting) nature, others are directed at specific levels of education and training provisioning (i.e. at GET, FET and HET level). Policies related to AET are organised and addressed within this framework.

2.3.1. SPECIFIC POLICY INITIATIVES OF THE DEPARTMENT OF AGRICULTURE RELATED TO AET PROVISIONING

AET Policies (including strategies and guidelines) that the Department of Agriculture has introduced to guide and direct AET provision and standardisation are the following:

2.3.1.1 THE AET STRATEGY:

Whilst the National Education and Training Strategy for Agriculture and Rural Development in South Africa (AET Strategy) of 2005 can not strictly be described as a “policy”, it serves as the strategic framework that guides and directs AET provisioning in the country and as such offers various guidelines of a policy nature.

The most pertinent policy directives forthcoming from the AET Strategy are the following:

- a) **Improved AET coherence and coordination:** The current fragmentation and lack of coordination within the AET system demands urgent attention. An urgent need exists to address current differences in quality, standards, outcomes and curriculum of programmes and qualifications. Related to such fragmentation aspects to be addressed include:
 - Improved articulation of programmes (and qualifications) between the formal and non-formal education and training sectors
 - Improved mobility and articulation both horizontally (between institutions) and vertically (to higher levels) within the formal education and training sector.
- b) **Redressing imbalances of the past:** An urgent need exists to redress the past racial based inequities in the provisioning of AET. Aspects to be focussed on include:
 - Skewed and uneven funding across different sites of provision (with former white institutions better resourced than their historical counterparts)
 - Measures to improve the quality and standard at historically black institutions through improving educator qualifications, infrastructure, practical training facilities, learning and teaching aids and equipment, etc.

- Removing access barriers to AET that people from previously disadvantaged communities are still experiencing (e.g. admission requirements, affordability, language, physical distance to institutions, etc.)
- c) Improved Responsiveness to agricultural challenges:** A clear directive is given for AET to be more responsive and directed towards addressing the needs and challenges experienced by the agricultural sector. Two focus areas are highlighted:
- The need to position agriculture as a market-directed business (thus a shift from the earlier narrow focus on agricultural production to knowledge and skills needed to optimise both upstream and downstream opportunities within the total agricultural value chain)
 - Broaden the scope to include urgent challenges facing South African agriculture within the larger ambit of rural development and wealth creation (incorporating issues such as food security, sustainable development, land care, water harvesting, etc.)
- d) AET focused on addressing Critical and Scarce Skills:** The Strategy offers policy guidelines regarding the need to ensure that programmes offer to address shortages experienced in skilled and educated people in the following five broad categories:
- Agricultural production (the need to expand narrow band of commodities geared towards large scale commercial farmers to include niche markets suitable for small-scale producers)
 - Agricultural engineering (specifically geared to develop technologies suitable for use by small scale farmers and opportunities in the value chain)
 - Agricultural economics (with focus on people who can assist emerging farmers to establish viable and sustainable business enterprises)
 - Agricultural development (the need for a large corps of trained people from Extensionists to scientists with a range of skills that will engage farmers and rural dwellers in initiatives aimed at food security, wealth creation, sustainability, land care, etc.)
 - Specific occupational shortages (e.g. veterinarians)

2.3.1.2 TERMS OF REFERENCE FOR COORDINATION, DELIVERY, MONITORING AND EVALUATION OF SECTORAL FUNDED TRAINING PROGRAMMES

In the words of the Minister of Agriculture, this document is a customisation of the government's training and education legislation (in particular the SAQA Act) for appropriate use in the agricultural sector. The basis used in developing the Terms of Reference was the Skills Development Act (79 of 1998), the National Skills Strategy 2005-2010 and the AET Strategy 2005. The document benchmarks training principles, standards for training providers, responsibilities and accountabilities of the various training role players and sources of funding for training. It thus creates the environment and sets the standards and criteria against which sectoral funded training programmes will be undertaken, coordinated, delivered, monitored and evaluated within the government sector towards capacity building of beneficiaries of agrarian and land reform, including black economic empowerment through the agricultural value chain.

Specific policy guidelines and fundamental principles adopted and promulgated by the Terms of Reference are:

- a) **Alignment to DoA policy and priorities:** These norms and standards were specifically developed to guide and govern agricultural training interventions by the government sector and as such they should be aligned to the DoA policy, key priority programmes and objectives.
- b) **Agrarian and Land Reform Beneficiaries as target group:** The training fund created (a minimum of 10% of all programme/project funding) and subsequent training interventions should primarily be used for the benefit of agrarian and land reform beneficiaries (a minimum of 75% to be targeted at this group)
- c) **Accredited Providers:** All training interventions should be undertaken by SAQA accredited service providers (accredited primarily by AgriSETA and the CHE)
- d) **Allocation of Roles and Responsibilities:** The ToR also assigns the following roles and responsibilities to different key stakeholders involved with the implementation of sectoral funded programmes and projects:
 - **Directorate Education, Training and Extension Services (DETES):** Lead the capacity building strategies; contract service providers to conduct skills assessment; manage funding of national directed programmes; monitor and evaluate training; maintain a register of providers.
 - **DoA Line Function Departments:** Responsible for identifying gaps in units standards, learnerships and qualifications; recommend improvements to the above; spearhead development of learning material.
 - **Provincial Departments of Agriculture:** Identify farmers needs; assist in compiling training plans; manage and implement training plans; appoint service providers to conduct training; compile training reports for DETES
 - **Department of Land Affairs:** Identify and approve support for Land Reform Beneficiaries; conduct pre-settlement training; compile pre-settlement training report for DoA
 - **SETA (AgriSETA):** Coordinate and manage training linked to agribusiness; facilitate development and registration of skills programmes, learnerships and qualifications; accredit training materials, register and accredit service providers, assess credit providers, set rates for targeted training programmes
 - **Service Providers:** Compile training implementation plans; conduct training at agreed unit standards; compile feedback and training reports for relevant authority.

2.3.1.3 NORMS AND STANDARDS FOR EXTENSION AND ADVISORY SERVICES IN AGRICULTURE, JUNE 2005

Amongst others the Norms and Standards document outlines the minimum qualifications, competence and skills requirements that Agricultural Extension Practitioners must have. In this regard the following are provided as requirements:

- a) Qualifications:** Section 3.4.1 of the Norms and Standards documents specifies the following as educational requirements:

“A person employed as an agricultural extension or advisory services officer at all levels shall be required to have a minimum qualification of a bachelor’s degree, or its equivalent in training and experience; a strong commitment to higher education and the willingness to assume responsibility and demonstrate competence.

The extension officers or advisors who wish to follow the specialist stream (e.g. agronomy) must have higher degrees in the technical field and are encouraged to belong to organizations that will help them to further their knowledge and expertise. Those who wish to be in the extension stream must have higher degrees in extension and must register with the recognized relevant professional body. Any person promoted or appointed to a management position must have a post graduate qualification in extension management or otherwise in accordance with the DPSA regulations.”

The document further recognises that the current staff complement falls considerably short of the above requirements and has set as a target that **a minimum of 60%** of agricultural extension and advisory services officers must have a minimum of a **bachelor’s degree by 2010**.

- b) Competencies as defined in the Public Service Regulations:** In addition to the above formal qualifications, the document specifies the following as further competencies required by service providers of agricultural extension and advisory services (as defined in the Public Service Regulations):

- Client orientation and Customer Focus
- Communication
- Project management
- Knowledge Management
- Service delivery orientation
- Problem Solving and Analysis
- People Management and Empowerment

- c) Multi-disciplinary Skills:** The document further recognises the fact that extension officers function within a dynamic and changing environment and that such officers are expected by their clients to advise them on issues beyond their field of specialisation. This demands a cadre of Extensionists skilled in the following fields:

- Agricultural production (scientific and technical expertise)
- Business (economics, marketing, financial management, farm planning, etc.)
- Extension approaches (participation, consultation, mentoring, etc.)

Chapter 6 reflects how the DoA will go about implementation of this and other policy guidelines related to the training and development of Extension and Advisory Staff.

2.3.1.4 THE NEW INTEGRATED MENTORSHIP POLICY OF THE DEPARTMENT OF AGRICULTURE

The Department of Agriculture (through the Directorate: Education, Training and Extension Services) has developed a new integrated Mentorship Policy to guide and direct all mentorship programmes and interventions funded and supported by the DoA. This new policy integrates the previous Farmer-to-Farmer Mentorship Policy and the Commodity Based Master Mentorship Programmes into a new single policy and programme that caters in the needs of the entire agricultural clientele served by the Department and accommodates all forms of mentoring needed by the target groups. The new policy pronounces norms and standards, includes practical implementation guidelines, proposes monitoring and management tools and practices towards quality assurance and facilitates the systematic and effective coordination of mentorship programmes. Given the importance of mentorship as a means of developing and capacitating emerging farmers (and the increased prominence that mentorship will play in the upgrading of AgriBEE farmers) this is a development that will stand the agricultural sector in good stead.

2.3.1.5 NORMS AND STANDARDS FOR SOUTH AFRICAN AGRICULTURAL TRAINING INSTITUTES

Whilst not strictly a “policy”, the Norms and Standards for ATIs, 2008 provides the norms and standards (in terms of minimum requirements) for attaining excellence in the provision of agricultural education and training by the Agricultural Training Institutes (former Colleges of Agriculture). In 2007, as a part of implementation of AET Strategy, the DoA conducted an in-depth, consultative investigation into the positioning of South Africa’s Colleges of Agriculture in the AET mix. In June of 2007, the NDA finalised its report: *Transforming South Africa’s Colleges of Agriculture* – which recommended a large scale transformation and upgrading of the ATIs. To guide and direct this transformation process the Norms and Standards were developed as a framework for transforming the ATIs. It positions ATIs within the Further Education and Training (FET) and Higher Education and Training (HET) bands within the overall framework of the FET Act and the Higher Education Qualifications Framework (HEQF). The norms and standards cover the following aspects:

- Governance and Finance: National level
- Governance and Finance: Institute level
- AET Plans and Programmes
- ATI Academic Staff, Administrative and Support Staff
- Access
- Infrastructure
- Centres of Rural Wealth Creation
- Centres of Excellence

As outlined in Chapter 7, the ATIs should perform a critical role within AET provisioning at FET and HET levels, and the “policy” and norms and standards to be provided by this policy initiative is thus of critical importance. Chapter 7 reflects how the DoA will go about implementation of the policy.

2.3.2. OTHER POLICIES AND LEGISLATION THAT IMPACT ON AET STANDARDS, QUALITY AND DELIVERY

As outlined in 2.3.1 above, each of the policies that have an influence on AET are not discussed in depth within this chapter, but the reader is referred to the specific section within the report where the particular policy and/or legislation is discussed within its relevant context and it is indicated how the policy is coordinated, addressed and/or harmonised with curriculum and AET provisioning.

To this end policies and legislation have, as far as possible, been grouped on a functional basis.

2.3.2.1. GENERAL POLICIES THAT SHAPE AND SET THE AET LANDSCAPE

- a) Critical legislation that sets the larger education and training landscape within which AET are provided include:
 - The National Education Policy Act, 1996 and various other subsequent legislation that lead to the establishment of SAQA, the National Qualifications Framework, the Higher Education Qualifications Framework and their accreditation and quality control bodies (such as Umalusi, AgriSETA, and the Council for Higher Education) – which sets and monitors the standards of curricula in South Africa
- b) The Human Resources Development Strategy, the National Skills Development Strategy (2005-2010) and the Agricultural Sector Skills Plan (2006-2010) prepared by the AgriSETA that sets the overall platform and guides and directs the provisioning of AET services geared to the needs and requirements of the agricultural sector. Various sections throughout the report shows how the Strategy and Sector Skills Plan relate to AET provisioning
- c) The AET Strategy does not stand in isolation but is directly linked to, and aims to support, other agricultural development strategies such as the AgriBEE Strategy, the Integrated Food Security and Nutrition Programme, the Comprehensive Agricultural Support Programme, the Land and Agrarian Reform Programme, the LandCare Policy, the Policy on Agriculture in Sustainable Development, etc. Throughout the document it is indicated how these strategies interlink and support each other particularly in Chapters 4, 5 and 6.

2.3.2.2. AET RELATED POLICY AT GET LEVEL

- a) The policy adopted by the Council of Education Ministers to implement Outcomes Based Education (OBE) in 2004 and which led to the National Curriculum Statements (NCS) Grade 10 -12 and set the curricula content and standards for agricultural subjects on offer at the GET level and which expanded the range of agricultural subjects on offer at schools – refer to Chapter 7 for details.

- b) The policy to establish and recognise the National Senior Certificate (NSC) as exist level qualification from school level and which will serve as the gateway between schools and higher level education.
- c) The National Language Policy Framework and the South African Schools Act, 1996 that guides policy related to promoting equitable use of the official languages in school and educational institutions.

2.3.2.3. AET RELATED POLICY AT FET LEVEL

- a) The Further Education and Training Act, 2006 and the FET Colleges Act – particularly the policy decision to, as from 2007 replace the former NATED programmes with the new National Certificate (Vocational) programme. This new NC(V): Primary Agriculture set the new standard and content for learning programmes in the agricultural field to be offered at the FET Colleges.
- b) The Skills Development Act that lead to the establishment of SAQA and the resultant establishment of the AgriSETA to guide and control unit standard based training programmes and qualifications registered on SAQA. The proposed establishment of the Trade and Occupational Pathway (TOP) as a further learning pathway within the new NQF should facilitate and enhance an integration of SAQA qualifications with other qualifications on the Higher Education Qualifications Framework (HEQF) – refer to Chapter 7 for details.
- c) Policy in terms of the Skills Development Levy Act that makes funding available to cover the costs of learners enrolled for learnerships and Accredited Skills Programmes.

2.3.2.4. AET RELATED POLICY AT HET LEVEL

- a) The Higher Education Act, 1997 and the Higher Education Qualifications Framework set as a policy of the Act and provides the basis for integrating higher education qualifications into the NQF – refer Chapter 7 of the report for details.
- b) The DoE policy document “Minimum Admission Requirements for Higher Certificate, Diploma and Bachelor’s Degree Programmes requiring a National Senior Certificate- 2005”.
- c) Policies incorporated in the National Plan for Higher Education that lead the way for interventions such as the Programme Qualifications Mix effort to coordinate and standardise programmes at Higher Educations Institutions.
- d) Policies introduced to reduce and rationalise the number of Higher Education Institutions in the country via mergers and incorporations – refer Chapter 7.

3. COORDINATION OF AET AT PROVINCIAL LEVEL

3.1. INTRODUCTION

This section of the assignment aims to investigate and analyse to what extent AET delivery is coordinated at the Provincial Level. The investigation included a review of the practices and/or procedures in place at provincial level to facilitate coordination, where and what type of coordination constraints are being experienced and the reasons for such. Ultimately proposals and suggestions towards overcoming constraints and obtaining better coordination in AET delivery at provincial level are proposed.

To achieve the above this Chapter is structured as follows:

- Background
- Functioning of PAET Forums as provincial coordination mechanism
- An identification and analysis of coordination practices, problems and constraints at Higher Education Institutions
- Recommendations – suggestions and means to address and overcome coordination problems and to enhance and facilitate coordination at provincial level.

3.2. BACKGROUND

The Agricultural Education and Training (AET) Strategy has as aim and objective to address agricultural education and training holistically in a manner that engages all role players in the coordinated development of human resources needed by the agricultural sector. The strategy advocates working jointly with other Departments and Public Entities, for example the Departments of Education and Labour as well as with the SETAs and the South African Qualifications Authority to realise a coordinated and relevant AET system that is responsive to and will address the knowledge and skills needs of the agricultural sector.

The national AET strategy is based on (and is the result of) an extensive consultative process that took place in 2002 and involved AET stakeholders in all the provinces and at national level. A National Coordinator conducted and directed research on the status of AET provisioning at national level (with regard to the policies in various different national departments such as DoA, DoE, DST, Labour, SAQA, whilst Provincial Research Officers were undertaking and coordinating the research activities in the different provinces. In this task they were supported by the following two structures:

- A Provincial Agricultural Education and Training Task Team (PAETTT) were established in each province. The role of PAETTT was to evaluate the status of AET provisioning in the respective provinces and report to the NSFT. These structures were constituted of the following stakeholders within the provinces
 - Farmer Unions
 - Provincial Departments of Agriculture
 - Provincial Departments of Education
 - AET Providers
 - Universities and Technikons
 - Colleges of Agriculture
 - Agricultural Research Council

- A National Strategy Formulation Team (NSFT) was established at national level to undertake national research (including policy research) and to coordinate and integrate the various provincial survey reports. The NSFT was constituted of the following stakeholders:
 - National Department of Agriculture
 - Department of Labour,
 - Department of Education
 - Department of Science and Technology
 - South African Qualifications Authority
 - Agricultural Public Entities
 - Farmer Unions

These structures engaged in a process of consultation, research and analysis, which resulted in ten reports outlining the status, issues and recommendations for each province and the DoA. The ten reports formed the basis and the foundation upon which the National Agricultural Education and Training Strategy for Agriculture and Rural Development in South Africa was formulated. The two outcomes of the consultative process were:

- Greater collaboration among the provincial and national agencies concerned with agriculture in general and with AET in particular.
- Information about the status of AET in all the provinces in terms of needs, providers and outcomes which could be used as a benchmark for the implementation of the strategy.

The consultative process further identified a lack of coherence and poor coordination as a key constraint of the AET system. The information gathered clearly identified the need for the establishment of a **National Agricultural Education and Training (NAET) Forum** that could (amongst its other roles and functions) provide coordination and strategic guidance to AET. This led to the establishment of the NAET Forum in 2005 with a structure and composition which included wide representation from the many key stakeholders, particularly at provincial and service delivery level. This national structure provided a platform for sharing and consulting on various aspects of the status of the AET strategy for the benefit of provincial and national initiatives.

It was further realised that such a National AET Forum by itself will be insufficient and that a need exists for the establishment of a **Provincial AET Forum** in each of the provinces (refer 1.3.1 for details). Apart from addressing difficult coordination issues related to the quality and standard of training, the task of simply coordinating activities and services amongst and between the different AET Providers are evident from the following statistics:

- Many Academic Schools (from Grade 1 to Grade 9) offer Agricultural Science as a subject – more than 1 000 schools offer the subject to an estimated 120 000 pupils
- ABET Programmes – agricultural science is also a subject within the ABET Level 4 curriculum.
- Agricultural High Schools – an estimated 42 Agricultural High Schools (with practical agricultural training facilities) offer the following three agricultural subjects (Agricultural Science, Agricultural Management Practices, Agricultural Technology)
- Private Sector Providers – there are a large number of Private Sector AET Providers – both those registered and accredited by AgriSETA and a large number of non-accredited providers offering agricultural programmes. In

recent years there has been good progress towards offering only programmes and courses that are unit standard based and registered with SAQA

- FET Colleges – there are a number of FET Colleges (approximately 9 Colleges) offering agricultural programmes (the National Certificate Vocational: Primary Agriculture)
- Colleges of Agricultural Colleges – there are 11 Agricultural Colleges offering a variety of agricultural programmes and qualifications – ranging from NQF Levels 4-7)
- Universities of Technology – there are four Universities of Technology offering various agricultural qualifications
- Universities – there are ten Universities offering various agricultural qualifications.

From the above it is thus evident that there is an urgent need to coordinate AET delivery between the above range of AET providers to avoid duplication, ensure that quality standards are set and maintained, enhance a needs orientation, etc.

To demonstrate the importance of coordination at a provincial level (and facilitate future coordination) the following Table reflects the size and scope of the range of AET Provider Institutions organised per functional group per province:

Table 3.1: AET Provider Institutions organised per Province

KZN	NO.	INSTITUTION NAMES
Agricultural Schools	3	James Nxumalo Agricultural High Vryheid Agricultural School Weston Agricultural College
Agricultural Colleges	2	Cedara Owen Sithole
FET Colleges	3	Esayidini Umfolozi Coastal
Universities of Technology	1	Mangosuthu Technikon
Universities	2	University of Kwazulu-Natal University of Zululand
MPUMALANGA	NO.	INSTITUTION NAMES
Agricultural Schools	9	Perdekop Agricultural High Morgenzon Landbou Akademie Sinithemba Agricultural High Umzimvelo Agricultural Beestepan Mathews Posa Suikerland Mahhushe Middelburg Hoërskool
Agricultural Colleges	2	Tompi Seleka Lowveld
FET Colleges	1	Ehlanzeni
Universities of Technology	0	
Universities	0	

GAUTENG	NO.	INSTITUTION NAMES
Agric. Schools	0	
Agric. Colleges	0	
FET Colleges	0	
Universities of Technology	1	Tshwane University of Technology
Universities	2	University of Pretoria University of South Africa
LIMPOPO	NO.	INSTITUTION NAMES
Agricultural Schools	7	Harry Oppenheimer Agric High Settlers Agricultural High Dimani Khetho Nxumalo Mandela Barloworld Merensky Kuschke Hoër Landbouskool
Agricultural Colleges	1	Madzivhandla
FET Colleges	3	Letaba Waterberg Vhembe
Universities of Technology	0	
Universities	2	University of Venda University of Limpopo
NORTH WEST	NO.	INSTITUTION NAMES
Agricultural Schools	6	Sannieshof Hoërskool P H Moeketsi Agricultural High Wadapos Ventersdorp Bekker Kromellenboog Combined
Agricultural Colleges	1	Potchefstroom
FET Colleges	1	Taletso
Universities of Technology	0	
Universities	1	University of North West
NORTHERN CAPE	NO.	INSTITUTION NAMES
Agricultural Schools	2	Noord-Kaapland Hoër Landbouskool Martin Oosthuizen Hoërskool
Agricultural Colleges	1	Grootfontein
FET Colleges	0	
Universities of Technology	0	
Universities	0	
WESTERN CAPE	NO.	INSTITUTION NAMES
Agricultural Schools	3	Bolland Augsburg Landbou Gimnasium Oakdale Hoër Landbouskool
Agricultural Colleges	1	Elsenburg
FET Colleges	1	Boland
Universities of Technology	1	Cape Peninsula University of Technology
Universities	1	University of Stellenbosch

FREE STATE	NO.	INSTITUTION NAMES
Agricultural Schools	9	Weiveld Landbouskool Tikwane Nampo Landbouskool Kroonstad Hoerskool Jacobsdal Hoër Landbouskool Hendrik Potgieter Hoerskool Itokiseng Combined School Unicom High School Gelukwaarts
Agricultural Colleges	1	Glen College
FET Colleges	1	Maluti
Universities of Technology	1	Central University of Technology Free State
Universities	1	University of the Free State
EASTERN CAPE	NO.	INSTITUTION NAMES
Agricultural Schools	3	Winterburg Agric. High Marlow Agric. High Phandulwazi Agric. High
Agricultural Colleges	1	Fort Cox Tsolo
FET Colleges	2	King Hinsta Lovedale
Universities of Technology	0	
Universities	1	University of Fort Hare

3.3. FUNCTIONING OF THE PROVINCIAL AET FORUMS AS COORDINATION MECHANISMS

The Provincial AET Forums (PAETFs) were created as the most important coordination structures and mechanisms in each of the provinces. The purpose of these Forums is to establish and maintain healthy dialogue among its members and other AET stakeholders with a view to:

- Facilitate the implementation of relevant AET programmes and projects in the province
- Coordinate and facilitate collaboration in AET service delivery within the province
- Monitor, review and report on AET programmes and projects in the province
- Provide feedback and make recommendations to the NAET Forum on AET delivery.

Visits to and/or telephonic interviews were held with the Chairpersons/Coordinators of five of the PAETFs to establish the status (existence and functioning) of the PAET Forums in the various provinces. Information gathered revealed the following:

- Forums have been established and functioning in almost all the provinces – (with the exception of Mpumalanga and the Western Cape).
- Whilst the PAET Forums have been established, and action plans have been developed, few are fully operational and making a meaningful contribution as yet (whilst it should be noticed that the majority have only been established in 2008 and are thus operational for less than a year). There are however exceptions e.g. the KZN PAET Forum which is actively engaging with numerous AET stakeholders and issues and is already reaping some results and benefits.

3.3.1. PROBLEMS AND CONSTRAINTS EXPERIENCED BY PAETFs

Consultation with the various Provincial AET Forums identified the following as the main causes for these structures not being fully effective and efficient:

3.3.1.1. LACK IMPLEMENTATION CAPACITY

A general constraint identified was the lack of capacity to implement the operational plans that have been developed. In this regard the following constraints exist:

a) Limited Capacity of Members

All the PAETFs indicated that the lack of full-time and dedicated staff who could undertake the PAETF role and functions on a full-time basis was a major constraint in making the anticipated progress. Currently practice is to utilise staff of the Provincial Departments of Agriculture to serve as the Chairperson and Secretariat of the PAETF. Whilst such functions will naturally fall within their scope and ambit of duties (and the PDA mandate), only limited time is available for the PAETF functions and it is thus undertaken on a part-time and ad hoc basis. The other (non governmental) members of the PAETF offer their time and efforts on a voluntary basis and since many are persons in senior and responsible positions within the agricultural sector they have limited time to allocate to PAETF matters.

Currently implementation of PAETF decisions and agreed tasks to be performed is solely dependent on the goodwill and time availability of members – with the result that things generally do not get done and simply stand over to the next meeting. This has a negative influence on the enthusiasm of members resulting in a loss of interest and even in members no longer attending PAETF meetings.

Against the above there was an almost unanimous request that consideration be given to the appointment of a government official (located within the PDA) to serve as full-time and dedicated PAETF official. This person should be an AET professional (probably at post level 13 or 14) and function as the driver to ensure implementation of PAETF decisions and resolutions.

b) Lack of funding

A second constraint experienced by almost all the PAETFs was the fact that they lack operational funding. Whilst the PADs are responsible for operational funds, few if any have budgeted for the PAETF for the current financial year and as such lack funding (even to pay the expenses of its EXCO Members attending meetings). Whilst many of the PAETF Operational Plans demands the appointment of service providers to undertake research studies or planning assignments, only in a limited number of cases were there sufficient funding available from the relevant PAD's Training Budgets to appoint such specialist consultants and service providers. As a result such work is kept on hold until budgets in the new financial year becomes available (this in turn holds back other activities that should build on such research and planning).

Again there was widespread request for financial assistance and support from the National Department of Agriculture to assist the PAETFs with funding support (especially during this initial stage – until such time that the PDAs have made provision for the PAETFs in their provincial budgets).

c) Lack of commitment on the part of industry stakeholders

It must unfortunately be reported that numerous PAETFs reported that they are not receiving the required support from stakeholders. As an example a number of Forums hoped to commence their functions with efforts to establish stakeholder's needs and requirements. Such needs identification demanded the various stakeholders to identify and prioritise their own needs and requirements (or that of the constituencies that they represent) and to submit such to the PAETF for consideration and action. Generally these initiatives have been poorly supported and numerous requests for responses have not yielded anything.

3.3.1.2. PROGRESS AND SUCCESSES

Whilst the above indicated constraints and problem areas present a rather bleak picture, it can also be reported that in a number of cases good progress have been made and the PAETFs are proving to make a valuable contribution to improved coordination of AET in those provinces.

In this regard the KZN, Limpopo and Free State PAETFs are quite active and/or have established good examples of "best practice" in selected fields. It is strongly advised that these best practices be shared with others – either via the PAET AGM or on individual one-on-one basis.

3.3.2. OTHER COORDINATION FORUMS/MECHANISMS (AT VARIOUS LEVELS)

In addition to the PAETFs, there are numerous other coordination forums and mechanisms. Whilst many of these bodies function at **national** and sectoral levels, and are not specifically geared to promote coordination at a *provincial level*, they nevertheless perform a key and critical role within the larger context of AET provisioning and coordination. Examples of bodies and forums that exist and perform a direct or indirect role in the coordination of AET are the following:

3.3.2.1. AT FET LEVEL

Within the Further Education and Training band we distinguish between the following learning pathways and streams – each with its own coordination and standardisation forums and mechanisms:

a) Mainstream Secondary Schools (General Pathway):

The exit level qualification is the National Senior Certificate and is awarded for the achievement of the exit level learning outcomes stipulated in the National Curriculum Statement (NCS) Grades 10-12 (General). This qualification provides access to tertiary education opportunities and is as such the pathway to further study at Higher Education Institutions. The NCS Grades 10-12 (General) uses the twelve Organising Fields of the National Qualifications Framework (NQF) for organising purposes and registration on the NQF. Within the **agricultural learning field** – there are three agricultural subjects namely Agricultural Science, Agricultural Management Practices and Agricultural Technology. These subjects are highly standardised and providers must comply with the curricula set out in the respective “*National Curriculum Statement Grades 10-12 (General)*” and the *Learning Programme Guidelines*”, compiled by the DoE and dated January 2008. Adherence to set standards are monitored and facilitated by Curriculum Advisors deployed on a provincial level.

b) Agricultural High Schools:

The 43 Agricultural High Schools offering the above agricultural curricula (including practical training on their farms) stand under the same coordination and standardisation guidelines and criteria as stipulated above for Secondary Schools. In addition there is the South African Agricultural Training Association (SAATA) which serves as the coordination body or forum (mouthpiece) acting for and on behalf of its members. SAATA performs an important role in obtaining a uniform approach and standard in training delivery and to ensure coordination and cooperation amongst members of the association (agricultural high schools). Typical coordination functions of SAATA are to assist and advise the DoE on aspects such as accreditation criteria for schools offering agricultural subjects, assessing practical training, standardisation of learning material in the three agricultural subjects, etc.

c) FET Colleges (Vocational Pathway)

There are 9 FET Colleges that offer agricultural programmes. Within the agricultural field the relevant new qualification (introduced in 2007) is the NC(V): Primary Agriculture. To standardise, regulate and quality control the content of the above qualification and subjects offered by the FET Colleges, the DoE developed both Subject Guidelines and Assessment Guidelines for each of the indicated study areas. In accordance with the National Education

Policy Act 1996 and the Further Education and Training Act, 1998 the Department of Education released a policy document that provides guidelines for the implementation of a coherent and integrated assessment system for the National Certificate (Vocational). It consists of an internal and external assessment and the assessment is done by Umalusi.

To further facilitate coordination, cooperation and standardisation amongst the FET Colleges and to collectively address issues such as student mobility and the portability of learning the South African College Principals' Organisation (SACPO) was established whilst there is also a dedicated FET Directorate within the Department of Education.

d) South African Qualifications Authority (SAQA)

The South African Qualifications Authority (SAQA) performs a very important standardisation and coordination role within its focus areas – namely at the ABET, GET and FET levels within the National Qualifications Framework. SAQA is appointed by the Ministers of Education and Labour and consists of members nominated by identified national stakeholders in education and training. The functions of the Authority are essentially twofold:

- To oversee the development of the NQF, by formulating and publishing policies and criteria for the registration of bodies responsible for establishing education and training standards or qualifications and for the accreditation of bodies responsible for monitoring and auditing achievements in terms of such standards and qualifications;
- To oversee the implementation of the National Qualifications Framework (NQF) by ensuring the registration, accreditation and assignment of functions to the bodies referred to above, as well as the registration of national standards and qualifications on the framework. It must also ensure compliance with accreditation provisions and that registered standards/qualifications are internationally comparable.

Within the context of this assignment SAQA aims to provide learners with clear learning pathways which provide access to, and mobility and progression within education, training and career paths. SAQA has two 'arms' i.e. Standards Setting and Quality Assurance. The sub-structures in the standards setting arm are the National Standards Bodies (NSBs recently replaced by Consultative Panels) and the Standards Generating Bodies (SGBs), while the sub-structures in the quality assurance arm are the Education and Training Quality Assurance bodies (ETQAs). The functions of the NSBs and SGBs are to generate, evaluate and recommend standards and qualifications to SAQA and to regularly review and update such.

Registered Unit Standard Programmes (Occupational Pathway): These programmes are geared to prepare the learner for a specific occupation or employment in a specific sector or company. Within the agricultural field there are approximately 50 qualifications and programmes registered with SAQA and range from National and FET Certificates (120 credits) to National Diplomas (240 credits). Currently the programmes are under the auspices of the AgriSETA which quality controls all the Learnerships and Skills Programmes that falls within the domain of the agricultural sector. AgriSETA also performs an important role to coordinate between providers and to ensure that programmes are needs based and stay abreast of new developments in the agricultural sector.

3.3.2.2. AT HET LEVEL

Within the Higher Education and Training level the following key institutional arrangements, structures/forums/bodies and organisations exist that promotes standardisation and coordination between the various Higher Education providers, qualifications and programmes:

a) Higher Education Qualifications Framework (HEQF)

The HEQF provides a single qualifications framework for a single coordinated higher education sector. The policy provides the basis for integrating all higher education qualifications into the National Qualifications Framework (NQF) and its structures for standards generation and quality assurance. It improves the coherence of the higher education system and facilitates the articulation of qualifications, thereby enhancing the flexibility of the system and enabling students to move more efficiently over time from one programme to another as they pursue their academic or professional careers. The new qualifications framework establishes common parameters and criteria for qualifications design and facilitates the comparability of qualifications across the system. Within such common parameters programme diversity and innovation are encouraged. Higher education institutions will have ample scope to design educational offerings to realise their different visions, missions and plans and to meet the varying needs of the clients and communities they serve. The policy thus operates within the context of a single but diverse and differentiated higher education system. It applies to all higher education programmes and qualifications offered in South Africa by public and private institutions.

b) Council for Higher Education (CHE)

The South African Council on Higher Education (CHE) is statutorily responsible for advising the Minister of Education on all higher education policy issues, and for quality assurance in higher education and training. The mission of the Council on Higher Education (CHE) is to contribute to the development of a transformed, equitable, high quality higher education system capable of responding to the intellectual, ethical and human resources challenges of a democratic society based on social justice principles which operate in a global context. Its functions include:

- Programme accreditation – all learning programmes offered by SA higher education institutions are accredited by the CHE
- Via its Higher Education Quality Committee (HEQC) it also coordinates quality assurance in higher education (sometimes in collaboration with the other bodies concerned, such as professional councils and sector education and training authorities (SETAs)
- It is also assigned with the responsibility of monitoring the achievement of higher education policy goals, and the state of the higher education system
- The CHE also proactively offers advice to the Minister on aspects such as the barriers to equity of student access, the funding and financing of higher education, the macro implementation of institutional restructuring, etc.

Whilst functioning at a national level, the CHE also perform an important coordination role at regional level and can play a (more) important role in attaining larger cooperation between Higher Education institutions within a province.

c) Higher Education South Africa (HESA)

Higher Education South Africa (HESA) was formed on 9 May 2005, as the successor to the following two statutory representative organisations for universities and technikons (now universities of technology): the South African Universities Vice-Chancellors Association (SAUVCA) and the Committee of Technikon Principals (CTP). The launch of HESA was in part driven by the restructuring of the higher education sector, which resulted in the establishment of new institutional types, but also by the need for a strong, unified body of leadership. HESA represents all 23 public universities and universities of technology in South Africa and is a section 21 company.

The roles of HESA are directed at four priority focus areas which includes an enhancing of South African Higher Education institutions' contribution to local and regional development. In this regard HESA promotes local and regional collaboration towards enhanced effectiveness and achieves this through developing and strengthening networks, partnerships and relationships between higher education organisations and stakeholder constituencies. Practical examples of support provided is improving the resources (human, financial and technological) available to institutions through economies of scale and scope, and to promote and facilitate partnerships, collaboration and information sharing between institutions and with other organisations.

3.4. IDENTIFICATION AND ANALYSIS OF COORDINATION PRACTICES, PROBLEMS AND CONSTRAINTS AT HET LEVEL

Whilst coordination is important at all levels of AET, it is especially at the higher education (HET) level where a lack of coordination seems to hold the most important repercussions.

This section reflects coordination issues and practices identified by means of a document review and opinions expressed by key stakeholders in the HET sector, as well as interviews (and the administering of questionnaires) amongst Higher Education Institutions (HEIs) to establish the coordination practices employed by AET providers at tertiary level.

3.4.1. PROVINCIAL AND OTHER COORDINATION ISSUES AT HIGHER EDUCATION LEVEL

Over a number of years, in the various regions of South Africa, public Higher Education Institutions (HEIs) have established regional consortia on a voluntary basis, as a support to regional collaboration efforts (e.g. shared academic programme offerings, and shared provision of infrastructure in such areas as libraries and information and communications technology).

Regional consortia include for example, the Cape Higher Education Consortium (CHEC, Western Cape), the Eastern Cape Higher Education Association (ECHEA), the Eastern Seaboard Association of Tertiary Institutions (ESATI); and the Forum of Tertiary Institutions in the Northern Metropolis (FOTIM).

There is no formal level of 'regional governance' in South African higher education. Since 1996, national policy and legislation have set out clear roles for regional collaboration, including providing support to national and institutional planning in a context of transformation and rationalisation, and providing a means to achieve effectiveness and efficiency in the application of institutional resources. The White Paper also advocated and requested HEIs to develop regional consortia and partnerships to build administrative and academic capacity.

Regional collaboration has been viewed as a mechanism for institutional responsiveness to policy goals, although the exact form that collaboration takes has been clearly delineated as the domain of the institutions themselves and there has never been any encouragement for statutory structures at regional level. However, the state has increasingly employed regional review processes and structures as coordination and clearing house mechanisms, most notably in the cases of institutional three-year rolling plans and the submission of new programmes for funding approval (as of 2002, following the DoE's PQM exercise). Regional consortia and their members have developed, or are developing, their own internal governance arrangements to meet these needs, as well as to take account of governance considerations in the offering of shared or joint programmes

Whilst the process of programme rationalisation at the regional level had always been policy, the way in which programme coordination should incur, however was left to the institutions to decide. Even with the implementation of the National Plan for Higher Education (NPHE 2001) the Ministry of Education was still reluctant to introduce clear guidelines on programme level coordination. The Plan however stated that HEIs are required to submit all proposed new programmes to “clearing houses” (in whatever form) from 2001 for regional clearance prior to submission to the Ministry of Education for funding and to the CHE for accreditation.

Programme rationalisation (as advocated in the White Paper and enforced via the PMQ) intended regional collaboration in:

- Developing and delivering programmes, including the production of courseware
- Reducing the overlap and duplication of programme provision
- Helping build academic and administrative capacity where needed (especially in Historically Black Institutions)
- Enhancing responsiveness to regional and national needs

The broad and undefined policy gradually became more regulated and the Ministry for instance identified a broad range of potential areas for programme collaboration and rationalisation within each region. The Programme Qualifications Mix (PQM) determined that the continued funding of the identified programmes from the 2004/2005 financial year would be subject to the affected regional HEIs’ jointly reviewing and submitting programmes for collaboration and rationalisation. As far as public higher education is concerned, the true effectiveness of these processes, including the degree of successful programme rationalisation achieved through regional cooperation, has not been very successful (refer to responses from HEIs in the following sections). The PQM exercise is however ongoing and future streamlining and improved rationalisation is thus possible.

The issue of cooperation amongst HEIs (both provincially and functionally) is closely linked to the restructuring process within the higher education sector. South African higher education restructuring is proceeding in two spheres: reconfiguration through mergers and incorporations, and programme-level restructuring. As the structural reconfiguration of the South African higher education landscape unfolds, it is important to remember the specific nature of the exercise in South Africa. Mergers and incorporations have been prescribed by the state as part of an explicit agenda of transformation, equity and efficiency in the sector. Restructuring has as its goal the dismantling of the apartheid landscape of higher education and the configuration of a new landscape which will allow higher education to achieve the goals set for it in national policy.

As indicated earlier the state has gradually increased its regulatory measures forcing institutions to cooperate and collaborate – eventually culminating in mandatory measures in the form of mergers and/or incorporations between institutions. As a critically related point, it must be reiterated that the South African state has taken the route of mandatory restructuring in the face of failure by HEIs to explore such solutions voluntarily (and no alternatives to mandatory merger have been ventured). Through mandatory restructuring, the state is recasting institutions in terms of a transformed ‘fitness of purpose’ – i.e. institutional fitness in terms of national policy goals, priorities and targets.

Within the context of HEIs offering AET programmes, the following mergers have taken place:

- **Merged Universities:**
 - The University of KwaZulu Natal (merger of the Universities of Natal and Durban-Westville)
 - University of Limpopo (merger of the University of the North and Medunsa)
 - North West University (merger of Potchefstroom University, University of North West and Vista University)
- **Merged Universities of Technology**
 - Tshwane University of Technology (merger of Technikon Pretoria and Technikon North West and Technikon Northern Gauteng)
 - Durban Institute of Technology (merger of former Mangosuthu Technikon and some facilities of University of Zululand)
 - Cape Peninsula University of Technology (merger of former Cape Technikon and Peninsula Technikon)
- **Merged Comprehensive Universities**
 - Nelson Mandela University (merger of former University of Port Elizabeth, and Port Elizabeth Technikon and Vista University)
 - University of South Africa (merger of UNISA and Technikon SA and Vista University)

Consolidating academic programmes across two or more campuses means that hard choices will have to be made about academic structures such as faculties, schools and departments as well as in relation to the nature of academic programmes, and where they will be presented. This arena is one in which there is high potential for conflict as academics are likely to defend their 'turf'. The issues to be dealt with are extensive and complex and inevitably a series of 'trade-offs' are likely to occur. On the one hand various academic interest groups will strive for the continuation of programmes in which they have invested considerable time and effort. On the other hand it will be necessary for institutional planners to achieve a balance between the academic desirability of continuing to offer a specific programme and the need to consider financial viability. Fortunately, since only one institution within each of the above mergers offered agricultural programmes at the time of the merger, they did not experience serious problems as far as choice, duplication and/or standard differences in AET offerings are concerned.

It should be noted that, whilst the South African government is of the opinion that its selected system of governance of the higher education is one of state supervision (as opposed to one of state control or state interference), the above indicated developments (mergers and the PQM) are experienced by many stakeholders in the higher education sector as inappropriate interventions and that the so-called state steering is now tipping over to state interference. This has resulted in considerable debate amongst roleplayers regarding the merits of principles such as *institutional autonomy* and *academic freedom* versus *public accountability*.

- On the one hand there is concern that the Higher Education Act and other legislation and regulatory measures governing HEIs (e.g. mergers, standards setting, enrolment targets, programme approval procedures, funding mechanisms, the standardisation of curricula and qualifications, etc), have transformed and moulded higher education into a tool for the state to produce professionals for the world of work and have transformed an educational process aimed at producing excellence (both nationally and internationally)

into a system producing average and similarly educated graduates on a conveyer belt.

- On the other hand there is large support for the principle of public accountability – which implies that institutions are answerable for their actions and decisions not only to their own governing bodies and the institutional community but also to the broader society. Firstly, it requires that institutions receiving public funds should be able to report how, and how well, money has been spent. Secondly, it requires that institutions should demonstrate the results they achieve with the resources at their disposal. Thirdly, it requires that institutions should demonstrate how they have met national policy goals and priorities. The central notion informing the White Paper and its proposals on restructuring and mergers is that higher education should be planned, governed and funded as a single national coordinated system.

It is believed that there is merit in both of the above arguments and that the debate regarding the level of state supervision/steering versus state interference will continue for some time. It however has a marked impact and effect on the level and degree of cooperation and collaboration between institutions (especially in terms of their willingness to standardise curricula and qualifications) and this in turn directly has an influence in terms of the mobility of students and the portability of learning between institutions (Chapter 7 deals with these issues in-depth).

Against this backdrop, the following section reflects the results of research undertaken as part of this assignment to establish the nature, scope and level of cooperation that takes place between the HEIs that offer agricultural programmes and qualifications.

3.4.2. COORDINATION AT THE UNIVERSITIES OF TECHNOLOGY (UoTs)

Interviews were held with the following four Universities of Technology offering agricultural programmes and qualifications:

- Cape Peninsula University of Technology
- Central University of Technology
- Mangosuthu Technikon
- Tshwane University of Technology

The question posed to the UoTs was to indicate how and where they consult and coordinate with other stakeholders to guide their development of agricultural curriculum and/or selection of programmes and qualifications to be offered. The detailed individual responses to this question are provided in Annexure A. Summarised the main findings are as follows:

- a) Consultation and cooperation with other relevant faculties/ departments/ institutes **within their own institution.*** The responses varied but three of the four institutions indicated that there is reasonably good liaison and consultation to overcome duplication or overlap of curricula between departments and faculties.

- b) Consultation and cooperation with other AET provider institutions (universities, universities of technology, colleges) *within their province*.** The responses varied from no formal consultation and coordination in two instances to wide consultation at one institution at all levels of provisioning (downwards to GET level and upwards to universities).
- c) Consultation and cooperation with other AET provider institutions (universities, universities of technology, colleges) *nationally*.** The responses generally indicate that there are little or no cooperation and consultation between institutions nationally other than through professional bodies and in some instances through Advisory Committees.
- d) Consultation and cooperation with the *Department of Education*.** Little direct consultation with the DoE. This is rather at HEQC level and then it is not done at a faculty or departmental level but rather at institutional level – with the Rector or Senior Management representing the institution.
- e) Consultation and cooperation with the *Department of Agriculture*.** All the institutions indicated that there is regular and good coordination and consultation with the DoA (both nationally and provincially) since representatives of the Department are members of their Advisory Boards and also serve as major clients in terms of employment of graduates from the UoTs.
- f) Consultation and cooperation with other *agricultural stakeholders and the Private Sector in their provinces*.** Responses were generally very positive and there are continuous liaison and coordination with the agricultural stakeholders. This is one of the characteristics and strengths of the UoTs – namely to be needs driven. This is achieved through these stakeholders having representation on their Advisory Boards and through having students doing experiential within employer organisations in the sector.

A further question was asked to establish if and how UoT's link with relevant role-players in the agricultural sector towards establishing what are the demand for skilled labour (as personified in employment opportunities or skills shortages) and which could thus serve as strategic information in the development of curricula or choices regarding the offering of programmes. Responses obtained from the various institutions reflect that there are no set processes or procedures guiding a uniformed approach to consultation with the industry and that each institution determines its own manner and extent of such consultation. Whilst the UoTs are, as a rule, closely linked to the sectors and industries that they serve (e.g. via Advisory Committees) there is further room for improvement and consideration should be given to means of consulting via formal structures and procedures with the key stakeholders in the industry on a regular basis.

3.4.3. COORDINATION AT UNIVERSITIES

Interviews were held with the following five traditional Universities and three Comprehensive Universities offering agricultural programmes and qualifications: - University of Fort Hare, University of KwaZulu Natal, University of Pretoria, University of Stellenbosch, University of the Free State, University of Zululand, University of South Africa.

Their summarised responses to how and where they consult and coordinate with other stakeholders towards guiding their development of agricultural curriculum and/or selection of programmes and qualifications to be offered are as follows:

- a) *Consultation and cooperation with other relevant faculties/ departments/ institutes within their **own institution**.* There is extensive consultation and coordination between relevant faculties, departments and institutes/schools as part of the normal curriculum development process and through the Senate.
- b) *Consultation and cooperation with other AET provider institutions (universities, universities of technology, colleges) **within their province**.* Whilst the Comprehensive Universities (like some UoTs) indicate that they consult with other institutions when developing their curriculum, this practice was almost absent at the Universities. Responses ranged from observing what other institutions offer to some liaison where other staff of other institutions might have representation on their Board and thus help to comment on and evaluate academic programmes.
- c) *Consultation and cooperation with other AET provider institutions (universities, universities of technology, colleges) **nationally**.* Responses varied with some institutions indicating that there is coordination via a Deans Forum (Faculties of Science & Agriculture) whilst others indicated that they do not consult others on their academic programmes as it is the prerogative of each university to deliver programmes to its internal objectives, specialisation and resultant niche fields. Another indicated that they rather consult with international universities to remain competitive and aligned to international thinking and trends rather than to coordinate with other SA universities.
- d) *Consultation and cooperation with the **Department of Education**.* Most responses indicated that for **new** qualifications a standard process of communication and coordination exists. In this regard a communication structure exists through the Quality Management Assurance committee at the University where academic matters concerning curriculum development and implementation can be taken up with the Department of Education. Normally changes in curricula are approved through the University structures and then clarified with the relevant DoE committees (SAQA, HEQC or CHE) where required. These discussions are, however, more regulatory applying to the changing of curricula, courses and qualifications.
- e) *Consultation and cooperation with the **Department of Agriculture**.* No formal communication structure exists for the discussion of agricultural training programmes with the DoA (nationally or provincially). It has been argued for many years that a proper forum be established to act as conduit for this type of discussions and interactions but none has come to fruition as yet. In some instances there is consultation between the university and the PDA on joint ventures – this does however not impact or influence the offerings and curricula at the university. Another indicated that they would like much closer involvement of DoA but that it is their impression that the Department is too busy or do not have the interest or capacity to become actively involved.

- f) *Consultation and cooperation with **other agricultural stakeholders and the Private Sector in their provinces.*** Responses varied from extensive cooperation with private sector (usually research related and the development of new cultivars) that has an influence on curriculum development and content to consultation and feedback from the industry regarding the relevance of curriculum. In this regard various scientific societies and professional bodies also perform a key role.

The overall conclusion is that whilst there is relatively wide consultation and coordination at a national level, such coordination tapers down at the provincial level. With the exception of individual institutions there is little consultation and coordination between HEIs to ensure that their programmes dovetail to avoid duplication and/or towards ensuring that the required spectrum of learning areas and specialisation fields needed within a province is covered. There is little formal consultation regarding uniform standards and this lack of coordination makes horizontal mobility (from one institution to another) problematic. For detailed responses on the type and level of coordination among Universities and between them and other key stakeholders in the agricultural sector as related to curriculum development please refer to Annexure B.

3.5. RECOMMENDATIONS FOR IMPROVED AET COORDINATION AT PROVINCIAL LEVEL

Given the individual and unique coordination requirements of each province, it is not attempted to make recommendations that will address all the needs identified. This section rather focuses on a few critical recommendations that could be undertaken at national (NAET) level and that will facilitate and enhance the ability of PAETFs (and/or other coordination bodies) to achieve increased and improved coordination, cooperation and collaboration.

3.5.1. CAPACITATING THE PAET FORUMS

Following the extensive AET consultation and research studies undertaken in each of the provinces towards establishing the provincial status, constraints and needs of AET per province (as the pre-work undertaken in the run-up to the establishment of NAET and the PAET Forums), each of the provinces have a good knowledge and understanding of their AET needs to be addressed. A need however exists to capacitate and empower the PAET Forums to act on this information (and/or further needs identified through additional studies). Given the identified lack of capacity currently experienced by the PAETFs, the following support is recommended:

- 3.5.1.1.** Strengthening the implementation capacity of each Provincial AET Forum through the appointment of a full-time professional AET expert to drive and coordinate the activities of the Forum and to facilitate implementation of their Operational Plans. This official should be based within the PDA and the costs of the posts should be part of the PAD budget.
- 3.5.1.2.** Ensure sufficient budget allocations to meet the operational costs of the PAETFs and to allow the appointment of external service providers where there is a need for such. Institutional arrangements should be made to either make such funding available from the NDA (Directorate ETES) or to ensure that the PDAs include it as a cost item within the provincial budgets.

3.5.2. IMPROVED REGIONAL LEARNING PROGRAMME COORDINATION

The study revealed that whilst there is an urgent need for the coordination of learning programmes and qualifications between HEIs within a region, and processes and procedures to this end do exist (at least in theory), practice has shown that the consultation between HEIs and other regulating bodies in terms of their programme offerings are limited to new programme offerings. Given the sensitivity surrounding issues such as “institutional autonomy and academic freedom”, the state has been rather lenient regarding the use of regional structures that actively review current programmes and qualifications offered at the institutions and to consider means of increased standardisation (both in terms of quality and content) where such is relevant and appropriate (e.g. in the so-called “generic” qualifications). To this end the following are recommended:

- 3.5.2.1.** That HEI academic cooperation structures be established with the mandate to investigate means of standardising so-called generic programmes and qualifications (e.g. B. Agric). It is recommended that such standardisation committees investigate to see how at least the first two years of academic study could be standardised to a minimum of 80% (both in terms of content and quality) to allow the horizontal mobility of learners (and accompanying portability of learning) between different HEIs of the same character and nature (e.g. from one UoT to another UoT).
- 3.5.2.2.** That regional academic committees be established where the spectrum of programme and qualification offerings within a region could be discussed and evaluated against the demand for learning programmes in the region. The mandate of such committees should be to facilitate a transfer of information flow, to identify areas of duplication (over supply), to identify areas where there are shortfalls (gaps in supply), to establish means of sharing capacity and expertise in common areas (e.g. exchange of staff, curricula and learning material, facility sharing, etc.).

4. AGRICULTURAL CHALLENGES, CURRICULUM ALIGNMENT AND RESPONSIVENESS

4.1. INTRODUCTION

Within the larger context of AET curricula evaluation, this section of the assignment aims to undertake the following:

- Identify, define and analyse the critical challenges facing the agricultural sector in South Africa
- Review to what extent current curriculum on offer at the various AET provider institution incorporate and address such challenges
- Make recommendations and suggest means towards improving the responsiveness and alignment of curricula to the identified challenges.

To achieve the above this Chapter is structured as follows:

- Background – outlining the point of departure and process followed in the identification and selection of critical challenges to be addressed
- Breakdown and analysis of each of the selected challenges to define the key components and issues that should ideally be accommodated within AET curricula at the various levels of provisioning
- Supply Analysis – a review of current curricula / supply at the various levels of AET delivery to establish to what extent curricula are aligned to and addresses the selected challenges
- Recommendations – suggestions on how AET curriculum should be adjusted and upgraded to be more responsive in addressing the critical challenges in the SA agricultural sector.

Agriculture is in its nature a very broad sector. From primary production to the marketing and sale of produce involve large numbers of people and a very great deal of expertise at several levels. In addition, it is a living discipline that is constantly changing due to new methods, technology and the changing environment in which farmers have to function.

Therefore, it is necessary to ensure that the persons qualifying themselves to labour in the field of agriculture are equipped with the most suitable body of knowledge to ensure optimal performance.

In addition, the general public are affected by the issues affecting agriculture albeit at a less intensive level. It is important that all the citizens of the country be aware of many of the issues which face the world today.

As mentioned previously, this section aims to identify the relevant challenges in Agriculture today and to ascertain whether the relevant knowledge is imparted to learners and students throughout the GET, FET and HET bands of AET provisioning.

4.2. BACKGROUND

In order to assess the responsiveness of AET to the challenges in Agriculture, criteria have to be assigned. Consequently, “key challenges” in agriculture today were identified for use in this study.

“Key challenges” is a wide concept and different stakeholder will have their own views on what is perceived as key challenges. For the purposes of this assignment we have selected the key challenges to be addressed as follows:

- Those challenges repeatedly highlighted by the Minister of Agriculture over the past two years (and which was specified by the DoA in the Terms of Reference) namely:
 - Sustainable agriculture and development, land care
 - Household food security and water harvesting
 - Rural wealth creation
- Challenges identified in the DoA Strategic Plan, the Settlement and Implementation Support (SIS) Strategy and the AgriSETA Sector Skills Plan (2005-2010) namely:
 - Land Reform
 - Globalisation
 - New Technology
 - Scarce Skills

Towards determining to what extent AET curriculum addresses these challenges, an attempt was made to analyse each challenge and to define the learning needs related to that challenge. With the exception of **Scarce Skills** (which is addressed as a challenge in its own right and which refers to those *occupations* within the agricultural sector where a shortage are being experienced), the learning needs of the other challenges are expressed as **Critical Skills** (i.e. the knowledge and skills fields that should be accommodate in curriculum to develop competencies related to that challenge).

4.3. CHALLENGES DEFINED AND ANALYSED

4.3.1. SUSTAINABLE AGRICULTURE AND DEVELOPMENT, LAND CARE

Currently there does not seem to be a hard and fast definition for the term “Sustainable Agriculture” specified by legislation in South Africa. Therefore the definition indicated here was sourced from U.S. legislation (U.S. Code Title 7, Section 3101).

“Sustainable Agriculture can be defined as an integrated system of plant and animal production practices having a site-specific application that will over the long-term:

- *Satisfy human food and fibre needs,*
- *Enhance environmental quality and the natural resource base upon which the agriculture economy depends,*
- *Make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls,*
- *Sustain the economic viability of farm operations, and*
- *Enhance the quality of life for farmers and society as a whole. “*

4.3.1.1 Integrated system of production

In order to ensure that production systems are sustainable it is logical that integrated production systems are more effective. This is clear from the fact that one of the problems facing resource poor farmers is that farming systems practised by smallholders are not sustainable. The common characteristic in most extensive rural systems is the lack of continuity in the fodder flow availability (ARC, 2008).

According to the Department of Agriculture's Policy on Agriculture in Sustainable Development (8th draft) Sustainable Production Practices may improve agricultural efficiency while conserving biodiversity, soil fertility and effectiveness of water use and while reducing the pressure to clear forests and over-fish the seas. In the conventional agricultural sector the following can be indicated:

- **Plant production** - Sustainable practices involve a variety of approaches. Important factors that impact on plant production are topography, soil characteristics, climate, pests, availability of inputs and the individual farmer's goals. The development and adoption of best management practices, incentives, guidelines and training in farm business and risk management are necessary to enhance farm profitability and promote the adoption of agricultural practices that are both sustainable and productive.
- **Animal Production** - Sustainable production involves breed selection, grazing (or feed supply), health, adaptability, nutrition, reproduction and welfare. A system approach, whereby production of animals and plants are integrated had proven to be more sustainable over time.

4.3.1.2 Satisfy human needs

This section of agricultural sustainability will be discussed in section 4.3.2 Food security.

4.3.1.3 The environment

The management of our natural resources is a critical requirement for sustainable agriculture in the medium to long term. This ever increasing challenge is due to the following broad trends indicative of our declining natural environment and resources:

- Climate change models forecasting a rise in temperature of between 1-3 degrees over the next 50 years – with a coupled reduction in annual rainfall of 5%-10% and an increasing frequency in severe droughts, violent storms, floods, etc.
- As a water-stressed country it is predicted that without improvements in water management and assuming a 6% growth in the economy demand will outstrip supply by 2025. Due to pollution water quality is also declining constantly.
- The country is dominated by shallow sandy soils with inherent limitations from an agricultural potential point of view (with only 3% considered high-potential land). This vulnerability to degradation coupled with poor land practices (such as over-grazing and over exploitation) and inappropriate farming methods (e.g. indiscriminate use of chemicals) has resulted in nation-wide soil degradation.

- South Africa's biodiversity and ecosystem are already declining and the anticipated climate change is predicted to have a severe impact on our biodiversity.

Degradation and loss of land, water and agro-biodiversity for agricultural use are widespread and accelerating. This poses an increasing threat to national and individual food security in many parts of South Africa. Agro-ecological systems are resilient up to a point, but subject to a collapse when degraded beyond that threshold. Whilst the current picture is not entirely clear, it suggests a close correspondence between areas experiencing significant land and water degradation, and areas troubled by high levels of rural poverty. Farmers maximize income and minimise risk in a dynamic context and often under harsh conditions and serious constraints. Research must respond to these challenges through inclusion of technologies to address sustainable natural resource management. This would include technologies to address conservation agriculture principles relating to soil organic matter decline, soil erosion and degradation, nutrient depletion, loss of biodiversity, prevention of invasion by alien species, maintenance of water quality and veldt productivity, optimisation of water use efficiency under both irrigated and rain fed conditions, capturing and storing rainwater (rainwater harvesting) and restoration or creation of new balances in biotic communities

In response to the above challenge of ensuring natural resource management, sustainable agriculture and land care, the government has introduced a myriad of legislation. Whilst the legislation is well intended, it is poorly coordinated and administered between various responsible government departments – to the point where stakeholders perceive the situation as over-regulated (too much law) and too little support in helping people to understand their rights, duties and liabilities in terms of environmental legislation. In addition to holding serious potential consequences for land and agrarian reform participants where legislation is not adhered to, in the short term the lack of law enforcement results in serious malpractice.

4.3.1.4 Efficient use of non renewable resources

According to the Department of Agriculture's Policy on Agriculture in Sustainable Development (8th draft) Agriculture is based on extensive use of non-renewable resources like fossil fuels and mineral deposits. Food production consumes considerable amounts of fossil fuel.

In sustainable agricultural systems, there is less reliance on non-renewable energy sources. In effect, non-renewable resources are substituted with renewable sources or labour to the extent that is economically feasible. Energy use is not eliminated, but efficiency of its use is increased. Consequently, its negative impact on the natural resource base on which sustainable agriculture depends is minimised. Achieving gains in efficiency also addresses the concerns about climate change and its potentially negative effects. This—plus land use practices aimed at lowering greenhouse gas emissions and carbon sequestration—give agriculture important linkages to the energy sector.

4.3.1.5 Economic viability of farm operations

According to the Department of Agriculture's Policy on Agriculture in Sustainable Development (8th draft) appropriate production systems are important for ensuring food security at both national and household levels, as well as promoting economic development through the production of raw materials for the manufacturing and processing sectors.

Economic viability of farm operations depends on many factors. Firstly capital is necessary to ensure that the operation can be undertaken. Subsequent to this initiation of activity, infrastructure (both of the farm itself and transport and marketing sectors) economic know-how, management and general knowledge of farming is necessary.

When farms are expropriated and turned over to beneficiaries, the most important part of the scheme is after care, to ensure that the farm produces (or continues to produce).

4.3.1.6 Quality of life

According to the ARC (2008), agriculture is an important primary component in the national economy and for the community. Not only is agriculture frequently the major factor in rural economic growth and development, but the necessary programmes to support agriculture play a characteristic role in broadening the economic and social options of rural and urban people, and consequently in improving their quality of life. In the urban milieu the improvement in food safety standards as well as in the variety and quantity of agricultural products improves consumer satisfaction and induces the processing of products in urban surroundings.

4.3.1.7 Land Care

As mentioned previously, land in South Africa is not conducive to farming practises in general. Consequently, conventional farming methods often lead to the damaging or destroying of land capability.

According to the document titled "*Implementation Framework for the LandCare Programme*" dated February 1999 in order to ensure that the land in South Africa is administrated in a manner that will promote the conservation of land in South Africa, LandCare South Africa was established. The LandCare Programme supports the general objectives of chapter 10 of the United Nations' Sustainable Development Agenda, entitled Integrated Approach to the Planning and Management of Land Resources.

LandCare South Africa objectives

- *"Provide a framework for individuals, community organisation and the public and private sector, through partnerships to optimise productivity and sustainability of the natural resources through management, protection and rehabilitation"*
- *Develop the capacity and skills of land users through education, knowledge sharing, information, participatory interaction for better access and management of resources*
- *Support institutional building at all levels of governance for improved communication, networking, financial and other support services*
- *Empower all people through knowledge and understanding to take the responsibility for the care of the environment*

- *Ensure as far as is practicable that resources are used at a rate within their capacity for renewal*
- *Maintain and enhance the ecological integrity of natural systems*
- *Minimise or avoid risks that lead to irreversible damage*
- *Maintain biodiversity (contribute towards the maintenance of biodiversity)."*

According to the Department of Agriculture's Policy for Sustainable Development (8th draft) strategies regarding integrated production systems can be implemented to increase the chances of success, such as the following for Plant production

- *"Promote integrated production systems, incorporating both plants and animals;*
- *Develop and adopt where appropriate, alternative crops and cropping systems suitable to the circumstances of farmers and climatic and soil conditions of a particular area;*
- *Promote the integrated management of pests, diseases, and weeds;*
- *Encourage the reduction of dependence on inorganic fertilisers and agrochemicals through the increased use of organic alternatives;*
- *Address nutrient depletion, especially in communal areas, through appropriate interventions, like liming, promotion of the use of organic manures, etc;*
- *Encourage innovative approaches including cover crops, minimum tillage, crop rotation, inter-cropping and incorporation of agricultural by-products and residues to increase soil organic matter;*
- *Minimize pre- and post harvest losses through technical assistance, capacity building, provision of appropriate information, etc;*
- *Develop effective local storage and distribution systems especially in rural areas;*
- *Improve capacity to manage both climatic and market risks;*
- *Develop environmentally friendly technologies in crop production that will use less land, water, supplemental plant nutrients and pesticides;*
- *Promote the establishment of niche markets, including organic production of products;*
- *Facilitate training in appropriate best practice in crop production methods;*
- *Support and promote the utilization of indigenous knowledge in crop production, natural resource management and plant protection;*
- *Develop new crop varieties that are capable of higher yields, can adapt to South African conditions and are tolerant to adverse conditions, pests, and diseases;*
- *Develop new crops from indigenous crops for niche markets."*

And for Animal Production:

- *"Encourage selection of animals appropriate to the available resources, feed and forage sources, landscape, climate and management capacity;*
- *Develop an understanding of the nutritional requirements of animals, including seasonal variations in feed and forage quality;*
- *Optimize the use of farm-generated by-products in diversified farming systems;*
- *Ensure the adoption of well-planned animal health programmes to ensure sustainability;*
- *Promote the use of quality germplasm, where appropriate, to enhance herd performance;*
- *Promote animal health, welfare and environmentally acceptable waste disposal under conditions of intensified animal production;*
- *Promote best practices for grazing management, including awareness of carrying capacity, forage sources and fenced camps;*
- *Investigate alternative livestock management systems, such as improved fallow, unpalatable cover crops and living fences, for communal farmers;*
- *Ensure a participatory approach to animal production, including women, the youth and the disabled thus contributing to food security and sustainability;*
- *Promote best management practices, including the development of calendars of operations, stock flows, forage flows, labour needs, production records and land use plans in order to monitor progress towards attainment of goals;*
- *Develop programmes aimed at promoting the use and improvement of indigenous animal species."*

In addition this document underlines the importance of the Implementation Framework for the LandCare Programme, 1999:

“The overall goal of the LandCare Programme is to optimize productivity and sustainability of resources to attain food security, job creation and a better quality of life for all. LandCare is a community-based programme supported by both the public and private sector through a series of partnerships. It is focused on the conservation of the natural resources (soil, water and vegetation) through sustainable utilization and the creation of a conservation ethic through education and awareness.”

4.3.2 FOOD SECURITY

According to the Department of Agriculture’s Policy for Sustainable Development (8th draft) appropriate production systems are important for ensuring food security at both national and household levels, as well as promoting economic development through the production of raw materials for the manufacturing and processing sectors. These systems need to ensure sustainable use of natural resources.

Food Security is a huge challenge that demands specific attention. It is estimated that 35% of the population (14 million people) are vulnerable and food insecure. With the recent rising food prices (which is anticipated to continue for the next decade), this vulnerability will increase further. The plight is particularly large in the rural areas (where 70% of the poorest people live). As such this challenge of food security is closely linked to Rural Development (refer point 4.3.4 below).

Research has shown that a typical rural household spends 50% of its time on agriculture, whilst such activities only contribute between 5% and 10% of their household income. This raises the question if such effort is justifiable and possibly explains why many poor rural households no longer attempt to cultivate their own food. On the other hand a lack of alternative sources of income in especially rural areas, and the real threat of malnutrition and even starvation, justifies any effort to supplement household food security. In this regard agricultural production (be it in the form of subsistence agriculture practiced by approximately 1.2 million people in the rural areas and by many urban dwellers in the form of food gardens) is critical for those poor households that do not receive welfare payments or grants (e.g. HIV/AIDS affected households).

From an agricultural perspective the challenge manifests itself in the establishment of various agricultural projects and initiatives that contribute to food security and to means of increasing the returns of household/homestead agricultural activities (activities such as food gardens aimed at increased food security).

4.3.3 WATER HARVESTING

Water Harvesting is defined as the process of collecting and concentrating water from runoff into a run-on area where the collected water is either directly applied to the cropping area and stored in the soil profile for immediate use by the crop or stored in containers for use (Rutherford 2007).

This method of water collection has historically, been applied predominantly “in arid and semiarid regions where rainfall is either not sufficient to sustain a good crop and pasture growth or where, due to the erratic nature of precipitation, the risk of crop failure is very high”. However, with the scarcity of water becoming a widespread

problem in many areas, water harvesting is now being employed all over the world. Water harvesting (WH) is aimed at reducing the pressure that development and the consequences thereof has placed on what is now being reconsidered as a limited resource.

Water harvesting has been practised in Northern Africa for millennia, but is not a method that is yet entrenched in agricultural thinking in South Africa.

According to Rutherford (2007) the need for Water Harvesting arises from many factors such as:

- low rainfall
- uneven distribution of rainfall
- high losses due to evaporation and runoff, and
- an increased pressure on water resources due to population growth.

The semi-arid nature of most of South Africa increases the importance of Water Harvesting as a strategy towards sustainable agriculture. There are several factors which influence the methods and efficacy of a Water Harvesting system in a particular area.

- Average rainfall and the number of days per year in which the rainfall exceeds the threshold volume of rainfall for the catchment
- Land use or vegetation cover. Working to reduce erosion and redirect runoff into appropriate catchments can lead to high labour inputs resulting from the necessity to keep the catchment area free from vegetation, to ensure that it is as efficient as possible. This is not necessarily a negative situation in South Africa where large numbers of unemployed persons exist as a possible source of labour for such a system.
- The management of the system must also be taken into account when selecting the size of the catchment. The system may be altered during instances of high precipitation necessitating maintenance.
- Topography and Terrain Profile are important aspects of Water Harvesting as the slope of the terrain and gradient will greatly impact the size and type of catchment area of the system
- Soil Type and Soil Depth influence the potential rate of percolation and infiltration for runoff and storage potential of water within the soil itself.
- The available Hydrology and Water Resources that are involved in storage, production and runoff of the Water Harvesting system, which will aid in the informed selection of the appropriate technique for the proposed site.
- The socio-economic conditions of the area where the water harvesting will take place. The persons involved must be committed to the project and the constant participation of the community will be necessary. The method of Water Harvesting must be understandable and practical for the persons involved in the project.
- It is important to note that while Water Harvesting is a valuable tool for the increase of water yield in a catchment, it may be detrimental to the environment if not implemented in a responsible manner. The change in flow patterns and the withdrawal of runoff from a system may have negative consequences downstream of the project.

4.3.4 RURAL DEVELOPMENT AND WEALTH CREATION

As indicated earlier, rural development is closely linked to some of the other challenges such as food security, sustainability and land care, the marginality of the sector etc. The importance of rural development and wealth creation stems from the fact that 70% of the “poorest of the poor” reside in the rural areas.

A critical challenge to land and agrarian reform and rural livelihoods in particular, is the **HIV/Aids pandemic**. UNAIDS estimate that 5.5 million South Africans were living with HIV at the end of 2005 and reliable sources estimate that 320 000 and 345 000 people died of Aids in 2005 and 2006 respectively. This has serious implications for the rural areas in particular – where people are far from health services and care and where HIV susceptibility and Aids vulnerability are aggravated by the absence of and/or poor quality water, nutrition, sanitation and housing.

Many of the densely populated and under-developed rural areas unfortunately do not have high agricultural potential and are generally characterised by low rainfall and a general water scarcity. These areas are usually far from the larger urban markets and often lack infrastructure such as roads and critical services such as electricity. Successful rural land and agrarian reform thus demands that interventions (and investments) be undertaken within the context of holistic and integrated rural development. Without creating rural infrastructure needed for local economic development (e.g. water, electricity, road infrastructure, etc.), it will not be possible to get a return on agricultural investment and the often adverse agricultural conditions and environment implies that increased agricultural output is a spin-off of other development gains in the area.

4.3.5 LAND REFORM (THE EMERGING FARMER)

South Africa’s land reform programme has three components:

- **Land restitution** is designed to restore land ownership (or provide compensation) to those who were dispossessed without adequate compensation by racially discriminatory practices after 1913 (Department of Land Affairs, 1997).
- **Land redistribution** is aimed at providing the disadvantaged and the poor with access to land for residential and productive purposes (Department of Land Affairs, 1997). It is also designed to deal with the past injustices of land dispossession discussed above, to ensure equitable distribution of land ownership and to reduce poverty and contribute to economic growth. It makes it possible for the poor and the disadvantaged to purchase land with the help of a Settlement Land Acquisition Grant.
- **Land Tenure Reform** is designed to provide security to all South Africans under diverse forms of locally appropriate tenure (Department of Land Affairs, 1997). This reform includes an initiative to provide legal recognition and to formalize communal land rights in rural areas; and a recently legislated programme to strengthen the rights of tenants on mainly white-owned farms.

A key challenge facing the agricultural sector is the successful implementation of the Land and Agrarian Reform Programme. Whilst the first phase of the Programme focussed on land delivery (and reasonable progress has been made with more than 4 million hectares delivered to land reform and restitution beneficiaries), it has become evident that the focus must now shift towards settlement support in order to ensure the sustainability of such projects. Whilst the rendering of improved and expanded post settlement support services span a wide range of interventions and initiatives (i.e. policies, strategies, systems and procedures, injection of financial resources, etc.) the scope of this curriculum study demands that we focus on the capacity building and training related components and requirements of such improved settlement services.

From this human resources capacitating perspective the challenge of Land Reform is addressed within the following framework:

4.3.5.1 Capacitating Land Reform Beneficiaries and Emerging Farmers to optimally utilise their land potential.

The SIS Strategy identifies “the limited social and economic returns on the investment of State funds in land reform and the low level of impact that the programme is having on poverty reduction” as a key challenge and shortfall to be addressed.

Some of the negative impacts of the Land Reform Programme are the following:

- In many cases where land was redistributed from large commercial farmers to land reform beneficiaries it was accompanied by a loss of agricultural production (and income)
- The above indicated land transfer often also resulted in the retrenchment of farm workers which in turn contributed to rural poverty (especially in those communities that were dependent on the income from farm labour)

Amongst others, a critical cause of such reduced production is the lack of capacity (knowledge and skills) amongst emerging farmers to optimally utilise the land and other production factors at their disposal.

4.3.5.2 Agricultural Support Systems (Post Settlement Support)

In view thereof that a large percentage of Land Reform Beneficiaries will have had little if any former experience in agriculture (at least not as farm owners in a commercial farming context), this target group will require considerable support during the initial stages.

4.3.5.3 The need for Black Economic Empowerment over the total Agricultural Value Chain:

Agriculture is a *marginal sector* and the policy adopted by the SA government to deregulate agriculture (e.g. reducing import protection, reducing agricultural subsidies, etc.) has brought new challenges and has increased the risks of agriculture considerably. Typical survival strategies employed by many of the successful farmers in this new era include economies of scale and *value adding*. Since new emerging farmers will find it difficult to obtain economies of scale (without cooperative approaches and mechanisms), it is strongly advised that they embark upon various value adding initiatives to complement and supplement the income to

be generated from their primary agricultural production activities. In this regard BEE initiatives and contracts over the total agricultural value chain (both upstream and downstream) need to be exploited and facilitated.

Post settlement support for beneficiaries of land reform. Such support needed include the following:

- **Extension and Advisory Services:** A need exists to improve and upgrade the range of extension support services to Land Reform Beneficiaries. Please refer to Chapter 6 of the Report which deals with this aspect in detail.
- **Mentorship Support:** It has been established that Land Reform Beneficiaries are in particular need of mentors during their initial establishment period to help them gain the experience and expertise needed to become successful commercial farmers. In this regard customised mentorship programmes are deemed to be the most effective capacity building approach to transfer the range of knowledge and skills needed by this target group. In this regard mentorship could be structured on a business basis where the mentors share in both the success and failure of the project.
- **Information and market Support:** To help overcome the challenges and constraints experienced by new entrants to the agricultural sector, Land Reform Beneficiaries will require extensive information support services. Whilst such information needs span the total agricultural spectrum, a particular need exists in terms of information regarding markets and means of accessing such markets (marketing support). Improved and expanded information systems must be developed with considerable attention to the means of providing emerging farmers access to such information.
- **Financial Support:** In most situations, especially in areas where the cost of land is high, current facilities are used mainly for buying the land and there is insufficient funding available as production capital. Access to credit by groups of beneficiaries (or communities) is also very difficult and needs to be addressed. New strategies in optimally utilising LRAD and other forms of state funding support are needed. The present narrow focus on land reform only, instead of farming as a business, is counter productive and is the root cause of failures and the lack of sustainability within the emerging farming sector.

4.3.6 GLOBALISATION

Generally the term globalisation as found in literature can be defined as “...*the breakdown of borders between countries, governments, the economy and communities. In the financial markets it is also the blurring of borders between different markets.*” (Mostert, 2003).

Pending ones economic philosophy (point of departure) globalisation could either be viewed as a new positive challenge that brings opportunities for growth and expansion, or it could be viewed as a negative challenge that will further reduce the ability of poor and developing countries to compete and further increase their disadvantaged position.

Globalisation perceived as a negative challenge:

The analysis of globalisation as a negative challenge to the South African agricultural sector as outlined below borrows heavily from the ANC policy statement on globalisation that was released in April 2008. According to this policy statement one of the most important policy challenges facing South Africa today is to respond to changes in the way in which the world economy works. Powerful forces of globalisation and liberalisation are changing the capitalist world economy and refer to the fact that international flows of trade, finance and information are being integrated into a single global market. Globalisation is therefore a process aimed at integrating the world market where national commodity capital, financial and currency markets are joined together into a single market which operates according to a set of rules that are applied universally.

Whilst globalisation has been facilitated by the introduction of new information and communication technologies, it is a process driven by the need to restructure the way in which global capitalism works. Globalisation has been accompanied by demands for removing regulatory and other barriers in national states. These barriers are seen as obstacles to the more liberated movement of commodities, finance and capital across the world. National states have been pressured by the rules of the World Trade Organisation (WTO), the conditions of international financial institutions such as the IMF and World Bank, and the impact of globalised currency and capital markets (which react with frightening speed against any country that does not conform). However, it has been reported that liberalisation associated with globalisation is being ***applied selectively***. At the same time as there is deregulation at a national level, there is more regulation at a global level. There is growing consensus amongst "neutral" parties (such as the UNDP) that globalisation is driven by the rich developed countries to their optimum benefit and that it is often ***to the detriment of the poor developing countries***. The following are provided as examples that strengthen the belief that in practice, globalisation is a highly uneven and unequal process of liberalisation:

- Whilst globalisation promotes free and liberated trade and international flows of finance, information, capital and services (all commodities that the rich and development countries have and wants to trade with), it excludes the free flow of unskilled labour (a commodity that the poor and undeveloped countries have and want to trade with).
- While global negotiations are moving rapidly towards free markets in foreign investment and services, developed countries intervene in textile and agricultural markets to create obstacles for exports by developing countries in areas where they are currently competitive.
- Developing countries have been pressured into significantly "opening up" their national economies and substantially reducing real levels of protection, only to encounter continuing real protection, taking various forms, in advanced industrialised countries. According to the UNDP, non-tariff barriers in at least 20 industrialised countries became more rather than less restrictive in the decade 1982-1992. By 1992, these *"global market restrictions and unequal partnerships"* were costing developing countries about \$500 billion.
- As example current levels of producer support in SA (Producer Support Estimate) have been reduced to around five percent and there has been a lowering of the average tariff level for all products between 1990 and 1999 from 27.5% to 7.1%. In contrast the producer subsidy equivalent for

European Union agricultural products is 15%. These subsidised EU products compete with those from South Africa and other developing countries not only in the EU market, but also in third country export markets and even the domestic South African market.

Globalisation perceived as a positive challenge:

However, while there is most certainly proof that now (in 2008) the income between the first and third world is skewed, followers who believe that globalisation is a positive challenge that offers opportunities for growth (Mostert 2003) indicate the following:

- When comparing the level of economic growth in countries that are actively involved in globalisation versus the countries that are not actively taking part the thirty developed nations that took part in the process grew by 3.5% in the 80s and 5% in the 90s. The countries that did not take active part in the process did not realise any growth and/or realised only marginal growth after 1980. Therefore, the process of globalisation is not the reason for the low and unequal distribution of income in developing countries, but rather the lack of participation in globalisation.
- In contradiction to the belief expressed in the ANC document quoted above, the developed countries were not getting rich at the expense of the developing world. The developed countries were taking more advantage of the opportunities offered by globalisation. During the process of globalisation the income of the poorest countries still grew to three times its size before the process began. It is true that the growth in the developed world was twice as great, unfortunately exacerbating the difference in the distribution of income. However, this cannot be attributed to the process of globalisation, but rather to the limited participation of the developing countries during the process of globalisation.
- Regardless of the fact that globalisation lead to a more slanted distribution of income between developing and developed countries it also lead to world production greater than before and an increase in the levels of trade. The move to integrated world markets offer big potential for economic expansion and can be seen as an opportunity for developing countries to advance their standard of living.
- It is also accepted that countries with an export driving economy have a better change for economic growth and development than an inward looking economy. It can thus be argued that globalisation can provide the solution to the growth problems in developing countries and regions like Africa. Therefore, it is almost more accurate to call globalisation an opportunity rather than a challenge.
- According to the IMF unskilled workers would have been under pressure to keep their jobs even without globalisation due to the fact that the economies of the developed countries have become more service orientated and that the demand for lower skilled workers has diminished. Therefore, unskilled workers in developed countries have been the hardest hit by the technological advances achieved in production in all sectors.

In the new global economy it is critical that the government provide a climate where business can flourish, but it also requires national and local economies to review continuously their relative advantages and to see how they can supply a more effective environment for competitiveness to be improved. It is also necessary to remember that comparative advantages for countries or a city change over time, especially as firms and individuals learn from interaction within the global economy.

South Africa has **strengths** it can build on in developing a proactive response to globalisation. It has a significant natural resource base, is relatively developed in relation to its neighbours, has a geographic location closer than the advanced industrialised economies of "the North" to faster growing economies of Asia and Latin America and has human resource potential.

What then is the appropriate policy response for a country like South Africa? Globalisation is clearly a complex process that we cannot ignore or avoid. Our country depends on its relationship with the world economy for about 50% of its Gross Domestic Product (GDP) and withdrawing or isolating ourselves is an option that could only be implemented at great cost. The government has subsequently taken a policy decision to engage proactively with globalisation and look for a beneficial re-insertion of our country, isolated by apartheid, into the world economy. We need to see globalisation as presenting both opportunities and threats, and to recognise that we have strengths and weaknesses in engaging with it.

The **opportunities** arise from the fact that world trade is expanding more rapidly than world GDP, that international capital flows have increased and that globalisation has been associated with a communications and information-technology revolution. The rapid expansion of world trade is creating possibilities for a country like our own to boost its economic growth by increasing exports as well as, at the same time, achieving a diversification of exports that could reduce our dependence on primary products. The technological advances linked to globalisation also have enormous potential to raise output and improve incomes.

The SA policy stance requires that a number of elements are put in place at the same time:

- First, there is a need for a clear trade strategy aimed at identifying countries and regions where we can most beneficially increase our trade. The Department of Trade and Industry (DTI) has identified the fast growing regions of the Indian Ocean Rim and Latin America, as well as the Southern African region and West Africa, as particularly important in this regard.
- Second, we need industrial and sectoral (agricultural) policies aimed at raising the overall level of competitiveness, identifying sectors where we have potential and those where there are vulnerabilities that need to be overcome. We must be willing to learn from international experience, and identify international best practice.
- Protectionism of the sort applied in previous years is no longer an option. The main thrust of our domestic policy response must involve recognising that change is certain and we must therefore proactively promote appropriate restructuring that serves our growth and development objectives.
- Globalisation also requires of us that we introduce concrete measures to counter its polarising and marginalising tendencies. In a context where globalisation has been accompanied by a widening of inequalities within countries and where jobless growth has become a global norm, active policies to promote employment, human resource development and basic needs provision, are all essential.

- Finally, globalisation challenges us to actively engage in wide trade diplomacy. A process which is continuing to reproduce a division of the world into "winning" and "losing" nations, particularly in a situation where many of our neighbouring states and a large part of the continent of Africa seem doomed to remain "losing" nations, cannot be one that South Africa is simply indifferent to. We need to recognise that globalisation and liberalisation have created an imperative to, on the one hand, struggle to find new ways to protect the integrity of domestic policy formulation and sovereignty, while, on the other, actively engaging in the international arena both to maximise opportunities within existing norms and structures, and at the same time striving to become an active force seeking to bring about changes in the global environment that will benefit our own country, Africa and the South in general

In conclusion, there are many factors which influence the economic performance of a country in the global market. But the existence of the global market itself creates opportunities for foreign investment as well as the opportunity to receive foreign currency as a result of export. This can be a powerful tool in the further raising of the living standard in developing countries such as South Africa. However, there are tangible challenges which face a country when undertaking business in the new Global market. Within an agricultural context the following are challenges that South Africa has to face to ensure that the country makes the most of the opportunities offered by Globalisation:

- International Trade Barriers,
- Food Miles, and
- Competitiveness.

A discussion of each of these challenges is as follows:

4.3.6.1 International Trade Barriers

A popular view is that new regulations and trade standards are a new form of trade barrier. Food safety has become a real concern in the international market, especially in Europe and North America. Unfortunately South Africa has not yet been able to build a consistent image in terms of food safety across all industries.

The experience within the meat industry highlights the following being used as soft trade barriers:

- The complexity of international trade agreements (SPS and TBT standards).
- Harmonisation of global food standards (e.g. MRL's – EU 2008 and Integrated Quality Management Systems)
- Traceability (e.g. EU 2005 Standard).
- The threat of Bio-Terrorism (such as the January 2004 food scare, Pick 'n Pay poisoned food, etc).
- International Quality Management Systems, of which the most important are EUREPGAP, HACCP, BRC, ISO 22000,

Reasons why these regulations are perceived as barriers in South Africa are:

- Questionable sanitary standards (hormone ban, disease restriction and zero tolerance),
- Technical accountability (burdensome paper trail related to traceability with slow approvals processes),
- Anti-dumping measures (both in the developed and developing world),

4.3.6.2 Food Miles

Food miles is defined as the number of miles or kilometres a product has to be transported from the farmer to various stages of production until it reaches the supermarket and finally the consumer. The argument is that the longer the trail the more energy is consumed, more fossil fuel is burned and more greenhouse gases are released into the atmosphere to cause global warming. It is therefore necessary that this phenomenon be closely monitored as it will impact on South African exports to the UK and Europe in future.

Ever-mounting anxiety about global warming is sparking consumer concerns, particularly in the United Kingdom, that carbon dioxide emitted while transporting food over long distances can contribute significantly to global warming. "Food miles" is a relatively new concept from countries such as the UK and Germany over the transportation of food. Although consumers may not really be aware of these issues, exporters can not ignore them. Consumer resistance to food miles could have detrimental consequences to food producers in the future and this issue should be addressed at an early stage.

Locally, the national treasury had been mandated by cabinet to research carbon dioxide emission levels by industry, which possibly could include agriculture processors, and that consideration be given to imposing penalties for damages done to the environment by perpetrators.

A possible solution to reducing food miles is the development of local markets and trade agreements within the SADEC nations.

4.3.6.4 Co-opetition

Co-opetition offers a unique opportunity to harness international markets. The shared risk and support offered by cooperation between individual farmers to form an export organisation, or even more far reaching by cooperating across the industry and/or creating trade blocks with other countries, harnesses key benefits for the industry as a whole. The focus of co-opetition is to collaborate to increase the size of the pie while still competing for a slice.

4.3.7 NEW TECHNOLOGY, INNOVATION AND INFORMATION

Defining **technology** is problematic as it is such a wide concept. However, in its most inclusive sense, technology can be defined as "...a broad concept that deals with a species' usage and knowledge of tools and crafts, and how it affects a species' ability to control and adapt to its environment" (Wikipedia 2008). This definition becomes more and more specific as one looks at a certain sector of development in society. In the agricultural sector, technology is almost equally broad as it may refer to something as basic as the building of the most efficient fence to the utilisation of sophisticated machinery to even the use of software to manage an agricultural business venture.

Innovation can be defined as the "*radical and incremental changes in thinking, in things, in processes or in services*" (Wikipedia 2008) Therefore it is something which is new or improved, including research for the development of new technologies, or refinement of existing technologies, or even development of new applications for existing technologies.

Information as a concept has a multiplicity of meanings, from daily usage to technical settings. *“Generally speaking, the concept of information is closely related to notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception, and representation”* (Wikipedia 2008).

The sections on globalisation and sustainability clearly indicated how the 21st Century is characterised by a fast changing world. These changes include shifts in consumer preferences, new products, changing markets, changing legislation, new production approaches and techniques, new technology and levels of mechanisation, new levels of information flow, new environmental challenges, etc.

The researchers of the world, including those working in South Africa, are constantly investigating how challenges can be addressed and/or how doors to new opportunities can be opened. There are new crop varieties that are higher yielding, but perhaps taste slightly different. Some are more stable than others. There are new options in processing, new methods, and different end results. Trade methods are constantly changing; electronic trading is becoming more popular. No farming operation, processor or trader can simply ignore such developments, nor can they rush in and take chances in implementing new, unproved formulas. The applicability of breakthroughs must be tested under the relevant circumstances, and sometimes the new technology needs adaptation. One has to consider the costs, the financing and the effects on income. The determination of the expected economic returns of new technology, and its feasibility within the specific operation, is an interesting and challenging task for agricultural economists.

Therefore the challenge lies in the utilisation of the new technological advances, innovations and the information which has become available. In addition the implementation of these technologies and the adaptation of the technologies to situations in South Africa are paramount. In this regard the education and training curricula that prepare the industry in the development, adaptation and correct application and utilisation of technology is of critical importance.

Current new technologies that may be incorporated in the curriculum includes the following:

- **Bio-technology**, defined as a set of technologies including, but not limited to, tissue culture and recombinant DNA techniques, bioinformatics and genomics, proteomics and structural biology, and all other techniques employed for the genetic modification of living organisms, used to exploit and modify living organisms to create/produce new intellectual property, tools, goods, products and services.
- **Bio-fuels and ethanol gel** identification of suitable crops for bio-fuel production; development of engineering plants of different capacities; adaptation of farm implements; environmental impacts of using bio-fuel and the economics thereof; value addition to the protein-rich residues for the feed and food markets. Ethanol gel is a renewable form of energy made by mixing ethanol with a thickening agent and water. The ethanol is extracted through the fermentation and distillation of sugars such as molasses, sugar cane and sweet sorghum or starch. Crops like cassava or maize could also be used. Ethanol gel is more suitable for household stoves and lighting.
- **Biogas** is well established in China, India and other Asian countries as a rural source of energy. The process requires biomass, for example, farm manure to be fermented. Biogas is an environmentally friendly energy source since it is

not derived from crude oil. Animal dung is put in a digester, an airtight container with an inlet for the farm manure, an outlet for the nutrient-rich outflow and a gas line to the house.

- **Organic Farming.** Certified organic production started with rooibos tea, mangoes, avocados, herbs, spices, and vegetables (ITC 1999). It has expanded to include a much wider range of products: organic wines, olive oil, speciality vegetables and berries, citrus, sub-tropical fruit, and dairy products have become major export commodities (IFOAM 2003). Different sorts of vegetables and culinary herbs form the core of the organic produce sold in South Africa itself (EPOPA 2006). Most organic growers therefore look to Europe as their outlet area (IFOAM 2003). Two local certification agencies exist. Afrisco, which is associated with Ecocert, is in the process of becoming ISO accredited, so that it will soon be able to provide EU certification
- **Aquaculture** refers to breeding, rearing and harvesting plants and animals in all types of water environments, including lakes, ponds, rivers and the oceans. It can take place in the natural environment or in a manmade environment. There are two types of production, marine aquaculture produces (oyster, prawns, mussels, salmon and shrimp) and freshwater aquaculture includes catfish, trout and tilapia.
- **Hydroponics** is an innovative production system which is relatively inexpensive to maintain once the initial capital investment has been made. This system needs no soil for production purposes, as production takes place in a bagged wood shaving medium which requires a low volume of irrigation (which includes all the necessary nutrients, called fertigation), due to the nature and design of the production system. This system needs only a small area of infertile land for its establishment, yielding high volumes in comparison to alternative (open land) production systems.
- Despite its high cost and high profile, **mechanisation** is a further input (like any other such as fertiliser, seed and crop protection chemicals), and is one of a mix of management tools a farmer has available to maximize production and profit. The type and degree of mechanisation should be decided by the producer to best suit his business and his own particular circumstances, and the choice of the suitable level of mechanisation will therefore be just one of a number of choices that the farmer has to make.
- **Agri-industry** contributes to the economy at many levels along the food value chain, from growers to harvester to processors to seller. The processing, packing and marketing of agricultural products are closely related activities. Agro-industry also increases the production of affordable food that is convenient to the consumers. Methods of quick freezing and dehydration have increased the markets for many farm products, and
- **Solar Power** - Capturing energy from the sun for some activities on the farm can reduce the farm's electricity bills. Energy from the sun is pure, unlimited and free.

4.3.8 SCARCE AND CRITICAL SKILLS

According to the document titled “*Agriculture Sector Skills Plan for the period July 2005- March 2010*” compiled by the Agri Sector Education and Training Authority (AgriSETA) scarce skills refer to occupations in which there are a scarcity of qualified and experienced people at the present time, or anticipated in the future to fill particular occupations or specialisations in the labour market. This can be as a result of one or both of the following:

- Skilled persons are not available, or
- The available skilled persons do not fulfil employment criteria.

This in turn can be as a result of one or a combination of the following factors. Here grouped as either absolute or relative scarcity:

In case of absolute scarcity suitably skilled persons are not available as a result of:

- A new or emerging occupation – Few persons exist in the country with the required skills (qualifications and experience) and education and training providers have not developed learning programmes to meet the skill requirements,
- Firms, sectors and government are unable to implement planned growth strategies and are experiencing productivity, service delivery and quality problems which are directly attributable to a lack of skilled individuals, and
- Replacement demand would reflect an absolute scarcity where there are no people enrolled or engaged in the process of acquiring skills that need to be replaced.

In the case of relative scarcity suitably qualified persons are available but they do not meet other employment criteria as a result of:

- Geographical location – People are often not interested in working in very isolated areas,
- Equity considerations – There are few candidates available from the right groups available to fill the skills requirements of firms, and
- Replacement demand – a relative scarcity where persons are currently obtaining the necessary qualifications and experience, but are not available to meet the existing replacement demand in the short term.

The National Education and Training Strategy for Agriculture (AET Strategy) highlights the following critical skills needs and constraints within the sector divided into five broad areas:

- Agricultural Production – The focus and research should be expanded to include the needs of small-scale and subsistence farmers
- Agricultural engineering – The focus and research should be geared towards subsistence and small-scale farming. More agricultural engineers are necessary.
- Agricultural economics – A general increase in agricultural economic skills in farmers and extension officers is necessary.

- Agricultural development – Agricultural Extensionists and support for emerging and small-scale farmers over the full spectrum i.e. training new extension officers and improving the skills of the existing officers.
- Veterinarians – State veterinarians for the state to perform its role and function regarding prevention, monitoring and regulating.

In addition critical skills are basic skills necessary for the effective functioning in any discipline. Table 4.1 below indicates the critical skill, the learning area in which it is included at GET level and additional information from the document titled “*Revised National Curriculum Statement For Grades R-9 (Schools) Overview*”, compiled by the Department of Education, published in Gazette No 23406, Vol. 443, dated May 2002.

Table 4.1: Critical skills included in the General Education and Training Phase as indicated by the Department of Education (2002)

Learning Area	Critical skill included	Outcomes of learning Area
Languages	Language and Literacy	<ol style="list-style-type: none"> 1. Listening: The learner is able to listen for information and enjoyment, and respond appropriately and critically in a wide range of situations. 2. Speaking: The learner is able to communicate confidently and effectively in a spoken language in a wide range of situations. 3. Reading and Viewing: The learner is able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts. 4. Writing: The learner is able to write different kinds of factual and imaginative texts for a wide range of purposes. 5. Thinking and Reasoning: The learner is able to use language to think and reason, and access, process and use information for learning. 6. Language Structure and Use: The learner knows and is able to use the sounds, words and the grammar of a language to create and interpret texts. Listening and speaking; reading and viewing; writing; thinking and reasoning; and the knowledge of sounds, words and grammar, although presented as separate outcomes, should be integrated in teaching and assessment.
Mathematics	Mathematical Skills	<ol style="list-style-type: none"> 1. Numbers, Operations and Relationships: The learner is able to recognise, describe and represent numbers and their relationships and can count, estimate, calculate and check with competence and confidence in solving problems. 2. Patterns, Functions and Algebra: The learner is able to recognise, describe and represent patterns and relationships, and solves problems using algebraic language and skills. 3. Space and Shape: The learner is able to describe and represent characteristics and relationships between 2-D shapes and 3-D objects in a variety of orientations and positions. 4. Measurement: The learner is able to use appropriate measuring units, instruments and formulae in a variety of contexts. 5. Data Handling: The learner is able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation.
Natural Science / Life orientation	Cognitive Skills – Problem Solving	<p>Natural Science -1. Scientific Investigations: The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.</p> <p>Life Orientation - 3. Personal Development: The learner is able to use acquired life skills to achieve and extend personal potential to respond effectively to challenges in his/her world.</p>
Technology	ITC skills	<ol style="list-style-type: none"> 1. Technological Processes and Skills: The learner is able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies. 2. Technological Knowledge and Understanding: The learner is able to understand and apply relevant technological knowledge ethically and responsibly. 3. Technology, Society and Environment: The learner is able to demonstrate an understanding of the interrelationships between Science, Technology, Society and the environment over time.

Each of the scarce skills identified by the AET Strategy can be defined as follows:

4.3.8.1 Agricultural Production – Research areas

According to the National Research Foundation (NRF), research is original investigation undertaken to gain knowledge and/or enhance understanding. Research specifically includes:

- the creation and development of the intellectual infrastructure of subjects and disciplines (e.g. through dictionaries, scholarly editions, catalogues and contributions to major research databases);
- the invention or generation of ideas, images, performances and artefacts where these manifestly embody new or substantially developed insights;
- building on existing knowledge to produce new or substantially improved materials, devices, products, policies or processes.

It specifically excludes:

- routine testing and analysis of materials, components, instruments and processes, as distinct from the development of new analytical techniques.
- the development of teaching materials and teaching practices that do not embody substantial original enquiry.

4.3.8.2 Agricultural Engineering - Design

The marked interest in agricultural engineering as a career choice has been widely debated. Food processing, packaging, storage and transport; numerous applications for computers, and sales and service opportunities are all off-farm activities that fall within the ambit of the agricultural engineer (Agricultural Digest, 2005/2006).

Agricultural engineers apply engineering technology and knowledge of biological sciences to agricultural problems such as power and machinery, electrification, structures, soil and water utilisation, and processing of agricultural products.

Agricultural engineers are problem-solvers, intent on detail, skilled in applicable technology and with an ability to design. Good communication skills are important for dealing with a team of colleagues as well as clients. Being practical and adaptable will come in useful, as things often do not go according to plan.

Engineering and design research call for many of the same skills as described in the previous section. From a curriculum perspective high quality mathematic and physical science knowledge is imperative.

4.3.8.3 Agricultural Development - Extension Officers

Agriculturists (also known as Extension Officers) assist farmers with the development of their land and the infrastructure on their land. They also provide extension (information) services. Some agriculturists are specialists in particular farming areas or activities, and their accountability lies mostly with supplying an information and support service to improve the profitability of existing farmers. Others specialise in helping new farmers develop their farms to become profitable. Agriculturists should be practical, realistic, innovative and organised. They should be able to work independently, and also have excellent communication skills, both oral and written, with people from a variety of backgrounds. Being able to lead constructive meetings is also very important. A lively interest in agriculture in general, as well as technical and practical knowledge of agricultural practices is essential such as cost-effective production, breeding, irrigation, marketing, financial management, facilities and planning.

4.3.8.4 Agricultural Economics – Economic Knowledge at all levels

Agricultural economists analyse economic and social phenomena in the world, and the impact thereof on agriculture. Research is an important part of the career.

Some career opportunities include:

- Agribusiness Management
- Financial services

An agricultural economist should have mathematical skills, be intuitive and have excellent communication skills.

4.3.8.5 Veterinarians

Veterinarians maintain the health of animals and treat sick or injured animals. They may specialise in treating pets, zoo animals, wildlife, horses, or farm animals. Veterinarians need to have animal-handling skills and the ability to diagnose problems. They also need skill in performing animal surgery. Veterinarians need to know about animals and animal diseases through the study of anatomy, physiology, biochemistry, microbiology, parasitology, medicine and surgery. Veterinarians should be understanding, patient, and concerned for animals. They must inspire confidence in their clients. They should not have any allergies to animals.

4.4 REVIEW OF CURRENT AET SUPPLY AND CURRICULA AT GET AND FET LEVEL IN ADDRESSING CHALLENGES

This section reviews curriculum at the GET and FET levels to establish to what extent it is responsive to, and addresses the agricultural challenges outlined in section 4.3 above. The level of responsiveness at HET level is addressed separately under section 4.5.

4.4.1 SUSTAINABLE AGRICULTURE AND DEVELOPMENT, LAND CARE

From an AET provisioning and curriculum perspective it is thus important that AET programmes incorporate natural resource management, land care and sustainability components as part of the syllabus.

This is important for curricula at all levels (i.e. ranging from school level through to programmes at HET level) and should include:

- A knowledge and understanding of the environment and the need to protect our natural resources, habitat and biodiversity
- Informing people involved in agriculture regarding their rights, responsibilities and liabilities in terms of environmental legislation
- Promotion and propagation of good land use practices
- Promotion and propagation of water management practices (including water harvesting)
- Correct and responsible use of chemicals (both for the fertilisation of soils and the control of pests and diseases) and the propagation of alternative natural methodologies e.g. homestead composting systems
- Specialist programmes aimed at natural resource management (e.g. variety of agricultural scientists) and sustainable development experts (e.g. agricultural economists),
- The efficacy of integrated systems for successful farming,
- How agriculture can fulfil human needs.
- The efficient use of non-renewable resources, and
- Economic principles of running a successful agricultural operation.

A review of and how these issues are addressed at the various levels of delivery reflects the following:

4.4.1.1 At General Education and Training (GET) level

As mentioned previously there are no subjects particularly addressing Agriculture in the GET Phase. However, natural science is closely related to agricultural science.

Natural Sciences

The following learning outcomes are being used (taught and assessed) in the GET curriculum from Foundation phase (Grade R-3), Intermediate phase (Grade 4-6) and Senior phase (Grade 7-9) According to the Document titled “*Revised National Curriculum Statement for Grades R-9 (Schools) Natural Sciences*”, dated May 2002.

Learning Outcome 1: Scientific Investigations

The learner is able to act confidently on curiosity about natural phenomena, and investigate relationships and solve problems in scientific, technological and environmental contexts.

Learning Outcome 2: Constructing Science Knowledge

The learner will know and be able to interpret and apply scientific, technological and environmental knowledge.

Learning Outcome 3: Science, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science and technology, society and the environment.

Currently there are no curriculum components existent that address sustainability. Other areas in the Gr. R-9 curriculum that discusses components of sustainability is included in Table 4.2 below.

Core Knowledge and Concepts in Life and Living**Table 4.2:** Gr R-9 Agricultural Curriculum addressing Sustainability:

Foundation Phase	Intermediate phase	Senior Phase
	This Phase addresses the knowledge areas such as plants and animals.	
Interactions in Environments		
	This phase addresses knowledge or learning areas such as ecosystems, sustaining both plant and animal life	The phase covers aspects such as Biodiversity and Ecosystems based on the principles of sustainable development.
Biodiversity, Change and Continuity		

4.4.1.2 At Adult Basic Education and Training (ABET) Level

The Abet Level 4 (NQF1) Curriculum Summary of Natural Science Unit Standards and Specific Outcomes (Agric Related Unit Standards) indicate that the following are the broad outcomes / aims of the programme. The programme should enable students to:

- Demonstrate an understanding of the concept of science,
- Conduct an investigation in the natural sciences,
- Apply basic concepts and principles in the natural sciences,
- Analyse how scientific skills and knowledge contribute to the sustainable use of resources, and
- Assess the impact of scientific innovation on quality of life.

The ABET Curriculum covers a wide range of aspects related such as: how scientific knowledge and skills can be applied in sustainable development of organic resources, describe the effect of mismanagement of inorganic natural resources on the organic resources.

4.4.1.3 At Further Education and Training (FET) Level

Table 4.3: FET Academic High Schools and Agricultural High Schools			
Sub-headings	Grade 10	Grade 11	Grade 12
Integrated systems of Production	In the Learning Programme Guidelines: Agricultural Management Practices (DoE 2008) content framework there is general mention of management practices but there is no indication that integrated systems of production in particular are discussed.	In the Learning Programme Guidelines: Agricultural Management Practices (DoE 2008) content framework there is general mention of management practices but there is no indication that integrated systems of production in particular are discussed.	In the Learning Programme Guidelines: Agricultural Management Practices (DoE 2008) content framework there is general mention of management practices but there is no indication that integrated systems of production in particular are discussed.
Satisfy Human Needs	Will be discussed under Food Security	Will be discussed under Food Security	Will be discussed under Food Security
The environment	Agro-ecology is a section of the Learning Programme Guidelines: Agricultural sciences (DoE 2008).		
Efficient use of non-renewable resources		Currently there is no mention of the efficient use of non-renewable resources in any of the courses presented at academic high schools. However, there is the mention of "Optimum resource utilisation", in the Agricultural Sciences Learning Programme Guidelines (DoE 2008).	
Economic viability of farming enterprise			In the Learning Programme Guidelines agricultural management practices (DoE 2008) entrepreneurship and the development of a business plan is incorporated.
FET Colleges NC (V)			
Sub-headings	NQF Level 2	NQF Level 3	NQF Level 4
Integrated systems of Production	Whilst both Animal and Plant production are separate courses, the Subject guides (DoE 2007) indicate that these subjects should prepare learners to enter a mixed farming situation. However, there is no mention on integrated systems of	Whilst both Animal and Plant production are separate courses, the Subject guides (DoE 2007) indicate that these subjects should prepare learners to enter a mixed farming situation. However, there is no mention on integrated systems of production in the Subject	Whilst both Animal and Plant production are separate courses, the Subject guides (DoE 2007) indicate that these subjects should prepare learners to enter a mixed farming situation. However, there is no mention on integrated systems of

	production in the Subject Guides for either course.	Guides for either course.	production in the Subject Guides for either course.
Satisfy Human Needs	Will be discussed under Food Security	Will be discussed under Food Security	Will be discussed under Food Security
The environment		The Agribusiness Subject Guidelines (DoE 2007) contain Topic 2: Sustainability and importing and exporting which will enable the student to demonstrate an understanding of different aspects of sustainability of an agri-business. And explain the concepts of social sustainability, economic sustainability and political sustainability, in the context of the legal environment.	In the Subject Guidelines (DoE 2007) Farm Planning and Mechanisation, Topic 1: Planning an Agricultural Enterprise Has the following outcomes " <i>Recognise the natural resources and other components of a sustainable farming system.</i> <i>The student should be able to: Recognise the natural resources required for an agricultural enterprise at a site, and the limitations they impose</i> <i>Range: Soil, water, climate, vegetation, topography.</i> <i>Recognise other components of a sustainable farming system. Such as people, markets."</i>
Efficient use of non-renewable resources	This is currently not covered in any of the subjects that make up NQF 2 qualifications in Primary Agriculture.	This is currently not covered in any of the subjects that make up NQF 3 qualifications in Primary Agriculture.	This is currently not covered in any of the subjects that make up NQF 3 qualifications in Primary Agriculture.
Economic viability of farming enterprise	The Subject Guidelines Agribusiness (DoE 2007) includes skills that would contribute to the viability of enterprise such as basic accounting (subheading under Topic 1) and the entire Topic 2 titled Entrepreneurship in Agricultural Context.	The Subject Guidelines Agribusiness (DoE 2007) again includes skills that the learner needs to make the farm a viable business such as Collecting data on the operations of a farming enterprise and reporting appropriately, Explaining costing and using it to help assess the viability of parts of an agri-business, as well as understanding the importance of maintenance.	At this level Subject Guidelines Agribusiness (DoE 2007) includes the following learning outcomes to ensure the economic viability of a farming enterprise. Demonstrate an understanding of some systems used in running a farm. Develop a marketing plan for a small agri-business. Prepare a whole farm budget and establish a proper integrated information system for an Agribusiness.

SAQA Qualifications				
Subheadings	NQF1	NQF2*	NQF3*	NQF4*
Integrated systems of Production	One of the fundamental competencies indicated by the SAQA National Certificate: Animal Production is to recognise the basic concepts of sustainable farming practices and be able to perform basic tasks in applying sustainable farming practices	.	The SAQA accredited National Certificate in Plant Production and Animal Production includes the general outcome that the learner will incorporate basic concepts of sustainable farming systems into practical farm activities. In addition the agricultural practices outcomes include the monitoring and supervision of the implementation of social and environmental practices and awareness within the agricultural chain.	The SAQA accredited National Certificate in Plant and Animal Production indicates that one of the fundamental competencies that the learner must assimilate is the planning and maintenance of environmentally sound agricultural processes by identifying knowledge processes and patterns of the environment in the region and understanding the limitations of resources and how their management contributes to sustainable interactive agriculture using environmental indicators
Satisfy Human Needs	Will be discussed under Food Security	Will be discussed under Food Security	Will be discussed under Food Security	Will be discussed under Food Security
The environment		The SAQA accredited National Certificate in Farming outcomes includes the monitoring and support of disaster and conservation management. The SAQA accredited National Certificate in Plant Production and the National Certificate in Animal Production, include the basic functions of the environment by recognising patterns and processes knowing local resources and basic sustainable agricultural	The SAQA accredited National Certificate in Plant and Animal production indicates that the outcomes regarding agricultural practices include monitoring practices to conserve the environment including natural resources ensuring the optimal utilisation of national resources on the farm.	The SAQA accredited National Certificate in Farm Management indicates that one of the outcomes is the identification of possible disasters and the application of the necessary precautions it also indicates that learners must understand what informs personal ethics values and norms and how it impacts on the workplace with reference to the environment.

EVALUATION OF AGRICULTURAL EDUCATION AND TRAINING CURRICULA IN SOUTH AFRICA

		processes using environmental indicators, as well as the basic practices to conserve the environment, including natural resources.		
Efficient use of non-renewable resources	The Agricultural Practices outcomes include the understanding of the role of natural resource management in sustainable agricultural practices into existing farming activities by applying basic practices to conserve the environment, including natural resources.	The SAQA accredited National Certificate in Farming outcomes includes the Utilisation of unsophisticated and/or manual technology and solving of problems within a specific context and appropriate to a commodity of choice.		The SAQA accredited National Certificate in Farm Management indicates that one of the outcomes is the identification and access of basic resources. One of the fundamental competencies required by the SAQA accredited National Certificate in Plant and animal Production is the Identification of the limitation of resources and how their management contributes to sustainable interactive agriculture using environmental indicators.
Economic viability of farming enterprise	The Agribusiness outcomes for the National Certificate: Animal Production indicates that the students will be able to Keep record and report appropriately on inputs and resources in an agricultural environment, as well as keep an accurate and current simple financial record keeping system in an agribusiness environment.	The SAQA Accredited National Certificate in Farming includes an outcome which requires that the learners compile and implement a basic business plan with a short-term focus, which includes a basic sales plan and basic budgeting plan. This plan will be specific to his/her own context of operation and agricultural commodities, whether horticulture, agronomy or animal husbandry. In addition the SAQA accredited National Certificate in Plant Production includes a	The SAQA accredited National Certificate in Plant and Animal Production includes that the learner will maintain stores and agro-inputs in stores, participate in the production planning process on a day-to-day basis, apply the components of the marketing cycle in an alternative agricultural marketing environment and interpret the factors influencing agricultural enterprises and enterprise selection and production and planning accordingly.	The SAQA accredited National Certificate in Plant and Animal Production includes that the learner will maintain stores and agro-inputs in stores, implementation of quality control, demonstrate the ability to develop an integrated marketing plan and to develop an integrated whole farm budget. The learner will also be able to participate in the analysis planning and management of an agribusiness, describe the structure of the relevant industry and evaluate and adjust the enterprise and production processes of animal and crop enterprises.

		section on the basic skills of record keeping as well as the principles and factors influencing agricultural enterprise selection and production.		
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**Plant Production and Animal Production are two separate accredited Courses.*

NQF2: The National Certificates in Mixed Production also include the sections mentioned above under the Plant and Animal Production modules.

4.4.2 FOOD SECURITY

Currently food security as such is not discussed in any of the curricula at GET level, High School or FET college level. However, some food security issues are addressed in the SAQA accredited courses:

- The SAQA accredited National Certificate in Animal Production (NQF Level 1) indicates that the learners must monitor and support the implementation of food safety and quality, production. Environmental and social practices and awareness within the agricultural supply chain.
- The SAQA accredited National Certificate in Farm Management (NQF Level 4) indicates that one of the outcomes is the understanding and application of safety and hygiene standards to comply with applicable legislation and industry requirements. The SAQA accredited National Certificate in Plant and Animal production (NQF Level 4) indicates that the learner will learn to implement a management system which will demonstrate social awareness within the agricultural value chain.

4.4.3 WATER HARVESTING

According to the document titled "*Learning Programme Guidelines Agricultural Technology*", dated January 2008, irrigation is covered in Grade 10. However, water harvesting as an aid to irrigation is not mentioned. Grade 11 also has a section devoted to irrigation, but once again water harvesting is not included. Grade 12 discusses water supply and waste water management, but not water harvesting.

In addition, the document titled "*Learning Programme Guidelines: Agricultural Sciences*" dated January 2008 indicates that Optimum resource utilisation is covered in Grades 10 and 11. This section includes water conservation as well as irrigation.

In the document titled "*National Certificate (Vocational) Subject Guidelines Farm Planning and Mechanisation NQF Level 4*" dated, September 2007 indicates the following:

- Topic 1: Planning an Agricultural Enterprise in which the student is enabled to recognise the natural resources and other components of a sustainable farming system. The student should be able to recognise the natural resources required for an agricultural enterprise at a site, and the limitations they impose.

The SAQA accredited qualifications often mention water conservation and sustainable use of water as a resource, in the Agricultural Practices outcomes for the qualification "National Certificate; Animal Production" the following is indicated:

The student must be able to "*Carry out basic physical farm layout tasks including construction of rainwater harvesting and soil conservation structures*". Therefore, water harvesting is to some degree addressed in the SAQA approved curricula.

4.4.4 RURAL DEVELOPMENT AND WEALTH CREATION

4.4.4.1 At GET Level

Agricultural Challenges and Curriculum Alignment addressing **Rural Wealth Creation**;

Table 4.3: Curriculum At GET Level addressing Rural Wealth Creation

<i>Foundation Phase</i>	<i>Intermediate Phase</i>	<i>Senior Phase</i>
Life Processes and Healthy Living		
	Curriculum gives learners only a wide range of general knowledge.	A wide range of general knowledge is covered by the curriculum.
Interactions in Environments		
	Curriculum gives learners only a wide range of general knowledge.	Curriculum gives learners only a wide range of general knowledge.
Biodiversity, Change and Continuity		
	None	None

4.4.4.2 At FET Level

Rural Wealth creation as a concept is not dealt with in the curriculum at High Schools, FET colleges or within SAQA curricula at present. However, all the skills that learners assimilate during their time at FET level should contribute to the success of the learners in their agricultural endeavours in future.

4.4.5 LAND REFORM (INCLUDING FARM MANAGEMENT)

Whilst the range of knowledge and skills required by farmers to operate and manage their farming ventures on a viable and profitable basis is large and varied, the most critical shortfall and constraint identified amongst land reform beneficiaries are their lack of **farm management and business management skills**. Considering that few black emerging farmers would have had previous experience and exposure in managing farming ventures in a commercial context, and would thus not have developed **entrepreneurship** skills within an agricultural environment, it is paramount that the AET system addresses this learning need as a top priority. Various research assignments have further established that mentorship is one of the most effective approaches to develop this range of skills amongst farmers.

4.4.5.1 At GET Level

Land reform as a concept and/or farm management is not included at GET level

4.4.5.2 At FET Level

Land reform as a concept is not mentioned specifically in the curricula at FET level.

However, Farm Management is addressed as per table 4.4. In this regard irrespective whether new farmers will be enrolled for relevant AET programmes, or if such skills will be transferred to them via Extensionists and Mentors, the following range of knowledge and skills are critically needed by most land reform beneficiaries and thus need to be incorporated within the spectrum of AET curricula:

- Farm Management (planning, organisation, coordination, control)
- Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)
- Production related technical training (relevant production systems)
- Health and safety (including food safety legislation and requirements)
- Entrepreneurship

Table 4.4: FET Academic High Schools and Agricultural High Schools			
Sub-headings	Grade 10	Grade 11	Grade 12
Farm Management (planning, organisation, coordination, control)	Agricultural Management Practices covers management principles used in crop and animal production enterprises.	Agricultural management Practices Learning Programme Guidelines include the identification of management aspects related to production related to agro-ecological region to solve agricultural related problems.	Agricultural Management Practices Learning Programme Guidelines specify that at this level the learner will analyse and explain management principles used in the relevant agribusiness, and identify management aspects related processing and marketing aspects related to the specific agribusiness in a given agro-ecological region
Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)			Agricultural Management Practices Learning Programme Guidelines indicate that learners will analyse the economic and financial aspects of specific agribusiness enterprises or supply chains.
Production related technical training (relevant production systems)	Agricultural Management Practices Learning Programme Guidelines indicate the learners will be introduced to crop production and animal production including classification of crops according to agronomic characteristics of seed and plant and the breeds available for each animal group.	Agricultural Management Practices Learning Programme Guidelines indicate that crop production and animal production will be covered. Such as breed standards and selection of breeding stock as well as breeding systems and aids.	Agricultural Management Practices Learning Programme Guidelines indicate that learners will be able to analyse farming systems as utilised by specific crop and animal production enterprises and demonstrating the responsible handling of animals and the use of related agricultural equipment according to the manufacturer's instruction manual and the Occupational Health and Safety Act (Act 85 of 1993).
Health and safety (including food safety legislation and requirements)	The Occupational Health and Safety Act (Act 85 of 1993) and General Safety regulations are included in the curriculum on Agricultural Technology.	The Occupational Health and Safety Act (Act 85 of 1993) and General Safety regulations are included in the curriculum on Agric Technology.	The Occupational Health and Safety Act (Act 85 of 1993) and General Safety regulations are included in the curriculum on Agricultural Technology.
Entrepreneurship			Entrepreneurship is covered in the learning programme guidelines of agricultural management practices. Including the development of a business plan, industry attachment and project reports.
FET Colleges NC (V)			

Sub-headings	NQF Level 2	NQF Level 3	NQF Level 4
Farm Management (planning, organisation, coordination, control)	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Basic Farm Accounting, which should enable the learner to Demonstrate an understanding of simple storage and recordkeeping procedures and use of records in a farm or related agribusiness.	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Collecting data, costing, planning and budget construction which should enable the learner to collect data on the operations of a farming enterprise and report appropriately. As well as state the implications of the data collected and produce appropriate reports. Students should also be able to construct a cash flow budget for an agri-business for the business in its entirety as well as separate components.	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Integrated management of a small agricultural which should enable the learner to: Demonstrate an understanding of some systems used in running a farm. And the student should be able to: Explain the use of a simple human resources system, including payroll management, in a small farm, using templates provided. As well as use a simple computerised accounting system with information of the sort encountered on a small farm. Students will also learn how to complete a tax return for a farm, and calculate VAT, SITE, and other relevant taxes used in a small enterprise.
Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Basic Farm Accounting, which should enable the learner to Demonstrate an understanding of basic accounting practices.	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Collecting data, costing, planning and budget construction which should enable the learner to Explain costing and use it to help assess the viability of parts of an agri-business. And to identify various sources of income generation available to the agri-business. Demonstrate understanding of a farming operations plan / work plan. Students should also be able to Outline the components of such a plan - the operations involved and their sequence.	The subject guidelines provided by the DoE for Agribusiness includes Topic 1: Integrated management of a small agricultural enterprise which should enable the learner to: Develop a marketing plan for a small agri-business. As well as gather information about market demand and size, transport and other marketing costs for existing and potential new commodities, construct a costed plan for a small enterprise to market existing and new commodities within the region. In addition students will learn how to Prepare a whole farm budget and establish a proper integrated information system for an Agri-Business. As well as the following: <ul style="list-style-type: none"> • Prepare an integrated whole farm budget. • Use sensitive analysis (what-if functions) to determine the economic and financial viability of a business. • Develop an information system for a

			<p>commercially-driven Agri-Business.</p> <ul style="list-style-type: none"> • Use the information system to generate managerial information for improved decision-making.
Production related technical training (relevant production systems)	The subject guidelines provided by the DoE for Animal Production indicates that the learners will be taught the basics of poultry and goat production. The subject guidelines indicate the learners will be taught basic vegetable production in the module on Plant production.	The subject guidelines provided by the DoE for Animal Production indicates that the learners will be taught the basics of sheep and cattle production. The subject guidelines indicate the learners will be taught basic production of agronomic crops, fruit trees and agro forestry systems in the module on Plant production.	The subject guidelines provided by the DoE for Animal Production indicates that the learners will be taught animal nutrition, cattle and dairy farming as well as ostrich farming. The advanced plant production course will concentrate on plant propagation and flower farming.
Health and safety (including food safety legislation and requirements)			
Entrepreneurship	The subject guidelines provided by the DoE for Agribusiness includes Topic 2: Entrepreneurship in Agricultural Contexts which should enable the learner to demonstrate an understanding of investment capital and different types of costs. And demonstrate an understanding of some basic factors affecting the selection of suitable agricultural enterprises in particular locations.		

SAQA Qualifications*		
Subheadings	NQF1	NQF2*
Farm Management (planning, organisation, coordination, control)	The SAQA accredited National Certificate on Animal Production gives Agri-business outcomes (amongst others) enabling the student to understand the basic principles of enterprise selection and production	The following outcomes are specified in the National Certificate: Farming Demonstrate a basic understanding of and apply basic principles of communication within the farm operations. Work effectively with others and operate as part of a team by applying basic teamwork principles. Understand and apply basic ethical principles, values, and norms applicable to the workplace with specific reference to relationships with co-workers, clients, him- or herself as well as the environment. The National Certificate: Plant Production indicate the following Agri-business skills as outcomes: Set goals and objectives related to production / conversion systems within an agricultural business. Describe and understand the principles of Human Resources Management as applied
Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)	The SAQA accredited National Certificate on Animal Production gives Agri-business: outcomes as the following: Keep record and report appropriately on inputs and resources in an agricultural environment. Describe the importance of marketing within the agricultural production process. Keep an accurate and current simple financial record keeping system in an agri-business environment. Apply the basic principles of human resources management in an agricultural environment.	The following outcomes are specified in the National Certificate: Farming Compile and implement a basic business plan with a short-term focus, which includes a basic sales plan and basic budgeting plan. This plan will be specific to his/her own context of operation and agricultural commodities, whether horticulture, agronomy or animal husbandry. The National Certificate: Plant Production indicate the following Agri-business skills as outcomes: Apply basic skills in record keeping, storage, contaminant management and associated legislation when controlling input and stock. Apply knowledge of the marketing principles within agriculture for a specific product or service. Define and illustrate the gross margin statement, income statement, balance sheet and cash flow budget as well as the different cost aspects that one can find in a business. Explain the principles and factors influencing agricultural enterprise selection and production.
Production related technical	The SAQA accredited National Certificate: Animal Production gives Agri-business: outcomes as enabling the student to describe the production process in an agricultural	The following outcomes are specified in the National Certificate: Farming Distinguish between different production systems appropriate to a specific commodity

<p>training (relevant production systems)</p>	<p>environment. The outcomes for Animal Production in particular also include the following: Visually evaluate animals externally with respect to their basic anatomical characteristics and morphological systems. Supply feeding by following the correct on-farm animal feeding practices. Observe and report on breeding behaviour of farm animals. Demonstrate an understanding of, and identifies the readiness of animal products for harvesting. Observe the health status of the animals and handle animals correctly</p> <p>In addition the SAQA accredited National Certificate: Mixed Farming indicate the following Production related skills as outcomes:</p> <p>Apply soil nutrient preparations in a safe, effective and responsible manner.</p> <p>Harvest agricultural crops by using basic harvesting tools</p> <p>Plant a range of crops according to correct placing, spacing and depth of the plant material.</p> <p>Identify insects and explain the damage it can cause to crops.</p> <p>Manipulate plants using pre-determined methods and techniques.</p> <p>Supply feeding by following the correct on-farm animal feeding practices.</p> <p>Demonstrate an understanding of and identify the readiness of animal products for harvesting.</p> <p>Observe the health status of the animals and will handle animals correctly.</p> <p>Lastly the National Certificate: Plant Production indicate the following skills as outcomes:</p> <p>Demonstrate an elementary understanding of the parts of a plant and their basic functions</p> <p>Apply soil nutrient preparations in a safe, effective and responsible manner.</p> <p>Assist with the propagation of plants. Harvest agricultural crops by using basic harvesting tools.</p>	<p>The following Plant Production outcomes are specified in the National Certificate: Plant Production</p> <p>Identify the basic structures and functions of a plant</p> <p>Soil is prepared according to the requirements of the crop.</p> <p>Propagate plants</p> <p>Recognize common insects, disease symptoms and weeds and apply basic control measures</p> <p>Apply agrochemical products in a safe, effective and responsible manner with consideration to the environment.</p> <p>Plant a range of crops and monitor the correct establish of crops as well as ensuring that planting is placed and spaced as required. Manipulate plants by applying a narrow range of techniques Harvest crops.</p> <p>The following Animal Production outcomes are specified in the National Certificate: Plant Production</p> <p>Produce livestock whilst demonstrating an understanding of the environment and its relationship to sustainable livestock production.</p> <p>The following Animal Production outcomes are specified in the National Certificate: Animal Production</p> <p>Evaluate animals externally with respect to their internal and external anatomical systems and morphology</p> <p>Explain the basic concepts used in animal nutrition, maintaining, preserving, modifying and enhancing the nutrient value of animal feeds and follow correct on-farm feeding practices.</p> <p>Identify and monitor breeding behaviour, and pre and post-partum behaviour of farm animals.</p> <p>Harvest animal products, prepare them for processing and identify processes involved in processing of animal products.</p> <p>Identify, record and report on abnormal animal behaviour and physical abnormalities, supervise the movement and restraint of animals and apply treatment and perform basic procedures.</p> <p>The following Plant Production outcomes are specified in the National Certificate: Animal Production Produce crop whilst demonstrating an understanding of the physical and biological environment and its relationship to sustainable production.</p> <p>In addition the SAQA accredited National Certificate: Mixed Farming</p>
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	<p>Plant a range of crops according to correct placing, spacing and depth of the plant material.</p> <p>Identify insects and explain the damage it can cause to crops.</p> <p>Manipulate plants using pre-determined methods and techniques.</p>	<p>indicate the following Animal Production related skills as outcomes:</p> <p>Explain the basic concepts used in animal nutrition, maintaining, preserving, modifying and enhancing the nutrient value of animal feeds and follow correct on-farm feeding practices.</p> <p>Identify, record and report on abnormal animal behaviour and physical abnormalities, supervise the movement and restraint of animals and apply treatment and perform basic procedures.</p> <p>In addition the SAQA accredited National Certificate: Mixed Farming indicate the following Plant Production related skills as outcomes:</p> <p>Soil is prepared according to the requirements of the crop.</p> <p>Recognize common insects, disease symptoms and weeds and apply basic control measures</p> <p>Apply agrochemical products in a safe, effective and responsible manner with consideration to the environment.</p> <p>Plant a range of crops and monitor the correct establish of crops as well as ensuring that planting is placed and spaced as required.</p> <p>Manipulate plants by applying a narrow range of techniques</p>
Health and safety (including food safety legislation and requirements)	<p>The SAQA accredited National Certificate on Animal Production gives Agricultural Practices outcomes that include the Application of sound food safety principles by identifying risk factors in food contamination and applying preventative measures to ensure product safety.</p>	<p>The following outcomes are specified in the National Certificate: Farming</p> <p>Understand and apply operational safety and hygiene standards applicable to the industry and market, taking into account the level of operational requirements.</p> <p>Be aware of and apply applicable legislation Distinguish between different production systems appropriate to a specific commodity The following Agricultural Practices outcomes are specified in the National Certificate: Plant Production</p> <p>Monitor and support the implementation of food safety and quality, production, environmental and social practices and awareness within the agricultural supply chain.</p>
Entrepreneurs hip	<p>Whilst there are no particular elements present in the outcomes of the SAQA accredited qualifications at this level, all the skills indicated in the first two sections mentioned above should assist in successful entrepreneurship.</p>	<p>The following outcomes are specified in the National Certificate: Farming</p> <p>Apply basic principles of entrepreneurship (should the learner choose to include this elective in the learning programme).</p>

Subheadings	NQF3*	NQF4*
Farm Management (planning, organisation, coordination, control)	<p>The following general outcomes are specified in the National Certificate: Plant Production</p> <p>Incorporate basic concepts of sustainable farming systems into practical farm activities.</p> <p>The following Agricultural Practices outcomes are specified in the National Certificate: Plant Production</p> <p>Apply the principles of water quality management and adjust systems to ensure appropriate levels of quality.</p> <p>Apply a routine maintenance and servicing plan.</p> <p>Monitor practices to conserve the environment, including natural resources whereby ensuring optimal utilization of national resources on the farm.</p> <p>Decide on appropriate land capability options for a given field.</p>	<p>The following general outcomes are specified in the National Certificate: Farming</p> <p>Understand what informs personal ethics, values, and norms and how it impacts on the workplace with specific reference to relationships with co-workers, clients, him- or her as well as the environment.</p> <p>Co-ordinate production processes.</p>
Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)	<p>The following Agri-business outcomes are specified in the National Certificate: Plant Production</p> <p>Maintain stores and agro-inputs in stores. Participate in the production planning process on a day-to-day basis.</p> <p>Apply the components of the marketing cycle in an alternative agricultural marketing environment.</p> <p>Determine viability of agri-business</p> <p>Assist with the management of human resources in an agricultural environment. Interpret the factors influencing agricultural enterprises and enterprise selection and production, and of planning accordingly.</p>	<p>The following general outcomes are specified in the National Certificate: Farming</p> <p>Interpret and manage a sub-section of a pre-set business plan</p> <p>Demonstrate an understanding and adhere to basic marketing principles, taking into account quality standards and the export market.</p> <p>The following Agri-business outcomes are specified in the National Certificate: Animal Production</p> <p>Manage stores and agro-inputs in stores.</p> <p>Implement quality control aspects of an agribusiness</p> <p>Demonstrate ability to development of an integrated marketing plan.</p> <p>Demonstrate the ability to develop an integrated whole farm budget.</p> <p>Apply principles of human resources management in an agricultural environment.</p> <p>Participate in the analysis, planning and management of an agri-business.</p> <p>Describe the historical and current structure of the relevant industry within secondary agriculture.</p> <p>Evaluate and adjust the enterprise and production processes of animal and crop enterprises.</p>

<p>Production related technical training (relevant production systems)</p>	<p>The following Plant Production outcomes are specified in the National Certificate: Plant Production</p> <p>Identify and describe the physiological processes and anatomical structures of a plant.</p> <p>Soil nutrient preparations are performed in a safe, effective and responsible manner for the benefit of plant/crop growth with consideration to the environment.</p> <p>Plants are propagated in a limited range of conditions</p> <p>Apply basic control measures for insects, plant diseases and common weeds.</p> <p>Monitor and co-ordinate the harvesting of crops.</p> <p>Monitor and supervise the manipulation of plants by applying a broad range of techniques.</p> <p>The following Animal Production outcomes are specified in the National Certificate: Plant Production</p> <p>Evaluate animals with respect to their internal and external anatomical systems and physiology of animals</p> <p>Describe the nature, function and utilisation of animal feeds and nutrients</p> <p>Apply advanced animal breeding practices</p> <p>Identify and describe the harvesting of animal products</p> <p>Demonstrate the implementation of minor clinical procedures under restraint</p>	<p>The following general outcomes are specified in the National Certificate: Farming</p> <p>Understand, interpret and apply technology within a specific context (either horticulture, or agronomy, or animal husbandry) and appropriate to a commodity(ies) of own choice. This could be applicable to both primary and secondary agricultural processes</p> <p>Understand, apply and monitor different production systems appropriate to an agricultural commodity(ies)</p> <p>The following outcomes are specified in the National Certificate: Animal Production</p> <p>Evaluate and manage animals according to specific criteria related to anatomical and physiological systems.</p> <p>Describe the scientific and technical principles of animal nutrition, feed, technology and feeding management.</p> <p>Apply basic genetic principles in the planning and maintenance of animal breeding systems.</p> <p>Describe potential damage and harmful effects to animal products and suggest alternatives.</p> <p>Apply repetitive and basic clinical procedures and apply correct dosages for the treatment of common diseases.</p> <p>Describe the historic and geographic origin and distribution of animal species and its use by man.</p> <p>The following outcomes are specified in the National Certificate: Plant Production</p> <p>Explain the different physiological processes involved in the growth and development of the plant.</p> <p>Establish and supervise the implementation of soil preparation procedures</p> <p>Propagate plants in a variety of situations</p> <p>Demonstrate an understanding of an integrated pest management system</p> <p>Develop a harvesting plan for crops.</p> <p>Implement a plant manipulation management plan using a broad range of techniques.</p>
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Health and safety (including food safety legislation and requirements)	The following Agricultural Practices outcomes are specified in the National Certificate: Plant Production Monitor and supervise the implementation of food safety and quality, production, environmental and social practices, and awareness within the agricultural supply chain.	The following general outcomes are specified in the National Certificate: Farming Understand, implement and apply safety and hygiene standards to comply with applicable legislation and industry requirements Implement applicable legislation. The following Agricultural Practices outcomes are specified in the National Certificate: Animal Production Implement a management system related to food safety, production practices, as well as demonstrate environmental and social awareness within the agricultural supply chain.
Entrepreneurship	Whilst there are no particular elements present in the outcomes of the SAQA accredited qualifications at this level, all the skills indicated in the first two sections mentioned above should assist in successful entrepreneurship.	Whilst there are no particular elements present in the outcomes of the SAQA accredited qualifications at this level, all the skills indicated in the first two sections mentioned above should assist in successful entrepreneurship.

**Within the SAQA qualifications National Certificate: Animal Production and the National Certificate: Plant Production, the General, Agribusiness and Agricultural Practices outcomes are often interchangeable. Therefore, contents are not repeated in this table.*

4.4.6 GLOBALISATION

Currently whilst globalisation as a concept may be part of school curricula, there is no mention of the effect of globalisation on the agricultural sector in the current AET curricula at either GET or FET levels. Issues such as international trade barriers and knowledge of the content of regulations regarding food safety in export countries are also not mentioned.

4.4.7 NEW TECHNOLOGY, INNOVATION AND INFORMATION

As indicated earlier education and training is essential for the correct use and application of technology transfer. At GET level there is currently no indication that New Technology, Innovation and Information form part of the curriculum. However, at FET level the AET curricula presently incorporate some elements of new technology as is indicated in the table 4.5 below.

4.4.7.1 At FET Level

Table 4.5 FET Academic High Schools and Agricultural High Schools			
Sub-headings	Grade 10	Grade 11	Grade 12
Bio-technology			In the learning programme guidelines agricultural sciences (DoE 2008) basic agricultural genetics is discussed as well as growth and genetic manipulation of genetically modified crops and their purpose.
Bio-fuels and ethanol gel			
Biogas			
Organic Farming			
Aquaculture		Aquaculture is discussed under Optimum Resource Utilisation in the Learning Programme Guideline for agricultural science (DoE 2008)	
Hydroponics		Hydroponics is discussed under Optimum Resource Utilisation in the Learning Programme Guideline for agricultural science (DoE 2008)	
Mechanisation		The learning programme guidelines for Agricultural Technology (DoE 2008) indicate that mechanical crop cultivating implements and equipment as well as mechanised systems will be discussed.	
Agri-industry	Agri-industry is a knowledge area included in the Learning Programme Guidelines: Agricultural Sciences (DoE 2008). This module includes the demand for foodstuffs, an overview of agricultural development, organisations in the farming industry and agricultural legislation.		

FET Colleges NC (V)			
Sub-headings	NQF Level 2	NQF Level 3	NQF Level 4
Bio-technology			
Bio-fuels and ethanol gel			
Biogas			
Organic Farming			
Aquaculture			
Hydroponics	The subject guidelines for Plant Production include hydroponics under the Vegetable Production Topic.		
Mechanisation			The Subject Guidelines for Farm Planning include topic 2: Agricultural mechanization, which should enable the student to demonstrate an understanding of the circumstances under which machines, manual labour and draught animals are appropriate. As well as maintenance and calibration of mechanical implements.
Agri-industry			
Solar Power			

4.4.8 SCARCE SKILLS

The alignment of educational programmes and identified scarce skills will be discussed under the following five broad areas, which is based on the Scarce Skills identified by the AgriSETA Sector Skills Plan, dated 2005

- Agricultural Production – The focus and research should be expanded to include the needs of small-scale and subsistence farmers
- Agricultural engineering – The focus and research should be geared towards subsistence and small-scale farming. More agricultural engineers are necessary.
- Agricultural economics – A general increase in agricultural economic skills in farmers and extension officers is necessary.
- Agricultural development – Agricultural extensionists and support for emerging and small-scale farmers over the full spectrum i.e. training new extension officers and improving the skills of the existing officers.
- Veterinarians – State veterinarians for the state to perform its role and function regarding prevention, monitoring and regulating.

Table 4.6 reflects the findings re alignment of educational programmes to scarce skills in the agricultural sector

Table 4.6 Alignment of Educational Programmes to Scarce Skills in the Agricultural Sector				
Scarce Skills	GET	FET (NSC)*	HET	
			UoT	University
Agricultural Production – Research areas	<p>According to the document titled “<i>Revised National Curriculum Statement For Grades R-9 (Schools) Natural Sciences</i>”, compiled by the Department of Education, published in Gazette No.: 23406, Vol 443, and dated May 2002 Natural Sciences Learning Outcomes are presented as the following:</p> <p>Learning Outcome 1: Scientific Investigations - The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts,</p> <p>Learning Outcome 2: Constructing Science Knowledge - The learner will know and be able to interpret and apply scientific, technological and environmental knowledge, and</p>	<p>According to the document titled “<i>National Curriculum Statement Grades 10-12 (General) Learning Programme Guidelines Agricultural Sciences</i>”, compiled by the Department of Education and dated January 2008, Agricultural Sciences can be defined as:</p> <p><i>“The study of the relationship between soils, plants and animals to produce and process food, fibre, fuel and any other agricultural commodities that have an economic, aesthetic and cultural value.”</i></p> <p>Whilst Agricultural Technology is defined as the following according to the document titled <i>National Curriculum Statement Grades 10-12 (General) Learning Programme Guidelines Agricultural Technology</i>”, compiled by the Department of Education and dated January 2008,</p> <p>In addition, for learners to be equipped for a career in research other subjects are also necessary to teach tools and principles such as Physical Science and Mathematics. These fields develop the necessary skills (and qualification) to be able to study further at HET level.</p> <p>According to the document titled “<i>National Curriculum Statement Grades 10-12 (General) Learning Programme Guidelines Physical</i></p>	<p>At HET level the curricula followed by the different educational institutions are no longer as set as it is at the lower levels of education. However, BSc studies at universities encourage research, and all post-graduate programmes are generally research orientated.</p> <p>According to the report titled “<i>International Training Strategy for the Agricultural Sector</i>”, dated 2006 and compiled by the Department of Agriculture, undergraduate study fields will be informed by the skills needs analysis and will be guided by the Sector Strategic Plan objectives and the ability to provide such skills. Study areas will include the skills required to drive national programmes such as ASGI-SA, AADP, CASP and AgriBEE and will focus on those study fields where South African Academic Institutions are unable to produce the desired capacities needed by the sector within a given timeframe. The training must be technological in nature and address the issues and problems faced by the beneficiaries of these national programmes.</p> <p>According to the draft document titled “<i>National Agricultural Research & Development Strategy</i>” dated 2006 the universities with agriculture-related faculties and/or schools, agricultural colleges and the agricultural development institutes constitute a primary source of research, an activity carried out in conjunction with teaching, education and training. These institutions are therefore an important nucleus for capacity building and curriculum development in agriculture.</p>	

	<p>Learning Outcome 3: Science, Society and the Environment - The learner will be able to demonstrate an understanding of the interrelationships between science and technology, society and the environment.</p> <p>Should these Learning Outcomes be met in pupils at GET level, successful study on the higher education bands will be enhanced, readying learners to become effective researchers.</p> <p>In addition Critical Skills are learned in this phase of education. According to the AgriSETA Sector Skills Plan (2005) key or generic skills such as cognitive skills (problem solving, learning to learn) language and literacy, mathematical skills, Information and Communications Technology (ICT) skills and working in teams are critical skills.</p>	<p><i>Sciences</i>”, compiled by the Department of Education and dated January 2008, Physical Science will be:</p> <ul style="list-style-type: none"> • <i>“...giving learners the ability to work in scientific ways or to apply scientific principles which have proved effective in understanding and dealing with the natural and physical world in which they live;</i> • <i>stimulating their curiosity, deepening their interest in the natural and physical world in which they live, and guiding them to reflect on the universe;</i> • <i>developing insights and respect for different scientific perspectives and a sensitivity to cultural beliefs, prejudices and practices in society (this aspect should also include the mobilising of African indigenous scientific knowledge and practices, particularly as these relate to solving social and environmental challenges in Africa);</i> • <i>developing useful skills and attitudes that will prepare learners for various situations in life, such as self-employment and entrepreneurial ventures; and</i> • <i>enhancing understanding that the technological applications of the Physical Sciences should be used responsibly towards social, human, environmental and economic development both in South Africa and globally.”</i> <p>The document titled <i>“National Curriculum Statement Grades 10-12 (General) Mathematics”</i> compiled by the Department of Education and dated 2003 indicate that Mathematics enables learners to:</p>	<p>Their roles will be to:</p> <ul style="list-style-type: none"> • Develop innovative curricula for the education and training of agricultural researchers, scientists, technicians and research managers; • Collaborate with others in the NARS to undertake adaptive and strategic research; • Participate in consortia or centres of excellence focused on specific themes/commodities research. <p>As mentioned previously, agricultural study fields are available at both historically black and historically white institutions. Therefore it is not anticipated that there are racial disparities regarding the enrolment of students in research-orientated scarce skills at HET level in South Africa.</p>
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<p>Agricultural Engineering - Design</p>	<p>The same elements as mentioned above are relevant.</p>	<p>The same elements as mentioned above are relevant.</p>	<p>According to the Agricultural digest (dated 2005/2006) the Tshwane University of Technology, Central University of Technology and Cape Peninsula University of Technology offer civil engineering with agricultural courses.</p> <p>In addition it is possible to become a Technician by doing a 3 year diploma course at several Universities of Technology.</p>	<p>The universities of Pretoria and KwaZulu-Natal offer degree courses in agricultural engineering (Agricultural Digest 2005/2006)</p> <p>However, qualifying as a Civil or Mechanical Engineer, also opens up the possibility of working in Agricultural Engineering.</p> <p>None of the traditionally black universities are mentioned as offering</p>

				agricultural engineering as an option. However, since most of the traditionally white universities have been transformed to be mostly black, it is not expected that there are truly racial disparities as a result of this.
Agricultural Development - Extension Officers**	It is essential that learners assimilate the critical skills necessary to succeed later in life at this level of education. In addition, it would be advantageous if learners are encouraged to pursue physical science and mathematics. In addition learning good verbal and written communication skills would be beneficial.	It is advisable for learners aiming for a career as an Extension Officer to take the full range of courses available to learners at this level to ensure a basis of knowledge for further study. It is also advisable for learners to take mathematics and physical science if they aim to access this career through a BSc qualification.	At UoTs it is possible to study a B Tech degree in agriculture, qualifying students for a job as an extension officer. The B Tech degree in Agriculture is presented at the Cape Peninsula University of Technology (CPUT) and the Central University of Technology (CUT) .	Traditional Universities offer both B. Agric and B Sc Agric as degree courses. The following Universities offer B. Sc Agriculture University of Stellenbosch (SUN), the University of the Free State (UFS), the University of KwaZulu-Natal (UKZN), the University of Pretoria (UP) the University of Venda, the University of Fort Hare and the University of Zululand.
Agricultural Economics – Economic Knowledge at all levels***	It is essential that learners assimilate the critical skills necessary to succeed later in life at this level of education. In addition, it would be advantageous if learners are encouraged to pursue physical science and	It is advisable for learners aiming for a career as an Agricultural Economist to take the full range of courses available to learners at this level to ensure a basis of knowledge for further study. It is also advisable for learners to take mathematics. It is particularly important for learners to take the subject Agricultural Management Practices as it includes economic applications in agriculture as	TUT, NMMU and CUT offer B.Tech degrees in Agriculture with options to take economic subjects, such as Business Management.	Prospective agricultural economists need a B.Agric. Several universities in the country have faculties, departments or schools of agriculture, viz. Fort Hare, Natal, North West, Free

	<p>mathematics. In addition learning good verbal and written communication skills would be beneficial</p>	<p>part of the course. As mentioned in the document titled "<i>National Curriculum Statement Grades 10-12 (general) Learning Programme Guidelines Agricultural Management Practices</i>", compiled by the DoE and dated January 2008, Agricultural Management Practices can be defined as the following <i>"...is the study and application of economic and management principles that are used in the production, transformation and marketing of food and agricultural products. The foregoing principles are used in the production and value adding of high quality agricultural products that have economic, aesthetic, social and cultural value.</i></p> <p><i>Agricultural Management Practices draws knowledge and skills from disciplines such as Crop Sciences, Animal Sciences, Soil Sciences, Economics and Management Sciences, Engineering and Information and Communication Technology and links mainly with subjects like Agricultural Sciences, Agricultural Technology, Life Sciences, Consumer Studies, Mathematics, Physical Sciences, Geography, Accounting, Economics and Business Studies."</i></p>		<p>State, Pretoria, Stellenbosch, Venda, Zululand and the University of Limpopo. The duration of a B.Sc.(Agric.) course is four years.</p>
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<p>Veterinarians</p>	<p>It is essential that learners assimilate the critical skills necessary to succeed later in life at this level of education. In addition, it would be advantageous if learners are encouraged to pursue physical science and mathematics. In addition learning good verbal and written communication skills would be beneficial.</p>	<p>The admission requirements for the B.Sc Vet degree to be completed before embarking on B V Sc are full matric exemption as well as Mathematics and Physical Science.</p>	<p>Universities of technology train Veterinary technicians but no veterinarians</p>	<p>Only the University of Pretoria offer a B.V.Sc Veterinary science degree in South Africa. University of Pretoria, Onderstepoort: 3 Year BSc followed by 4 Year BVSc</p>
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4.5 AGRICULTURAL CHALLENGES AND RESPONSIVENESS AT HET LEVEL

As mentioned previously, generic curricula do not exist for HET courses, because the different institutions develop their own courses to meet a particular need / transfer a particular skill. Therefore, a different approach was followed in order to compare the various AET offerings presently available at tertiary institutions. Questions were set by the research team and a representative of the relevant institutions responded

4.5.1 UNIVERSITIES OF TECHNOLOGY (UoTs)

4.5.1.1 REVIEW OF CURRENT AET CURRICULA AND SUPPLY

Table 4.7 below consolidates the answers received from the four (4) UoTs that offer Agricultural courses. From the responses, attempts to align curriculum to challenges in Agriculture are achieved through the following:

- Keeping abreast with new technology;
- Discussions with relevant committees and boards;
- Revision of curricula and alignment of qualifications, and
- Broadening representation globally.

EVALUATION OF AGRICULTURAL EDUCATION AND TRAINING CURRICULA IN SOUTH AFRICA

Table 4.7: Objective 4: A clear reflection if, how and where the identified challenges are addressed in curricula, learning programmes and qualifications at UoTs

Questions	A	B	C	D
Does interdisciplinary education form a component in your curriculum, e.g. in linking education, extension education and food security?	Yes. Overlapping does occur. Through electives students are exposed to different disciplines.	Yes, indeed: the Agricultural curriculum is enjoying interdisciplinary education integration with distance learning, industry-linked subject offering, animal welfare and food production and processing ethics.	Not in the current curricula, but has been adopted in the planning of the new curricula.	This is the cornerstone of our department. Extension and food security make our department unique to other agriculture offering departments.
Do you offer any unique qualifications (i.e. not offered at other AET provider institutions) in your faculty? If so, please give reason(s) for introducing such qualification(s).	ND: Agriculture (Viticulture & Oenology). Concentrate on agricultural production systems of the Western Cape.	We have introduced viticulture as part of work integrated learning. It is the result of a need identified by our chancellor.	Yes, Equine science. In the late eighties a definite need was identified for a qualification in equine science.	Yes. This department offers a qualification that embraces agriculture in the discipline of crop and animal production as one component, community development and food security as other components. Other institutions do not offer crop and animal as one unit. A student has to select either plant or animal production program but not both. Secondly, food security is not offered as one unit, but this department offers it as part of the program. This department covers the utilization of natural resources, land utilization, crop and animal production, community development and community resource management, skills development, value adding, agricultural economics and extension.

The following list indicates some key aspects pertaining to challenges facing contemporary agricultural training in South Africa. In your honest opinion, which of these are NOT receiving sufficient attention in your faculty's curricula and courses?

	A	B	C	D
Sustainable agriculture and land care				
Development and Land care	X			
Household food security				
Water harvesting	X	X	X	X
Rural wealth creation	X			
Land reform	X	X		
Globalization in terms of food safety, co-operation and international trade		X	X	X
New technology: Information systems	X			
New technology: Bio-technology				X
New technology: Bio-fuels		X		X
New technology: Organic farming				X
New technology: Mechanization				

EVALUATION OF AGRICULTURAL EDUCATION AND TRAINING CURRICULA IN SOUTH AFRICA

New technology: Precision farming			X	X
Scarce skills	X		X	
Agricultural extension				
Can you mention any other challenges facing SA agriculture that your curricula address?	Food processing through the technology station	All challenges are included in sustainable economic production of crops and livestock. No	The education and training of the science of agricultural production must, in our opinion, be pivotal in the curriculum at under graduate level. This is also our current position. This is in line with global competition, declining resources, such as water and land.	Extension services, poverty alleviation, project planning and management, skill development, HIV-AIDS, normal and therapeutic nutrition, team work, research methodology.
How does your faculty improve or intend to improve alignment to the challenges facing South Africa's agriculture?	We keep abreast with new technology	Formal discussions with the members of the advisory board are taking place and many links with agricultural organisations and activities.	Revision of curricula and alignment of qualifications.	By being actively involved in AET activities, broadening representation of advisory body, formalizing links with relevant public and private sectors.
Does your faculty have at least one bursary holder studying towards food security and water harvesting?	No	No but bursaries are available in Agricultural Management which we offer. 5 B.Tech Students received scarce skills bursaries from NRF addressing food security, and rural wealth creation in their projects <u>20</u> M&D students have projects focussing on food security and wealth creation.	Yes	No. We not offer bursaries
Does your faculty have at least one bursary holder studying rural wealth creation?	No	We are doing active research on the management performance of emerging farmers which will contribute to rural wealth creation	Yes	No. We not offer bursaries
Has your faculty included sustainable agriculture and development and land care as part of your core, capstone or required courses? Please elaborate on this by giving programme examples.	All agriculture courses are by nature sustainable.	We offer Agricultural Management. Some modules do contain the above mentioned aspects.	It will be incorporated in the planned revised curricula.	Yes. Extension. Human Ecology and land Use Planning. Land Our Planning course covers aspects that including conservation of natural resources including soils as well as restrictions in use of various land types and land classes.
Has your faculty included at least one module in food security and water harvesting in relevant curricula in your undergraduate qualifications in Agricultural Science, Agricultural extension and	Food Security – Agricultural Extension	We offer Agricultural Management. Some modules do contain the above mentioned aspects.	No	Yes - in food security. Water harvesting is partly covered in land Use Planning
Has your faculty included at least one module in rural wealth creation in relevant curricula of undergraduate	No. Only to a small extent. White paper on Extension pays attention to these aspects. These form an integral part of	Agricultural extension and rural wealth creation are implicit in most of the programmes This is augmented by	No. Is it not included in the current programmes? We concentrate on basics and with the full curriculum	Yes. Human Ecology in the module of Household economy; Extension and. Agricultural Economics under farm

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qualifications, Agricultural extension and Social Science qualifications?	programmes in the department	service learning on farms.	it is difficult to add more	management module.
Does your faculty's curriculum address areas such as marketing, management, value-adding skills and other practical skills? Please elaborate.	Yes. Through the food technology programmes. A 6 month course in marketing is included in the Food technology programme. Practical work is done at Dole Academy in Finance, Marketing, Quality control, logistics, Transport , Operations	Yes, on introduction level in the first year while they do for example the SAFFEX course on 4th year level.	Yes. Through offering subjects such as Agricultural marketing II and Agricultural management I, II and III.	Yes. In agricultural Economics under Marketing module where students are equipped to produce products that have market or has potential to generate income for the producer. There is also a course in Food science, Skills development, poultry production, crop production and small stock production.
Does your faculty teach agriculture as a market-directed business, as opposed to being taught only as a production enterprise? If so, elaborate on this.	Market-directed through agricultural production management. Western Cape agriculture is predominantly geared towards the export market. Our graduates learn how to become commercial farmers.	Our Faculty teach agriculture as a market-directed business by: <ul style="list-style-type: none"> • Developing and maintaining an effective and well-coordinated agricultural education and training curricula that is integrated at all students' levels and responds appropriately to community and industry needs. • Enhancing equitable access and meaningful participation in agricultural education and training for all South Africans. • Aligning the agricultural education and training curricula with urgent challenges facing South African agriculture including sustainable development and land care, food security, and rural wealth creation. 	No. The focus is on production, followed by marketing of the product.	20Yes. in marketing module and Extension course. These both business and market related activities.
Do you have one or more lecturers in your faculty who have been trained to teach agriculture as a profit-making business?	Agriculture (other than subsistence farming) is by nature a profit making business	Yes, two.	Yes, several.	Yes. Post for lecturers who teach Agriculture Economics, Extension and most staff have been trained in financial management
Do your faculty's curricula address the development of entrepreneurial skills in students? If so, please elaborate briefly.	Not really although it gets attention in some of the courses offered Entrepreneurial skills are embedded in all programmes.	Yes, included in modules	No	Yes. Entrepreneurship which is offered at 3 rd year level to students

a) Sustainable Agriculture and Development, Land Care

From Table 4.7 above it is clear that presently all UoTs incorporate or plan to incorporate some elements in the curricula which address sustainable agriculture and development, as well as land care. Whilst some of the UoTs consider sustainability to be implicit in all their courses; others approach it as part of Agricultural Management. At institution D these aspects are included in a particular course “*Human Ecology and Land Planning*” which covers aspects including restrictions in use of various land types and land classes.

b) Food Security

Food security forms part of courses at 75% of the UoTs. Whilst it is included as part of an Extension course at one institution, it is covered by “Agricultural Management” at another and again at institution D forms part of the aforementioned “*Human Ecology and Land Planning*” course.

In addition, whilst bursaries are not available at institutions A and D for Food security, both C and B offer bursaries. The bursaries available are not specific to food security, but are offered in “Agricultural Management”, and currently 25 students (20 of which are Masters and Doctorate candidates) receive bursaries from the NRF addressing food security and rural wealth creation.

c) Water Harvesting

Water harvesting is currently not included in a module / course at any of the UoTs.

d) Rural Development And Wealth Creation

Currently all of the UoTs offer courses which partially or completely address these issues. According to the information, institution A addresses it only slightly, whilst the institutions B and C consider it to be implicit in their courses. At D a module titled “Household Economy” as well as Extension and Agricultural Economics are considered to contribute to knowledge in this regard.

Bursaries are offered at 50% of the UoTs (the bursaries at institution B was discussed under Food Security above) and in addition B are doing active research on the management performance of emerging farmers which will contribute to rural wealth creation.

e) Land Reform (The Emerging Farmer)

- ***Farm Management (planning, organisation, coordination, control)***: All of the UoTs indicate that Management forms part of the curriculum, as indicated in the Table.
- ***Business and Financial Management (full range including risk management and focus on markets and marketing skills)*** Marketing and running agricultural enterprises like a business is also included at all the UoTs except at institution C where the focus is on production and marketing, more than business. At all except C lecturers trained to run agriculture as a profit making business are present.
- ***Entrepreneurship*** Entrepreneurship is included at 2 of the UoTs, as specific modules, and is included in some of the courses at institution A. It is not included in the curriculum at institution C.

f) Globalisation

The challenges of ensuring participation in the global economy (such as food safety and international trade standards) are not currently included in the curricula at 75% of the UoTs.

g) New Technology, Innovation and Information

The new technologies indicated in the questionnaire were not all covered at any of the UoTs. However, particularly MUT cover few of the technologies indicated.

h) Scarce Skills

50% of the UoTs promote scarce skills at their institutions.

4.5.2 COMPREHENSIVE UNIVERSITIES**4.5.2.1 REVIEW OF CURRENT AET CURRICULA AND SUPPLY**

Table 4.8 below consolidates the answers received from three (3) Comprehensive Universities that offer Agricultural courses. From the responses, each faculty improves its alignment to the challenges facing South Africa's agriculture from an individual point of departure:

- Institution E has currently just started with a complete review in line with AET and will address alignment issues when implementing their new curricula.
- Institution I shows an ever-increasing awareness on curricular inclusion, depending on the availability/acquisition of necessary equipment and facilities.
- Institution K concentrates on the following:
 - I. Emerging farmer.
 - II. Organizing farmer's days
 - III. Use of waste as bio-fuel
 - IV. Mushroom cultivation.

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Table 4.8: Objective 4: A clear reflection if, how and where the identified challenges are addressed in curricula, learning programmes and qualifications at Comprehensive Universities			
Questions posed to the various UoTs during the focus group sessions were the following:	Institution I	Institution E	Institution K
Does interdisciplinary education form a component in your curriculum, e.g. in linking education, extension education and food security?	By its very nature, AET is interdisciplinary. "We are generalists". Curriculum revision issues are dealt with on Faculty level, rather than on School level.	Yes. We have a department of Agriculture, animal health and human ecology where the later (food security nutrition, water harvesting etc) is integrated into the curricula	Not really. We have a very compartmentalized attitude. However, interdisciplinary contact does exist as overlapping takes place where students are exposed to different disciplines such as agronomy, plant pathology, soil science, entomology, etc.
Do you offer any unique qualifications (i.e. not offered at other AET provider institutions) in your faculty? If so, please give reason(s) for introducing such qualification(s).	No. (The participants had quite a discussion about this, and felt that certain emphases were unique. However, the question focused on "qualifications".)	* Yes we had a B Human Ecology community agriculture and are introducing food and nutrition stream into our courses. This is guided by the AET strategy as well as needs of agric extension officers.	No, nothing out of the ordinary
11. The following list indicates some key aspects pertaining to challenges facing contemporary agricultural training in South Africa. In your honest opinion, which of these are NOT receiving sufficient attention in your faculty's curricula and courses?			
	Institution I	Institution E	Institution K
Sustainable agriculture and land care			X
Development and Land care			
Household food security			
Water harvesting			X
Rural wealth creation			
Land reform		X	
Globalization in terms of food safety, co-operation and international trade	X		X
New technology: Information systems	X		X
New technology: Bio-technology	X		X
New technology: Bio-fuels	X	X	X
New technology: Organic farming			X
New technology: Mechanization	X	X	X
New technology: Precision farming		X	X
Scarce skills			
Agricultural extension			
Can you mention any other challenges facing SA agriculture that your curricula address?	Global warming, climate change, use of bio-fuels, genetic resourcing, non-hazardous pesticides.	* Rural wealth creation is limited. We look at sustainable livelihoods and agribusiness as well	Specialization in Agronomy combined with Animal Science. Further, meaningful participation of students in Agribusiness by equipping them with special skills.
How does your faculty improve or intend to improve alignment to the challenges facing South Africa's agriculture?	Ever-increasing awareness and curricular inclusion, depending on the availability/acquisition of necessary equipment and facilities.	We have currently just started with a complete review in line with AET	Concentrate on the emerging farmer. / Organizing farmer's days / Use of waste as bio-fuel / Mushroom cultivation. However, the areas of mixed farming and horticulture are hardly covered to date.

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Does your faculty have at least one bursary holder studying towards food security and water harvesting?	Many.	Yes at mater's level	Yes
Does your faculty have at least one bursary holder studying rural wealth creation?	Many.	Yes at mater's level	Yes
Has your faculty included sustainable agriculture and development and land care as part of your core, capstone or required courses? Please elaborate on this by giving programme examples.	The first is a research niche area, and the results are fed into curricula - see calendar. The latter is not getting sufficient attention.	Yes food security, nutrition security, extension and water harvesting modules are included in all curricula. We have a masters in food security and a Higher certificate in Food and nutrition security.	No. However, Rangeland ecology and Soil conservation are two courses in 2 of the three programs.
Has your faculty included at least one module in food security and water harvesting in relevant curricula in your undergraduate qualifications in Agricultural Science and Agricultural Extension.	Yes. E.g. B.Sc (Agronomy). Soil science.	Yes	Only in food security and partially in Agribusiness
Has your faculty included at least one module in rural wealth creation in relevant curricula of undergraduate qualifications, Agricultural extension and Social Science qualifications?	Yes. Particularly well-represented in all agricultural extension courses and modules.	Yes	Yes, a number of courses as part of Agribusiness
Does your faculty's curriculum address areas such as marketing, management, value-adding skills and other practical skills? Please elaborate.	Yes. These areas are attended to where appropriate in the whole array of modules and courses.	Yes – our agribusiness module in all curricula. Also extension includes value adding. We also look at community resource allocation	Yes, this is an important part of the Agribusiness course
Does your faculty teach agriculture as a market-directed business, as opposed to being taught only as a production enterprise? If so, elaborate on this.	Yes. Sufficient attention is given to this.	Yes and no we teach an integrated approach i.e. Keeping community, resources and agricultural practices in balance to produce sustainable livelihoods, sustainable agriculture and a sustainable environment	Yes, indirectly. Agronomy and Animal Science students follow limited courses in the Agribusiness program
Do you have one or more lecturers in your faculty who have been trained to teach agriculture as a profit-making business?	All lecturers.	Yes – 2 agric economists who focus on agribusiness	Yes, only one.
Do your faculty's curricula address the development of entrepreneurial skills in students? If so, please elaborate briefly.	No, not to any significant extent. This is a distinct area for improvement.	In our extension programme and our diploma we look at entrepreneurship	Yes, but only in the Agribusiness program. We have at least 3 courses that promote entrepreneurship. Students who have completed their studies know how to start a business and what it takes to manage one.

a. Sustainable Agriculture and Development, Land Care

According to the responses received only one of the comprehensive institutions do not include sustainable agriculture in their courses and all include agricultural development and land care. UNISA has a Masters programme in food security and a higher certificate in Food and Nutrition Security.

b. Food Security

All of the respondents indicated that they address household food security in their programmes. UNISA has a Masters programme in food security and a higher certificate in Food and Nutrition Security

All of the respondents have bursaries for students to study towards degrees including water harvesting and food security.

c. Water Harvesting

All but one of the universities covers water harvesting in their curricula.

d. Rural Development And Wealth Creation

Again, all but one of the universities indicated that they include elements of rural development and wealth creation in their programmes. At UL this concept is particularly well represented in all the agricultural extension courses and modules. All of the respondents indicated that there are bursaries pertaining to studies in rural development and wealth creation. At UNISA bursaries only at a Masters Level.

e. Land Reform (The Emerging Farmer)

- ***Farm Management (planning, organisation, coordination, control)*** All the Universities indicate that they address these aspects in their courses. Most of the respondents indicated that these aspects are covered in their Agricultural Economics module as well as in Agribusiness.
- ***Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)*** Currently the emphasis at most of the Universities is on Production. However, most acknowledge that market-directed skills and running agricultural enterprises as a business are important aspects that are gaining importance. All the Universities offer courses such as Agricultural Economics or Agribusiness which equip students with skills to run an agricultural enterprise as a successful business.
- ***Entrepreneurship*** All but one of the universities include entrepreneurship in their courses. UL does not, but has indicated that they feel this is an area for improvement.

f. Globalisation

Only one of the comprehensive universities includes globalisation in terms of food safety co-operation and international trade as part of their curriculum.

g. New Technology, Innovation and Information

None of the comprehensive universities cover all of the elements of new technology included in the questionnaire, but UZ and to a lesser extent UL include very few.

h. Scarce Skills

All of the Universities indicated that Scarce Skills are encouraged to some extent at their institutions.

4.5.3 TRADITIONAL UNIVERSITIES

The same approach was used to obtain information from Universities as from the UoTs and Comprehensive Universities. However, there are eight (8) Universities that offering agricultural qualifications.

4.5.3.1 REVIEW OF CURRENT AET CURRICULA AND SUPPLY

Table 4.9 below consolidates the answers received from the five (5) Universities that offer Agricultural courses and which participated in the study. From the responses, each faculty improves its alignment to the challenges facing South Africa's agriculture from an individual point of departure:

- Institution F does it through their close interaction with the agricultural industries and is aligning continuously.
- Institution G has a strategic plan at the university of which the Faculty of Science and Agriculture is part. They intend to achieve alignment by a policy of African scholarship and ensuring that staff and students reflect the demographics of the nation. They make it their business to prepare students for commercial agriculture to create wealth and food security.
- H addresses this matter on a number of levels:
 - I. Current restructuring of curricula, especially in extension training, to address the issues mentioned earlier in terms of support to extension practitioners, rural enterprise advancement, the continuum of commercialization and increased attention to interdisciplinary approaches.
 - II. The establishment of economically viable and sustainable production models under the rural enterprise advancement programme (REAP). These models are then replicated under controlled conditions in suitable venues – the purpose of which is to stimulate economic activity and support the generation of a new economy in rural areas. This not only provides essential exposure of students to a real world situation, but also provides valuable research opportunities to both staff and students.
 - III. The development of a “simulation environment” (through integrating agricultural training programmes into the REAP) for student training in order to prepare them for more purposeful engagement and integration in the practical agricultural development environment.
 - IV. Changing our approach to agricultural training and research to be driven by community engagement activities translated into an academically sound and accountable training and research context, content and environment.
 - V. Active public / private / community partnerships for the establishment and management of sustainable commercial enterprises for research and training.
- Institution J is constantly monitoring the current trends in crop and livestock prices as well as water needs and climate changes via the Department of Agricultural Economics. Although they probably can't have a direct affect on these tendencies, they are well informed at all times and in a position to react accordingly.
- Institution L addresses the challenges as follows:
 - i) The new BSc Four Year Program that provides access to science and science based degree programs by setting lower entrance requirements. After 18 months the student then progresses to the second year of the BSc Agric program

- ii) The availability of the Advanced University Diploma in Agriculture Extension specifically for Extension workers who does not qualify for a degree qualification - those people with a 2/3 year diploma in Agriculture but who are working with farmers in an advisory/extension position.

The responses obtained from the Universities are reflected in Table 4.9 below

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Table 4.9: Objective 4: A clear reflection if, how and where the identified challenges are addressed in curricula, learning programmes and qualifications at Universities					
Questions posed to the various UoTs during the focus group sessions were the following:	Institution H	Institution J	Institution G	Institution F	Institution L
Does interdisciplinary education form a component in your curriculum, e.g. in linking education, extension education and food security?	Yes, particularly in extension training where linkages to adult education, communication, technical agricultural disciplines and management sciences make up a prominent part of the curriculum. A relatively high level of "cross-disciplinary" education takes place between the School of Sciences and Agriculture. Not so prominent in the technical agricultural sciences curricula	At the UFS we offer double majors in all agricultural curricula. This ensures interdisciplinary interaction between at least two disciplines. However, a core curriculum together with a list of choice subjects, from which a student can construct a curriculum according to interest and need, further enhances interdisciplinary education	Yes through the food security programme and the rural resource management program. Interdisciplinary post grad research projects, M Agric Ext , M.Agric Food Security	Yes, strongly.	Yes it does. Modules are available as electives for students to select specifically in the fourth year. With regard to Extension education it is seen as a top-on qualification. After a student has successfully obtained the Four year BSc Agric he/she can enrol for a specific Honours degree in Agricultural Extension either a BSc Agric Hons in Extension or the B Inst Agrar in Extension, part -time or full-time presented, on campus or off campus.
Do you offer any unique qualifications (i.e. not offered at other AET provider institutions) in your faculty? If so, please give reason(s) for introducing such qualification(s).	No, not currently. A part time diploma in Agricultural Extension was offered in the past but not currently, although it is still a registered course with the University	The qualifications offered at the UFS are nationally and SAQA approved and include a 2 year Diploma, 3 year B.Agric. and 4 year BSc Agric degree. This is not out of the ordinary. However, a number of curricula that include education in Agro meteorology are unique in the sense that this is probably the only university that has such a department. More, post graduate degrees in Sustainable Agriculture are unique to this specialization.	Yes, on post graduate level in food security. PG Dip RRM, B Agric Hons (Extension), M Agric Extension.	Yes. We offer a unique programme in Viticulture and Oenology and a unique degree programme in a B.Agric which is taught in collaboration with an Agricultural College. The programme in Viticulture and Oenology is unique in Africa and is offered at Stellenbosch University due to the importance of the wine and table grape industries to the Western Cape Province. Stellenbosch University also conduct research relevant to these industries, creating exciting possibilities for post graduate studies in Viticulture, Oenology and Wine / Grapevine Biotechnology.	Wildlife Science as part of the BSc (Agric) Animal Science programme is offered which constitutes the introductory aspects of wildlife conservation, habitat management, wildlife nutrition and keeping and wildlife in zoological gardens.

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11. The following list indicates some key aspects pertaining to challenges facing contemporary agricultural training in South Africa. In your honest opinion, which of these are NOT receiving sufficient attention in your faculty's curricula and courses?					
	Institution H	Institution J	Institution G	Institution F	Institution L
Sustainable agriculture and land care					
Development and Land care					
Household food security				X	
Water harvesting			X		
Rural wealth creation					X
Land reform	X				
Globalization in terms of food safety, co-operation and international trade	X	X	X		
New technology: Information systems	X				
New technology: Bio-technology	X				
New technology: Bio-fuels	X	X	X		
New technology: Organic farming	X		X		
New technology: Mechanization		X			
New technology: Precision farming	X		X		
Scarce skills	X				
Agricultural extension					
Can you mention any other challenges facing SA agriculture that your curricula address?	Rural enterprise advancement – offering economically viable and sustainable solutions to small scale farmers on the road to commercialization and improved food security. Agricultural servicing needs to improve agricultural decision making on the road to commercialization. Extensive support and guidance to extension practitioners in guiding the process of commercialization of small scale emerging	1. The changing environment and induction of resistance in crops 2. Treatment of crops with newly developed products to increase yields as a means to counteract the increase in input costs 3. Water scarcity & water management	The competitiveness of SA agriculture. Reducing risk and uncertainty. HIV and AIDS. Also, Most of what we teach gives students problem-solving skills to confront challenges	Entrepreneurship; Phyto-sanitary barriers; and Climate change.	Protection of property rights Environmental degradations Poor and uninformed agricultural policy processes Utilisation of environmental waste

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	<p>farmers. Development of new and advanced technology solutions for small scale and emerging farmers. Skills training (hands-on) and especially exposure to the business side (not agriculture economics) of agriculture or farming are some of the new developments or additions in Fort Hare training model.</p>		<p>in various aspects of agriculture. Facilitating the link between rural and urban food production systems</p>		
<p>How does your faculty improve or intend to improve alignment to the challenges facing South Africa's agriculture?</p>	<p>Our faculty is addressing this matter on a number of levels: Current restructuring of curricula, especially in extension training, to address the issues mentioned earlier in terms of support to extension practitioners, rural enterprise advancement, the continuum of commercialization and increased attention to interdisciplinary approaches. The establishment of economically viable and sustainable production models under the rural enterprise advancement programme (REAP). These models are then replicated under controlled conditions in suitable venues – the purpose of which is to stimulate economic activity and support the generation of a new economy in rural areas. This not only provides essential exposure of students to a real world situation, but also provides valuable research opportunities to both staff and students.</p> <p>The development of a “simulation environment” (through integrating agricultural training programmes into the REAP) for student training in order to prepare them for more purposeful engagement and integration in the practical agricultural development environment.</p>	<p>Via the Department of Agricultural Economics we are constantly monitoring the current trends in crop and livestock prices as well as water needs and climate changes. Although we can probably not have a direct affect on these tendencies, we are well informed at all times and in a position to react accordingly.</p>	<p>The UKZN does have a strategic plan for the university of which the Faculty of Science and Agriculture is part. We intend to achieve this by a policy of African scholarship and ensuring that our staff and people reflect the demographics of the nation. We at (AGPS) try to prepare students for commercial agriculture to create wealth and food security</p>	<p>Through our close interaction with our agricultural industries, we are aligning ourselves continuously.</p>	<p>i) The new BSc Four Year Program that provides access to science and science based degree programs by setting lower entrance requirements. After 18 months the student then progresses to the second year of the BSc Agric program ii) The availability of the Advanced University Diploma in Agricultural Extension specifically for Extension workers who does not qualify for a degree qualification - those people with a 2/3 year diploma in Agriculture but who are working with farmers in an advisory/extension position.</p>

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	<p>Changing our approach to agricultural training and research to be driven by community engagement activities translated into an academically sound and accountable training and research context, content and environment.</p> <p>Active public / private / community partnerships for the establishment and management of sustainable commercial enterprises for research and training</p>				
Does your faculty have at least one bursary holder studying towards food security and water harvesting?	No	Yes	Yes	Yes	No, but have bursaries for Plant Production and Food Production.
Does your faculty have at least one bursary holder studying rural wealth creation?	No	Yes	Yes	Yes	No, but have bursaries for Plant Production and Food Production.
Has your faculty included sustainable agriculture and development and land care as part of your core, capstone or required courses? Please elaborate on this by giving programme examples.	<p>This matter is quite elaborately addressed in the land use planning, horticulture, crop science, soil science and agricultural engineering courses with a very specific practical approach being followed in the work done and programmes offered by the Animal Traction Unit.</p>	<p>Sustainable agriculture is a central theme running through all of our programs</p>	<p>Sustainable agriculture is a central part of all our courses and soil science teaches honours on advanced level fertility which incorporate sustainable agric. Also Sustainable Agriculture is offered as an elective in the extension programme.</p>	<p>Yes. Elements of sustainability are important parts of all programmes.</p>	<p>Sustainable agriculture and development and land care are addressed in the following programmes: BSc (Agric) Plant Pathology, BSc (Agric) Plant Production, BSc (Agric) Soil Science and BSc (Agric) Animal Science and Pasture Science.</p>
Has your faculty included at least one module in food security and water harvesting in relevant curricula in your undergraduate qualifications in Agricultural Science, Agricultural extension and	<p>It forms part of several modules</p>	No	<p>We have a whole program on food security which is housed in the African centre for food security (NEPAD and SADC recognized).</p>	<p>Included as subjects in various undergraduate and post-graduate course modules.</p>	<p>These topics are not directly addressed, but similar content is addressed in the following programmes: BSc Plant Pathology, BSc Plant Science and BSc Soil Science.</p>

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<p>Has your faculty included at least one module in rural wealth creation in relevant curricula of undergraduate qualifications, Agricultural extension and Social Science qualifications?</p>	<p>This matter is addressed to various degrees with various focuses in a number of courses, though maybe not comprehensive enough to have sufficient impact. Agribusiness development is an important part of the courses offered in Agricultural Economics and Extension training while financial aspects of rural agriculture plays an important role in the Land Use Planning curriculum</p>	<p>No</p>	<p>Yes, via community resources. Also via Geography</p>	<p>Yes</p>	<p>The programme BSc (Agric) Agricultural Economics/Agribusiness management, there is a module being offered in the fourth year: Agricultural and Rural Development Studies, which addresses rural water.</p>
<p>Does your faculty's curriculum address areas such as marketing, management, value-adding skills and other practical skills? Please elaborate.</p>	<p>Marketing and management are addressed elaborately in Agricultural Economics and Extension training, with increasing attention being paid to value adding. The issue of skills development is definitely not sufficiently addressed but is currently under review. Skills training programmes in a "simulator environment", managed by the Rural Enterprise Advancement Agency (REAA), is currently being developed.</p>	<p>Yes, all of these aspects are covered by the agricultural economics section. Students following all of the other natural science directions have an option to choose from the list of subjects that include these modules.</p>	<p>Yes, via agricultural economics, post harvest technologies, economical botany and food science. Community Resource Management also offers Introduction to Consumer Behaviour and Marketing as well as Small business enterprise.</p>	<p>Yes. As curricula are aimed at preparing students for the workplace in agricultural industries, the above mentioned skills and experience are very important. Some programmes require students to obtain industry experience as interns during holiday periods. This exposure and structured feedback facilitate that they gain a better understanding of the industries they are being trained for.</p>	<p>In the module: Microbiology, water harvesting is addressed as part of the content. It is not offered as a separate module.</p>
<p>Does your faculty teach agriculture as a market-directed business, as opposed to being taught only as a production enterprise? If so, elaborate on this.</p>	<p>The emphasis is currently still very much on agriculture being a production enterprise but the market orientation of agriculture and its role as a rural wealth creation activity and national economic sector is increasingly gaining importance in training courses.</p>	<p>Production of either crops or livestock forms the basis of any agricultural business and therefore also the core curriculum at the UFS. However, students are taught market-directed skills that are necessary to run a business.</p>	<p>There are two options namely production and entrepreneurship. A student can choose one or both.</p>	<p>Yes. As mentioned before we are very closely aligned with our industries and therefore with all their requirements.</p>	<p>The programme: BSc (Agric) Agricultural Economics/Agribusiness management focuses on the marketing and management of the agricultural domain. Modules which address these specifically are Financial Accounting, Economics, Agricultural Economics, Business Management, Taxation, Agricultural Demand & Supply Analysis and Commodity Price Analysis.</p>
<p>Do you have one or more lecturers in your faculty who have been trained to teach agriculture as a profit-making business?</p>	<p>There are lecturers trained in and who also present programmes to promote agriculture as profit making business, although it is believed that its impact is still limited. It is believed that the background of students studying agriculture has much to do with this limited progress in</p>	<p>Yes, in the Agricultural-economics department.</p>	<p>Yes, in the Agro-economics discipline.</p>	<p>Yes</p>	<p>Several</p>

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	<p>establishing the image of agriculture as a profit-making business. In excess of 95% of students studying agriculture have never been exposed to the practical operation of agriculture as profit making business. Subsequently they fail to readily conceptualize the bigger financial and economic role of agriculture as profit making business.</p>				
<p>Do your faculty's curricula address the development of entrepreneurial skills in students? If so, please elaborate briefly.</p>	<p>Yes, to a certain extent. Agricultural entrepreneurship does, however, not receive nearly enough attention. This is partly also because the general concept of agricultural entrepreneurship is not yet sufficiently embedded in agricultural training generally, although it does receive some attention in management subjects. Great deficiencies exist however in agricultural decision making training. The latter is increasingly receiving attention in agricultural economics and extension training at UFH. It seems as if a new paradigm for agricultural training nationally will seriously have to receive attention. Although not part of the 2008 curriculum, the Rural Enterprise Advancement Programme (REAP) contains the Agri_Park Business Training Programme, focussing on small-scale agriculture.</p>	<p>Although a module under the direct name "Entrepreneurial Skills" is not offered, we regard the concept as crucial. Seminars on the subject have been organized in the past and staff are constantly informed and motivated during faculty board meetings to emphasize the importance of entrepreneurial thinking via examples.</p>	<p>Yes, There are two options namely production and entrepreneurship. A student can choose one or both.</p>	<p>Yes. As an example final year BSc Food Science students develop two new food products during their final year of study. On the post graduate level, students in Wine and Grapevine Biotechnology are exposed to aspects of (biotechnology) business development.</p>	<p>Although not a specific module, this forms part of Agricultural Business Management.</p>

a) Sustainable Agriculture and Development, Land Care

According to the information all universities include sustainable agriculture and land care as part of their curriculum to greater or lesser extent. At institution H this is an integral part of the curriculum with a specifically practical approach. At institution G, "Sustainable Agriculture" is offered as an elective in the Extension programme.

b) Food Security

Food security is addressed at most of the Universities. Institution H has an entire programme on food security which is housed in the African Centre for Food Security and is recognised by NEPAD and the SADC. Institution L states that it is indirectly addressed by courses such as BSc Plant Pathology, BSc Plant Science and BSc Soil Science. .

Bursaries concentrating on food security are available at 75% of the Universities whilst institution L does not have bursaries pertaining to food security in particular, bursaries are awarded for Plant and Food production.

c) Water Harvesting

Institution G indicated that they do not currently include information on water harvesting in their curricula. Therefore, most of the Universities include water harvesting in their curricula. However, Institution L indicated that water harvesting is not a separate module, but that it is a topic addressed in the microbiology module.

d) Rural Development And Wealth Creation

Institution L is the only University not to address this issue to some extent within their curricula. Institution H currently includes this concept in various degrees, but indicates that perhaps more emphasis can be given to this aspect to ensure more impact. Institution J does not include a particular module on rural development and wealth creation, whilst H indicated that skills training programmes in a "simulator environment" managed by the Rural Enterprise Advancement Agency is currently being developed.

Bursaries concentrating on rural development and wealth creation are available at most of the Universities. Whilst the institution L does not have bursaries pertaining to rural development and wealth creation in particular, bursaries are awarded for Plant and Food production.

e) Land Reform (The Emerging Farmer)

- ***Farm Management (planning, organisation, coordination, control)*** All the Universities indicate that they address these aspects in their courses. Most of the respondents indicated that these aspects are covered in their Agricultural Economics module as well as in Agribusiness. Institution G have several courses which promote skills pertaining to farm management, over and above Agricultural Economics, courses such as Post Harvest Technologies, Economical Botany and Community Resource Management contribute to a body of knowledge on farm management.
- ***Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)*** Currently the emphasis at most of the Universities is on Production. However, most acknowledge that market-directed skills and running agricultural enterprises as a business are important aspects that are gaining importance. All the Universities offer courses such as Agricultural Economics or Agribusiness which equip students with skills to run an agricultural enterprise as a successful business.

- **Entrepreneurship** All the Universities address entrepreneurship to a greater or a lesser extent. Institution H indicated that entrepreneurship is increasing important in their programmes. At institution J no specific module exists, but seminars on the subject are given, and staff is motivated to emphasise the importance of entrepreneurship in their classes via examples at hand. At institution G students can choose to study agriculture with the emphasis on either production or entrepreneurship, or both.

f) Globalisation

The challenges of ensuring participation in the global economy (such as food safety and international trade standards) are not currently included in the curricula at most of the Universities.

g) New Technology, Innovation and Information

The new technologies indicated in the questionnaire were not all covered at any of the Universities. Institution H in particular has little course content pertaining to new technology.

h) Scarce Skills

The vast majority of the Universities indicated that Scarce Skills are encouraged to some extent at their institutions. According to the responses presented in the Table. Institution H does not include scarce skills in their curricula. However, Agricultural Extension is still a registered course at the university, although it is not currently offered.

4.6 RECOMMENDATIONS TOWARDS MORE RESPONSIVE CURRICULUM AND SUPPLY AT GET AND FET LEVELS

4.6.1 SUSTAINABLE AGRICULTURE AND DEVELOPMENT, LAND CARE

4.6.1.1 AT GET LEVEL

Sustainability and sustainable agriculture are complex concepts that may be too advanced for learners at this level. However, basic concepts such as the importance of conservation, not littering and other basic concepts that are applicable to the level of development should be included as early as possible to ensure that a lifestyle of environmental awareness is entrenched in the youth.

4.6.1.2 AT FET LEVEL

Integrated systems of Production

NSC - As mentioned above, management systems are discussed at all levels of the NSC, but no mention is made of integrated systems of production. However, this could easily be included as a system of production in the curriculum.

NC(V) - Integrated systems of Production are not discussed, but mixed farming is. It should be possible to include a section on integrated systems in the present offerings of Animal and Plant Production.

SAQA – There is a general mention of sustainability, but integrated farming systems are not mentioned in particular. It is possible that this can be included in the modules on Plant and Animal Production.

Satisfy Human Needs

This section will be discussed under **Food Security**

The environment

NSC – Agro-ecology is only part of the curriculum in Grade 10. However, it is recommended that the environment and relevant legislation be included in the NSC programme.

NC(V) – Whilst the environment is not discussed on NQF Level 2, it is included in the Levels 3 and 4. The context is very broad, and it is recommended that relevant methods of conserving the environment within an Agricultural Framework be included.

SAQA – The importance of protecting the environment, and seeing agricultural enterprises in the context of the environment is included in the current information in the modules at all (1-4) levels of the SAQA qualifications.

Efficient use of non-renewable resources

NSC – Currently this is not covered by the curriculum. It is suggested that non-renewable resources and alternative sources of energy are discussed. It is common knowledge that the fossil fuels present for human consumption is becoming depleted. Consequently, it is

important that a sector which makes use of non-renewable resources be informed on their economical use. However

NC(V) - Currently this is not covered by the curriculum. It is suggested that non-renewable resources and alternative sources of energy are discussed. It is common knowledge that the fossil fuels present for human consumption is becoming depleted. Consequently, it is important that a sector which makes use of non-renewable resources be informed on their economical use.

SAQA – This course (especially at NQF Level 4) addresses the sustainable use of resources.

Economic viability of farming enterprise

NSC – The concept of viability of farming enterprises is not discussed. However, the module on Agricultural management practices in Gr.12 mentions the importance of business plans. To ensure that learners have sufficient skills to make farming enterprises viable, it is necessary that more attention is given to economic matters relating to the farming enterprise.

NC(V) – Agribusiness is a set course during the studies for Primary Agriculture. Economic viability in itself is not discussed, but the learners are given various tools to ensure economic viability.

SAQA – Many modules in the SAQA curriculum include sections relating to financial as well as practical skills to ensure the economic viability of a farming enterprise.

4.6.2 FOOD SECURITY

As mentioned previously, the effect of food insecurity in South Africa is growing day by day, and Food Security as an issue is becoming more and more important. Therefore, it is recommended that Food Security be discussed with learners from a young age. Due to the fact that most children in South Africa will most likely be exposed to Primary School, it is important that this subject be breached as early as possible.

Within the context of this AET curriculum assignment it is further narrowed down to the following:

- Imparting knowledge and skills to the poor on how to establish successful food gardens. In 2006/07 more than 66 000 households were provided with agricultural production packages, specific food security projects were launched countrywide and the DoA worked closely with the Social Sector Cluster in informing and facilitating stakeholders such as NGO's, schools, churches and communities to optimise such programmes. Such training programmes should include **education on nutrition**, and offer **best practice guidelines** on the production of agricultural produce suitable to the production environment.
- Practical means and guidelines towards improving the environment for food production. In this regard a lack of water is often a critical constraint. Education and training on **water harvesting practices** and techniques (for both urban and rural environments) is thus a typical requirement to be accommodated in AET programmes. Similarly soil preparation and enrichment techniques will be a critical requirement in an urban (township) agricultural environment.

4.6.2.1 AT GET LEVEL

Food security as a concept may be complex at this age, but practical knowledge of food security at GET level is possible.

A practical plan to make children aware from a young age of the basic means to increase food security, is to establish vegetable gardens at schools. This will provide sustenance (partial food security for learners at least once a day during school terms) to the learners, as well as providing an opportunity for learners to be taught the basics of food production. Consequently, the children will be able to utilise these skills in their own communities.

4.6.2.2 AT FET LEVEL

It is recommended that FET courses include the concept of Food Security (both Household and National) and to include information on how to increase chances of food security using several of the techniques that are already included in this study, such as water harvesting. In addition it is suggested that learners are taught about choosing the correct crops for a certain area, taking physical constraints into account, as well as the utility of trade with areas that are suited to growing other crops.

4.6.3 WATER HARVESTING

As water utilisation is discussed in the section on optimum resource utilisation it is recommended that the basic principles of water harvesting as a supplementary water resource be added to the curriculum at GET and FET (High Schools and FET Colleges) level. However, it is very important that the responsible use of Water Harvesting techniques is advocated.

The SAQA accredited courses already provide a broad outline within which the discussion of Water Harvesting can easily be accommodated. As an example The National Certificate: Animal Production (NQF level 1) indicates the following as an outcome:

“Incorporate an understanding of the role of natural resource management in sustainable agricultural practices into existing farming activities by applying basic practices to conserve the environment including natural resources”

Clearly Water Harvesting may be included in this section as agricultural practice to conserve natural resources.

4.6.4 RURAL DEVELOPMENT AND WEALTH CREATION

4.6.4.1 AT GET LEVEL

Whilst rural wealth creation in itself may be complex concept for learners at this level, it would be prudent to ensure that learners assimilate skills that may contribute to rural wealth creation at this level. As mentioned in the section on Food Security, learners can be taught the basics of a Food Garden, which may increase chances of the creation of Rural Wealth. In practical terms, it must be taken into account that many learners may not attend school higher than the GET band, especially in rural areas. Therefore, this is the only forum where learners will be exposed to the basics of creating something like a food garden that they may be able to utilise.

4.6.4.2 AT FET LEVEL

It is recommended that the practical portions of the AET curricula be given particular attention to ensure that the learners who achieve NSC with Agricultural subjects and NC (V) are empowered to start and successfully manage their agricultural enterprise in a sustainable manner. If these learners can be encouraged to apply their learnt skills in the rural communities, success may in time create wealth as the enterprise can be expanded. The expansion will lead to job creation.

From an AET perspective it is thus important that this need for functional alignment and spatial integration are accommodated in curricula and that agricultural practitioners are trained to understand their role as development agents within the larger context of local economic development. This holistic approach will also contribute forward and backward linkages within the total agricultural value chain and to other business and development opportunities.

4.6.5 LAND REFORM (THE EMERGING FARMER)

4.6.5.1 AT GET LEVEL

Skills which would facilitate successful management of a farming enterprise are generally complex and it is only expected that basic concepts should be included at this level which will facilitate the understanding of the learner at higher levels in education. However, as mentioned previously basic skills for subsistence farming can be broached with young learners such as the establishment of a food garden.

4.6. 5.2 AT FET LEVEL

Farm Management (planning, organisation, coordination, control)

NSC – Agricultural management practices comprises an entire subject. This subject gives learners an overview of basic management skills.

NC(V) – The Agribusiness module contained within Primary agriculture covers many of the elements necessary for the successful management of a farming enterprise.

SAQA – This element is covered by the current curriculum.

Business and Financial Management (full range including risk management and with considerable focus on markets and marketing skills)

NSC – Only in Gr.12 are economic and financial aspects of a farming enterprise covered.

NC(V) – Business and financial management are extensively covered over all three years of the Primary Agriculture Course.

SAQA - This element is covered by the current curriculum

Production related technical training (relevant production systems)

NSC – Agricultural Management Practices also give learners a grounding in the production of crops and animals.

NC(V) – The basic Production of Poultry (broilers and layers), goats, cattle (for beef and milk) as well as sheep and ostriches are covered in the three years of the Primary Agriculture course.

SAQA - This element is covered by the current curriculum

Health and safety (including food safety legislation and requirements)

NSC – The Occupational Health and Safety Act (Act 85 of 1993) is included in the curriculum. It is recommended that international health and safety standards be included to ensure that learners are aware of the standard necessary for export to different countries in the world.

NC(V) – Health and Safety such as the Occupational Health and Safety Act (Act 85 of 1993) is not included, and it is recommended that this is included in the curriculum. It is also recommended that international standards of health and safety be included in the curriculum, to ensure that students are aware of the standards of export to other countries.

SAQA - This element is covered by the current curriculum. However, it may be prudent to include international standards, to ensure that the students are aware of the stringent controls enforced by (for instance) the EU, when importing agricultural produce from other countries. This will aid the overcoming of *international trade barriers* as indicated under the following section of **Globalisation**.

Entrepreneurship

NSC – Entrepreneurship is only covered in Gr.12. It is suggested that entrepreneurship is prioritised.

NC(V) – Entrepreneurship is only covered on NQF level 2, as an elective. It is suggested that entrepreneurship is prioritised, and that it be made compulsory to all students completing the Primary Agriculture course.

SAQA – This is only discussed in one module of the entire SAQA accredited range. However, many elements of entrepreneurship are discussed in the Agribusiness sections that are also relevant to business and financial management. It is recommended that more time may be spent on the initial steps of establishing a business.

4.6.6 GLOBALISATION

From an AET provisioning and curriculum perspective it is thus important that agricultural education and training programmes prepare the agricultural sector for increased international competition (in safeguarding and securing local markets for local producers) and increasing our competitiveness on the international export markets. In this regard the following are typical globalisation related issues and challenges that has to be incorporated into AET curricula:

- International Trade Barriers,
- Food Miles, and
- Competitiveness.

As discussed above and possible solutions to the challenges facing South Africa's export market.

As mentioned previously it is imperative that farmers be made aware of the specifications of the Food Safety regulations of countries that require products that South Africa can export. In addition the competitively priced and competitively run agribusiness model is necessary to improve the chances of success of the aspiring farmer.

Globalisation offer many opportunities to South Africa as a country, if the products can satisfy the standards of the markets and be competitively priced.

Strategies to increase the chances of success of the emerging farmer include tactics such as co-opitition and the identification of markets that are closer to home such as South Africa's partners in the SADC.

4.6.7 NEW TECHNOLOGY, INNOVATION AND INFORMATION

From the table included above it is clear that many of the new technologies impacting on agriculture are not discussed in the curriculum at present. It is important to ensure that modern technologies are researched in South Africa and that international research be scrutinised to ensure that the applicable technologies are incorporated into the AET system.

Technology acquisition and transfer into the economy are central for productivity improvement and growth – leading to raised economic productivity and living standards. There are two aspects of technology change that are important:

- the first is the international transfer of technology from developed to developing countries and *vice versa*, and
- the second is diffusion of technology (both imported and locally developed from the importing or innovating company or organisation) into the wider sector and economy.

The implementation of technology transfer in agriculture could be guided by the *Norms and Standards for Extension and Advisory Services* (2005). These provide the minimum standards (i.e. skills levels of extension agents and advisors; resources requirements at district, municipal and local offices; etc.) to be adhered to in the provision of services to farmers. In this regard, capacitating Extension Officers towards such participatory research methodology is considered to be very important and extension related AET and curricula should thus accommodate such modules.

Agricultural Information Systems

Given the fact that Information and Communication Technology (ICT) is generic, its applications in agriculture and rural development are extensive and pervasive. Agricultural information systems have attracted much attention because of the importance of facilitating access to information and to knowledge. The information systems itself have been subjected to a process of profound transformation with the spectacular development of the Internet, and the evolution of web based information systems, even in developing countries. Of this, South Africa is a classic example considering the fast adoption of ADSL and 3G technologies as well as the implementation of Enterprise Resource Planning and Management in most economic sectors.

All appropriate avenues for effective information and technology transfer need to be utilised. Within the context of an Agricultural Information Management System (AIMS), South Africa has a number of significant warehouses of information of importance to agriculture - these include the Manstrat Extension Suite Online (ESO) and to a lesser extent AGIS. The real challenge is to make this information available in useful and usable form for information

users (both in well-equipped offices on the one hand and resource poor rural communities on the other). This entails the interpretation, packaging and dissemination of the information in appropriate and usable form. Modern information communication technologies (ICTs) and innovations based on the internet, digital satellite television and cellular telephones are required to facilitate access to information. In this regard ESO has made great strides.

It is of utmost importance that agricultural practitioners be exposed to such information systems and learn how to use them optimally. AET curricula and programmes should thus include and accommodate such ICT and AIMS modules.

4.6.8 SCARCE SKILLS

As scarce skills is not a component that can be included at GET or FET level, the most important recommendation is to ensure that students are prepared for further study to acquire scarce skills. The prioritisation of mathematics and science at GET and FET level, and the encouragement of promising learners in these fields are crucial. In addition, advertising to school leavers regarding the possibilities and opportunities that exist for students choosing these fields of study can increase the numbers of students studying courses in scarce skills.

4.7 RECOMMENDATIONS TOWARDS MORE RESPONSIVE CURRICULUM AND SUPPLY AT HET LEVEL

4.7.1 RECOMMENDATIONS TOWARDS MORE RESPONSIVE AND NEEDS ALIGNED CURRICULUM AND SUPPLY AT UOTS

Inputs from the various UoTs indicate that other challenges which may constrain general growth and success in Agriculture are the following:

- Food processing;
- The science of Agricultural Production;
- Extension Services;
- Poverty Alleviation;
- Project Planning and Management;
- Skills Development;
- HIV/Aids;
- Normal and Therapeutic Nutrition;
- Team Work, and
- Research Methodology.

Agricultural experts at tertiary institutions have other perspectives than those obtainable by other surveys. Therefore, it is recommended that these issues BE considered for inclusion in the AET strategy to ensure that all possible efforts are made to facilitate students for further success in their endeavours in the Agricultural sector.

From the information received through the questionnaires, it was also clear that:

- Modules in Food Security and Water Harvesting need more attention in the curricula at UoTs.
- Rural Wealth Creation should be addressed more boldly in the curricula at UoTs
- Certain key challenges facing contemporary agricultural training in South Africa do not receive sufficient attention at UoTs and should be promoted by giving incentives to faculties for incorporating these challenges in curricula. These challenges are modules in:
 - Water harvesting;
 - Land reform;
 - Globalization, and
 - Bio fuels.
- The DoA should keep an open mind about the myriad of challenges facing Agriculture and not only concentrate on certain issues but be open minded by challenging HET to explore the challenges and implement where the need arises;
- Through the creation of a representative HE body consisting of Agricultural Faculties alignment to the challenges facing South African agriculture can be addressed;
- The DoA should avail more bursaries towards the study of Food security and Water Harvesting as well as Rural Wealth Creation as these major challenges need to be explored by more students as study fields.

4.7.2 RECOMMENDATIONS TOWARDS MORE RESPONSIVE AND NEEDS ALIGNED CURRICULUM AND SUPPLY AT UNIVERSITIES

Inputs from the various Universities indicate that other challenges which are addressed in their curricula and which may constrain general growth and success in Agriculture is the following:

- Sustainable livelihoods;
- Agribusiness.
- Entrepreneurship;
- Phyto-sanitary barriers,
- Climate change.
- The competitiveness of SA Agriculture;
- Reducing risk and uncertainty;
- HIV/Aids;
- Problem solving skills;
- Facilitating the link between rural and urban food production systems.
- Rural enterprise advancement;
- Agricultural servicing needs to improve agricultural decision making on the road to commercialization;
- Extensive support and guidance to extension practitioners in guiding the process of commercialization of small scale emerging farmers;
- Development of new and advanced technology solutions for small scale and emerging farmers;
- Skills training (hands-on)
- Exposure to the business side (not agriculture economics) of agriculture on farming.
- Global warming;
- Generic resourcing,
- Non-hazardous pesticides.
- The changing environment and induction of resistance in crops;
- Treatment of crops with newly developed products to increase yields as a means to counteract the increase in input costs;
- Water scarcity and water management.
- Specialization - Agronomy combined with Animal Science;
- Equipping students with special skills in Agribusiness.
- Protection of property rights;
- Environmental degradations;
- Poor and uninformed agricultural policy processes; and
- Utilisation of environmental waste.

As mentioned previously, Agricultural experts at tertiary institutions have other perspectives than those obtainable by other surveys. Therefore, it is recommended that these issues considered for inclusion in the AET strategy to ensure that all possible efforts are made to facilitate students for further success in their endeavours in the Agricultural sector.

From the information received through the questionnaires, it was also clear that:

- All Universities can pay more attention to the comprehensive incorporation of modules on food security, water harvesting and rural wealth creation within Agricultural and Social Science qualifications,
- The market-directed orientation of agriculture is increasingly gaining importance in training courses at all faculties where they try to be closely aligned with industries and their requirements. Students also need to be taught market-directed skills that are necessary to run a business.
- Although all faculties address the development of entrepreneurial skills in students in one way or the other, it varies from faculty to faculty how this is done. The concept is regarded as crucial and lecturers are sensitised to concentrate in their lectures on entrepreneurial thinking. It seems however as if it does not receive enough attention as agricultural entrepreneurship is not yet sufficiently embedded in agricultural training.

- Each university should at least have one unique qualification that distinguishes it from other institutions (a flagship qualification) that can serve as an attraction to lure students to the specific institution.
- In agricultural training universities should pay more attention to the following key challenges in South Africa in the presentation of their programmes:
 - Sustainable agriculture and land care;
 - Development and land care;
 - Household food security;
 - Rural wealth creation;
 - Scarce skills, and
 - Agricultural extension.
- Universities seem to address a wide range of challenges in their curricula that need to be acknowledged and appreciated.
- Each university is well aware that they should align to the challenges facing South Africa's agriculture and each is implementing their improved alignment strategies in an individualistic way. It is important that the DoA should respect the individuality and autonomy of each HE institution and see it as advantageous and not as a threat. The uniqueness and individuality of each faculty gives the right of existence to each of these institutions.

5. RACIAL DISPARITIES IN THE AET SYSTEM

5.1. INTRODUCTION

This section of the report reflects the findings of the assignment that aimed to investigate and analyse perceived racial disparities within the AET System and to develop recommendations and means of addressing such disparities where they exist.

To achieve the above this Chapter is structured as follows:

- Background
- An identification and analysis of Racial Disparities within the AET System to establish the causes, impact and effect thereof
- Recommendations – suggestions and means to address and overcome racial disparities in the system

5.2. BACKGROUND

Disparity or “inequality” can be defined as being the opposite of “equality” – which is a state of social organisation that enables or gives equal access to resources and opportunities to all members of that society. Past policies of segregation and racial discrimination has given inequality in South Africa a racial character and in present day South Africa (14 years after the end of apartheid) its legacy in terms of inequality of income is still rive. Measurement of income disparity involves indicators such as the Gini coefficient, which ranges from 0 (absolute equality) to 1 (absolute inequality). For a long time South Africa’s Gini coefficient (currently 0.58) has been second to none in the world, and today only that of Brazil is higher. Another way to express income inequality is to examine the shares in total income of groups of households arranged in order of income level. The poorest 40% of households (equivalent to 50% of the population) receive only 11% of total income, while the richest 10% of households (equivalent to only 7% of the population) receive over 40% of total income.

In the post-apartheid era various policies, measures and interventions have been introduced to address disparities and racial inequalities over a wide front of South African life and society – ranging from replacing all racial discriminatory legislation; introducing universal and free access to primary health care; introducing BEE measures for the advancement of black population groups in the economic and employment spheres; increased social grants for the poor; targeting sectoral policies and government spending to the poor; increased access to tertiary education for black pupils by applying lenient enrolment requirements for them, etc.

A further interesting aspect when considering disparities is that whilst there has been a drastic increase in the income amongst the black economically active population group and black per capita income growth has been steady since the political transition, only a small proportion of black South Africans is benefiting significantly from the post-apartheid economic dispensation. In this regard some economists argue that the main driver of inequality currently in SA is no longer the Black/White divide, but rather the intra-group divide between rich Blacks and poor Blacks and some even assert that inequality has been ‘changing from being race to class based’ as a rich black elite has emerged and whites have become proportionately less wealthy. This inequality within the black race group is substantial and increasing – with African households for example have a Gini coefficient of 0.54 which is nearly as high as the national figure.

5.2.1 EDUCATIONAL DISPARITIES:

South Africa built a strong higher education sector during the apartheid years, but race-based inequalities, duplications and inefficiencies were rife. There were separate institutions for different race groups, historically 'white' institutions were most favourably located and resourced and conducted almost all research, and there was a binary system featuring 'academic' universities and 'vocational' technikons. The legacy was a divided education sector of uneven quality. Post-apartheid, education faced enormous challenges: primary among these were the need to achieve greater equity, efficiency and effectiveness within institutions and across the system.

Disparities within the educational system (and higher education in particular) however reflect dramatic changes since the collapse of apartheid. In the new landscape there are far more students of all races enrolled in fewer but larger universities that are of three distinct types and offer a full range of courses leading to internationally recognised qualifications. There are three quarters of a million students attending 23 public universities in a higher education system that is the strongest and most diverse in Africa. Today, one in six young South Africans enter higher education. Student numbers have nearly doubled in the dozen years of democracy, to 735,000 in 2006. Major strides have been made in opening access to groups disadvantaged under apartheid, especially black and women students: the portion of black students has grown to three-quarters of the student body, and 55% of students are women. The human face of South Africa's public universities has thus transformed during the past dozen years. Once rigidly reserved for different race groups, today's multi-campus institutions are multi-racial, multi-cultural and multi-lingual – though English is the primary language of instruction on all but a few campuses.

At the institutional level, universities needed to improve access to students of all races, to help build a new democracy and to become more responsive to the new society's needs. In this regard they also had to transform campuses and cultures to become less alienating to students from diverse backgrounds. They were required to develop curricula that were locally relevant but also geared towards an increasingly competitive, technological and knowledge-driven world, to produce scholars able to tackle South African problems, and to train the growing numbers of graduates essential to economic growth and development.

Whilst the above statistics reflect that in real numbers the black student population (including Coloureds and Indians) have increased to 75 per cent, the picture is less favourable when considering the **proportions** of young people from different race groups who enter higher education: while 60% of white and 51% of Indian school leavers access higher education, the participation rate for blacks is only 12%. The primary reason for this disparity is to be found in the sub-standard schooling that most poor black children receive (not meeting entry requirements) and the poverty amongst a large percentage of the black population group that serves as a barrier to accessing available opportunities. Towards addressing the financial constraints of poor black students, access to universities by hundreds of thousands of black students has been enabled via the government-funded National Student Financial Aid Scheme, which currently supports 110,000 poor students (compared with 86,000 five years ago). In 2007 the Scheme will spend R1.6 billion providing needy students with bursaries and loans. Student loans are recovered through the tax system once graduates are employed. Towards overcoming the constraints related to their sub-standard schooling, most universities have devised alternative admission processes that select educationally disadvantaged students on the basis of their academic **potential** rather than their performance in national school leaving exams. Many institutions have also introduced academic development and 'bridging' programmes that help students to overcome poor schooling and to cope with learning in a second language, usually English.

At the national level, the Government drove a radical restructuring of higher education to make it more focused, stronger and efficient. The former binary divide was dismantled, and the number of institutions was cut from 36 to 23 through mergers and campus incorporations involving most institutions. No campuses were however closed, so there remains as much higher education provision as there was before. The new landscape comprises three types of institutions: 'traditional' research-focused universities, universities of technology, and new 'comprehensive' universities that combine academic and vocationally oriented education and are aimed at enhancing student access and expanding research opportunities and market responsiveness. The South African universities are further launching a major revamp financed by a R6 billion allocation from the Government, which will be used to refurbish buildings, construct new facilities, fund improvements to equipment and libraries, improve outputs and produce more science, engineering and technology graduates. In this regard particular focus will be placed on upgrading the traditionally black universities.

5.2.2 GRADUATION RATES:

Whilst the above statistics show a marked increase in the number of black students enrolled in higher education and the overall number of graduates – which has increased almost 100% over the past 15 years – there is serious concern regarding the low graduation rate in these institutions. Only 15% of students graduate each year (one of the lowest graduation rates in the world and much lower than the Government's benchmark of 25%). There is particular concern about a continuing high drop-out rate of 50 per cent (30% in the first year, 20% in the second year with only 22% graduating within the specified three years duration for a generic Bachelors degree). This high drop-out rate is especially prevalent among black students (70%). Whilst transformation of the educational landscape has resulted in more black than white graduates – in 2005 their numbers were 66,600 and 38,200 respectively – graduation rates are lower among African students (many who are from sub-standard schools and are thus battling to cope with higher education standards, and/or from poor families and so endure financial difficulties even if they receive bursaries or loans).

Against the above general background of educational inequalities and disparities within the South African educational system, the following sections of this Chapter attempts to further identify and analyse the causes of race related disparities within AET and attempts to make recommendations on how such could be addressed.

5.3. IDENTIFICATION AND ANALYSIS OF RACIAL DISPARITY PROBLEM AREAS

This section analyses various manifestations and causes of AET related racial disparities and inequalities. To this end the following issues are investigated and analysed:

- Differentiated **access** to AET (with access barriers such as location, language, admission requirements, affordability, etc.)
- Disparities in the **quality** of AET on offer
- Disparities in the **type and range** of programme offerings (between traditionally black universities and the so-called white universities) and the enrolment/graduation of black candidates in the so-called **scarce skills fields** – with a consideration if black students are prepared during various school phases to meet enrolment requirements for such programmes.
- Disparities in the level of sourcing and **funding** of AET institutions (including loans and bursaries for disadvantaged black students)

5.3.1. ACCESS TO AET

This section deals with racial disparities in terms of the **access** that different race groups have to AET services and AET institutions.

Despite the fact that Section 29 (1) of South Africa's Constitution reads: "*Everyone has the right to a basic education, including adult basic education; and to further education, which the state, through reasonable measures, must make progressively available and accessible*", it must be acknowledged that previously disadvantaged communities, especially women and the disabled, still have unequal access to quality Agricultural Education and Training (AET) services.

The following were identified as factors/barriers influencing access and resulting in differential access to AET services and provider institutions:

- Location constraints
- Language barriers
- Admission requirements, and
- Financial constraints

5.3.1.1. THE LOCATION BARRIERS TO AET INSTITUTIONS / SERVICES

Location related barriers can be defined as a lack of access to AET provider institutions and services due to the following reasons or causes:

a. Distance to facilities / services.

Whilst there is a well developed and established education and training sector capable of serving the needs of the agricultural sector in South Africa, it should be noted that at FET and HET level, the majority of such facilities and providers are located within the urban areas (metropolitan and secondary towns) with an under-provision in the rural areas. Given that the overwhelming majority of persons living in rural areas are black, it is evident that racial disparities exist in the access to agricultural education at FET and HET level due to the location of such facilities. Rural related location barriers and constraints are further compounded by poor road infrastructure and poor/inconsistent and expensive transport services in rural areas.

These distance related constraints can be overcome through either establishing more decentralised service rendering (via satellite facilities), or through providing adequate (more) hostels and/or other forms of accommodation facilities for students from the rural areas at the existing institutions. It should however be noted that such board and lodging is expensive and will bring an additional financial burden to the students and/or the state.

The above state of affairs is also true at the lower levels of training (skills training) – with a relatively small number of AET providers that still adopt the approach of taking training to the farmer (i.e. offering training on farms and in communities) as opposed to the majority that offer institutionalised training (i.e. where the trainee must come to the service provider and the training is offered at its training centre). A further possible means of overcoming distance related access problems is thus for more training providers to adopt the mobile training approach (like the former Boskop Training Institute which took training to the farmers via its mobile training units).

b. Knowledge of AET Service Providers and services on offer

The study revealed that there is a lack of knowledge amongst prospective students regarding the network of AET providers, who they are, where they are located, what they offer and what recognition and accreditation their programmes enjoy. This lack of knowledge, coupled to the relatively poor image of agriculture among a large proportion of the black population, reduces the uptake of available AET opportunities and is thus viewed as an access barrier. A need thus exists to, via the AgriSETA and the Provincial Agricultural Education and Training Forums, provide information to prospective students and learners on the AET provider network and the programmes on offer. The efforts of the DoA in promoting agriculture as a career must also be supported and expanded.

c. Non-conducive Learning Environment

Conditions in the rural communities are often not conducive to learning and serve as a location related barrier to AET. In this regard prospective students living in rural areas will have to deal with conditions such as a lack of electricity, overcrowded homes with a resultant lack of privacy for study purposes, lack of computers and internet access, limited local support networks (e.g. study groups or mentors), etc. Even if distance learning opportunities exist, the conditions in many rural homes are thus not conducive to realise or optimise such opportunities.

To form a statistical impression of racial access disparities that may exist due to the location of institutions that offer AET, the following are provided:

- The overwhelming majority of people living in the rural areas (where the largest location related access problems are experienced) are blacks (close to 90% of all people living in the rural areas are black)
- Whilst there is a large AET provider network in the country, the majority are either located and/or focussed on service rendering to people residing in urban areas. Whilst there is a relatively good distribution of education and training facilities at school and ABET level, the position changes towards an urban bias at the FET (vocational) and HET levels. Statistics regarding the education and training network is as follows:
 - **At GET level:** The “*National Assessment Report (Public and Ordinary Schools)*” dated 17 September 2007 compiled by the Department of Education reflect that in 2006 there was 25 145 schools in South Africa offering educational services up to Junior Secondary level (Grade 9). These schools are located throughout both the urban and rural areas and correlate to population densities.

- **ABET Programmes:** According to StatsSA figures there was a total of 1 750 ABET facilities throughout South Africa in 2003. These facilities are widely distributed in both urban and rural areas and whilst there might not be enough facilities to meet the national demand for adult basic education and training, the facilities cater predominantly for the black population groups and as such there is not racial barriers to accessing such facilities and services.
- **At FET Level:** The AET landscape at FET level can be divided into the following provider categories:
 - Academic Secondary Schools: Information provided by DoE reflect that in 2006 a total of 1 097 secondary high schools offered Agricultural Science as a subject to approximately 117 000 pupils. The overwhelming majority of pupils who enrolled for the subject are black students. Whilst access is thus not a problem from a racial perspective, the quality of education received at these predominantly black schools are suspect given that 30% of the students failed – even though the majority took the subject at Standard Grade only.
 - Agricultural High Schools: In 2008 a total of 43 specialised Agricultural High Schools offered a range of agricultural subjects to an estimated 550 pupils. These schools are dispersed throughout the various provinces and many are located in smaller rural towns. Whilst the schools originally catered almost exclusively for white pupils, the situation has been reserved and currently pupils enrolled at the Agricultural High Schools are predominantly black. Access barriers of a racial nature thus no longer exist.
 - FET Colleges: Whilst there are 50 FET Colleges in the country, a total of only 13 FET Colleges offer agricultural programmes. These colleges are predominantly located in larger towns and could thus present access problems to the rural poor. The overwhelming majority of students enrolled for learning programmes at the FET Colleges are black and as such there are no institutional barriers of a racial nature.
- **At HET Level:** The AET landscape at HET level can be divided into the following provider categories:
 - Agricultural Colleges (Agricultural Training Institutes): There are 11 Agricultural Training Institutes (ATIs) located throughout the country. The majority are located in areas where there are concentrated farming activities (semi-rural and countryside districts). Whilst the Agricultural Colleges initially predominantly served the white population group, their student population is now dominated by black students and there are no racial access barriers to these institutions.
 - Universities of Technology: There are 4 Universities of Technology that offer agricultural learning programmes. These institutions are mainly located within the urban areas and access to their facilities could thus be problematic for prospective students from poor rural communities. Blacks comprise the overwhelming majority of students enrolled at the Universities of Technology and there is thus no institutional access barriers of a racial nature to these institutions
 - Universities: There are a total of 8 Universities that offer agricultural programmes. These institutions are mainly located within the urban areas and access to their facilities could thus be problematic for students from poor rural communities. Blacks comprise the overwhelming majority of students enrolled at the traditionally black

universities, but during the past decade black student numbers have also increased substantially at the so-called white universities (black students now outnumber white students two-to-one). Whilst there is thus no formal or institutional access barriers of a racial nature to any university in the country, other aspects such as language (English proficiency), culture at former Afrikaans universities, and entry requirements for certain study fields still effectively serve as barriers to many black students wishing to enter such institutions (refer sections below) .

5.3.1.2. LANGUAGE AS A BARRIER TO ACCESSING AET SERVICES / FACILITIES

A National Language Policy Framework was developed by the Department of Arts and Culture in 2002 with the aim of promoting equitable use of the 11 official languages, and to promote good language management for access to government services, knowledge and information, and for efficient public service rendering and administration aligned to client needs.

Despite the above indicated entrenchment of the various official languages within the constitution and various other relevant policies and legislation, it is evident that from a practical perspective, English serves as the most widely used official language – both in the public service and in the private sector as well as in institutions of learning (especially at the HET level). Due to an increasingly globalised, technologically driven environment, both within South Africa and worldwide, the successful attainment of English language proficiency and literacy (even in a multilingual, multicultural country such as South Africa) is thus becoming critical for educational and workplace success. Against the above demand for English proficiency, the DoE subsequently developed a national Language-In-Education Policy, which ascribes to the principle of additive bilingualism (even though learning in a second language is known to impair the assimilation of knowledge).

It must unfortunately be reported that South Africa has not attained much success to date. Illiteracy amongst persons of all ages is still alarmingly high, and recent comparative studies have indicated that the level of scientific and mathematical literacy amongst South African students is the lowest internationally (NRF 2007). .

From the above it is thus evident that language serves as a major constraint and access and success barrier to many black students. The size and extent of the problem at the various levels of AET is as follows:

a) At GET Level:

Language in Education Policy in South Africa is determined by the terms of Section 4 of the National Education Policy Act, 1996 (Act 27 of 1996), and the norms and standards regarding language policy published in terms of section 6 of the South African Schools Act,(Act 84 of 1996). While these two policies have different objectives, they complement each other and it should not be considered in isolation of each other.

According to Section 6(1) and 6 (2) of the South African Schools Act (Act 84 of 1996) the Language policy of public schools is decided by the following:

“6. (1) Subject to the Constitution and this Act, the Minister may, by notice in the Government Gazette, after consultation with the Council of Education Ministers, determine norms and standards for language policy in public schools.

(2) The governing body of a public school may determine the language policy of the school subject to the Constitution, this Act and any applicable provincial law.”

In Addition, relevant extracts from Section 4 of the National Education Policy Act (Act 27 of 1996) states that:

“4. The policy contemplated in section 3 shall be directed toward-

(a) the advancement and protection of the fundamental rights of every person guaranteed in terms of Chapter 3 of the Constitution, and in terms of international conventions ratified by Parliament, and in particular the right-

(ii) of every person to basic education and equal access to education institutions;

(v) of every student to be instructed in the language of his or her choice where this is reasonably practicable;

(viii) of every person to use the language and participate in the cultural life of his or her choice within an education institution”

Against the above legislation and policies put in place by the Department of education, it is not anticipated that any language barriers exist at GET level (i.e. **Primary and Junior Secondary Schools**).

Subsection 11(k) of the Adult Basic Education and Training Act (Act 52 of 2000) states that the governing body of the public centres will determine the language policy of the centre. In effect, this ensures that the communities involved in particular centres will have representation on the governing bodies. Therefore, it can be inferred that the language of instruction will be suitable to the area where the ABET centre is situated. Consequently, it is not anticipated that language will be a barrier to education at **ABET Centres**.

b) At FET Level:

A consideration of language as access barrier within the FET band is undertaken within the following sub-groupings:

- ***In Academic Secondary Schools (Gr 10-12)***

The National Education Policy Act (Act 27 of 1996) and the South African Schools Act (Act 84 of 1996) also include academic secondary schools. Therefore, as with primary and junior secondary schools, it is not anticipated that any language barriers to education exist at academic secondary schools.

- ***In Agricultural High Schools:***

Agricultural High Schools are also under the control of the Department of Education (for each province). Therefore, it is assumed that the same language policy that is relevant for the other secondary schools in the country is relevant for the agricultural secondary schools. Consequently it is not anticipated that there are language barriers to education at Agricultural High Schools.

- ***FET Colleges:***

According to the Further Education and Training Colleges Act (Act 16 of 2006) the language policy of the college will be determined by its Council, subject to the approval of the Member of the Executive Council for Education. Due to the representativity of the College Council and the fact that this representative body defines the language policy for the FET institutions it is not anticipated that language will be a barrier to education at FET colleges.

- **Unit Standard Based Programmes:**

Whilst there is no particular mention of a language policy in the Skills Development Act (Act 97 of 1998) as amended by the Skills Development and Levies Act (Act 9 of 1999) and the Skills Development Amendment Act (Act 31 of 2003), it is likely that the programmes and learning material registered with SAQA will have been developed in English. As a rule such programmes will be delivered / presented by accredited providers who will function on a market oriented and profit basis. This implies that they will have to present the training in the language demanded by the clients / communities being served and as a rule there should thus not be a language barrier towards accessing such offerings.

c) At HET Level:

It is at tertiary education institutions (HET level) that black students are experiencing language problems. In this regard the document titled "*Language Policy for Higher Education*" compiled by the Ministry Of Education", dated November 2002 confirms such where it is stated that:

"Language has been and continues to be a barrier to access and success in higher education; both in the sense that African and other languages have not been developed as academic/scientific languages and in so far as the majority of students entering higher education are not fully proficient in English and Afrikaans."

Towards addressing this problem the *Language Policy for Higher Education* proposes amongst others the following:

- **Language of Instruction:** The Ministry acknowledges the current position of English as the dominant language of instruction in higher education and believes that in the light of practical and other considerations it will be necessary to work within the confines of the status quo until such time as other South African languages have been developed to a level where they may be used in all higher education functions. The government is however committed, as stated in the National Plan for Higher Education, to ensuring that language should not act as a barrier to equity of access and success. To this end the Ministry encourages all higher education institutions to develop strategies for promoting proficiency in the designated language of tuition, and the provision of language and academic literacy development programmes.
- **The promotion of multilingualism** in the institutional policies and practices of institutions of higher education. All HET institutions were requested to develop strategies towards introducing multilingualism in terms whereof English is coupled to the appropriate black languages of its feeder area. The government however acknowledges that the implementation of multilingualism will, in practice, be in tension with other considerations such as the need for financial affordability. Thus the Constitutional provisions in respect of language in education explicitly state that such rights as receiving education in the official language(s) of choice in public educational institutions are also subject to considerations of **practicability**.

Whilst the implementation of the Language Policy at HE institutions ensures that the language barriers will be minimal in terms of access to the institutions, the reality of the situation however remains that various research studies have shown that a critical factor in determining the success or failure among black students lies in the degree of proficiency of the student in the English language. While a variety of factors influence student success/failure profiles (e.g. intelligence, social and cultural background, attitude towards study, application, etc.), the most significant variable was that of English language proficiency – which was found to be central to all aspects of success in higher education.

English language proficiency is the most important moderator of performance, and considerable evidence indicates that it is responsible for failure to finish in the minimum time. Thus higher levels of language proficiency are required to succeed in higher education. The problem is that most black candidates for higher education take English as a second language at matriculation level. Thus their grasp of English is limited. It was further found that problems referring to English reading and writing proficiency – all due to a basic lack of comprehension of English – are being transferred to a lack of knowledge about other subjects. Students resort to rote learning to pass subjects rather than attaining true subject understanding. This under-preparedness also extends itself into the study options available to many black students – with a relatively small percentage that have the mathematical background for entry into the engineering and other “hard” science fields and the majority opting for the “soft” options of arts and social sciences – which in turn result in an oversupply for some jobs and severe shortages in others.

Research further found that of the total student body the English first language students consistently outperformed their English second-language counterparts. Within this latter group it was again found that black students from poor rural areas had the worst results. Thus socio-economic disadvantage translates into academic disadvantage, and black students experience greater difficulties in adapting to the higher educational system, and are thus less successful in their studies.

The scale of the problem is such that both quantitative and qualitative corrective measures are required. On the **quantitative** side a more rigorous selection system is required which goes beyond the current practice of accepting matriculation exemption results and a mere interview as being sufficient. In this regard various stakeholders propose the inclusion of the International English Language Testing System (IELTS) as a critical selection tool to be used by tertiary institutions towards a more accurate prediction of candidates with the potential to be successful. On the **qualitative** side it is evident that a large proportion of rural black students will require a comprehensive support service to help them to overcome the language and cultural barriers that they are bound to encounter at traditionally white universities. Whilst many institutions offer some type of support service, it is believed that the current size and scope of support is insufficient when considering that the poor pass rate is costing the government in excess of R 1,5 billion per year in lost subsidies.

5.3.1.3. ADMISSION REQUIREMENTS AS ACCESS BARRIER TO AET

According to the document titled “*Report on the ten year human resource development in agricultural graduate outputs in SAQA accredited higher education institutions*” compiled by the Department of Agriculture, and dated 2006, admission requirements are set by an education institution in relation to the level of difficulty of a course with the purpose of ensuring that candidates have the necessary skills and capacity to complete the prospective programme of study.

Agriculture is ultimately a science, and requires certain basic scientific knowledge for students to be successful in their studies. This only becomes a barrier at higher education institutions where AET becomes specialised enough to necessitate the selection of students based on their chances of successfully completing the course of study.

Admission requirements as a racial access barrier to educational opportunities manifest itself primarily at tertiary (Higher Education) level. The nature, size and extent of the problems at HET level are as follows:

a) *Agricultural Colleges (Agricultural Training Institutes):*

According to the Department of Agriculture (2006) within the Agricultural Colleges, uniform minimum entrance requirements are stated, but there are several Colleges that apply additional criteria (e.g. senior certificate subjects relevant to agriculture). In general, admissions policy at the institutions:

- become more stringent as qualifications rise up the NQF levels and increasingly extends beyond common standard requirements
- become more complex for entry at higher qualifications levels (eg: where institutions apply many different criteria that become difficult to compare)

As a rule those Agricultural Colleges that offer tertiary programmes have targeted students who do not meet the entry requirements for enrolment at the Universities and/or Universities of Technology (UoT). The programmes have a strong focus on practical competence and are less research oriented than the qualifications offered at the universities. They subsequently focussed on programmes such as the Higher and Advanced Certificates in Agriculture (2 year programme at HEQF level 5/6) and the Diploma in Agriculture (3 years study at HEQF level 7). It should be noted that selected Colleges have recently also introduced B Agric programmes within their scope of offerings. To date entry or admission requirements to the Certificate programmes do not require matriculation exemption as a requirement and usually only demands a 50% pass of the Senior Certificate. A further standard requirement is that prospective students should have passed at least one of the following subjects: mathematics, physical science, biology or agricultural science (whilst a combination of these subjects is an advantage). Successful completion of the Higher / Advanced Certificate in turn serves as entry requirement to the Diploma programme.

From the above it is evident that the Agricultural College programmes and qualifications create an additional or alternative opportunity for students (those who have not passed with a matric exemption) to enrol for tertiary education in the AET field. Given that the majority of students enrolled at the Agricultural Colleges are black, there are no racial access constraints of an institutional nature. There might however be access barriers in the sense that many black students were not advised at secondary school level with regard to subject choice (selecting subjects that will enable them to further their studies in the science related fields). As such a relatively small number of black pupils take subjects such as mathematics and science in the senior secondary phase and the majority of black school leavers will thus not meet the entry qualifications of the above programmes. In view thereof that agriculture is

ultimately a science, and requires certain basic scientific knowledge for students to be successful in their studies, these entry requirements should not be lowered and the means towards addressing the problem rather lies at school level – where career guidance services (subject choice decisions) and the capacity to offer quality education in subject fields such as mathematics and science should be bolstered.

b) Universities and Universities of Technology

Previously, the different HET institutions each set dissimilar criteria for admission to studies leading to a degree. For example, requirements for admission to BSc Agric programmes in the universities were quite diverse beyond the standard requirements of a matriculation exemption. However, in August 2005 the minimum requirements for admission to all Higher Education Institutions was standardised and stipulated in the document titled “*Minimum Admission Requirements for Higher Certificate, Diploma and Bachelor’s Degree Programmes requiring a National Senior Certificate*” it is stated in this document that the policy will be applicable to all institutions as from January 2009 and specified the following:

“4. Minimum requirements for admission to the Higher Certificate, Diploma and Bachelor’s Degree

Higher Certificate

The minimum admission requirement is a National Senior Certificate (NSC) as certified by the Council for General and Further Education and Training (Umalusi). Institutional and programme needs may require appropriate combinations of recognised NSC subjects and levels of achievement. For example, an institution may determine that a Higher Certificate in Architectural Design requires in addition to the NSC a specified level of attainment in Design and an associated recognised subject.

Diploma

The minimum admission requirement is a National Senior Certificate (NSC) as certified by Umalusi with an achievement rating of 3 (Moderate Achievement, 40- 49%) or better in four recognised NSC 20-credit subjects. Institutional and programme needs may require appropriate combinations of recognised FETC subjects and levels of achievement. For example, a Diploma in Datametrics might require a pass at a prescribed level in Mathematics or Information Technology.

Bachelor’s Degree

The minimum admission requirement is a National Senior Certificate (NSC) as certified by Umalusi with an achievement rating of 4 (Adequate Achievement, 50- 59%) or better in four subjects chosen from the recognised 20-credit NSC subjects (which will be known as the designated subject list

Satisfactory Achievement in four designated NSC subjects provides the primary basis for admission to a Bachelor’s Degree programme. An institution is entitled to specify an appropriate level of subject achievement for a particular programme. For example, admission requirements for a Bachelor’s Degree in Fine Art or Music might include a specified level of achievement in the corresponding recognised NSC subjects. Similarly, an institution will be entitled to specify subject requirements for a particular programme. For example, Mathematics and Physical Sciences might be considered as requirements for admission to a Bachelor’s Degree in Science.”

According to the Department of Agriculture (2006) only at the university level was the subject ‘Agricultural Science’ specified explicitly as a part requirement for admission to programmes. In the Agricultural Colleges, it was a recommendation rather than a requirement to have Agricultural Science in Matric. Clearly there is no explicit advantage in getting entry to a programme for an applicant holding a Matric with the subject ‘Agricultural Science’. Therefore a student who took Agricultural Science instead of Mathematics or Science or even Biology at Matric level could well be disadvantaged in his/her attempt to access agricultural study opportunities in higher education.

Analysing admission requirements across the institutions (where programmes are presented in almost exactly the same way and where each programme contains a limited number of courses and where students have a limited number of options), should allow one to compare the effects of admission policy on outcomes (e.g. FET Colleges programmes). However, in the case of higher education and especially universities, investigating the impact of admissions criteria across institutions and across programmes is much more complicated (Department of Agriculture 2006).

The complicated nature of the comparison of admission requirements at HET level is a result of the following conditions:

- each programme (e.g.: BSc Animal Science) will involve a different set of courses in each institution,
- at each institution students can select individualised combinations of courses, because there will be a variety of options.

This means that degree programmes differ across institutions and even students taking the same degree will have different focus fields of specialisation. For these reasons, student achievement is not strictly comparable unless at a highly aggregated level (e.g. type of degree such as BSc or broad field of study such as animal health).

Currently all but two of the universities offer AET short courses (Science Foundation Programmes, or short courses to different sectors of the public) to empower people from disadvantaged communities and educational backgrounds towards access to formal AET courses. However, none of the UoTs offer these courses as yet.

In addition most of the institutions also offer bridging programmes or extended curriculum programmes to assist students in succeeding at tertiary level. As example well developed foundation programmes exists at some institutions for phasing students with poorer scholastic results into the B Agric degree programmes whilst a number address such shortfalls through the Extended Curriculum Programme (ECP). These programmes are basically aimed specifically at improving the computational and writing skills of students through bridging courses in Maths and Science, while attention is also paid to improving proficiency in general scientific concepts and scientific writing skills. In some cases these special foundation programmes adds one year of additional study to the degree programme and results in students following this course to complete the three year B Agric course in four years. In general these extra years has a very positive influence on the maturity of the students.

5.3.1.4. FINANCIAL MEANS AS ACCESS BARRIER OF (RURAL) BLACK STUDENTS

According to the Department of Agriculture (2006) the cost of studying is a significant factor that influences access to study opportunities. Unless study costs are very low, they represent a severe barrier to students who qualify academically for admission but do not have access to sufficient funds to meet financial responsibilities inherent to especially tertiary education.

The cost of study constitutes a barrier since any student that cannot raise this minimum amount is excluded from education. Comparative analysis of cost as a barrier is hard due to the differences in charges at the various institutions. Some institutions bundle costs together, whilst others charge particular costs separately. This may lead to misconceptions as tuition fees paid separately may appear lower than when these fees are bundled together with other costs. Accurately estimating the costs from institutions is difficult as institutions provide their costs in different forms and documents. Presently there is no official requirement for standard reporting of costs.

Finances and costs as an access barrier manifest itself in two ways, namely:

- Where the student and/or his/her family can not raise sufficient funds to meet the tuition and other costs they are not in a position to realise the opportunity. Whilst good progress has been made in providing students from previously disadvantaged communities with financial support (e.g. via the National Student Financial Aid Support in the form of study loans, bursaries and grants) there are still large numbers of black students who are excluded from tertiary education due to financial constraints.
- Where tertiary education students perceived as “under-prepared” are denied access because the institutions are under financial pressure and can not afford to take on students deemed likely to not succeed in their studies (thus resulting in the institution losing its government subsidy). An earlier section of the report indicated how the English language constraints of many rural black students cause them to fail and how this can lead to classifying such students as high failure and thus high financial “risk” candidates.

An analysis of financial means as an access barrier to education, as well as disparities that exists in terms of the costs of tuition between different educational institutions is as follows:

a) At GET Level:

- ***Primary and Junior Secondary Schools:***

Section 3 of the South African Schools Act (Act 84 of 1997) states that no learner may be refused admission to a public school on the grounds that his or her parent is unable to pay or has not paid the school fees determined by the governing body under section 39. Therefore, it is not anticipated that there exist any financial barriers to education at GET level.

- ***ABET Programmes:***

Section 23 of the Adult Basic Education and Training Act (Act 52 of 2000) states the origin of funding at public centres for ABET which includes funds allocated by the State. ABET is a Constitutionally Mandated Basic Service (CMBS) as indicated in Chapter 2 of the Constitution of South Africa. This makes it a top priority for accessibility for all citizens and financial means is not an access barrier.

b) At FET Level:

- ***Academic Secondary Schools and Agricultural High Schools (Gr 10-12)***

These schools also fall under the South African Schools Act (Act 84 of 1997) and amendments. Therefore, barriers to access should be minimal regarding finances as mentioned above. Consequently it is not anticipated that barriers concerning finance exist relating to AET offerings at these schools.

- ***FET Colleges:***

According to Schedule 1 of the Further Education and Training Colleges Act (Act 16 of 2006) the Council of the relevant college will decide on the fees to be charged to students. Whilst financial assistance is available from several institutions such as the NSFAS, it is conceivable that there are financial barriers to students wishing to study further at FET level at FET colleges. In the FET Colleges, the costs of the more popular programmes N4 and N5 (1 year) and N6 (1 year) are R 3 150, R 3 000 and R 6 650 respectively. There are considerable variations in the scale of costs between FET Colleges.

- **SAQA Registered Unit Standard Programmes:**

Learning programmes such as Learnerships and Skills Programmes registered on SAQA are funded via the National Skills Fund and/or via the relevant SETAs (in this case AgriSETA). In theory all costs related to enrolment for such training programmes are covered from the Skills Training Levy payable by business registered within the relevant sector or from the NSF (for strategic projects). As such financial means should thus not be a constraint or barrier towards accessing such education and training opportunities and mechanisms have been created to accommodate the poorest of the poor on such programmes.

c) At HET Level:

This section is dealt with in detail under section 5.3.4 (Disparities in the funding and sourcing of AET institutions). Summarised it can however be stated that subsidy formulae for Universities and Universities of Technology currently comprise on average about 85% of the public funding received by these institutions.

Despite the large amount of money invested in HET institutions, the cost of studying remains high and still constitutes a serious barrier to students who wish to enrol and who qualify academically for admission but do not have access to sufficient financial resources to meet fee requirements and other study related costs.

There is fortunately various financial assistance programmes in place to financially support needy students (especially students from previously disadvantaged population groups) and to ensure that a lack of finance to not exclude them from study opportunities (on condition that they meet the academic entry requirements). The government has put in place a financial support scheme, bursaries and scholarships to increase the number of deserving students to higher education and preference is specifically given to black students, students from rural areas and those with financial needs. In this regard the National Student Financial Aid Scheme (NSFAS) is the main funding scheme of government that gives assistance to previously disadvantaged students. The NSFAS allocate funding to higher education institutions on the basis of a formula that factor in the number of students, student needs and cost of study. The scheme has a performance incentive base in terms whereof up to 40% of a study loan can be converted into a bursary depending on the student's academic performance. Statistics obtained from the DoA reveal that in 2004, a total of 1 372 students in agricultural study fields were awarded a total of R12 348 million by the National Student Financial Aid Scheme. The data further revealed that 85% to 90% of students receiving NSFAS support are black students.

5.3.2. DISPARITIES IN THE QUALITY OF AET OFFERED / RECEIVED

This section deals with racial disparities in terms of the **quality** of education and training offered at those institutions historically recognised as white institutions versus those that primarily caters for black pupils and students. The following were identified as factors influencing the quality of education and training offered at the AET institutions and which could lead to racial disparities:

- The format, type and range of programmes on offer
- The subject content of programmes (quality of training material)
- The quality of teaching/lecturing staff
- The quality of teaching and training facilities

5.3.2.1. FORMAT TYPE AND RANGE OF QUALIFICATIONS OFFERED

In South Africa the range and content of subjects are regulated (in the form of fixed curricula) at GET level and the offerings at schools are standardised and generic up to Grade 9. Whilst subject choice becomes available at the FET level (Grades 10-12) in the schools, the content of subjects remains standardised (pending if the subject is taken at higher grade or standard grade). This freedom of subject choice, and various learning pathways, increases at the FET level when entering the various study options of a vocational nature (typically offered at the FET Colleges).

It is however at the HET level where considerable differentiation exists and where there are perceived disparities in quality of education. Agricultural Colleges, Universities of Technology and traditional Universities each cover a different aspect of education at the HET level (whilst there is a degree of overlap). The complexity regarding differentiation (and the quality of education) is compounded at HET level since one must not only consider the differences in quality at institutional level, but students at Universities and Universities of Technology have the option to construct programmes from all the different offerings at the institution of their choice and selected subject combinations also influences the quality or value perception that industry hold of such qualifications.

The extent of differentiation in the format/type of qualifications on offer at historically white versus historically black institutions (with the focus being placed at the HET level) is as follows:

a) **Agricultural Colleges:**

According to the document titled “*Report on the ten year human resource Development in agricultural graduate Outputs in SAQA accredited higher Education institutions Department of Agriculture*” compiled by the Department of Agriculture, dated 2006, the Colleges of Agriculture do not provide highly standardized programmes like the FET colleges. This flexibility exists because the Colleges of Agriculture orient their courses towards supporting the agricultural activities that are practiced in their region. For example:

- Cedara focuses on forestry and horticulture;
- Lowveld focuses on sugar cane, tobacco and horticulture (while offering cotton to attract students from other regions);
- Potchefstroom focuses on mixed farming as carried out in the Highveld and adjacent regions; and
- Elsenberg has set itself the aim of specializing in agribusiness and viticulture.

However, as a rule the following broad agricultural fields are covered by the curricula on offer at Colleges of Agriculture:

- Plant production,
- Animal production,
- Agricultural management, and
- Agricultural engineering.

The student profile at Agricultural Colleges reflects that approximately 65% of all students are black, whilst some institutions have more white candidates than others (such as Potchefstroom, Lowveld and Elsenburg). Others such as Tompi Seleka, Tsolo and Madzivhandhila are almost exclusively patronised by black students. Within this context it is interesting that the latter three colleges have decided to no longer offer tertiary programmes whilst the former three are all in the process of introducing B Tech or B Agric degrees. In this sense there might thus be disparities with a racial impact in the offerings of the ATIs.

Given the considerable changes expected regarding the future role and function of ATIs (namely as **Centres of Excellence**) the above indicated disparities will however be of little or no significance (please refer to Chapter 7 of the Report for details regarding the position of the Agricultural Colleges (Agricultural Training Institutes).

b) Universities of Technology (UoTs):

This section must be read with Chapter 7 of the report that deals in-depth with matters of curricula standardisation and the mobility of students (and the portability of learning) between different Higher Education Institutions

In contrast to the Colleges of Agriculture, the various Universities of Technology (UoTs) provide a wider range of programmes that present multiple ways of acquiring a similar qualification level, but with different areas of expertise. Logically, it would be impossible for each UoT to offer all of these courses at the same time, as this would create an unsustainable staff to student ratio. Therefore it is important to consider which institutions concentrate on which programmes.

Analysis makes it possible to assess the relative emphasis on particular programmes within the broad agriculture field and also to see which institutions offer a wider range of programmes to their students.

The number of institutions offering a particular programme does not tell us how many students are actually enrolled and graduating. However, the number and location of institutions offering particular programmes will limit the opportunities for entry into the field especially where students need funding for travel, accommodation and living expenses.

c) Universities:

This section must be read with Chapter 7 of the report that deals in-depth with matters of curricula standardisation and the mobility of students (and the portability of learning) between different Higher Education Institutions). From the responses provided by the Higher Education Institutions (HEIs) that participated in the study it was observed that some of the former white institutions perceive the quality of education from some of the traditionally black institutions as of a lower quality and this result in students from such “lower quality” institutions finding it difficult to obtain credits for uncompleted qualifications when moving between institutions.

There is a range of programmes offered in universities at the Bachelor’s level. Some of these are presented as general programmes (e.g.: B.Agric [General]), while others provide a relatively high degree of specialisation (e.g.: BSc Agric [Economics]). The degree programmes are offered from different disciplinary bases (B.Agric, BInst, BSc, B.Com) although most programmes are located within the domain of Science. This distinction is important because the different degree programmes have different admission criteria which include the core gateway subjects of Mathematics and Science. It is these subjects which deflect the flow of enrolments into ‘softer’ administration and social science related agriculture programmes and restrict the access of students to ‘harder’ science-based programmes (DoA 2006).

Students at university have greater latitude to construct their own degree programmes. Upon graduation two students who graduate with the same qualification (e.g.: BSc Animal Health) may have obtained different sub-specialisations dependent on the mix of courses they have chosen to make up the programme leading to their degree. Naturally, not all students elect to move outside of a standard type of programme, and their choice is restricted to the extent that options are available.

5.3.2.2. PERCEIVED DIFFERENTIATION IN SUBJECT CONTENT AND QUALITY ON OFFER AT DIFFERENT AET INSTITUTIONS

The extent of differentiation in the subject content on offer at historically white versus historically black institutions (at the HET level) is addressed in some detail in Chapter 7 of the report. As outlined earlier it is however very difficult to make comparisons due to the large variety of programmes on offer and the manner in which students construct their qualifications are outlined in section 5.3.2.1 above.

In addition to the subject mix / combinations that make up a qualification, the quality of education and training is also determined by the **subject content** (e.g. what learning fields and learning outcomes are covered in a subject; what is the level/standard/quality of the learning material; relevance to industry needs; adjustments to changing environment and technology; does content allow for practical reinforcement of theory, etc.)

5.3.2.3. QUALITY OF TEACHING AND LECTURING STAFF

The quality of AET on offer at an institution is directly related to the quality of the instructors/teachers/ lecturers employed at that institution. Quality related racial disparities should thus also be investigated in terms of differences in the qualifications and experience of the lecturing staff at traditionally black provider institutions versus the profile of staff employed at those institutions perceived as traditionally serving the white population group.

The extent of differentiation in the qualifications and experience profile of staff at historically white versus historically black institutions (at the various levels of AET provisioning) is as follows:

a) At GET Level:

According to the document titled “*Teacher Education And Development In South Africa: A Research And Development Programme*” compiled by F. Arends and dated May 2007, the Relative Education Qualification Values of Educators can be defined according to the Employment of Educators Act 76 of 1998. This Act provides the formula for relating formal qualifications to salary scales. “The determination of the REQV is based primarily on the number of recognized prescribed full-time professional or academic years of study at an approved University, UoT or College of Education and taking into account the level of school education attained.”

A teacher with a M+3 qualification is, thus, classified as at REQV 13, and one with a M+4 qualification as at REQV 14. The PERSAL database was analysed to assess the Relative Education Qualification Values (REQV's) of teachers.

Educators with a REQV 13 (Matric + 3 post-matric education) and higher are considered to be classified as qualified, while educators with an REQV 12 or lower are considered to be classified as under-qualified.

Overall 8 per cent of educators were under-qualified. Consequently it is not anticipated that the quality of teachers at most primary and junior secondary schools negatively influence the quality of the education at institutions. However, it is not possible to determine from the information available where the under qualified teachers are located. It can however be assumed that the majority of under-qualified teachers will be employed in black schools.

Fortunately 8% is a relatively low percentage. It must however be stressed that the academic foundation is laid at this level and problems or learning constraints established will be carried through to higher levels of education.

b) At FET Level:

Within the FET band we distinguish between the following providers:

- **Academic Secondary Schools (Gr 10-12)**

According to the document titled "*Profiling agricultural science teachers and other teaching professionals at FET and HET institutions*" compiled by Manstrat and dated March 2008 a large portion of the teachers presently offering Agricultural Science at mainstream academic schools do not have sufficient qualifications of an agricultural nature to competently deliver the subject. The document states that at least 25% of the sample group were under qualified.

There is also a marked lack of practical experience and exposure amongst these teachers. Consequently, they lack practical knowledge of the subject and an understanding of the context of agriculture in South Africa. Another facet of agricultural knowledge generally lacking at academic schools is entrepreneurship, which enables students to view farming as a business. However, since the location and the racial make-up of the student body of the schools where these under qualified teachers are present is unknown, it is not possible to determine whether there are racial disparities resulting from the quality of teachers at Academic High Schools.

- **Agricultural High Schools:**

According to the document titled "*Profiling agricultural science teachers and other teaching professionals at FET and HET institutions*" compiled by Manstrat and dated March 2008, the **experience** of teachers offering agricultural subjects at agricultural high schools is indicated in Figure x below.

From Figure 5.1 it is clear that most of the teachers at Agricultural schools (73%) have more than 10 years experience teaching.

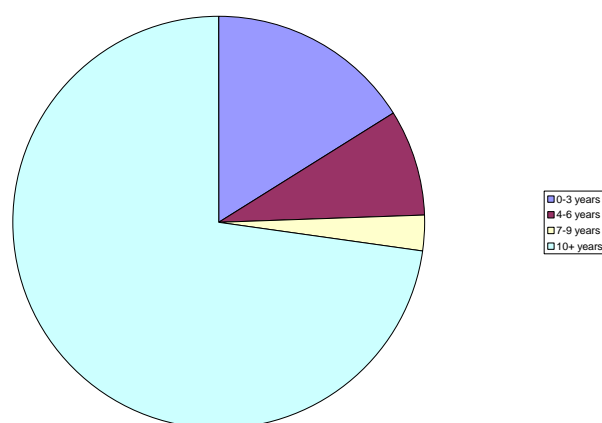


Figure 5.1: Teaching experience of teachers at Agricultural High Schools (Manstrat 2008)

The **qualifications** of teachers also have an influence on the quality of the education received at Agricultural High Schools. The qualifications of teachers at Agricultural High Schools are indicated in Figure 5.2 below.

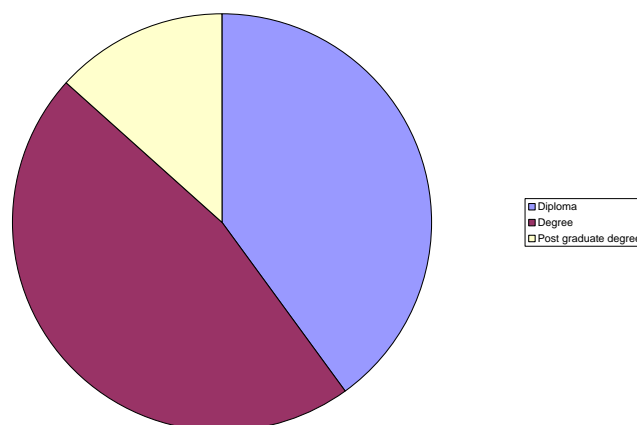


Figure 5.2: Qualifications of teachers at Agricultural Schools in South Africa (Manstrat 2008)

As can be seen most of the teachers at agricultural schools have at least a degree in agricultural sciences in most provinces. However in the Western Cape and Limpopo most teachers still only have a diploma. The majority of teachers at Agricultural schools in South Africa are still white and from this perspective there are still racial disparities in teachers employed at Agricultural High Schools.

However, due to the fact that most of the teachers at Agricultural High Schools have a tertiary qualification, and these teachers are deployed in all the schools, it is not anticipated that there are racial disparities in terms of the quality of teaching received by pupils attending Agricultural High Schools.

c) At HET Level:

Information provided in this section was obtained from the study undertaken by Manstrat in 2008 to Profile Agricultural Teaching Professionals at HET Institutions.

- Agricultural Colleges:**
The racial composition of lecturers employed at the Agricultural Colleges reveals that 67% of all lecturers fall within the black population groups. Transformation goals regarding the lecturing staff has thus been obtained (particularly in the Eastern Cape and North West where only black lecturers are employed – whilst in the Northern Cape and KwaZulu-Natal provinces there are still more white than black lecturers). Lecturers are generally well qualified with 29% holding post graduate degrees and a further 44% having been qualified to degree level. A concerning factor however, is that the overwhelming majority of lecturers (48%) have less than 3 years experience. In view thereof that both the lecturers and the graduates at the Agricultural Colleges are predominantly black, it is not anticipated that there are racial disparities as a result of the quality of the lecturing staff at Agricultural Colleges.
- Universities of Technology and Traditional Universities**
The lecturers at Universities and at the UoTs have been considered together for this part of the report. In Figure 5.3 below the racial composition of the lecturers at Universities and UoTs is illustrated.

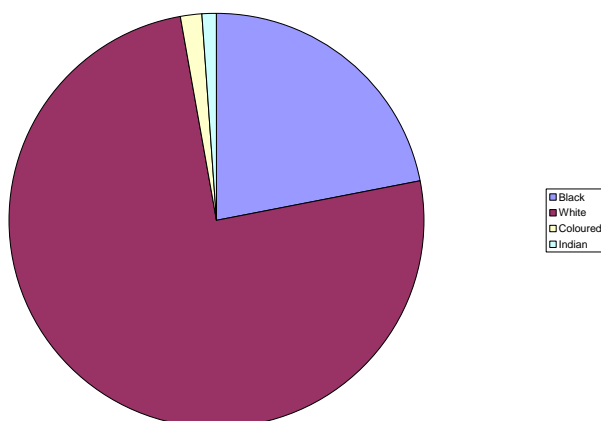


Figure 5.3: The racial composition of lecturers at HET institutions presenting agricultural courses

From the information it is evident that HET institutions have not been able to attain employment equity from a racial perspective, since 75% of the lecturers are still white.

An analysis of the qualifications of lecturing staff at Universities and UoTs reveal that the majority of the lecturers at HET institutions have a doctoral degree (58%) whilst a further 30% hold Masters Degrees. It can thus be concluded that the lecturing complement is well qualified and given that the majority has considerable teaching experience (50% have more than 10 years experience) they are deemed competent to offer quality education services.

A comparative analysis was also undertaken to establish if there are disparities in the quality of teaching staff employed at the traditional black universities versus that employed at traditional white universities. Table 5.1 reveals the results of this analysis:

Table 5.1: Comparison of staff qualification at various Universities

HIGEST QUALIFICATION PER UNIVERSITY										TOTAL
	PHD	MSC	BSC HONS	MA	BCOM HONS	BSC	M ENG	BA	NDIP	NO
Univ Fort Hare	12	5	0	0	0	0	0	0	0	17
Univ Zululand	4	2	1	0	0	0	0	0	0	7
Univ KZN	23	17	2	1	0	1	1	0	0	45
Univ Pretoria	40	17	5	0	1	5	0	1	1	70
Univ Stellenbosch	65	15	0	0	0	0	0	0	0	80
Univ Free State	37	8	2	0	0	0	1	0	0	48
	181	64	10	1	1	6	2	1	1	267
% HIGEST QUALIFICATION PER UNIVERSITY										TOTAL
	PHD	MSC	BSC HONS	MA	BCOM HONS	BSC	M ENG	BA	NDIP	NO
Univ Fort Hare	70.60	29.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Univ Zululand	57.10	28.60	14.30	0.00	0.00	0.00	0.00	0.00	0.00	100
Univ KZN	51.11	37.77	4.44	2.22	0.00	2.22	2.22	0.00	0.00	100
Univ Pretoria	57.14	24.29	7.14	0.00	1.43	7.14	0.00	1.43	1.43	100
Univ Stellenbosch	81.25	18.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Univ Free State	77.08	16.66	4.17	0.00	0.00	0.00	2.08	0.00	0.00	100

From the information it is evident that there is not much difference in the qualification profiles of lecturing staff between the so-called former “black” universities versus the former “white” universities that participated in the survey. Based on the above information it can thus be concluded that there should not be disparities in terms of the quality of education provided by the various institutions as a result of differences in the educational qualifications held by lecturing staff.

It should however be cautioned that whilst the above statistics might project a reasonable degree of parity in the qualifications of lecturing staff between the institutions, employment practices applied by some universities might reflect a different situation in practice. In this regard it is common practice at some of the historically black institutions to utilise Lecturing Assistants (who normally only possess Honours Degree qualifications), to lecture to students at First and even Second Year level. The University of Venda and the University of the North (Limpopo) unfortunately did not submit information on the qualifications of their lecturing complement and it was thus not possible to take their profiles into consideration.

5.3.2.4. DISPARITIES IN THE FACILITIES AT DIFFERENT AET INSTITUTIONS – (AND THE ABILITY TO REINFORCE THEORY THROUGH PRACTICAL TRAINING

This section of the report aims to establish if there are disparities in the availability of facilities at historically white versus historically black AET institutions and how this impacts on the delivery of quality education and training to the different racial groups. Within the confines of the study focus was placed on:

- practical training facilities (the ability to facilitate and enhance the development of practical competencies), and
- hostel and accommodation facilities (thus the ability to provide access to institutions for black students from the rural areas)

The findings of the research revealed the following:

a) Practical Training Facilities

Competence (as perceived by industry) consists of both theoretical knowledge and practical skills or the ability to apply knowledge. From an AET institutional perspective this in turn is a function of:

- Practical application of theory – demanding facilities and opportunity (labs, farms, experiments, machinery, technology, internships, assignments, etc.)
- Practical knowledge and experience of teacher / lecturer / employer/mentor, etc.
- Linkages with (and status within) the agricultural sector

In scientific fields both theoretical knowledge and practical skills are necessary for effective knowledge transfer. In order for learners and students to accumulate practical skills, suitable facilities (or experiential opportunities) are thus required where students can perform practical work and develop practical competencies.

The extent of differentiation in the ability of so-called black institutions versus white institutions to provide students with opportunities to obtain practical skill competence (at the various levels of AET provisioning) is as follows:

- ***In Schools:***

As mentioned previously schooling up to Gr. 9 is generic in South Africa and there is not a specific subject focussing on agriculture as such. Therefore, in this section the disparities perceived, will be discussed regarding Natural and Physical Science. According to the NEIMS report the infrastructure of the combined and primary schools in the country is as is indicated in Figure 5.4 below.

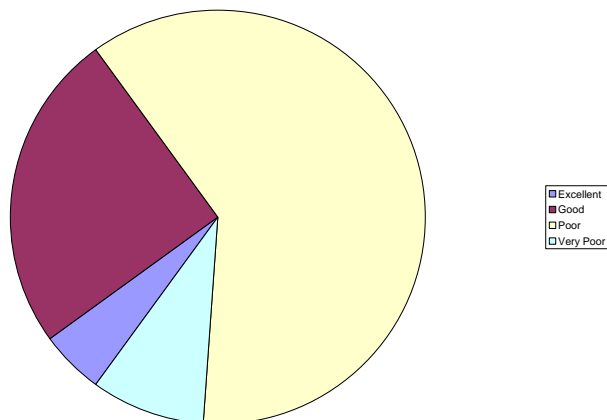


Figure 5.4: The condition of infrastructure at schools in South Africa (NEIMS 2007)

From the above it is clear that most of the schools in South Africa have poor infrastructure. Therefore, it can be inferred that the schools do not generally possess the infrastructure to ensure that students are enabled to receive the best practical training. It can further be assumed that black schools will have poorer facilities than the white schools (due to historical discrepancies in the funding of schools and the fact that many black rural communities are poor and that they would not have the financial means to establish practical infrastructure from own sources to the same level as the more affluent white communities). This reality will typically manifest itself in areas such as the availability of laboratories and equipment and materials to undertake demonstrations and experiments in such laboratories. It can be assumed that the 15% of secondary schools that have stocked and equipped laboratories will overwhelmingly be schools located in the more affluent urban communities.

It can thus be concluded that there are disparities in the facilities within schools and that black school pupils (especially those from poor urban communities) are still being disadvantaged when it comes to practical training facilities. This in turn could have a critically influence on their eligibility to enrol for study fields in the so-called “hard sciences” – which usually demands a matriculation pass rate in mathematics and physical science at Higher Grade.

- ***At FET Colleges:***

Whilst the research has revealed that there are considerable disparities in practical agricultural training facilities between the different FET Colleges offering agricultural programmes, the racial composition of enrolments at these institutions is such that it does not disadvantage and/or benefit one race group over another.

Generally a large need exists to substantially upgrade the agricultural facilities at FET Colleges and it is hoped that the substantial funding provided by government for their upgrading as part of the College Recapitalisation Programme will be used to this end.

- **At the Agricultural Colleges (Agricultural Training Institutes):**

Within the Agricultural Colleges there is large flexibility of agricultural programmes as they orient their courses towards supporting agricultural activities that are practiced in their respective regions. In terms of facilities, the majority of the Colleges of Agriculture have extensive grounds that serve as experimental farms for students to gain practical experience and generally have the basic equipment and machinery to provide practical work opportunities to students within their fields of “specialisation”. It should however be noted that in many of the institutions the equipment and machinery have not kept pace with developments in the sector and are outdated. Given the plan to upgrade the ATIs into *Centres of Excellence* an urgent need exists to refurbish these institutions with modern equipment and technology. Table 5.2 indicates the facilities available at the colleges for practical training.

Table 5.2: Practical facilities in Agricultural Colleges

Name of Agricultural College	Facilities available
Cedara	Comprises of 60-ha area for general farming practices <ul style="list-style-type: none"> • Small pig unit and dairy unit • A broiler and layer unit • 80 cow beef herd and 100 ewe sheep for basis of veterinary • Fully equipped scientific laboratory
Owen Sithole	<ul style="list-style-type: none"> • 137 grazing camps • Dairy unit and pig unit • Poultry unit (broiler and layers) • Library, computer room and 2 laboratories • Shade house, plastic tunnel, potting shed and cultivated land for crop production
Grootfontein	Comprises of 11418-ha whereby: <ul style="list-style-type: none"> • 114-ha under cultivation • 25-ha under irrigation
Eisenburg	Eisenburg experimental farm and wine cellar.
Glen college	Comprises of 4667-ha whereby <ul style="list-style-type: none"> • 4335-ha Natural Veld • 200-ha of dry-land • 132-ha is under irrigation • Laboratories
Fort cox	Comprises of 1354-ha <ul style="list-style-type: none"> • Horticultural nursery • Dairy unit • Irrigation dam • Laboratories • Library
Madzivhandila	Comprises of 680-ha whereby: <ul style="list-style-type: none"> • 27.8-ha under irrigation • 4,7-ha for cash crops and vegetables • 13-ha for orchards • 3,5-ha for maize • 6,6-ha for artificial pasture and fodder trees • buildings and natural veld for grazing camps comprise the remaining area

Potchefstroom	Comprises of 3 experimental farms on 4000-ha of land <ul style="list-style-type: none"> • 45-ha cultivated land • Orchard • Abattoir • Veterinary services • Dairy unit
Taung	<ul style="list-style-type: none"> • Dairy Unit (Friesland) • Beef cattle (Bonsmara) • Piggery • Poultry (Layers and Broilers) • Small stock (Dorpers, SAMMand Boer goats) • Feedlot • Horticulture • Irrigated crop production section
Tompi seleka	Comprises of 1470-ha whereby: <ul style="list-style-type: none"> • 100-ha under irrigation • 70-ha for field crop production • 30-ha for artificial pastures for the dairy herd • Dairy unit • Aquaculture unit • The rest is shared between residential areas, natural pasture camps and wild life

- ***At the Universities of Technology (UoT):***

Within the UoTs, in-service training or co-operative education is an educational model that includes productive work as a standard and integral element of the curriculum. In-service training provides learners the opportunity to apply their theoretical knowledge in a practical situation. Since industry/companies perform a critical partnership role within the co-operative educational model (both in offering experiential training and eventually as employers), it is important that they are involved in curriculum design. This strengthens the relationship between companies and UoTs, leading to improved career-oriented education. Therefore, there is a relationship between in-service training and on-the-job training and employers regard in-service training experience as work experience.

Our research revealed that all the Universities of Technology do not have sufficient in-house practical training facilities in the agricultural field for their students and usually make use of nearby commercial farms for students' practical work. All the institutions however have well equipped laboratories and libraries. The Tshwane University of Technology is the exception since it has its own experimental farm where students can obtain practical training and exposure. The lack of practical facilities might put a strain on the quality of education received at some of the UoTs since difficulties are experienced in obtaining sufficient practical training opportunities for all students. Indirectly this could result in racial disparities as far as practical training opportunities are concerned since the majority of commercial farmers where such opportunities exists are white and historically they favoured white students.

- **At the Universities:**

Facilities at most of the Universities are reasonably satisfactory and/or plans are underway to upgrade such facilities to meet the demand and requirements. In this regard the SA Government has allocated funds to the universities to refurbish their infrastructure (implementation phased over the period 2002 to 2010). All universities will have received funding from the government with a bias towards historically black universities (the objective being the upgrading of facilities so that disparities in learning, teaching and research facilities are eradicated).

At present most universities however have experimental farms (or access to such facilities) where students can obtain practical experience and where postgraduate students can undertake research. These experimental farms are generally equipped with the required facilities and equipment related to the courses offered at the various institutions. Whilst historic imbalances might exist between the level and quality of facilities between the historically white and black universities, the recapitalisation programme indicated above have (will) eradicate such disparities. Table 5.3 below reflects the practical training facilities available at the various universities to facilitate and enhance practical training in the agricultural study fields:

Table 5.3: Practical Agricultural Training Facilities at Universities

Name of Institution	Facilities
University of Fort Hare	Fort hare research farm and Honeydale research farm
University of Free state	Paradys and Sydenham experimental farms
University of KwaZulu-Natal	Animal house, Botanical garden, Centre for electron microscopy, Controlled Environmental Research Unit, Information Technology division, Molecular biology unit, University Research and Training Farm, Zoological Museum, Laboratory
University of Limpopo	Aquaculture Research Unit and Experimental farm
University of Pretoria	Experimental farm with horticultural unit, Milk and pig unit, Small stock unit, Animal production unit, Agronomy, Phytotron, Academic Information system, Computer based education laboratories and skills laboratories for different courses. Onderstepoort Campus with practical facilities for veterinary science.
University of South Africa	No experimental farm but make use of Onderstepoort Campus in Pretoria for veterinary sciences, Madzivhandila and Cedara agricultural colleges for beginners animal and plant sciences practical sessions. Advanced practical sessions offered in Tompi seleka and Glen agricultural colleges.
University of Stellenbosch	Welgevallen experimental farm and Mariendahl farm. The Mariendahl farm is used mainly for Animal sciences as it comprises of excellent facilities for poultry, pig research, Simmentaler herd, Dohne merino and South African Mutton Merino. The Welgevallen farm comprises of Several laboratories, controlled-climate growth chambers, small plots, deciduous and citrus fruit orchards, Vineyards and Friesland herd. Experimental wine cellar equipped with latest technology.
University of Venda	Experimental farm
University of Zululand	Experimental farm that comprises of Dairy, Poultry, Orchard, Vegetables under irrigation, Nursery, Tunnel and Laboratory.

1.3.2.5 DISPARITIES IN ACCESS DUE TO A LACK OF HOSTEL ACCOMMODATION

A further facilities related aspect that could result in racial disparities (in terms of access to AET), is the availability of hostel facilities at AET institutions to accommodate students from the rural areas. This is particularly relevant at HET level – where most of the institutions are located in the urban areas or secondary towns and where transport to such institutions on a daily basis are problematic for students who live in the rural areas. Such students are thus dependent on hostel facilities or other alternative accommodation (at a subsidised rate) if they want to access learning opportunities at these institutions.

Accommodation on campus plays a further vital role in the academic performance of students since it provides them with access to the resources of the institution at all times – other than off-campus students that can only access resources during the day. This is particularly relevant to students who reside in rural areas and where electricity and internet constraints serve as constraints.

Previously most institutions separated their white and black residences but recently most of the institutions (primarily the former white institutions) have integrated students into residences not according to race but students' preferences and date of application which result in a situation that black and white students stay in the same residences sharing the resources available at the residences.

The Agricultural High Schools have accommodation for students who wish to stay in the hostels. At some of these schools it is compulsory for students to live in at the school hostels to undertake the practical component of their training. Generally they however enrol small number of learners and have hostels that can accommodate the number of learners to be accommodated.

a) At Schools:

Generally accommodation (hostel facilities) is not needed at schools since the education policy is to provide schools within easy reach of the communities that they serve and against the norm that learners can freely access the school premises from their homes. The exception is Agricultural High Schools where there are hostels (since they serve students from a much larger feeding area and students should be resident in order to fully benefit from the practical training opportunities created at such schools)

b) At FET Colleges

The FET colleges do have limited accommodation for a limited number of students enrolled at these institutions. The granting of accommodation is done on a first-come-first-serve basis and with a preference to needy students. It is envisaged that the limited hostel facilities could serve as an access barrier to the rural poor.

c) At HET Level

All the **Agricultural Colleges** have accommodation for their students (although there is not sufficient capacity to accommodate all students). As a rule students who live far from the College receive priority and it is attempted to assist students from the lower income groups as a first choice.

All the **Universities of Technology** have residences on campus (and in some cases also subsidised off campus accommodation). The Tshwane University of Technology is the largest residential university of the country with 60 000 students of which 22% are living in the 34 residences at various campuses. The Pretoria campus where agriculture is offered has 5 female residences, 4 male residences and 4 residences for mixed genders and senior

students. The total accommodation capacity at the Pretoria campus is approximately 3000 students. The other UoTs all have similar hostel accommodation and/or alternative accommodation arrangements. Some institutions (e.g. the Mangosuthu Technikon) however do not have sufficient capacity and demand usually exceeds supply.

The situation at **Universities** is similar to that at the UoTs with all having hostels and student residences, but with limited capacity and not able to accommodate the total demand for such facilities. The University of Pretoria, despite having 25 residences, can for instance only accommodate 20% of its total student body in its residences. The former policy of racial segregation also served to hamper access and gave cause to racial disparities in accessing hostel accommodation at HET institutions. This situation has been largely addressed and both the Tshwane University of Technology (TUT) and University of Pretoria (TUKS) for instance claim that their residences are fully integrated, with students placed according to their year and field of study, not their race. TUT currently has 86.05% black students and 11.91% white students with 2% being Indian and coloured in their residences. The TUKS student demographic profile in the residences shows figures of 59% white students and 41% black students.

Allocation at the University of Stellenbosch's residences (which has 12 women's residences, 9 men's residences and 2 co-ed residences) is undertaken on the following basis: 35% - excellence (academic performance), 15% - random selection by a computer; 8% - vice-rectors choice; 12% - residences nominate 10 places; 30% to candidates with disabilities, who are black, coloured or Indian, or financially needy or who live far from Stellenbosch.

The University of Free State have 26 residences that accommodate approximately 3 400 students on the university's main campus in Bloemfontein. Racial incidences at the university have given it a reputation of racism in the residences (which is not due to racially discriminatory practices but rather due to the mentioned incidences). From the UFS residence occupancy report for 2007 a total of 1597 African students, 1666 white students, 144 coloured students and 21 Indian students are accommodated in the residences.

Traditionally black universities such as the University of Limpopo, the University of Venda and Fort Hare all have hostel facilities to accommodate approximately 30% to 40% of the total student body. All available capacity within the residences is currently taken up by black students.

From the above it is evident that there is little if any racial access barriers to the accommodation facilities at the HET institutions. The problem is rather one of limited capacity to accommodate the demand for hostel and accommodation facilities. In this regard students from poor rural communities might be denied access because total demand exceeds total supply.

5.3.3. DISPARITIES IN ENROLMENT FOR PROGRAMMES GEARED TOWARDS ADDRESSING SO-CALLED SCARCE SKILLS

This section of the study investigated if there are racial disparities in terms of enrolment and graduation figures within study fields specifically geared towards addressing so-called scarce and critical skills in the agricultural sector.

5.3.3.1. THE SCARCE SKILLS

According to the document titled “*Sector Skills Plan for the Agricultural Sector period July 2005- March 2010*” compiled by the AgriSETA, scarce skills refer to occupations in which there are a scarcity of qualified and experienced people at the present time, or anticipated in the future to fill particular occupations or specialisations in the labour market.

The AET Strategy developed by the Department of Agriculture indicated a shortage of critical skills in the agricultural sector. The scarce skills identified as priorities are:

- Agricultural production specialists
- Agricultural engineers
- Agricultural economists
- Agricultural development specialists (people with skills in agricultural extension, sustainable livelihoods, agriculture law and policy and environmental management).
- Veterinarians

5.3.3.2. ENROLMENT AND GRADUATION FIGURES IN SCARCE SKILLS - PER RACE

a) In the Agricultural Economics Field

Agricultural economists analyse and advise on the optimal use of production factors for the environmentally sustainable production of food and fibres. They perform a critical function in the economic planning and analysis of the agricultural sector. Table 5.4 and Table 5.5 respectively reflect the enrolment and graduation figures for students in the agricultural economics field for the period year 2000 to 2003 at the Universities and the UoTs.

Table 5.4: Enrolment of Agricultural Economics students in Tertiary Institutions

Year	Enrolment in Universities					Enrolment in Technikons				
	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	761	389	9	6	357	199	173	2	2	22
2001	886	590	5	6	286	488	375	14	1	99
2002	824	594	5	7	219	314	208	12	1	92
2003	1142	919	7	6	210	394	244	15	1	133
Total	3613	2491	26	24	1071	1395	1000	43	5	346
%		69%	1%	1%	30%		72%	3%	0%	25%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

Table 5.5: Agricultural Economics Graduates from Tertiary Institutions

Graduates in Universities						Graduates in Technikons				
Year	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	200	106	3	1	90	37	32	0	1	4
2001	191	111	1	1	78	26	21	0	0	5
2002	143	73	1	3	66	37	27	2	1	7
2003	186	130	0	0	56	45	16	3	0	26
Total	720	421	5	5	290	145	96	5	2	42
%		58%	1%	1%	40%		66%	4%	1%	29%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

From the above statistics it is evident that there is an increasing number of students enrolled for agricultural economics and that the largest percentage of enrolments in both universities and technikons are black students (58%). Whilst there is thus not a racial disparity in terms of enrolment, it is however a concern that the throughput of black students have dropped over this period from 27% in 2000 to 14% in 2003 (this is particularly noticeable since the throughput of white students have remained stable at 27%).

b) In the Agricultural Engineering Field

Agricultural Engineering is offered at most Universities and UoTs. The agricultural engineers plan, design and develop the equipment or infrastructure needed for the production and processing of agricultural products. Table 5.6 indicates how many students enrolled for agricultural engineering studies whilst Table 5.7 indicates how many students graduated in the period 2000 to 2003.

Table 5.6: Enrolment of Agricultural Engineering students in tertiary institutions

Enrolment in Universities						Enrolment in Technikons				
Year	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	117	31	0	3	84	36	24	2	0	9
2001	133	45	0	5	83	16	3	1	1	12
2002	130	54	0	6	70	56	40	3	0	13
2003	144	75	0	6	63	43	34	0	2	8
Total	523	204	0	19	300	151	102	6	3	42
%		39%	0%	4%	57%		67%	4%	1%	28%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

Table 5.7: Agricultural Engineering Graduates from Tertiary Institutions

Graduates in Universities						Graduates in Technikons				
Year	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	23	4	0	1	18	0	0	0	0	0
2001	29	6	0	1	22	6	1	1	1	3
2002	18	4	0	1	14	11	6	0	1	4
2003	30	16	0	1	13	8	4	1	1	3
Total	100	30	0	4	67	25	11	1	3	10
%		30%	0%	4%	67%		44%	4%	12%	40%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

From the above statistics it is evident that enrolments for this programme are small and were stable for the reporting period. Enrolment in Universities show a higher percentage of white students, whilst in the UoTs there were more black students than white students.

Regarding the graduation figures, graduation rates and throughput are however a concern and it is noticeable that whilst black students make up 39% of the enrolment figures at universities they only contribute 30% of the graduates (similarly they represent 67% of enrolment at UoTs but only 44% of the graduates). This suggests that whilst there are no racial access barriers to the programme, there are race differentials in terms of graduations which suggest that attention should be given to means of providing learner support services to black students enrolled for agricultural engineering programmes.

c) In the Agricultural Extension field

Agricultural Extension is offered at almost all the HET institutions offering agricultural programmes. The course is defined as the provision of information to farmers on agricultural production technologies designed to increase production. Table 5.8 indicates the number of enrolments while Table 5.9 indicates the number of graduates from this course.

Table 5.8 Enrolment of Agricultural Extension students in tertiary institutions

Enrolment in Universities						Enrolment in Technikons				
Year	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	891	879	2	1	10	67	29	1	0	37
2001	1323	1299	3	1	20	155	112	1	0	43
2002	391	275	2	3	112	252	197	3	0	52
2003	486	300	5	8	173	192	164	0	0	28
Total	3091	2753	12	13	314	666	501	6	0	159
%		89%	0%	0%	10%		75%	1%	0%	24%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

Table 5.9: Agricultural Extension Graduates from Tertiary Institutions

Graduates in Universities						Graduates in Technikons				
Year	Total	Race				Total	Race			
		Black	Col	Indian	White		Black	Col	Indian	White
2000	34	30	1	0	4	14	4	0	0	10
2001	50	45	0	1	4	45	34	0	0	11
2002	79	78	0	0	1	19	11	0	0	8
2003	55	55	0	0	1	29	24	0	0	4
Total	219	208	1	1	9	106	73	0	0	33
%		95%	0%	0%	4%		69%	0%	0%	31%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

Overall enrolment in this field of study was high with Africans comprising the overwhelming majority of enrolments (89%). The enrolments in universities are higher than that of Technikons. It also shows that there was an increase in enrolments in the four years under review – with white students' enrolment increasing significantly from a small base. The graduation rate (or throughput) is however very low with the average at universities being only 7% and at UoTs 16%. It is evident that considerable attention is required to reduce the number of drop-outs and/or repetitions that serve as contributing factors to these low graduation or throughput rates.

d) In the Veterinary field

The DoA report does not have enrolments for the veterinary students and the course is only offered at the University of Pretoria.

Graduation of Veterinary students

The data provided is for Bachelor of Veterinary Science from the University of Pretoria. The number of students graduating from the degree has not increased largely because the faculty does not have sufficient capacity to increase student numbers.

Table 5.10: Veterinary Graduates from Tertiary Institutions

Graduation from Universities					
Year	Race				
	Total	Black	Coloured	Indian	White
2000	97	1	1	4	91
2001	81	1	1	2	77
2002	80		3	5	72
2003	72	1	0	7	64
Total	845	3	6	19	817
%		0.7%	0.7%	2.2%	96.7%

DoA Report on Agricultural Graduate outputs in SAQA Accredited HET Institutions, 2006

The annual number of veterinarians declined since 2000 which is worrying given the shortage in these professionals. The overwhelming majority of graduates from this field are white students with only 3% from the other population groups. This clearly reflects racial access and/or study barriers to this field of study. Whilst this low percentage of black students might be related to the fact that the course is only offered at the University of Pretoria, the large number of black students in the other agricultural study fields at this institution (almost equal to the number of white students) – suggests that the problem lies elsewhere. In this regard the admission requirements for enrolment in Veterinary science is very high (equal to that of entering medical school) and the study opportunities for black pupils with such good matriculation results are so large that few are interested in enrolling for this programme.

From the above it can be concluded that there are no racial access barriers of an institutional nature to black students interested in enrolling for programmes relevant to the above indicated scarce fields or occupations in the agricultural field. Where black enrolment figures are still too low, the current efforts of the DoA to promote these fields as high potential careers amongst the black youth, and to sustain and expand the availability of bursaries for students interested in such studies, should be continued and increased. The low throughput (or graduation rate) of especially black students in these study fields is however a concern and consideration should be given at institutional level to provide such students with academic support services to overcome learning problems where they exist.

5.3.4. DISPARITIES IN THE LEVEL OF SOURCING AND FUNDING OF AET INSTITUTIONS

This section investigates possible racial disparities from an institutional funding and sourcing perspective. Aspects considered in this regard include:

- Government subsidies at the different AET institutions
- Differentiation in tuition fees
- Bursaries available to students to facilitate access
- Institutional linkages to industry

5.3.4.1. Government subsidies for agriculture at different institutions

Government subsidies are aimed at assisting students to gain access to education. Due to the high cost of tertiary education it would not be affordable to most people if the government did not subsidise the costs of these institutions in an attempt to make it affordable. The practice to subsidise tertiary education institutions is practiced internationally and is viewed as a critical investment by government towards developing high levelled labour needed for growth and prosperity. Government subsidies are the major source of funding for most public educational institutions.

a) Government funding at GET Level:

The GET and FET (Gr10-12) levels are managed by the National Department of Education (via the Provincial Departments of Education). The South African Schools Act section 34 state that “the state must fund public schools from the public revenue on an equitable basis in order to ensure proper exercise of the rights of learners to education and redress of past inequalities in education provision”. The state funding is organised on a quintile system, in which schools are divided into five categories according to the poverty levels in the areas they serve. Poorer schools are given larger state subsidies and so have to lower their school fees, while the wealthier schools are given smaller subsidies and so have higher school fees. Institutional funding barriers of a racial nature thus do not exist at this level – on the contrary the policy is designed to facilitate and enhance access of the poor.

b) At FET Level:

The FET level is also managed by the Education Departments. The FET Colleges Act, 2006 provides for the establishment, governance and funding of public FET colleges. The FET Colleges are run by their respective Executive Councils, their Academic Boards and their Student Representative Councils. The FET Colleges receive government funding from the public revenue appropriated for the purpose of the FET Colleges and the members of the executive council must fund the colleges on a fair, equitable and transparent basis. Within the FET the following arrangements exist:

- **Academic Secondary Schools (Gr 10-12)**
The academic secondary schools are highly dependent on government subsidies whereby they receive approximately 75% of their budgets via state funding and are responsible to obtain the remaining 25% from school fees and other voluntary donations.
- **Agricultural High Schools:**
The Agricultural High Schools are subsidised on a similar basis as academic high schools. The costs at these institutions are however considerably higher than in other schools (due to costs related to maintaining their practical farm facilities) which

demands higher subsidies from government. As a rule the school fees are also higher to cover the hostel accommodation costs of pupils (these schools all have hostels to accommodate students from the wider region and to facilitate the required practical training). An urgent need exists to review the subsidies received by the Agricultural High Schools since they find it difficult to cover their operational expenses. In such cases it is not possible for the schools to subsidise hostel fees of students from poor communities and this could thus serve as an access barrier to rural and poor black pupils.

- **FET Colleges:**

The Department of Education is responsible for general and vocational education and training programmes offered at the FET Colleges, whilst the Department of Labour subsidises the costs of occupational education and training programmes (Learnerships and Skills Programmes) offered at these institutions. The subsidy formula is based on FTE (Full Time Equivalent) counts and calculated on a similar basis as for tertiary institutions. Student fees are charged to cover the difference between the actual training provision costs of the institutions and the government subsidy received – which explains the differences in student fees between different institutions. As a rule the costs at FET Colleges (as a result of government subsidies) is relatively affordable and there are also student bursaries available for students who can not afford student fees from own sources.

c) At HET Level:

Subsidy formulae for Universities and Universities of Technology currently comprise on average about 85% of the public funding received by these institutions as stated in the Education White Paper 3 (1997). Whilst Colleges of Agriculture fall within the HET band they are administered, controlled and funded by the Department of Agriculture.

The HET institutions have three primary sources of funding: approximately 50% is in the form of government subsidies; 25% is earned in the form of student fees and the rest is generated through donations and entrepreneurial activities. According to Higher Education South Africa's (HESA) economic impact study published in 2007, government subsidy levels ranged between 32% and 57% of the various institutions' income. Section 39 of the Higher Education Act, 1997 makes provision that the Higher Education and Training Institutions are allocated funds on an annual basis by the Minister of Education in terms of a fair and transparent basis **and towards attaining a redress of past inequalities.**

In the Minister of Education budget speech (2008/9) it was announced that universities would receive R3.6 billion from the government in addition to the annual government subsidy. This decision follows a 2004 finding that subsidy levels have not followed inflation trends and it has thus become increasingly insufficient particularly for institutions that are heavily dependent on government support. Funding subsequently increased substantially and in 2008 the total subsidy amounted to R15.1 billion and in 2010 it is expected to increase to R19.2 billion. Allocations from the above indicated increased funding for higher education will especially allow those institutions traditionally serving black communities and students to balance costs so that tuition fee levels are not out of reach of the majority of their students.

From a government funding and subsidy perspective it can thus be stated that the state is doing everything in its means to ensure that former racial access barriers resulting from disparities in the funding of institutions are addressed and redressed.

5.3.4.2. Tuition fees of agricultural programmes at different institutions

The cost of studying is one of the most important factors that affect access to study opportunities. Unless the cost of studying at a tertiary institution is affordable, usually as a result of the earlier indicated state subsidies, it constitutes a serious barrier to students who wish to enrol and who qualify academically for admission but do not have access to sufficient financial resources to meet fee requirements and other study related costs.

In South African higher education institutions, there is no prescribed statute or rule that sets uniform fees across all institutions. The result is that each institution must determine its own fees (a complex process in which operational expenditure is balance against income – which in turn is determined by the cost efficiency of the institution and its various/differing sources of income). The result is that the various institutions (in their competition with each other for students) are attempting to maximise the quality of education they provide whilst keeping the costs of tuition to the students at a minimum. In addition the costs of programmes (both within and between institutions) differ from each other – with high technology related programmes tending to be more expensive on account of the equipment, laboratory and other resources needed in its provisioning.

a) Agricultural Colleges:

The Colleges independently structure their fees and bundle their costs in different ways. Therefore, cost information provided by the Colleges is difficult to bring into comparison (Department of Agriculture 2006). A generalised breakdown of the cost of study for one year and the different qualifications is presented in Table 5.11 below.

Table 5.11: The average cost of study for one year at a College of Agriculture in South Africa (Department of Agriculture 2006)

Cost Item	Cost
Registration	R 1 000
Tuition Fees	R 7 000
Accommodation	R 7 000
Total	R 15 000

b) Universities and Universities of Technology

As indicated earlier there is a conscious effort on the part of government to provide historically black institutions with a proportionally larger state funding allocation to overcome historic imbalances. It is thus interesting to note that whilst their state funding allocation is proportionally larger, the fees at historically black institutions are not significantly lower than that charged by historically white institutions. The reason for this might lie in the fact that they have a lesser ability to generate own income via entrepreneurial activities and/or to attract donations (e.g. via alumni or linkages with industry). The fees charged by some historically black institutions are however slightly lower than that charged by the historically white institutions as outlined in Table 5.12 below:

Table 5.12: Cost of study (2005) at Universities and UoTs offering AET Programmes

Institution	Academic Fees	Registration	Residence Fees	Full Study Cost
Universities of Technology				
Central UoT	11 232	248	19732	31 212
Mangosuthu UoT	12 112	-	14 619	26 731
Tshwane UoT	9 259	320	15 192	24 771
Vaal UoT	8 945	320	20 044	29 309
Universities				
University of Fort Hare	7 124	946	18154	26 224
University of Venda	12 711	1 380	19 070	33 161
University of KwaZulu Natal	15 352	250	19 659	35 261
University of the North	11 528	1 165	13 130	25 823
University of Free State	11 963	535	19 870	32 368
University of North West	15 227	650	13 498	29 375
University of Pretoria	16 805	-	23 726	40 531
University of Stellenbosch	17 238	-	18 248	35 486

From the above it is evident that despite government subsidies the above indicated study costs remain high and will continue to be an access barrier to students from poor communities and households. There is fortunately various financial assistance programmes in place to financially support needy students (especially students from previously disadvantaged population groups) and to ensure that a lack of finance do not exclude them from study opportunities (on condition that they meet the academic entry requirements).

5.3.4.3. Bursaries and scholarships for agricultural studies

The government has put in place a financial support scheme, bursaries and scholarships to increase the number of deserving students to higher education and preference is specifically given to black students, students from rural areas and those with financial needs.

In this regard the National Student Financial Aid Scheme (NSFAS) is the main funding scheme of government that gives assistance to previously disadvantaged students. The NSFAS functions as an income contingent loan and bursary scheme, where students only start repayment of their loans once they find employment. The NSFAS allocate funding to higher education institutions on the basis of a formula that factor in the number of students, student needs and cost of study. The scheme has a performance incentive base in terms whereof up to 40% of a study loan can be converted into a bursary depending on the student's academic performance. Currently a total of 110 000 students are supported from the Scheme to a total value of R 1,6 billion. Statistics obtained from the DoA reveal that in 2004, a total of 1 372 students in agricultural study fields were awarded a total of R12 348 million by the National Student Financial Aid Scheme. The data further revealed that 85% to 90% of students receiving NSFAS support are black students.

The various higher education institutions also have their own bursaries that are awarded to students with high academic potential and financial need. In addition there are a variety of donors and stakeholders within the agricultural sector that offer bursaries to deserving students for tertiary education in the agricultural fields. A survey undertaken of privately provided bursaries revealed that more than 50% of the schemes reviewed (60 bursary schemes) provided bursaries to students in the agricultural or related study fields.

The value of bursaries ranged from R400 to R25 000. A list of providers of bursaries in the agricultural field is available at www.gradx.net/bursaries/categories/12/1/. As a rule students from previously disadvantaged population groups are given first preference in awarding bursaries and scholarships.

From the above it is thus evident that there is considerable funding support and/or bursaries available to worthy students interested in furthering their studies in the agricultural field. For good academic performers a lack of own financial resources should therefore not serve as an access barrier to educational opportunities.

5.4. RECOMMENDATIONS TO ADDRESS RACIAL DISPARITY PROBLEM AREAS

It can be concluded that remarkable progress has been made in removing racial disparities within the education and training system in South Africa over the past 14 years. There are no longer legislation and/or policies that restrict the access of black pupils and students to learning opportunities of their choice – on the contrary policy and other support measures are geared to facilitate and enhance the access of students from previously disadvantaged communities and population groups.

Today, one in six young South Africans enter higher education. Student numbers have nearly doubled in the dozen years of democracy, to 735,000 in 2006. Major strides have been made in opening access to groups disadvantaged under apartheid, especially black and women students: the portion of black students has grown to three-quarters of the student body, and 55% of students are women. The human face of South Africa's public universities has thus transformed during the past dozen years. This is also the case in the Agricultural Education and Training (AET) field with black students dominating enrollment for such programs from GET to HET level.

Whilst the above statistics reflect that in real numbers the black student population (including Coloureds and Indians) have increased to 75 per cent, the picture is less favourable when considering the proportions of young people from different race groups who enter higher education: while 60% of white and 51% of Indian school leavers access higher education, the participation rate for blacks is only 12%. The primary reason for this disparity is to be found in the sub-standard schooling that most poor black children receive (not meeting entry requirements) and the poverty amongst a large percentage of the black population group that serves as a barrier to accessing available opportunities.

Throughout this chapter numerous **recommendations** have been made to address these and other racial disparity related constraints that still exists. Some of the more pertinent recommendations are reiterated here:

- 5.4.1 Whilst it lies beyond the scope of the education and training system to make inroads into the widespread poverty problem in the short term (and thus address poverty related access problems to education opportunities on a nation wide scale), note should be taken of the National Student Financial Aid Scheme and other financial support programmes that exists to help worthy students to overcome financial access constraints. In this regard NAET and the various PAET Forums must actively pursue such financial support schemes and ensure that prospective agricultural students receive their "fair share of the cake". Current efforts to promote agricultural careers amongst students must be continued and expanded and high potential students must be recruited and facilitated to access available bursaries and other study related financial support and assistance.
- 5.4.2 Towards overcoming location barriers to accessing AET opportunities (distances that especially the rural populations has to travel to provider institutions), it is recommended that mobile training providers be revived and encouraged (especially skills training providers offering on-farm training services).
- 5.4.3 The study revealed that there is a lack of knowledge amongst prospective students regarding the network of AET providers, who they are, where they are located, what they offer and what recognition and accreditation their programmes enjoy. This lack of knowledge, coupled to the relatively poor image of agriculture among a large proportion of the black population, reduces the uptake of available AET opportunities

and is thus viewed as an access barrier. A need thus exists to, via the AgriSETA and the Provincial Agricultural Education and Training Forums, provide information to prospective students and learners on the AET provider network and the programmes on offer. The efforts of the DoA in promoting agriculture as a career must also be supported and expanded.

- 5.4.4 English language proficiency amongst many black students were identified as the most important moderator of performance and the largest factor responsible for students failing to complete their studies in the minimum time. The scale of the problem is such that both quantitative and qualitative corrective measures are required. On the **quantitative** side a more rigorous selection system is required which goes beyond the current practice of accepting matriculation exemption results and a mere interview as being sufficient. In this regard various stakeholders propose the inclusion of the International English Language Testing System (IELTS) as a critical selection tool to be used by tertiary institutions towards a more accurate prediction of candidates with the potential to be successful. On the **qualitative** side it is evident that a large proportion of rural black students will require a comprehensive support service to help them to overcome the language and cultural barriers that they are bound to encounter at traditionally white universities. Whilst many institutions offer some type of support service, it is believed that the current size and scope of support is insufficient when considering that the poor pass rate is costing the government in excess of R 1,5 billion per year in lost subsidies.
- 5.4.5 An access barrier to the science based agricultural programmes (B Sc and the agricultural engineering programmes) is poor subject choice of pupils at school level. In this regard a relatively small number of black pupils take subjects such as mathematics and science in the senior secondary phase and generally do not do well in these subjects as a result of a lack of good teachers, poor laboratory facilities, etc. Given the entry requirements for the above agricultural programmes at tertiary level, it is found that many black candidates are denied access to such programmes. Towards addressing the root of the problem It is necessary to improve the quality of education in mathematics and science at school level. Whilst most of the HEIs offer a variety of student support services (e.g. extra classes, supplementary instruction, bridging courses, the Extended Curriculum Programme, etc.) it is believed that more could and should be done. In this regard an overarching strategy should be developed and more resources should be made available to institutions to assist students who experience English language constraints and/or have problems with subjects that demand a good command and understanding of mathematics and science.

6. EXTENSION OFFICER EDUCATION AND TRAINING NEEDS AND CURRICULUM RESPONSIVENESS

6.1. INTRODUCTION

This section of the assignment aims to undertake and achieve the following:

- Investigate (and define) the ideal knowledge and skills repertoire needed by Extension Personnel to undertake their role and functions in a competent manner
- Compare this ideal knowledge/skills repertoire against the actual qualifications and skills profile of Extensionists currently in the system – thus identifying the demand for re-training and upgrading
- Review to what extent current curriculum on offer at the various AET provider institutions address such needs
- Make recommendations and suggest means towards improving the responsiveness of curricula to the identified needs.

To achieve the above this Chapter is structured as follows:

- Background – providing the context and environment within which extension services are delivered and how such influences the demand for knowledge and skills
- Profiling of Extensionists – providing a profile of current Extensionists together with perceived performance shortfalls and constraints
- Ideal Knowledge and Skills Repertoire – summarising the results of various studies and efforts aimed at establishing Extensionists training and development needs
- Review of current Supply (AET curricula aimed at Extensionists)
- Recommendations – suggestions on how AET curriculum should be adjusted and upgraded to be more responsive in addressing the training and development needs of Extensionists.

6.2. BACKGROUND

Amongst various other challenges and constraints facing the agricultural sector ten years ago, was the lack of a national framework for extension and advisory services – leading to confusion regarding the roles and responsibilities of different stakeholders in service delivery. A further critical challenge was to transform agricultural extension from being a dualistic service to a single amalgamated service focusing on the needs of both small scale and commercial farmers.

A few years ago the DoA subsequently conducted a national study on the most feasible agricultural extension and advisory model for South Africa. Whilst the study did not recommend a specific model of extension, it identified the following as key principles and objectives towards reforming extension and advisory services and approaches:

- Improved efficiency, relevance and cost effectiveness of publicly funded extensions and support services
- Introduction of a participatory approach to extension and advisory services and a recognition of the entire spectra of participants in the provision of services
- The implementation of an approach that will facilitate holistic support services

A further outcome of the study was the development of Norms and Standards for Extension and Advisory Services in Agriculture – which was published in June 2005. These norms and standards culminated from extensive discussions and consultation within the agricultural sector on the status of extension and advisory services in RSA and the need to improve the system, and are a pronouncement of quality measures benchmarked against international best practice.

Within the above indicated context of reform, the Norms and Standards for Extension and Advisory Services document specifies the following as specific functions to be undertaken (and objectives to be achieved) via extension and advisory services:

- Facilitating access to extension and advisory services that lead to sustainable income generation by clients
- Providing and facilitating access to agricultural information for improved planning and decision-making
- Facilitating access to technology and, where possible, providing such technologies
- Providing and facilitating access to advice on sustainable agricultural production
- Providing and facilitating access to advice on skills development in agriculture
- Strengthening institutional arrangements (partnerships, restructuring, funding, expansion, etc.) for the effective delivery of services.

Whilst the Department of Agriculture started implementation of the above indicated extension and advisory norms and standards in 2006/2007, there are still numerous challenges, shortfalls and constraints experienced with service delivery. Amongst others these challenges include the following:

- a) *Capacity shortfalls and constraints.* There is an acute shortage of extension personnel to meet the demand for services. Based on the norms and standards for extension-to-farmer ratio, approximately 5 500 further Extensionists have to be recruited. This shortage of extension personnel manifests itself in poor visibility and insufficient service delivery. Aggressive recruitment of extension personnel by the provinces is thus urgently required.
- b) *Knowledge and skills shortfalls of Extension Personnel:* The profiling study undertaken by the DoA reveal a bleak picture in terms of the knowledge and skills capacities of the current extension corps. Approximately 80% of the Extensionists do not possess a bachelor's degree qualification (as prescribed by the norms and standards document) and only 20% possess the spectrum of appropriate generic skills deemed necessary to perform effectively. Urgent action and interventions are thus required to undergo both qualifications and skills upgrading programmes.
- c) *Lack of effective information management systems:* Extensionists experience serious constraints in terms of access to information that is needed to render advice and other support services to farmers. Such constraints manifest itself in terms of relevant and appropriate information, easy access to such information, fast access to the information (when needed by farmers) and the ability to consult with experts when own knowledge and information is insufficient. Efforts to date (at both national and provincial levels) to support Extensionists with effective information management systems have not been satisfactory and urgent action to address this constraint is needed.

- d) *Lack of professionalism and commitment:* In addition to the above shortfalls and constraints (which will all negatively impact on the morale of Extensionists), it should be noted that some staff lack the required commitment and professionalism expected of them. The situation is further exacerbated by the lack of an effective performance evaluation and monitoring system. The norms and standards document has made certain recommendations in this regard, which requires implementation. The establishment of a professional body to facilitate adherence to ethics and standards of professionalism could also make a contribution.
- e) *An environment that is not conducive to efficient and effective service delivery:* The lack of logistical and infrastructure support also serve to constrain service delivery. In this regard urgent attention must be given to critical aspects such as transport, communication and ICT equipment.

Against the above shortfalls and constraints, the Department of Agriculture has embarked upon an **Extension Recovery Plan** aimed at ensuring that extension (as one of the critical support services needed by farmers) are delivered in a professional, efficient and effective manner. This Extension Recovery Implementation Plan is based on the following 5 pillars:

- ***Pillar 1: Ensuring accountability and the visibility of Extension*** – to be achieved through the following core activities:
 - Establishing an Extension Recovery Plan Forum
 - Establishing a unit responsible for managing extension
 - Developing a service charter outlining the role of extension and responsibilities of farmers including communication protocols
 - Implementation of performance contracts at all levels
 - Developing and implementing a policy on accommodation of frontline extension personnel
 - Reviewing the policy on transport and the provision of subsidized vehicles for extension personnel
 - Developing a policy framework on the provision of uniforms for extension personnel – and providing such uniforms
- ***Pillar 2: Promote professionalism and improve the image of Extension*** – to be achieved through the following core activities:
 - Review the Norms and Standards and turn them into a national Policy on Extension
 - Establish a statutory body to guide and uphold the image of extension as a profession
 - Introduce an award system in recognition of service excellence
 - Harmonization of job titles and salary levels of extension and advisory personnel
- ***Pillar 3: Re Skilling and re-orientation of Extension Personnel*** – to be achieved through the following core activities:
 - Provision of bursaries to current personnel to upgrade their qualifications in line with norms and standards
 - Enrol extension personnel in competence based skills programmes (from technical to soft skills programmes)
 - Design and facilitate the implementation of compulsory education and training programmes for all stakeholders (e.g. extension advisors, subject matter specialists, managers, empowerment programmes for farmers and their organisations)

- **Pillar 4: Provision of ICT infrastructure and other support resources** – to be achieved through the following core activities:
 - Develop an ICT policy and guidelines with special focus on standardization of supply of equipment
 - Develop capacity building programmes on knowledge and information management
 - Provide extension personnel with Decision Support systems in line with farming practice in a given geographical locality

- **Pillar 5: Recruitment of Extension and Advisory service personnel** – to be achieved through the following core activities:
 - Conduct work-study and job evaluation as per policy
 - Use the DoA Professional Development Programme framework to recruit interns as recruitment strategy
 - Provinces to utilize 58% of the extension recovery budget for the recruitment of personnel

Within the context of this AET Curriculum Evaluation assignment, the focus is particularly placed on **Pillar 3: Re Skilling and re-orientation of Extension Personnel** towards addressing the knowledge and skills shortfalls and requirements of Extension Personnel; establishing the manner and to what extent the current curriculum addresses such needs – finally resulting in means/recommendations towards improving the responsiveness of curricula.

6.3. THE PROFILE OF EXTENSIONISTS (STATUS QUO)

As a point of departure in determining the knowledge and learning needs of Extension Personnel (and subsequently the curriculum requirements to address such needs), we provide the following as a profile of the existing Extension Personnel Corps within the Provincial Departments of Agriculture:

6.3.1. GENERAL PROFILE

During 2006/2007 the Department of Agriculture undertook a study to profile all extension officers employed by government in an attempt to measure the gap between the current capacity and the ideal capacity as outlined in the norms and standards document. This report stated the status quo as follows:

6.3.1.1. Extension and Advisory Services Complement: In February 2007 the number of Extension and Advisory Services officers employed nationally amounted to approximately 2 210 people. Table 6.1 below reflects the provincial deployment of such staff.

From table 6.1 it is further evident that in terms of gender, males are dominant (73%) in most provinces. Only KZN and Mpumalanga reflect some gender equity with females respectively occupying 50% and 39% of the positions in these two provinces.

Table 6.1: National Deployment of Extension and Advisory Services Personnel, 2007.

PROVINCE	TOTAL		GENDER	
	No.	%	Male %	Female %
Eastern Cape	623	28	78	22
Free State	70	3	71	29
Gauteng	29	1	59	41
KwaZulu Natal	360	16	50	50
Limpopo	666	30	79	21
Mpumalanga	189	9	61	39
Northern Cape	23	1	87	13
North West	137	6	89	11
Western Cape	119	5	79	21
TOTAL	2210	100	73%	27%

6.3.1.2. Racial Profile: With the exception of the Western Cape and the Northern Cape where there is a racial mix, the racial profile in all the other provinces shows a strong domination by Africans (92%).

6.3.1.3. Age Profile: The age profile shows a fair distribution in the age groups 21 to 55 years with 20% of the total staff complement under the age of 35 years. This age profile bodes well for the large scale development and upgrading initiatives planned by the DoA as most staff will in theory still have a fairly long service period before reaching retirement age (on condition that their service is retained).

6.3.1.4. Experience Profile: The number of years experience of extension officers as outlined in Table 6.2 below indicate that whilst 30% of all staff has less than 5 years experience, a considerable number (44%) has more that 10 years experience. Generally this indicates a relatively stable labour force and a sufficient mix of new and experienced staff. The exceptions are Gauteng where 45% of the staff have less than 5 years experience and a further 45% less than 10 years. In contrast the Limpopo and Mpumalanga provinces reflect a very experienced cadre.

Table 6.2: Years experience of the Extension and Advisory Service Corps, 2007

PROVINCES	Years Experience				
	≤5 (%)	6-10 (%)	11-20 (%)	21-29 (%)	≥30 9%)
Eastern Cape	28 %	18	24	25	5
Free State	44 %	29	14	9	4
Gauteng	45 %	45	10	0	0
KwaZulu Natal	21 %	25	39	13	3
Limpopo	3 %	2	47	35	13
Mpumalanga	12 %	4	60	20	3
Northern Cape	44 %	13	17	22	4
North West	14 %	73	8	7	5
Western Cape	46 %	17	25	4	8
TOTAL	30	26	26	14	4

6.3.2. FORMAL QUALIFICATIONS PROFILE

The education and training profile of the extension officers is critical since it provides an indication of their current knowledge and skills base and will serve as the basis for determining further upgrading and development needs and interventions.

Summarised the DoA Profiling Report reflects that 80% of all extension officials have only attained a diploma qualification or lower whilst only 20% have a degree or post graduate qualification.

6.3.3. INFORMAL SKILLS / COMPETENCY PROFILE

In addition to the above formal qualifications, extension and advisory personnel also require a range of competencies that would normally not be obtained via formal diploma or degree studies in the agricultural field. Various training needs analysis studies have been undertaken to establish what these additional skills and competencies are and the following range have been incorporated into the DoA Norms and Standards document as requirements: client orientation and customer focus; communication; project management; knowledge management; service delivery orientation; problem solving analysis; people management and empowerment.

The DoA Profiling Study undertaken by DoA in 2007 established that only modest progress have been made to date towards empowering the existing extension services corps with the above range of skills and that a very big tasks still lies ahead in this regard. Of the current 2 210 staff members only the following skills programme enrollments were recorded:

- Training in communication – 204 Extensionists enrolled
- Project Management training – 238 people trained
- Computer / ICT training – 140 persons completed training course as basis of knowledge management training
- People Management and Empowerment training – only 143 people enrolled
- No enrolment figures were provided for other specified competency requirements such as client and customer focus; service delivery innovation, problem solving and analysis.

6.3.4. PERFORMANCE EVALUATION (PROBLEMS AND CONSTRAINTS)

It must unfortunately be reported that the majority of beneficiaries of Extension and Advisory Services continue to rate the service rendering as poor. Whilst the earlier indicated educational and skills profile will contribute to this unsatisfactory service delivery, it is also a function or the result of a poor client or customer service orientation. In this regard the recently published Settlement and Implementation Support (SIS) Strategy of the Department of Land Affairs stated the shocking finding that among agricultural extension officers consulted during the SIS Strategy development “only 2.8% indicated that they met their own expectations in terms of productivity”. It was further reported that less than half of the projects surveyed have ever been visited by an Extensionist.

As outlined in the Background (Section 6.2 above) factors influencing and contributing to poor service delivery range from insufficient capacity (staff shortages), an insufficient knowledge and skills base, a lack of information systems, an environment that is not conducive and poor morale and commitment.

During the Extension Indaba held in East London in March 2008 a workgroup (Commission 3) , was assigned with the responsibility of considering means of “*Creating an Extension and Advisory Services Cadre for the 21st Century*”. This Commission had to consider the ideal knowledge and skills profile of an extension and advisory services cadre capable of meeting the challenges and demands of agriculture in the 21st century. In addition to formal qualifications and the informal skills repertoire indicated in 6.3.3 above, they also identified the following as further key attributes and other knowledge requirements needed by Extensionists.

6.3.4.1 Attributes:

It is believed that many Extensionists currently lack *professionalism and commitment* and that the morale is generally low. The following attributes were identified as essential for success (the present lack thereof perceived as key contributors to poor performance):

- Passion, drive and perseverance
- Standards of ethical conduct and behaviour (possibly to be attained and monitored through registration in a professional body and/or via service level agreements)

6.3.4.2 Extension methodology (models and approaches).

It was identified that Extensionists require a working knowledge and competence of various extension methodologies and approaches since such is essential for the successful transfer of knowledge, skills and information to the farmers that they serve. The following were identified as requirements in this regard:

- The Technology Transfer Approach
- The Participatory Approach
- The Project Approach
- Mentorship as Extension Approach

6.4. IDEAL KNOWLEDGE AND SKILLS REPERTOIRE

This section of the Report defines the ideal knowledge and skills repertoire required by an extension and advisory services cadre capable of meeting the challenges and demands of agriculture in South Africa in the 21st century.

The ideal knowledge and skills profile has been compiled from various needs analysis studies, skills requirements reports, the AgriSETA Sector Skills Plan, the DoA Extension Norms and Standards Report, etc.

This section is organised and structured as follows:

- The proposed future post structure within the Extension and Advisory Services Filed and the Job Descriptions for each post
- Formal Qualification requirements
- Functional agricultural knowledge and skills requirements
- Extension methodology knowledge
- Other non-agricultural skills and competency requirements

6.4.1. THE PROPOSED FUTURE EXTENSION AND ADVISORY SERVICES ORGANISATIONAL STRUCTURE AND POSTS WITH QUALIFICATIONS

There has been considerable confusion in terms of the organisational structure for Extension Services and the various provinces used different post titles. As an example three different sets of post names and titles were found in the Agricultural Norms and Standards document, the document that established the number of Extension and Advisory Personnel in 2005, and in the DoA Extension Profiling Report of 2007.

As a result the Directorate: Human Resources Management of the Department of Agriculture was requested in 2008 to review the situation and to, with inputs from the Agriculture Public Sector, develop Job Descriptions for a future scenario and indicative organisational structures for Extension and Advisory Services. (Please note that the indicative organisational structures suggested are not fixed but can be adjusted to suit the specific needs and circumstances in each of the provinces).

Table 6.3 reflects the titles of the new proposed positions together with suggested qualifications and other knowledge/skills as minimum appointment requirements:

Table 6.3: New proposed positions within Extension Advisory Services

New proposed position	Minimum Qualifications	Minimum Skills and Experience
Specialist Agricultural Advisor	Masters degree in Agriculture	6 years experience Extension methodology Project planning and management Advanced Communication Computer skills
Senior Agricultural Advisor	4 Year Extension degree	3 years experience Extension methodology Project planning and management Advanced Communication Computer skills Management Skills
Agricultural Advisor (Combine Scientist and Technician)	4 Year Extension degree	No experience Extension methodology Communication skills Computer skills
Agricultural Development Officer	National Diploma	No experience Extension methodology Communication skills Computer skills
Community Worker	Standard 10 and In-service training	Drivers license Communication skills

Against the aim and objective of this assignment (study) namely to review if curricula meet the knowledge and skills needs and requirements of Extensionists and Advisors it is important to note the following:

- The new post of **Specialist Agricultural Advisor** demands a minimum of a **Masters** degree in agriculture. The Job Purpose is to promote sustainable development in agriculture through the application of specialised subject specific interventions. This implies a high level specialist that will be involved in adaptive research; staying abreast with latest developments in his/her subject field; build capacity of others in the subject field; render specialist scientific and technical advice on the subject area; and function as the expert in the subject field to represent his/her district on forums as required. Whilst the incumbent of this post will demand a sound knowledge and understanding of extension principles and methods, they require high level expertise in the specific specialist subject field (i.e. animal husbandry, horticulture, etc)
- The post of **Senior Agricultural Advisor** demands an appropriate **4 year Agricultural Degree**. The Job Purpose is to promote sustainable development in agriculture through the **planning** and application of appropriate extension methods and principles. This position has a strong managerial focus and renders guidance and support to (subordinate) Agricultural Advisors. Activities and thus expertise demanded range from rendering scientific and technical advice on sustainable agricultural development practices and methods; provide information and facilitate access to financial assistance; provide technical support and planning and advice on various subject areas; promote establishment of farmers; promote sustainable production through planning and organising the rendering of appropriate extension programmes (self and through others); supervision and support to subordinates. Whilst the incumbent of this post must have sound and broad knowledge and skills of the agricultural sector, he/she needs to be very well grounded in the principles, theory and methodologies of extension.
- The post of **Agricultural Advisor** also demands an appropriate **4 year Agricultural Degree**. The Job Purpose is to promote sustainable development in agriculture through the application of appropriate extension methods and principles. The job description and range of activities are similar to that of the Senior Agricultural Advisor and only differs in that it is focussed on actual service rendering (as opposed to planning services) and is often undertaken under the guidance and mentorship of senior personnel (e.g. the Specialist or Senior Agricultural Advisors). Whilst the incumbent of this post must have sound and broad knowledge and skills of the agricultural sector, he/she needs to be very well grounded in the principles, theory and methodologies of extension.
- The post of **Agricultural Development Officer** demands an appropriate Agricultural Diploma. The job purpose is to promote sustainable development in agriculture through the correct application of selected extension methods and principles. The range of activities are to render general agricultural advice (which could be sourced from other experts if and when required); provide technical support on government funded projects; variety of activities under mentorship and guidance of seniors aimed at promoting sustainable production. The incumbent requires a sound general knowledge of agriculture and an understanding of extension principles and methods.
- Whilst a new job description for the post of **Agricultural Community Worker** was not developed, it is believed that a demand for such posts will remain in the future. This person should have at least a Standard 10 Certificate and must receive both in-service training on extension principles and practices as well as the range of “soft skills” outlined in 6.4.3 below. The incumbent of this post serves as the presence and “ears” of the Department on the ground and is the liaison between the community and Extension Services – as such considerable focus is given to facilitating the clients to identify and prioritise their needs.

6.4.2. TECHNICAL (FUNCTIONAL) AGRICULTURAL RELATED KNOWLEDGE AND SKILLS

The following is a combination of *functional / technical production* agricultural skills identified as critical for the re-training and upgrading of Extensionists and should be provided either as an integral part of the formal qualifications and/or in the form of non-formal short skills programmes (whilst such programmes should ideally be accredited and thus credit bearing). Such skills are needed to enhance the quality of technical service delivery by Extensionists to farmers – whether it is in the form of rendering advice or imparting knowledge and skills in a more formal and structured manner of training.

Whilst not exhaustive, the range of skills and expertise were specifically selected because they cover the farming ventures and practices deployed by the majority of emerging and small-scale farmers and are aimed at capacitating such farmers to become productive and to help them to operate and manage their farming ventures in a sustainable and economically viable manner: Since most Extensionists service both agronomy and livestock farmers it was felt that they should be exposed to the full range of programmes to increase their ability to function as generalists.

Key sources from which the list was compiled includes the Agricultural Sector Skills Plan 2005 -2010, the SIS Strategy document, and various needs analysis studies undertaken by Manstrat regarding the knowledge and skills requirements of Extension Officers.

The range of production orientated knowledge and skills are:

- **Animal Husbandry:** Courses in animal husbandry should include training in both large and small stock production and typically include the following topics:
 - Extensive production and management
 - Intensive production and management
 - Control of diseases
 - Feeding and care
 - Breeding
 - Marketing
 - Economics related to stock production
- **Poultry:** Focus should be provided to broiler production and the following topics presented:
 - The management of broiler production systems
 - Control of pests and diseases
 - Packaging and marketing
 - Economics related to broiler production
- **Crop Production:** Crop production should focus largely on maize. The following topics should be presented:
 - Soil preparation and planting
 - Fertilization
 - Irrigation
 - Crop maintenance and rotation
 - Control of pests and diseases
 - Harvesting
 - Economic aspects related to maize production

- **Horticulture:** Horticultural training should focus on the following crops:
 - Vegetable Production (beans, cabbage and spinach, beetroot, onion, pepper, sweet potato, etc.)
 - Tomato production
 - Citrus and other fruits
 - Ornamental plant production

The training courses in horticulture should typically include topics such as soil preparation and planting, fertilization, irrigation, crop management, crop rotation, harvesting, packaging, value adding and marketing, economic aspects related to horticultural production, use of agrichemicals for the control of pests and diseases.

6.4.3. NON-PRODUCTION SKILLS AND COMPETENCY REQUIREMENTS

In addition to the spectrum of agricultural production (technical) related knowledge and skills required by Extensionists to cater in the majority of emerging farmer's needs, the following list reflects so-called non production skills and competencies to facilitate and support farmers with the management and general operation of their business enterprises:

6.4.3.1. Agricultural Economics

The skills and knowledge demands include the following topics:

- Agricultural marketing
- Branding
- Packaging
- Distribution

6.4.3.2. Agricultural Management

The proposed training to address skills and knowledge shortfalls should focus on the following topics:

- Farm management
- Farm planning

6.4.3.3. Community Development

The proposed training to address skills and knowledge shortfalls should focus on the following topics:

- Communication skills
- Conflict management
- Facilitation skills

6.4.3.4. Business Skills

The proposed training to address skills and knowledge shortfalls should focus on the following topics:

- Business plan development (including economic viability)
- Basic financial management (including Business Plan Development)
- Human resources management
- Project management (including project viability)

Please also refer to section 6.4.4.2 below for a useful diagramme provided by S H Worth that attempts to integrate and present the full range of knowledge and skills required by Extensionists in undertaking their role and functions.

6.4.4. EXTENSION KNOWLEDGE AND APPROACHES OR MODELS

This section reflects those “specialised” skills focussed directly on the **extension** role and function of Extensionists. Information reflects the views of the DoA as presented in its Norms and Standards for Extension and Advisory Services document/policy as well as publications/papers by S H Worth (Senior Lecturer at the University of KwaZulu Natal).

6.4.4.1 Extension Approaches as per DoA Norms and Standards Document

To enhance and facilitate liaison and consultation of farmers, Extensionists need training in the following:

- **The Technology Transfer Approach** – training interventions for EO’s to increase their ability in assimilating and transferring relevant technologies
- **The Participatory Approach:**
 - Training EO’s in practices and consultative methods that will facilitate and enhance community participation and involvement
 - Training EO’s in approaches and methodology to identify and prioritise needs in consultation and collaboration of communities to be served
 - Training EO’s in problem identification, analysis and solving skills
 - Training EO’s to function as facilitators in the development of networks and cooperative structures amongst farmers and supporting stakeholders
 - Capacitating EO’s (through training and coordination mechanisms) to coordinate and integrate extension and advisory services provided by the various interest groups and stakeholders
- **The Project Approach:**
 - Training EO’s in Project Management as an instrument to plan and implement projects
 - Support EO’s with Extension Kits that will help to develop, record and monitor aspect such as project objectives, action plans, timelines, resource assignment, deliverables, performance indicators, etc.
- **Mentorship as Extension Approach** – through training EO’s in the principles and administration of mentorship – thus developing their capacity to organise and manage mentorship programmes organised for their farmers.

6.4.4.2 Extension Needs as defined by S H Worth (AgriFlection Model)

Interesting and enlightening work has been done by S H Worth (Senior Lecturer, Centre for Environment, Agriculture and Development, University of KwaZulu-Natal) towards establishing the so-called Extension Elements and Skills. Worth moves from the premise (supported by modern international thinking regarding successful extension approaches), that agricultural extension is essentially a system of education and that in essence **extension should be a facilitated learning activity**. A review of current agricultural extension curricula against the primary theory currently driving education policy in South Africa – namely Outcome-Based Education (OBE), and an application of the educational transformation agenda (as embodied in OBE) to agricultural extension, brings him to the conclusion that current curriculum offerings in the agricultural extension field falls considerably short in preparing Extensionists for their learning facilitation role and function and that this aspect demands urgent attention. Particular focus is placed on:

- The need to view farmers as learners, and the **role of the Extensionist as a facilitator of the learning process**, is strongly propagated. An argument is made for the need to shift from Extensionists' traditional role as *messengers of technology transfer* to the new role as *developers and facilitators of the learning process* – where farmers are developed to become empowered participants of development – thus creating prosperity for themselves, their communities and the nation as a whole. To this end a need exists for extension officers to have a sound knowledge and skills related to training needs analysis, learning theory, curriculum development, learning facilitation, learning assessment, etc.
- The need for a **participatory** process – where the farmer is engaged in and takes responsibility for determining his/her own extension programme and agenda. This participation is in the broadest possible sense (i.e. participating in technology development and/or selection of technology appropriate to his/her needs – versus the former practice where the farmer is a mere recipient of technology transfer as determined by the Extensionist; participating in research and the sharing of such information; becoming an active partner in the learning process; being active in determining the development agenda – including sustainability and sustainable livelihoods; etc.

Worth suggests that the so-called technical (agricultural and production) learning areas be learned within an overarching context of **extension skills** as per his 34 markers of curriculum criteria for the essential additional (non-technical) learning needed by extension practitioners. These markers or criteria are grouped into the following 5 categories:

- Learning (believed to be the most important group of markers and includes an understanding and practice of learning theory, needs analysis, curriculum development, learning facilitation, learning partnerships, etc. This range of skills is deemed essential for sustainability and creating the partnering relationship between the extension practitioner and the farmer. The outcome to be achieved is the facilitation of the farmer to become “a partner in the leaning agenda – as investigator, generator, sharer and user of agricultural knowledge, technologies and skills”)
- Technology, innovation and scientific enquiry (theory and practice of how to attain participatory technology development and research – where farmers are actively involved in technology development an/or technology selection that matches their needs and requirements and they are assisted to use technology effectively and responsibly (both socially and environmentally)
- Sustainable livelihoods and development concepts (achieving wider development objectives such as sustainable livelihoods and prosperity by means of a sound understanding of development and a knowledge of the systems interacting with (and impacting on) the farming enterprise and how to operate within such a set of systems)
- Planning, action and reflection (developing a culture of reflective and cumulative learning amongst farmers through facilitating creative and critical thinking, problem solving, investigation, etc. – of a continuous and iterative nature that fosters independence).

In addition to the above issues related to the need to transform agricultural extension curricula to match the changed developmental, educational and agricultural priorities of South Africa, Worth also provides a very useful diagram outlining the (traditional) range of learning fields and disciplines that should ideally be covered in extension curricula. The following figure reflects his so-called Agricultural Extension Carousel of Learning and indicates how the various knowledge and skills fields are interlinked and underpinned by the new additional learning and development dimensions within an expanded learning programme (Worth 2007).

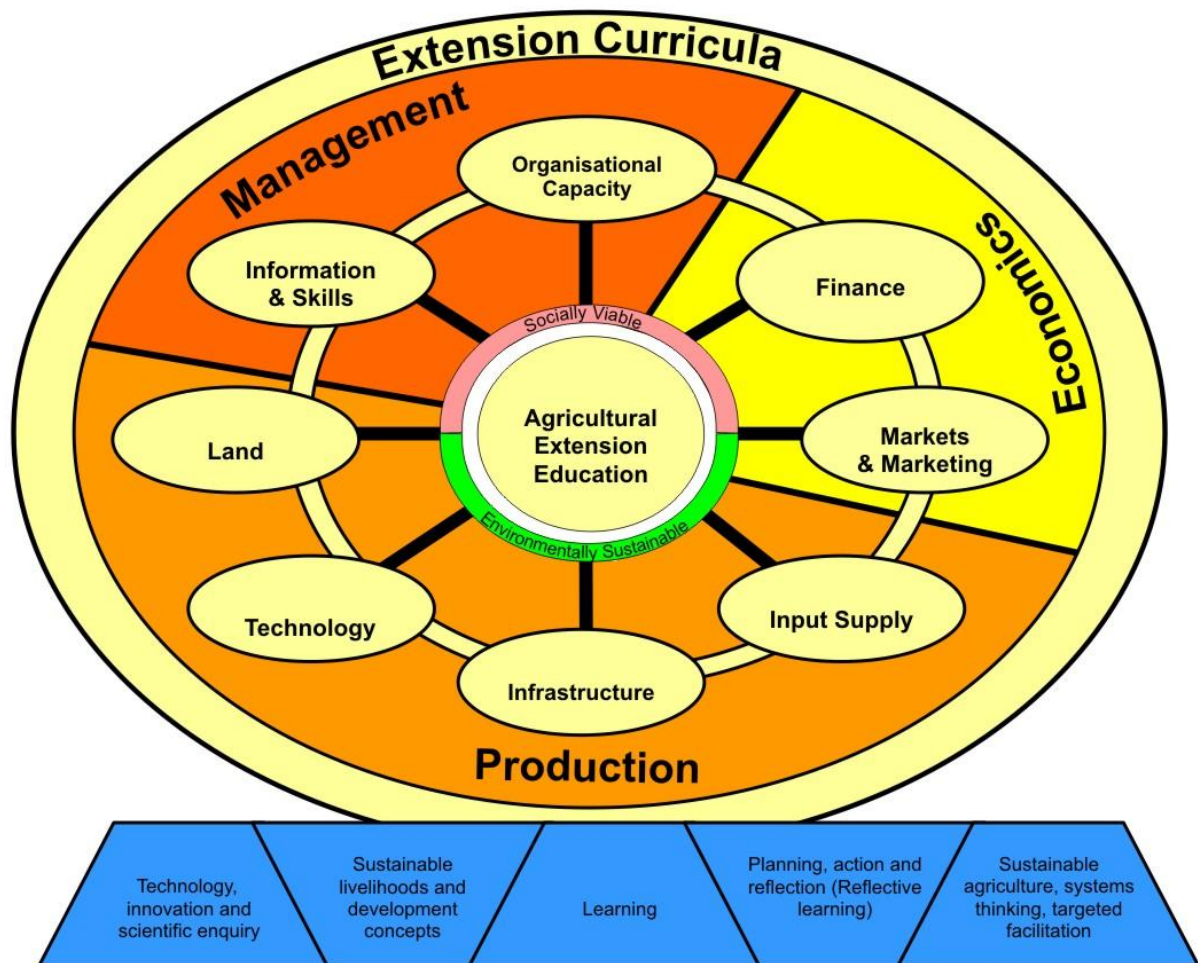


Figure 6.1: Agricultural Extension Carousel of Learning

S H Worth: Paper delivered in 2007 at the 41st Annual Conference of South African Society of Extension "Tertiary Agricultural Extension Education in South Africa: Time for a Revolution"

A further delineation of the various learning fields and dimensions in the above figure is as follows:

The Technical Component of an Extension Qualification:

A total of 10 Technical (non-extension) Elements falling into two overarching learning areas namely:

- Social Viability elements – assessing agricultural activities in terms of social viability and acceptability
- Environmental Sustainability elements – assessing agricultural activities in terms of environmental ability and acceptability

The other 8 technical learning areas are grouped into the following three main categories:

- Production
 - Land (soil-plant and soil-animal relationships)
 - Input Supply (evaluation of supply options)
 - Technology (evaluation of technical options and technology development)
 - Infrastructure (basic infrastructural requirements and evaluation of infrastructure options)

- Management
 - Information and Skills (locating, assessing, generating and sharing information and assessing skills)
 - Organisational capacity (basic farm management)
- Economics
 - Finance (profitability, gross margins, enterprise budgeting)
 - Markets and marketing (fundamentals of marketing, evaluation of marketing options)

6.4.5. INFORMATION AND KNOWLEDGE MANAGEMENT (INCLUDING ICT)

A further critical shortfall and constraint in the performance of Extension Officers are their lack of access to the range of information needed by them to advise and support farmers. Training extension personnel in means of collecting, collating, organising, managing and disseminating information and knowledge needed by them and their farmers is thus a critical need to be addressed. Such skills will include the use of ICT, optimal utilisation of web based search engines, usage of the Agricultural Information System: Extension Suite Online (ESO that was specifically designed and developed to address their information needs), AGIS, etc.

6.5. REVIEW OF CURRENT AET SUPPLY AND CURRICULA

This section reviews the current Agricultural Extension education and training programmes and curriculum on offer at the various levels of education and training and at various provider institutions. An attempt is also made to evaluate the appropriateness of such programmes and curriculum against the education and training needs of Extension Officers as outlined in sections 6.3 and 6.4 above.

It is significant to note that, based on the SAQA Database, there are currently a total of **nineteen (19) Agricultural Extension Qualifications** registered on the NQF at levels 5 and above. This is a surprisingly high number of qualifications and can generally be grouped into:

- Exit level outcome qualifications (15)
- Unit standards based qualifications (4)

6.5.1. EXIT LEVEL OUTCOMES BASED QUALIFICATIONS

This type of qualification is where the ***qualification is based on exit level outcomes*** which have been structured into modules or subjects, rather than unit standards. This is typical of most qualifications offered at the Higher Education Institutions (e.g. Universities, Universities of Technology or Colleges of Agriculture).

6.5.1.1. QUALIFICATIONS ON OFFER

The following table 6.4 reflects the *Exist Level Outcome qualifications* specifically aimed at the development of Agricultural Extensionists.

Table 6.4: Agricultural Extension Qualifications – (Exit Level Outcome Type – 2008)

ID	QUALIFICATION TITLE	NQF LEVEL	MIN CREDITS	PROVIDER	ETQA
15150	Diploma: Agricultural Extension and Rural Develop	Level 5	240	University Fort Hare	CHE
21831	Diploma: Community Extension	Level 5	240	APAC (Association Principals of Agric Colleges)	CHE
24381	Bachelor of Science: Agriculture: Livestock Science and Agricultural Extension	Level 6	540	University Fort Hare	CHE
15120	Bachelor of Agriculture Honours: Agric Extension	Level 7	128	University Fort Hare	CHE
15128	Bachelor of Agriculture Honours: Pasture: Livestock Production: Agricultural Extension	Level 7	128	University Fort Hare	CHE
6415	Bachelor of Institutional Agriculture Honours: Extension	Level 7	160	University Pretoria	CHE
15130	Bachelor of Science Honours: Agriculture: Agricultural Extension	Level 7	128	University of Fort Hare	CHE
19409	Bachelor of Science Honours: Agriculture: Agricultural Extension	Level 7	120	University of North West	CHE
14495	Bachelor of Science Honours: Agriculture: Extension	Level 7	160	University of Pretoria	CHE
19129	Postgraduate Diploma: Agricultural Extension	Level 7	120	University Fort Hare	CHE
15151	Doctor of Philosophy: Agricultural Extension	Level 8 up	216	University of Fort Hare	CHE
6295	Doctor of Philosophy: Extension	Level 8 up	360	University of Pretoria	CHE
6799	Master of Institutional Agriculture: Extension	Level 8 up	200	University of Pretoria	CHE
15184	Master of Agriculture: Agricultural Extension	Level 8 up	144	University Fort Hare	CHE
15189	Master of Science: Agriculture: Agricultural Extension	Level 8 up	144	University Fort Hare	CHE

6.5.1.2. COMPARING QUALIFICATIONS

These *exit level outcomes qualifications*, which have been structured into modules or subjects present limitations to comparative and RPL assessment, specifically when inter-institutional articulation is a priority. This is because subjects and modules are generally content-based rather than output-based and institutions interpret the learning content to meet the requirements for the exit level outcomes differently. If credit transfer and articulation is thus based on subjects and modules, rather than on the specified outcomes of the qualification, the process of credit transfer is inhibited.

A detailed evaluation and comparison of all the qualifications could not be undertaken within the ambit and scope of this project – peer review amongst the HEIs however revealed that those universities with specialist and dedicated Extension Departments (e.g. University of Pretoria, the University of Forth Hare) are generally deemed to be of high quality.

6.5.1.3. RELEVANCE OF QUALIFICATIONS TO NEEDS OF EXTENSION STAFF

In evaluating the relevance of current Agricultural Extension Curricula to the changing agricultural and educational landscapes in South Africa, some work has been done by S H Worth (Senior Lecturer, Centre for Environment, Agriculture and Development, University of KwaZulu-Natal). As part of his research, an evaluation of existing agricultural extension curricula at 11 HET institutions (4 Agricultural Colleges, 6 Universities and 1 University of Technology) were undertaken against a total of 34 curriculum criteria or markers – deemed by the researchers as essential learning for extension practitioners in addition to the particular technical learning required. Interpreted within the context of this assignment, the evaluation was done from the following perspectives (Worth 2006):

- **The degree to which curriculum reflects changes in agricultural policy and priorities.** In this regard Worth found the following related to the alignment and appropriateness of curricula to changes in agricultural policy and the agricultural vision and mission of the DoA:
 - Despite policy changes to develop a single integrated extension service (serving both the commercial and emerging/small-holder farming sectors) most educational institutions offering agricultural programmes still have commercial agriculture as their primary focus.
 - Issues related to small-holder farming, food security, rural livelihoods and sustainable agriculture hardly feature in the agricultural curricula.
 - Existing extension qualifications still follows the traditional approach and philosophy of extension where the focus is on production related knowledge and skills, technology transfer and negotiation/persuasion and subsequent behavioural change to adopt and implement new technology.
- **To what extent does Extension Qualifications accommodate critical non-agricultural and technology knowledge and skills.** Worth's research found that the current extension curricula falls considerably short in preparing Extensionists for their critical role as learning facilitators, as the catalyst responsible for getting farmers involved in participatory research and technology development, as development agent ensuring that a conducive development environment and sustainable development systems are created within which the farming venture will operate, etc.
- **To what extent Extension Modules and Skills are accommodated in Agricultural Qualifications:** A further important finding was that there is a marginalisation of agricultural extension “subjects” and content in the majority of agricultural qualifications offered at the institutions that formed part of the research. It was found that “extension modules” were totally absent in the majority of cases; it featured as an elective in few programmes and as a required area of learning in a very small number of qualifications. This thus implies that the current agricultural education system is not producing agricultural graduates that are geared and skilled to work with the majority of farmers in the country (namely land reform beneficiaries and emerging and resource poor farmers) within an extension context. This is deemed to be out of pace with the agricultural policy and the extension reform introduced by the DoA. Serious attention should subsequently be given to the inclusion of appropriate agricultural extension education and training as a compulsory learning component of **all** agricultural qualifications in the tertiary system.

6.5.2. UNIT STANDARD BASED QUALIFICATIONS

This type of qualification is a **unit standard-based qualification**, where credits are awarded towards specific unit standards in terms of the overall purpose of the qualification. Unit Standards are nationally agreed descriptions of the results of learning, and credit transfer between different providers are facilitated by the fact that learners have to meet the same requirements to prove competence, regardless of which provider has offered the programme and regardless of the content of the programme. Articulation and credit transfer between different (but closely associated) fields of learning and between institutions are thereby facilitated.

6.5.2.1. UNIT STANDARD BASED QUALIFICATIONS ON OFFER

The following table reflects the *Unit Standard based qualifications* developed by the Standards Generating Body: Agricultural Extension specifically aimed at the development of Agricultural Extensionists and which is registered on the SAQA database.

Table 6.5: Agricultural Extension Qualifications – (US Based – 2008)

ID	QUALIFICATION TITLE	NQF LEVEL	ORIGINATOR	MIN CREDITS	PROVIDER	ETQA
59409	National Certificate: Agricultural Extension	Level 5	SGB Agricultural Extension	156	Various	AgriSETA
59550	National Certificate: Agricultural Extension	Level 6	SGB Agricultural Extension	177	Various	AgriSETA
59388	Bachelor of Agriculture: Extension	Level 6	SGB Agricultural Extension	360	Various	?
59529	Bachelor of Agriculture Honours: Extension	Level 7	SGB Agricultural Extension	150	Various	?

6.5.2.2. COMPARISON TO EXIT LEVEL QUALIFICATIONS AND RELEVANCE

It was not possible to evaluate and compare the SAQA programmes to that offered at the HEIs within the scope and ambit of this assignment and it can thus not be concluded if they are better or worse than the exit level qualifications. It can however be stated that these qualifications have been developed recently (in the past two years) under the guidance of the Standards Generating Body: Agricultural Extension (which comprised of leading Agricultural Extensionists in South Africa). It can thus be assumed that the content should be relevant and aligned to the newest thinking.

6.6. RECOMMENDATIONS TOWARDS MORE RESPONSIVE AND NEEDS ALIGNED CURRICULUM AND SUPPLY

6.6.1. FORMAL QUALIFICATIONS

6.6.1.1. SELECTING THE MOST SUITABLE LEARNING PROGRAMMES AND/OR DEVELOPING EXTENSION CURRICULA TO MEET NEEDS

On the basis of the findings of this study it is difficult to conclude that the existing range of extension related curricula and qualifications on offer at the HEIs (19 dedicated programmes/qualifications) are not suitable and do not meet the needs and requirements of Extension and Advisory personnel. Note is however taken of the research undertaken by Worth and the shortcomings listed in point 6.5.1.3 above and this seems to justify the need for further in-depth investigation and consultation.

Against the above it is recommended that A Panel of Extension Experts be established under the auspices of the Department of Agriculture (DETES) to undertake the following:

- Evaluate and compare the range of programmes and qualifications on offer to establish best practices and components of each and to combine such in a new “generic” programme that could be made available to all HEIs and would be favoured by the DoA when enrolling its staff for retraining and upgrading (and/or when DoA bursaries are allocated to prospective students). This should serve as a motivation to the HEIs to offer this new programme.
- To specifically consider the merits of the so-called shortfalls in existing curricula when developing the new “combined” programme proposed above.

6.6.1.2. PRACTICAL AND AFFORDABLE MEANS OF UPGRADING QUALIFICATIONS

Against the very big demand to upgrade a large number of existing extension personnel (close to 80% will have to upgrade from their current diploma qualifications to the new requirement of 4 year degrees), a practical and affordable way of scheduling and undertaking such upgrading will have to be established. For vast numbers of existing extension staff to be upgraded from diploma to degree qualifications trained

Whilst it would have been ideal to enroll a considerable group of Extensionists on learning programmes of longer duration towards upgrading and/or attaining new qualifications, it will neither be feasible nor affordable. On the one hand withdrawing Extensionists from their workstations (and thus the farmers and farming projects that they currently support) for extended periods of time will be detrimental to such projects, and on the other hand the magnitude of development needs and the costs of formal tertiary training for all will be extremely costly.

It is recommended that the above Extensionist Expert Panel also consider practical means of offering such upgrading programmes on a part time basis and/or scheduling training on a block release basis to allow larger numbers of staff to be enrolled.

6.6.2. NON-FORMAL TRAINING - RECOMMENDED TRAINING APPROACH AND METHODOLOGY

Towards addressing the needs for updating and upgrading the knowledge and skill levels of staff in both technical/production related skills as well as in the so-called non-agricultural soft skills, the following approach and methodology is proposed as an alternative to the contracting of external providers which is very costly:

6.6.2.1. Short and Refresher Courses

It is recommended that use be made of short courses and refresher seminars that should be provided within a structured schedule and programme over a phased period of time. The proposed training interventions will thus primarily consist of:

- **Short Courses:** These courses should be presented to extensionists over a period of 1 to 2 weeks and should focus on all aspects of production in a specific field that will enable the extensionists to become good generalists in that particular field.
- **Refresher Courses:** These courses should be provided to extensionists over a period of 1 to 3 days and should focus on aspects that are crucial in a specific field of agriculture.

6.6.2.2. Developing Master Trainers:

Whilst it is envisaged that selected external providers will initially be used to offer the training, cost implications will demand an approach whereby internal training capacity will have to be created within the Department of Agriculture to roll-out the training to all staff. In this regard it is concluded that it will be most cost-effective to identify suitable candidates who could be developed as “*master trainers*” in selected priority fields and who will take responsibility for the bulk of in-service training and upgrading of other departmental staff in their respective specialisation areas during subsequent years. Use could either be made of Specialist Agricultural Advisors to function as Master trainers in their areas of specialty. Alternatively other suitable staff could be developed as master trainers, by means of the following learning interventions:

6.6.2.3. Specialisation Courses:

It is recommended that the selected candidates who will act as in-service trainers within the Department, be enrolled for development programmes of approximately 4 weeks in duration in their respective fields of specialisation.

It is proposed that at least one “master trainer” per district be identified and trained for each of the following functional fields:

- Crop production
- Horticultural production
- Animal husbandry
- Poultry production
- Farm Management systems
- Business Management and Entrepreneurial Development
- Community Development and Facilitation

6.6.2.4. Developing Extensionists as Generalists:

A need has been identified to develop Extensionists over a wide field to enable them to assist most farmers (with diverse needs) within their respective geographical areas of responsibility or jurisdiction. To this end they thus have to be developed as generalists with sufficient knowledge to assist farmers in more than a single functional field. It is therefore recommended that Extensionists receive both technical production related and generic training.

7. AET MOBILITY /TRANSFERABILITY – DISPARITIES IN STANDARDS AND ARTICULATION PROBLEMS

7.1. INTRODUCTION

This section of the assignment aims to investigate and analyse problems experienced regarding the mobility and transferability (accreditation and recognition) of AET learning and the subsequent difficulties that students experience in articulating between institutions and qualifications.

To achieve the above this Chapter is structured as follows:

- Background – an outline and review of the AET landscape and the different objectives, target groups served and offerings within each of the learning bands
- An identification of disparities in the standards and quality of AET offerings and how such manifest itself in poor learning mobility, transferability and articulation. An analysis of identified problem areas to establish the causes, impact and effect thereof.
- Recommendations – suggestions to improve the mobility and transferability of learning between AET institutions and qualifications.

7.2. BACKGROUND

An evaluation and analysis of learning mobility, portability and articulation within the agricultural education and training field must be undertaken within the context and a good understanding of the AET landscape and environment (which has changed considerably over the past number of years). This background section subsequently attempts to provide an overview of the AET Landscape.

There have been considerable developments and changes within the education and training system and dispensation in South Africa in the post 1994 era. Within the context of increased learning mobility the establishment of SAQA (mandated to oversee the development and implementation of a National Qualifications Framework) was a key development. The NQF had as aim and objectives to:

- Create an integrated national framework for learning achievement
- Facilitate access to, and mobility and progression within, education, training and career paths (including improved portability and establishment of progression routes)
- Enhance the quality of education and training

These changes and developments also had a marked impact and effect on the Agricultural Education and Training Landscape in South Africa. As a point of departure it is thus important to obtain a holistic view of the “new” AET Landscape and how the various AET provider institutions and qualifications relate to and interlink with one another (please refer Figure 7.1).

Figure 7.1: The AET Landscape

ENVISAGED NEW AET LANDSCAPE									
NQF	GENFET QC		TRADE , OCCUPATION & PROFEESIONAL QC		HIGHER EDUCATION QC		NQF		
5 to 10	HET BAND						5 to 10		
				Professional Communities of Expert	Agricultural Colleges	Universities of Technology	Universities		
10				<i>National Occupational Awards linked to an Occupational or Professional Title (where relevant in the agricultural sector)</i>		D Tech	Ph.D	10	
9						M Tech	Masters Degree	9	
8							Post Grad Dip (4 years)	B Hons (4 years) B Degree (4 years)	8
7						B. Agric		B Degree (3 years)	7
6						Dip Agric (3 years)	Diploma (3 years)	Diploma (3 years)	6
5					Advanced Certificate	Advanced Certificate			
					Higher Cert Agric	Higher Certificate		5	
2 to 4	FET BAND						2 to 4		
	Academic Shools <i>National Senior Certificate (NSC) as exit Qualification</i>	Agric High Schools <i>National Senior Certificate (NSC) as exit Qualification</i>	FET Colleges <i>National Certificate Vocational (NCV) as exit Qualification</i>	<i>National Skills Certificates</i> (Delivered and obtained via Knowledge + Practical Skills + Experience Providers)	National Certificates in Agriculture Levels 1-4 at selected Agric Colleges (currently controlled by AgriSETA and /or Umalusi)				
4	Agric Science Gr 12	Agric Science Gr 12 Agric Man Prac Gr 12 Agric Tech Gr 12	Farm Plan & Mech L 4 Advance Plant Prod L 4 Soil Science L 4 Animal Prod L 4 Agribusiness L4	Foundational Learning Certificate (including Mathematical Literacy and Communications)			4		
3	Agric Science Gr 11	Agric Science Gr 11 Agric Man Prac Gr 11 Agric Tech Gr 11	Plant Prod L 3 Soil Science L 3 Animal Prod L 3 Agribusiness L 3				3		
2	Agric Science Gr 10	Agric Science Gr 10 Agric Man Prac Gr 10 Agric Tech Gr 10	Plant Prod L 2 Soil Science L 2 Animal Prod L 2 Agribusiness L 2				2		
1	GET BAND						1		
1	Secondary Schools		ABET Level 4 (Adult)				1		
	Subject Natural Science with Agric related content		ABET Levels 1- 4 Included in syllabus is Agric related Unit Standards						
	Primary School Subject Natural Science with Agric related content								

A further breakdown of the above AET Landscape into the three Education and Training Bands on the NQF is as follows:

7.2.1 AT THE GET BAND

Within an AET context the GET Band comprises of the following provider institutions and learning programmes/qualifications:

7.2.1.1 PRIMARY AND JUNIOR SECONDARY SCHOOLS:

Within schools at the GET band there are no particular agricultural subjects, therefore Natural Science was used as an equivalent at this level. According to the document titled “*Policy Revised National Curriculum Statement Grades R-9 (Schools) Overview*” Gazette No.: 23406, Vol. 443, dated May 2002, science has been shaped by the search to understand the natural world through observation and codifying and testing ideas. Science has evolved to become part of the cultural heritage of all nations. The Natural Sciences Learning Area Statement visualizes a teaching and learning milieu that recognises that the people of South Africa have a variety of learning styles and different culturally influenced perspectives. This learning area starts from the basis that all learners should have access to a meaningful science education. The area statement indicates that meaningful education has to be learner-centred, and has to help learners to understand not only scientific knowledge and how it is produced but also the environmental and global issues. The Natural Sciences Learning Area promotes scientific literacy and aims to provide a **foundation** on which learners can build throughout life by including the following:

- The development and use of science process skills in a variety of settings
- The development and application of scientific knowledge and understanding,
- Teaching the appreciation of the relationships and responsibilities between Science, society and the environment.

7.2.1.2 ABET PROGRAMMES

Table 7.1 below indicates the number of ABET centres present in the nine provinces of South Africa.

Table 7.1: Number of ABET facilities per province in South Africa (StatsSA, 2003)

Province	ABET Centres
Eastern Cape	282
Free State	196
Gauteng	24
KwaZulu-Natal	12
Limpopo	467
Mpumalanga	237
Northern Cape	127
North West	143
Western Cape	262
Total 2006	1 750
% 2006	6.08

7.2.2 AT THE FET BAND

Section 29 of the Bill of Rights in the Constitution of South Africa (1996) stipulates that the Ministry of Education has the constitutional obligation to make Further Education progressively available and accessible. Equally, the success of the government's human resources development strategy depends heavily on a flexible, responsive and vibrant Further Education and Training system that provides the intermediate and higher-order skills necessary for economic growth and social development.

The location of the FET band between the Higher Education (HE) and General Education and Training (GET) bands presents several complex challenges. The institutions in this band have to respond to the needs, interests and preferences of a widely-varied target audience. The new FET institutional landscape must cater for young learners graduating from the compulsory school phase as well as adult workers and unemployed citizens who are seeking to enter or progress in or change a career pathway, or equip themselves for admission to Higher Education.

There have been considerable changes within the FET Band towards ensuring an education and training system that will provide learners with a sound knowledge and skills foundation towards becoming productive citizens capable of making a useful contribution to society. Given that the FET band is located between the GET and HET bands is further very important since it is the juncture at which learners are selected for higher education or to join the world of work. FET is thus not merely an extension of general education (GET), and neither can it have a solely vocational focus. The purposes of FET are:

- preparation for learning in higher education
- preparation for the world of work
- preparation for full personal development and productive citizenship
- preparation for lifelong learning.

In the past the National Qualifications Framework provided for a single Level 4 qualification called the Further Education and Training Certificate (FETC) at the FET band. The National Standards Body Regulations developed in 1998 stipulate the design of this qualification. It was however recognised that a single "one-fit-all" qualification did not cater for the needs of learners and the expectations of society, and it is necessary to recognise **three learning pathways**, namely:

- The General pathway (leading to the NSC qualification offered mainly in schools)
- The General Vocational pathway (leading to the NCV qualification offered primarily in FET colleges)
- The Trade, Occupational and Professional pathway (leading to unit standard based qualifications such as Learnerships under the auspices of SETAs)

a) The General Pathway

The General pathway leading to the National Senior Certificate (NSC General) is the basic programme offered predominantly at senior secondary schools. It is structured into Fundamental, Core and Elective Learning Components in accordance with the National Curriculum Statement. Learners choose from a limited number of subjects in the Learning Fields of the school curriculum. The examination is set and administered by the Department of Education and is certified by Umalusi. The qualification is based on band exit-level outcomes, and designed so as to permit articulation with other learning pathways. It complies with the requirements for full acceptance at South African Universities and Universities of Technology. Elective subjects relevant to the **agricultural learning field** are Agricultural Science, Agricultural Management Practices and Agricultural Technology.

b) The General Vocational pathway

The Vocational pathway leads to a National Certificate (Vocational) and is primarily offered by the FET Colleges. This pathway is relevant for 16-18 year olds who have yet to make a career choice, who wish to progress to Higher Education in a career-focused pathway, or who have not been able to secure access to a workplace for trade, occupational and professional skills training. Unemployed adults may have similar reasons for taking this route. The National Certificate (Vocational) is also structured into Fundamental, Core and Elective Learning Components, with a concentration on the vocational fields. The NC(V) is offered through FET colleges and specialised technical senior secondary schools at NQF Levels 2-4. Programmes in this pathway will not prepare learners for specific occupational competence but will offer them a broad-based orientation to employment skills within a sector as well as sufficient academic education to prepare them for admission to Higher Education. The NC(V) is also a band exit-level outcomes-based qualification at Level 4 of the NQF. Portability of learning credits will be possible to permit articulation with other learning pathways. The vocational subjects offered within the **agricultural field** include soil science, plant production, animal production, farm planning and mechanisation and agribusiness.

c) The Trade, Occupational and Professional (TOP) pathway

The TOP pathway leads to unit-standard based qualifications registered with SAQA (e.g. Learnerships) and is primarily offered in a joint venture agreement between an accredited provider and an employer. Learners in this pathway, both young people and adults, will make the most specific and least flexible choices. The TOP pathway is open to those who have been able to secure access either to a workplace learning site or a simulated workplace learning site (an accredited college workshop, for example) where they can learn and practise their skills and attain determined competency standards or expertise recognised by relevant professional bodies. These unit-standard based programmes (Learnerships in the case of full qualifications and Skills Programmes for incomplete qualifications) are geared to prepare the learner for a specific occupation or employment in a specific sector or company. Within the **agricultural field** the approximately 50 qualifications and programmes are registered with SAQA and range from National and FET Certificates (120 credits) to National Diplomas (240 credits) and are quality controlled by the AgriSETA.

7.2.3 AT THE HET BAND

The 1996 Constitution for the Republic of South Africa defines higher education as a national government competency, as opposed to a provincial competency. As a result, higher education provision falls under the jurisdiction of the national Ministry of Education. The Higher Education Act of 1997 provides the legislative basis and framework for South African Higher Education.

Alongside the public higher education sector exists a small but growing private higher education sector. The 1996 Constitution provides for such institutions on condition that they do not discriminate on the grounds of race, register with the state, and maintain standards that are not inferior to those at comparable public educational institutions.

There is a diverse range of key national actors in higher education and higher education policy-making. The national Ministry and Department of Education regulate higher education provision and attempt to steer higher education to contribute to national policy goals through

the instruments of national planning and public funding. The Council on Higher Education (CHE) serves as the statutory and independent advisory body to the Minister of Education. It is also responsible for monitoring the achievement of policy goals, reporting to parliament on the state of higher education, convening an annual consultative forum of all key national higher education stakeholders and contributing to the development of higher education generally. Finally, a key function of the CHE is quality assurance (programme accreditation, programme reviews, institutional audits and quality promotion) through its Higher Education Quality Committee. Umbrella interest groups such as the South African University Vice-Chancellor's Association, the Committee of Universities of Technology Principals, the Association of Principals of Agricultural Colleges and the Alliance of Private Providers of Education, Training and Development exist alongside numerous national student organizations, labour unions and research and development agencies. The existence of a relatively large number of national, regional and institutional level organisations means that there tends to be considerable inputs into policy making and extensive policy debates and occasionally strong contestation around policy issues.

Universities of Technology (UoT's)

Four (4) Universities of Technology (UoT's) offer various tertiary AET programmes that are nationally accredited. At UoT's AET follows a practical curriculum, though not as extensive as Colleges of Agriculture. With the introduction of the BTech degree, UoT's are increasing their theoretical components and moving towards agricultural science.

Universities of Technology are characterised by the following:

- A strong corporate-orientation/focus;
- Service to industry and the community;
- Own characteristic roles and values;
- Relevance of programmes (responsiveness to, and fulfilment of the needs of industry, community and society);
- Appointment of experts acknowledged by industry(not necessarily by academics);
- Strong attention to niche areas;
- Emphasis on scholarship, innovation and R&D;
- Transfer of technology;
- Preparation of a new generation of knowledge workers. (e.g. work ethics, ability to work in multi-cultural teams, students-for-life, etc.)

The above will make a university of technology a distinct and unique type of institution, markedly different from the traditional universities in existence in South Africa today with the following benefits for UoTs:

- With university status, a university of technology can ensure that its diplomas and degrees, and the graduates with these qualifications, obtain the recognition and credibility they deserve, particularly in the international arena.
- Recognition as a university will assist an institution in recruiting and retaining top quality teaching and research staff, both locally and internationally.
- University status will improve access to funding, especially with respect to research grants and the funding of post-graduate programmes in high-cost categories.
- A University of Technology will have a stronger appeal as an institution of first-choice for local students, as a destination for international students, and an attraction for exchange and visiting staff.
- Recognition by national and international professional educational associations, organisations and agencies.
- Finally, Universities of Technology, as a consequence of the rapid development of an information-based society, will be in a better position to respond to the increasing quantum of knowledge needed for progress, by offering higher levels of learning through technically-infused programmes.

Comprehensive Universities (CU's)

The South African government's decision to create 'comprehensive' universities through combining formative and career-focused education (universities and technicons) might have seemed like a good idea at the time. But the reality has been fraught and complicated. The problem is that there isn't a clear idea of what the institutions are and how they should deliver on their mandate. The National Plan for Higher Education provided four rationales for comprehensive institutions. Comprehensive universities were created to:

- Enhance access to a wider variety of courses with different entry requirements;
- Promote articulation and student mobility between career-focused and formative courses;
- Expand research opportunities by linking the applied research of UoT's to university research strengths, and
- Through their increased scope and capacity, respond better to regional needs.

Unfortunately there are major obstacles on the road to achieving these goals such as:

- How to be different from traditional institutions as not to try to emulate them and then run the risk of being second rate;
- How to position themselves in an original way;
- How to achieve balance between technological and career-focused education and still be accessible to students;
- How to go about widening access but also attract students of exceptional talent;
- How to brand themselves in the marketplace;
- South Africa's university funding formula favours research institutions. As a result comprehensives do not have much option but to move towards becoming more research-intensive and in reality again emulating traditional universities;
- This drift towards being a traditional university will undermine institutional and programme differentiations.

The dilemma for South Africa's new generation' universities is to find new ways to meet these goals and achieve a balance between formative and applied programmes and research without drifting towards traditional provision and undermining differentiation.

Universities

Higher education institutions have ample scope to design educational offerings to realise their different visions, missions and plans and to meet the varying needs of the clients and communities they serve. The prime roles of universities are to offer undergraduate and postgraduate studies in all their faculties and to be outstanding in teaching and research and to educate for life and addressing the challenges that faces society. To educate for life means a university's educational processes must provide:

- A foundation of skills, knowledge and versatility that will last a life-time;
- Research based teaching and learning;
- Critical enquiry in the form of the search for new knowledge and better understanding;
- An active developmental role in South Africa's cultural, economic political, scientific and social environment.

7.3. AET OFFERINGS AT FET LEVEL AND MOBILITY, STANDARDISATION AND ARTICULATION CONSTRAINTS

This section of the report investigates the type and range of AET programmes, courses and qualifications offered within the FET band and identifies and analyses problems and constraints experienced with issues such as standardisation, the portability of qualifications and credits obtained, the mobility and articulation of students, etc.

7.3.1. MAINSTREAM SECONDARY SCHOOLS AND AGRICULTURAL HIGH SCHOOLS (GENERAL PATHWAY)

7.3.1.1. THE NEW NATIONAL SENIOR CERTIFICATE (GENERAL)

For the purposes of this assignment, the exit qualification at school level (Matric or Grade 12) is the National Senior Certificate (NSC). This Level 4 qualification (130 credits) on the National Qualifications Framework (NQF) is to be awarded for the achievement of the exit level learning outcomes stipulated in the National Curriculum Statement (NCS) Grades 10-12 (General). This qualification provides access to tertiary education opportunities and is as such the pathway to further study at Higher Education Institutions.

The NSC (Schools) is offered to pupils over a three year period (from grades 10-12). The minimum entrance requirement for Grade 10 is an official Grade 9 school report which indicates promotion to Grade 10 or a General Education and Training Certificate (GETC) for Adult Basic Education and Training (ABET), or a NQF Level 1 Certificate, or a recognised equivalent qualification obtained at NQF Level 1.

Following approval by the Council of Education Ministers to implement Outcomes Based Education (OBE) in FET - incrementally beginning with Grade 10 in 2004, a process commenced in developing the National Curriculum Statement (NCS) for Grades 10-12 (schools). Twenty nine Subject Working Groups developed subject statements in the 29 subjects that form the core curriculum. The NCS Grades 10-12 (General) uses the twelve **Organising Fields** of the National Qualifications Framework (NQF) for organising purposes and registration on the NQF. These Organising Fields are linked to various disciplines and occupational fields in the world of work and are therefore designed to provide a framework for organising qualifications in a coherent and coordinated manner.

To qualify for the NSC a learner need seven subjects, four of which are compulsory and three are the learner's choice. In the **compulsory** section each learner will have to take two Languages, Life Orientation and either Mathematics or Maths Literacy. In the choice section there are **27 choice** subjects (some of which are classified as *designated* subjects which are more suitable for tertiary study and in the context of agricultural studies will typically include: agricultural science, physical science, mathematics, geography, economics, information technology). Regarding promotion and certification requirements a NSC shall be issued to a candidate who has complied with the following promotion requirements:

- Obtained at least 40% in the required official language at Home Language level
- Obtained at least 30% in the other required language on at least First Additional Language level
- Obtained at least 30% in Mathematical Literacy or Mathematics
- Obtained at least 40% in Life Orientation
- Obtained at least 40% in one of the remaining three subjects and at least 30% in two subjects

The Higher Education Act, 1997 ensures that policies of higher education institutions, including admissions policy, must be formulated with due regard for its relationship to and influence on education and training in other sectors. Institutions' admissions requirements, policies and practice are expected to advance the objectives of the Higher Education Act, 1997 and the National Qualifications Framework and must be consistent with the Minister's policies in terms of the Act. In particular, such requirements, policies and practices are expected to advance the objectives of redress, equity and quality in higher education.

Whilst the Act prescribes the statutory minimum admission to higher education as the National Senior Certificate, the setting of the admission requirements is made in terms of section 74 of the Higher Education Act and section 16(7) of the General and Further Education and Training Quality Assurance Act by Higher Education South Africa (HESA), being the successor to the South African University Vice-Chancellors Association (SAUVCA) and the Committee of Technikon Principals (CTP). HESA is recognised as the body to set the minimum admission requirements for the Higher Certificate, Diploma and Bachelor's Degree Programmes requiring a National Senior Certificate.

Although the National Senior Certificate is the primary gateway between school and higher education, it does not guarantee a learner's admission to any programme of study in higher education. Within the context of the Policy on Higher Education, the right of higher education institutions to set specific admission requirements to particular programmes is confirmed in terms of section 37 of the Higher Education Act. Many adult learners who have not achieved a National Senior Certificate or equivalent qualification can benefit from higher education. In keeping with the objectives of the National Qualifications Framework the Ministry of Education supports wider and more diverse access to higher education and fairer progression pathways within the system. As at present, institutional admission policies must allow for alternative routes of entry that are equivalent to the National Senior Certificate standard, including the assessment of an adult learner's capacity to benefit from a particular programme by the Recognition of Prior Learning (RPL) or other means.

Table 7.2 below outlines the statutory minimum or threshold norms for admission to the undergraduate Higher Certificate, Diploma and Bachelor's Degree programmes. Such norms will apply to all public and private higher education institutions.

Table 7.2: Minimum Requirements (Levels of Achievement) to tertiary study opportunities

NQF Level	Qualification	Minimum NSC entry requirements
7	Bachelor's Degree	Four subjects from the designated list have been passed with an achievement rating of 4 (Adequate achievement 50-59% or better together with any institutional requirements and/or subject specifications – geared to intended field of study that will specify subject requirements)
	Advanced Diploma	Appropriate Diploma or Bachelor's degree
6	Diploma	Four subjects have been passed with an achievement rating of 3 (Moderate achievement 40-49% or better together with any institutional requirements
	Advanced Certificate	Higher Certificate or An achievement rating of 3 (Moderate achievement 40-49%) is obtained in Life Orientation and two 20 credit subjects, and a rating of 2 (Elementary Achievement 30-39%) is obtained in the other subjects, together with any institutional requirements.
5	Higher Certificate	An achievement rating of 3 (Moderate achievement 40-49%) is obtained in Life Orientation and two subjects, and a rating of 2 (Elementary Achievement 30-39%) is obtained in the other subjects, together with any institutional requirements.

As stated above, within the context of the Policy on Higher Education, the right of higher education institutions to set specific admission requirements to particular programmes is confirmed in terms of section 37 of the Higher Education Act. Attention is thus drawn to the above indicated institutional requirements that are set by the various HE institutions as further entry and admission requirements and/or selection processes (e.g. to address problems where there are an over demand for available study opportunities). As an example most historically White Universities will demand achievement ratings of 6 (70-79%) and preferably 7 (80-89%) in mathematics and physical science for entry to some BSc degree studies. It is thus critical to note that mathematics and science are **critical gateway subjects** (entry requirements) to some higher education programmes in the agricultural sector and the above minimum pass requirements (50-59% in mathematics) will not automatically allow entry to science based agricultural programmes. Even though the Act, its policies and practices are expected to advance the objectives of redress, equity and quality in higher education, and many institutions have introduced bridging programmes and other measures to overcome access barriers experienced by prospective black students, poor subject selection and under-achievement in critical subjects at GET level will remain a constraint to accessing HET opportunities.

7.3.1.2. AGRICULTURAL SUBJECTS

Historically a large number of mainstream (academic) high schools offered “Agricultural Science” as a subject choice up to the school leaving Senior Certificate Examination at Grade 12. Data provided by the Department of Education indicate that in 2003 a total of 1 097 schools offered **Agricultural Science** as a subject in the Senior Certificate Examinations. More recent statistics reflect that approximately 117 000 pupils enrolled for the subject Agricultural Science (Higher Grade, Standard Grade and Lower Grade) in 2006.

Exam results of these 117 500 pupils revealed the following:

- Approximately 6 000 students passed at Higher Grade (HG)
- Approximately 55 600 students passed at Standard Grade (SG)
- Approximately 20 000 students passed at Lower Grade (LG)
- Both the actual numbers and percentage pass rates at HG and SG were lower than in 2005 whilst the number who passed at LG increased.
- The number of students who failed the exam increased substantially from 21% in 2005 to 30% in 2006.

It is important to note that historically Agricultural Science was a subject choice out of a minimum of six subjects in total and as such the character of the Senior Certificate qualification was generalist and formative rather than vocational. It should further be noted that Agricultural Science was often taken as a stand-alone choice subject only and could be studied without taking Mathematics or Science which are critical gateway subjects for would-be entrants into higher education.

Following the review and reform of the educational system to introduce Outcomes Based Education (OBE), a decision was taken to (in addition to the existing Agricultural Science subject) develop curriculum for two further agricultural subjects within the **agricultural learning field** – namely Agricultural Management Practices and Agricultural Technology and to align these new subjects with Agricultural Science. According to the National Curriculum Statement there are thus now three Agricultural subjects that can be taken within the NSC syllabus, namely:

Subject	Grade 10	Grade 11	Grade 12
Agricultural Management Practices	01060012	01060023	01060034
Agricultural Science	01060042	01060053	01060064
Agricultural Technology	01060072	01060083	01060094

These subjects are highly standardised and providers must comply with the curricula set out in the following documents:

- **Agricultural Science** as set out in the documents titled “*National Curriculum Statement Grades 10-12 (General)*” and the *Learning Programme Guidelines Agricultural Science*”, compiled by the DoE and dated January 2008.
- **Agricultural Management**, as set out in the documents titled “*National Curriculum Statement Grades 10-12 (General) Subject Assessment Guidelines and the Learning Programme Guidelines Agricultural Management Practices*”, compiled by the DoE dated January 2008,
- **Agricultural Technology**, as set out in the documents titled “*National Curriculum Statement Grades 10-12 (General) Subject Assessment Guidelines and Learning Programme Guidelines Agricultural Technology*”, compiled by the DoE dated January 2008, and

7.3.1.3. AGRICULTURAL HIGH SCHOOLS

It should however be noted that few schools (other than the dedicated Agricultural Schools) have the resources and practical training facilities needed to facilitate a mastering of the operational skills required in the Agricultural Management Practices and Agricultural Technology subjects. As a result few (if any) mainstream schools have ventured to offer these additional two subjects since its introduction in 2005 and it has largely been introduced at the Agricultural High Schools only.

The National Agricultural Directory 2007 (published by the Department of Agriculture) lists forty four **Agricultural High Schools** that offer a learning programme up to Grade 12 (Senior Certificate level). Up to 2003 (when the new NCS was introduced), these schools all offered the same Agricultural Science (HG/SG) subject offered at ordinary academic high schools as well as five other agricultural subjects. To this end the majority of these schools had some form of agricultural facilities (or access to such facilities) where the practical training component of agriculture could be provided (whilst all schools did not have the facilities and capacity to offer the full range of agricultural subjects). Statistics for 2003 (*Report by the DoA re Agricultural Graduate Outputs*) indicated that a total of 548 learners were enrolled at the Agricultural High Schools and who took at least one agricultural subject.

7.3.1.4. CONCLUSION

In conclusion it can thus be stated that whilst the NSC has contributed towards improved articulation of students from the GET level to HET level, it must however be cautioned that subject choice remains a critical aspect in the preparation and selection of school pupils for further study at tertiary institutions. In this regard the above agricultural subjects can be taken as stand-alone subjects, which can be studied without taking Mathematics or Science. This however becomes a problem as Mathematics and Science are the critical gateway subjects for would-be entrants to higher education in the science-based programmes (e.g. BSc Agriculture). Therefore, even if a student passes all of the above agricultural subjects he/she will have a limited choice of study options in higher education without Mathematics or Science. Many of the other study fields relevant towards addressing the Scarce and Critical skills experienced in the agricultural sector as indicated elsewhere in this document also demand mathematics and science and the selection of these subjects would thus be more beneficial to students than the above three agricultural subjects..

7.3.2. FET COLLEGES (VOCATIONAL PATHWAY):

There are 50 Further Education and Training (FET) Colleges in South Africa – of which a total of 13 Colleges offered agricultural programmes. The curricula offered at FET Colleges are vocational in nature and extends from the FET band into the HET band (N1 to N6). Curriculum is nationally specified and the same programme (content) is thus found in all the FET Colleges. The semester based structure of instructional offerings provided at the FET Colleges implies that students do not have to enrol for a whole qualification but can (on an intermittent basis) enrol for semester instructional offerings in accordance with their needs and circumstances.

Following a revision of the curriculum offered at FET Colleges it was found that it no longer met the needs of students, business and industry due to the following:

- The programmes separated theory and practice giving rise to irrelevant programmes that did not meet the needs of the sectors served and the economy as a whole
- The poorly articulated FET programmes and qualifications inhibited student mobility across programmes and providers or learning sites
- Students exiting the system had to repeat subjects already passed when they re-entered the system

From January 2007, the National Certificate (Vocational) has subsequently replaced the former NATED 5500 courses (N1 – N3) at public FET Colleges. The National Certificate (Vocational) is the new and modern qualification at levels 2, 3 and 4 of the National Qualifications Framework (NQF) being introduced at public FET colleges around the country. It gives Grade 9 learners a Vocational alternative to an academic Grade 10 – 12 by offering industry focussed training on the NQF levels 2 – 4.

These programmes are intended to directly respond to the priority skills demands of the modern economy and are designed to provide both the theory and practice. Although the curriculum is based on selected existing unit standards, the NC9V) is a non-unit standard qualification. The aim is not to train people for individual companies, but to train them for a sector. Because it is programme driven (not subject driven), it offers more generic and rounded training than unit-standard based qualifications. It consists of an integrated learning process, balancing theory and practice. The practical component of study may be offered in a real workplace environment or in a simulated workplace environment. It will provide students with an opportunity to experience work situations during the period of study. The NC(Vocational) programmes and curricula were introduced at FET Colleges at NQF Level 2 in 2007, Level 3 in 2008 and Level 4 in 2009.

7.3.2.1. COMPOSITION AND DURATION OF NC(V)

A total of 11 NC(V) Programmes have been developed and are now being implemented at various FET Colleges.

The National Certificate qualification is a full year programme at each of the NQF levels of study. Students can enrol for a single Programme (NQF level 2 or 3 or 4) only or can take the full programme (all three levels). The duration of the full NC(V) is thus a minimum of three years. In the case of incomplete qualifications, the National Department of Education will issue a subject statement for subjects passed.

In order to obtain a National Certificate (Vocational), a student is required to take a total of 7 subjects. These include the 3 fundamental subjects and 4 vocational subjects, of which 3 are compulsory and 1 is optional

To standardise, regulate and quality control the content of the above qualification and subjects offered by the FET Colleges, the DoE developed both Subject Guidelines and Assessment Guidelines for each of the indicated study areas. In accordance with the National Education Policy Act 1996 and the Further Education and Training Act, 1998 the Department of Education released a policy document that provides guidelines for the implementation of a coherent and integrated assessment system for the National Certificate (Vocational). It consists of an internal and external assessment and the assessment will be done by Umalusi.

Every NC(V) Programme consist of two components, namely:

- Fundamental Component (three subjects – Official Language, Mathematics and Life Orientation)
- Vocational Component (three compulsory subjects related to the specialisation of the qualification and one additional optional subject).

Total credits for the qualification is 130 credits (each subject is worth 20 credits with Life Orientation worth 10 credits).

7.3.2.2. NC(V): PRIMARY AGRICULTURE

Within the agricultural field the relevant new qualification is the NC(V): Primary Agriculture (offered at for instance the Boland FET College). This qualification consists of the following subjects:

- **First and Second Year** (NQF levels 2 and 3): Agri-business, Animal Production, Plant Production and Soil Science
- **Third Year** (NQF level 4): Agri-business, Animal Production, Advanced Plant Production, Farm Management and Mechanisation

To standardise, regulate and quality control the content of the above qualification and subjects offered by the FET Colleges, the DoE developed both Subject Guidelines and Assessment Guidelines for each of the indicated study areas.

The subjects within the **National Certificate (Vocational): Primary Agriculture** are presented in table 7.3 below:

Table 7.3: Subjects comprising the National Certificate (Vocational) Primary Agriculture

Implementation Date	January 2007		January 2008		January 2009	
Primary Agriculture	Soil Science	01011002	Soil Science	01011003	Farm planning & mechanisation	01011044
NQF 2 01010002	Plant production	01011012	Plant production	01011013	Advanced plant production	01011014
NQF 3 01010003	Animal production	01011022	Animal production	01011023	Animal production	01011024
NQF 4 01010004	Agribusiness (Optional)	01011032	Agribusiness (Optional)	01011033	Agribusiness (Optional)	01011034

Table 7.4 provides a further breakdown indicating the broad fields covered within each of the subjects:

Table 7.4: Broad content of subjects comprising the NC(V) Primary Agriculture

<p>Agri-business:</p> <ul style="list-style-type: none"> • basic farm accounting • entrepreneurship • planning and budgeting • importing and exporting • integrated management of a small agricultural enterprise 	<p>Animal production:</p> <ul style="list-style-type: none"> • basic understanding of animal anatomy and physiology • poultry production • goat production • sheep production • animal nutrition • cattle farming • ostrich farming
<p>Soil Science:</p> <ul style="list-style-type: none"> • atoms and molecules • soils and their components • plant's requirements from soils to grow • fertilisation of soils • soil water and evapo-transpiration • soil erosion and its prevention 	<p>Plant production:</p> <ul style="list-style-type: none"> • physiology and anatomy of plants • establishment of plants • cultivation practices • crop management • harvesting and storage
<p>Farm Planning and Mechanisation</p> <ul style="list-style-type: none"> • planning an agricultural enterprise • mechanisation 	

7.3.2.3. CONCLUSION

There is little doubt that the new NC(V) will ensure that students are more marketable on completion of their studies and that they will be better prepared to meet the needs and requirements of industry.

Whilst the introduction of these standardised curricula will enhance and facilitate recognition at higher levels of education for "credits" obtained and learning assumed to be in place, the articulation of students to Higher Education however has not been clarified as yet and remains a challenge.

7.3.3. UNIT-STANDARD PROGRAMMES (TRADE/OCCUPATIONAL PATHWAY)

The Trade and Occupational Pathway (TOP) is open to learners who have been able to secure access either to a workplace learning site or a simulated workplace learning site (e.g. an accredited training provider with suitable facilities – e.g. an experiential farm) where they can learn and practise their skills and attain determined competency standards or expertise recognised by relevant professional bodies.

The Skills development Act introduced these unit standard based programmes and qualifications (Learnerships in the case of full qualifications and Skills Programmes for incomplete qualifications) to address the historical and structural barriers to the acquisition of relevant occupational skills and qualifications. These programmes are geared to prepare the learner for a specific occupation or employment in a specific sector or company. Within the **agricultural field** there are approximately 50 qualifications and programmes registered with SAQA and range from National and FET Certificates (120 credits) to National Diplomas (240 credits).

Currently these programmes are registered at SAQA and quality controlled by the AgriSETA. There is however proposals for a revised approach to the development and management of occupational qualifications on the NQF – namely through the **Occupational Qualifications Framework** (OQF). It is envisaged that the OQF will be based on two types of occupational qualification:

- an occupational award which certifies the achievement of an occupational title, and
- a skills certificate which certifies a distinct but occupationally relevant skill set

For such qualifications to be registered they will have to reflect three modes of learning: the acquisition of knowledge and theory, the acquisition of practical skills, and the scope, nature and duration of work experience. The acquisition of the qualification will be based on a final integrated summative assessment. Such qualifications can be registered at all levels of the proposed 10 level NQF. In many cases these occupational qualifications will link to other qualifications and learning units within the further and higher education qualification frameworks.

However, currently the programmes are under the auspices of the AgriSETA whose mandate covers all the economic sub sectors previously demarcated to PAETA (Primary Agriculture) and SETASA (Secondary Agriculture) and thus quality controls all the Learnerships and Skills Programmes that falls within the domain of the agricultural sector.

Qualifications within the primary agricultural sector currently registered at SAQA are reflected in Table 7.5:

Table 7.5: Unit-standard based Qualifications in Primary Agriculture registered at SQA

Qualification	NQF Level	No Credits
National Certificate: Animal Production	1	120
National Certificate: Mixed Farming Systems	1	120
National Certificate: Plant Production	1	120
National Certificate: Farming	2	120
National Certificate: Plant Production	2	120
National Certificate: Animal Production	2	120
National Certificate: Mixed Farming Systems	2	120
National Certificate: Animal Production	3	120
National Certificate: Plant Production	3	120
National Certificate: Farming	4	120
National Certificate: Animal Production	4	131
National Certificate: Plant Production	4	140
National Diploma: Plant Production	5	142
National Diploma: Animal Production	5	240
National Certificate: Landcare Facilitation	5	240

7.3.3.1. MOBILITY OF LEARNING

At present there are problems in terms of the vertical mobility (and access to institutions of higher education such as Universities and UoTs) since there are not sufficient recognition by such institutions for credits obtained by learners via the Learnerships and Skills Programmes and who have obtained the above indicated National Certificates or National Diplomas.

The impediments to articulation stems from the following differences between unit standard based qualifications and qualifications based on exit level outcomes:

- **Unit-Standard-Based Qualifications:** These are qualifications where credits are awarded towards specific unit standards in terms of the overall purpose of the qualification, allowing the learner the opportunity to complete the outstanding unit standards that are needed to achieve the qualification through a process of RPL. Unit standards are nationally agreed descriptions of the results of learning, and credit transfer between different providers is facilitated by the fact that learners have to meet the same requirements to prove competence, regardless of which provider has offered the programme and regardless of the content of the programme. Articulation and credit transfer between different (but closely associated) fields of learning and between institutions are facilitated in this way.
- **Qualifications Based on Exit-Level Outcome:** These are qualifications that have been structured into modules or subjects rather than into unit standards. This is typical of most higher education qualifications and schooling qualifications and presents limitations to RPL assessment, specifically when inter-institutional articulation is a priority. This is because subjects and modules are generally content-based rather than output-based. Institutions interpret the learning content to meet the requirements for the exit-level outcomes differently. If credit transfer and articulation are based on subjects and modules, rather than on the specified outcomes of the qualification, not only is the process of credit transfer inhibited, but also the implementation of RPL against the requirements for the qualification; i.e. the descriptions of the results of learning.

It seems that there is the mistaken perception that new qualifications (or re-formatted qualifications) registered on the NQF, are just 'old wine in new bottles'. That means that the subject and module objectives can be redefined in terms of learning outcomes and that these would then be considered outcomes-based qualifications. The implication of this perception, in terms of the administrative processes of institutions, is that administrative systems do not make provision for the awarding of credits towards outcomes, but towards subjects and modules. It should be noted that an outcome is not equivalent to a subject or a module. Outcomes are broad statements encompassing the purpose and requirements of qualifications and do not directly translate into subjects or modules. Subjects and modules are the vehicles through which the outcomes of a qualification are achieved. Currently, the capturing of credits towards the outcomes of a specified qualification is problematical because administrative systems were developed for and are geared to award credits towards subjects/modules.

The implication goes further: for **credits to be transferable** within an institution and between institutions, subject or module credits cannot be used. Different faculties, departments and providers/institutions interpret the content supporting the achievement of exit level outcomes differently. This is acceptable, as long as the requirements of the outcomes are met. However, when outcomes are perceived to mean 'content', difficulties arise. Consider the following hypothetical example: In a B.Com Management degree offered at institution A, the outcome "Qualifying learners can demonstrate an understanding of quality management", may be achieved by teaching learners about the 'ISO9000' quality approach. In institution Z, the same outcome is achieved by teaching learners about 'Total Quality Management' or the 'Business Excellence Model'. If credits are awarded for the module: Quality management systems, based on the content of the module, there is clearly a difference in opinion as to which model is the preferred. However, both of these providers have ensured that the concept 'quality management' is understood and used and that it forms the basis for further learning. Credits should therefore be awarded against the outcomes of the qualification, as this will ensure transferability of credits.

An important point to note therefore is that providers/institutions' learning programmes are not generic. However, qualification descriptors, and in particular, the level descriptors for a level on the National Qualifications Framework, do provide generic descriptions of the learning expected at a particular level. When equivalence of learning is determined, it is important to have a clear understanding of the broad descriptor as associated with the level, breadth and depth of learning required. This will prevent a highly technicist view of RPL assessment. Would-be implementers of RPL must therefore look closely at the extent to which their administrative systems (and those of their ETQAs) make it possible to award credits against outcomes, rather than against modules or subjects.

7.4. AET OFFERINGS AT THE COLLEGES OF AGRICULTURE (OFFERINGS SPANNING BOTH FET AND HET LEVELS)

7.4.1. ORIENTATION AND HISTORICAL PERSPECTIVE

Within the context of this assignment – namely an evaluation of AET curricula, the Colleges of Agriculture (or the Agricultural Training Institutes as they are now called) are somewhat of an enigma. Their peculiar positioning within the AET provider fraternity stems from the following:

- ***Their positioning on the NQF.*** Whilst essentially viewed as Higher Education Institutions, the Colleges of Agriculture offer programmes and curricula spanning NQF Levels 1 to 7 – thus covering the GET, FET and HET bands within the new HEQF framework. This implies that they have various accrediting bodies – namely the Higher Education Quality Committee of the Council on Higher Education as well as Umalusi and AgriSETA for the programmes at NQF levels 1 to 4.
- ***Diversity of the Agricultural Colleges:*** There are marked differences between the Colleges of Agricultural, the target groups served by them and their resultant programme mix. The Colleges were originally established as specialised training institutions geared to address the agricultural education and training needs relevant to their respective regions and agricultural environments. As a result they are more flexible in their offerings than the FET Colleges and orient their programmes towards supporting the agricultural activities and practices within their regions (resulting in some form of functional specialisation). A further form of diversification is the primary target groups served. Whilst the majority primarily offer post FET NQF level 5 and level 6 programmes, some Colleges (such as Tsolo, Tompi Seleka and Madzivandila) increasingly focus on the training needs of emerging farmers through lower level short course offerings; whilst others such as the Cape Institute for Agricultural Training: Elsenburg and Potchefstroom are focusing on higher level skills through collaboration with other higher education institutions and are now offering Degree and B.Tech programmes. There is also considerable disparity between the Colleges in terms of quality and standard of staff and facilities.
- ***Uncertainty regarding their future.*** Whilst initially established under the auspices of DoA as specialised training institutions to cater in the specific training needs of the agricultural sector, the changing FET and HET landscapes have resulted in numerous arguments for and against the transfer of the agricultural colleges from the DoA to the Department of Education (DoE). This uncertainty regarding their future, governance and funding structures stretched over a period of almost 10 years. The lack of direction, guidance and financial investments in the Colleges during this

period have left many of the Colleges with reduced institutional capacity, diminishing morale, a drop in standards and a deteriorating infrastructure. It can fortunately be reported that the DoA has now confirmed that it will retain responsibility for the Colleges of Agriculture (soon to be renamed as Agricultural Training Institutes) and that a new dispensation and plan is being put into place to restore these institutions to their rightful place as critical service providers within the AET landscape. In this regard a policy guideline titled “Norms and Standards for South African Agricultural Training Institutes” have been developed that aims to revamp and restructure them as “**Centres of Excellence**” – serving selected functional fields or sub-sectors within the agricultural sector.

The above clearly indicates that the Colleges of Agriculture find themselves in a rather “unique” position within the AET provider landscape. Despite the above differences that make an evaluation of their curricula somewhat complex and difficult, the following are however important common denominators:

- Even though the curriculum in the Colleges of Agriculture is not as highly standardised as in the FET Colleges, a survey amongst them revealed that their programmes cover the same broad fields of knowledge namely Plant Production, Animal Production, Agricultural Management and Agricultural Engineering. Within these broad generic fields the programmes are relatively standardized with a fair amount of compatibility in content. These factors make it possible to describe (and compare) the curriculum within each qualification and further allows student mobility and progression from one college to another where a similar programme / qualification is on offer.
- The most common qualifications offered in all the colleges are a NQF level 5 Higher Certificate in Agriculture (2 years duration) and a NQF level 6 Diploma in Agriculture (3 years duration – usually offered as a third year following attainment of the Higher Certificate). These programmes/qualifications are currently offered at nine of the Colleges of Agriculture and are registered on the NQF.
- Aligned to their mission when originally established – namely to provide prospective farmers, extension personnel and employees within the primary agricultural sector with relevant employment knowledge and skills – all the Colleges have retained a strong practical training focus. The balance between theoretical and practical training within the college programmes is 55-60% theory with the remainder focussed on practical application. (It must however be noted that the deterioration of infrastructure at some of the colleges have seriously impacted on their ability to provide practical application relevant to the agricultural industry as practised today).

Table 7.6 below present the programmes offered by the individual Colleges of Agriculture, the NQF levels, duration of programmes and accrediting bodies (2005).

Table 7.6: Programme offerings at the Colleges of Agriculture

College	Programme	NQF	Duration	Accreditation
Cedara	1. Higher Certificate in Agriculture. 2. Diploma in Agriculture. 3. Short Courses	5 6 NA	2 years FT 3 years FT Variable	HEQC HEQC Not Accredited
Elsenburg (CIAT)	1. National Certificate (Plant / Animal Production (Learnerships) 2. Higher Cert in Agriculture. 3. Dip in Plant Production (Viticulture) 4. Dip Animal Production 5. Diploma in Agriculture. 6. Diploma in Extension 7. B Agric Viticulture 8. Short courses (SAQA US based)	1 - 4 5 6 6 6 6 6 1-4	1 year 2 years FT 1 year FT 1 year FT 1 year 3 years FT 3 years FT Variable	AgriSETA CHE CHE CHE CHE CHE CHE AgriSETA
Fort Cox	1. Dip in Social Forestry. 2. Dip in Agric: Animal Production. 3. Dip in Agric: Crop Production. 4. Dip in Agriculture: Agribusiness 5. Short Courses	6 6 6 6 NA	3 years FT 3 years FT 3 years FT 3 years FT Variable	CHE CHE CHE CHE Not Accredited
Glen	1. Higher Certificate in Agriculture 2. N Dip in Agriculture. 3. Short Courses	5 6 NA	2 years FT 1 year FT Variable	HEQC HEQC Not Accredited
Grootfontein	1. Higher Certificate in Agriculture. 2. Diploma in Agriculture. 3. Short Courses	5 6 NA	2 years FT 3 years FT Variable	HEQC HEQC Not Accredited
Lowveld	1. Higher Cert: Plant Production 2. Diploma Plant Production	5 6	2 years FT 1 year (post certificate)	CHE/HEQC CHE/HEQC
Madzivandila	1. Learnerships: • Animal Production • Plant Production. 2. Short Courses	4 4 NA	8 months FT 8 months FT Variable	AgriSETA AgriSETA Not Accredited
Owen Sithole	1. Higher Certificate in Agriculture. 2. Diploma in Agriculture 3. Higher Cert in Home Economics 4. Dip in Agric: Home Economics 5. Short Courses	5 6 5 6 NA	2 years FT 3 years 2 years 3 years Variable	HEQC HEQC HEQC HEQC Not Accredited
Potchefstroom	1. H Certificate in Agriculture. 2. Dip in Agriculture. 4. B.Tech Agriculture 3. Short Courses	5 6 6 1-4	2 years 3 years 3 years Variable	HEQC HEQC HEQC AgriSETA
Taung	1. N4 Cert Farming Management. 2. N5 Cert Farming Management. 3. N6 Cert Farming Management. 4. Diploma in Farming Management	4 4 5 6	1 year 2 years 3 years N6 plus 18 months experiential	Umalusi Umalusi Umalusi
Tompi Seleka	15. Short Courses	1-4	Variable	AgriSETA and non-accredited
Tsolo	1. Short Courses	1-4	Variable	AgriSETA and non-accredited

From the above table it is evident the majority of Colleges (9) offer the Higher Certificate in Agriculture (NQF 4/5) and the Diploma in Agriculture (NQF 5/6). Through collaboration with other HET institutions two Colleges are now offering either a Degree or B.Tech qualification and one institution offer Learnerships accredited by AgriSETA. With the exception of 2 Colleges all offer short courses (four institutions offer courses accredited by AgriSETA)

Enrolment figures for the various programmes at the Colleges of Agriculture (2005) are provided in table 7.7 below:

Table 7.7: Enrolment Figures at the Agricultural Colleges, 2005

Breakdown of Enrolment per Programme							
College	NQF US (1-4)	Certificate (NQF 3)	High Cert (NQF 4/5)	Diploma (NQF 5/6)	Degree / B.Tech (6)	Total	Short Courses
Cedara	0	0	135	30	0	165	561
Eisenburg	?	0	103	82	225	410	1555
Fort Cox	0	0	0	48	0	48	17
Glen	0	0	134	38	0	172	566
Grootfontein	0	0	111	30		141	610
Lowveld	0	62	94	61		217	0
Madzivandila	?	0	0	0	0	0	459
Owen Sithole	0	0	0	60		60	1052
Potchefstroom	?	0	0	291	?	291	134
Taung	0	69	90	41	0	200	0
Tompi Seleka	0	0	0	35	0	35	917
Tsolo	?	0	0	0		0	304
Total	?	131	667	716	225	1739	6175

7.4.2. FUTURE PERSPECTIVE (AGRICULTURAL TRAINING INSTITUTES)

As indicated above, the Department of Agriculture is in the process of finalising a new dispensation for the Agricultural Training Institutes (ATIs). To this end a strategic / policy guideline document named the **Norms and Standards for ATIs** has been developed to provide a platform for positioning the ATIs to deliver on the South African agricultural agenda and creates a framework for ensuring consistent quality of AET. These Norms and Standards provide clear guidelines and direction on the following:

- **Governance Issues** – positioning the ATIs as a Programme within the National Department of Agriculture and operating with a national mandate. To this end they will be funded from the national DoA budget and function under common stewardship so that the policies, practices and programmes of the ATIs are harmonised and in alignment with the AET Strategy. The ATIs will be governed by a National Council and will be assigned with the responsibility to ensure equity and quality service delivery across the ATIs through implementation of the Norms and Standards. Whilst having a national mandate, close provincial working relationships are essential and each ATI will maintain its autonomy and be governed by individual ATI Councils.
- **AET Plans / Programmes:** Amongst others the following are some of the standards and guidelines related to AET offerings at the ATIs:
 - Training Plans to be developed in consultation with industry stakeholders and be geared towards:
 - Addressing education and training needs of the sector
 - Reflect the HRD needs of the PDA's
 - Contribute to strengthening capacity of other service providers towards addressing the needs of the agricultural sector as a whole

- ATIs offer qualifications on NQF levels 1-7. This thus includes:
 - Higher Certificate, Diploma, Advanced Diploma, BAgric and BTech Agriculture qualifications
 - Unit Standard based programmes registered on the NQF
 - Programmes to be registered with SAQA and to comply with policies and standards as set by SAQA, CHE, HEQF and AgriSETA
 - The curricula of programmes provide training in agricultural production, extension, farm management, resource management, farm engineering and all integrate theory with **practice**.
- ATIs offer programmes for skills training outside the NQF system (i.e. non formal or non registered short courses that are needs based and geared to the needs of especially the emerging farming sector).
- ATIs will also conduct relevant applied research – on condition that it supports and enhances AET delivery and does not distract from such and/or is subsidised from the AET budget
- Develop programmes and plans aimed at supporting the PDA's demand for training, retraining and up-skilling staff such as Extension Officers.
- Develop partnerships with other service providers and stakeholders to increase the capacity of the sector as a whole

The DoA has established a Task Team that is currently investigating the future role and functions of ATIs (against the agreed Norms and Standards). The outcomes of such investigations will unfortunately only be available after this Curriculum Evaluation Assignment has been completed and we have subsequently ventured proposals on the future positioning, role and functions of ATIs as outlined in 7.4.3 below.

7.4.3. THE ROLE AND POSITIONING OF ATIS WITHIN THE LARGER AET LANDSCAPE

In considering the ideal role, function and positioning of ATIs within the larger AET landscape (and subsequent decisions regarding their programme offerings and curriculum), the following are key factors to be taken into consideration:

- ***Integrated theory and practice.*** A unique feature of ATIs is their ability (due to their practical training facilities and experiential farming infrastructure) to offer **practical training** opportunities to students and to integrate theory and practice. Amongst HET institutions the ATIs are thus ideal to offer those learning programmes (and/or focus on those agricultural careers) where large emphasis is placed on practical skills and competencies. On a continuum where practical training competencies is a requirement the ATIs are at the top end of the scale, Universities of Technology are in the middle and Universities at the bottom end of the scale.

True to this character the ATIs should remain different from the other HET institutions in that it offers qualifications that have a strong practical orientation. It also creates opportunities for cooperation between ATIs and a Universities in offering learning programmes on a joint venture basis – where the University provides the lecturers and learning material whilst delivery is at the ATI site. Examples of such cooperation agreements are the B Agric degree offered at Elsenburg in partnership with Stellenbosch University and the planned B Agric: Agricultural Extension and Resource Management degree to be offered from 2009 at Cedara College in partnership with the University of KwaZulu Natal.

- Because of the above *practical orientation* the ATIs traditionally focussed on offering training programmes relevant to the agricultural activities and practices suitable and feasible to their *location* (agricultural environment). This location and environmental orientation lends itself to needs or demand driven service rendering. It further served as a first step towards *functional specialisation* amongst the old Colleges of Agriculture and it is envisaged that within the new dispensation the ATIs will further build on this specialisation and the various Institutes will be developed as Centres of Excellence in their respective specialisation fields.
- Within the context of **Centres of Excellence** the following are envisaged:
 - An ATI will focus on a specific functional field or area of agriculture within which it has a **comparative advantage**. There is already some form of specialisation amongst the ATIs (e.g. Grootfontein focussing on small stock, Elsenburg focussing on wine and deciduous fruit; Lowveld focussing on irrigation and irrigated horticulture and crops, etc.).
 - Within its earmarked field of specialisation each ATI should be developed and **capacitated** to become a Centre of Excellence. This implies that it will develop a pool of staff with specific expertise in the functional field; it will establish and develop its infrastructure, facilities and equipment to world class standards within the functional field; it will offer a range of programmes that caters in the needs of all farming sectors in the field (from short courses aimed at emerging farmers to highly specialised courses for the commercial sector); it will undertake applied research in the functional field; its programmes will also consider upstream and downstream (agribusiness) opportunities in the field, it could render a farmer consultancy service within the field, etc.
- Range of Programmes / Qualifications on offer. The above indicated specialisation and excellence (which will be costly and require large investments in the functional field) will demand that an ATI **limits** itself to a range of programmes and courses within the selected field. Within this field it should establish itself as a **preferred provider** and offer a full range of programmes (spanning NQF levels 1-7) – with the implication and understanding that the range of programmes outside the specialisation field will probably have to be reduced to ensure that these institutions are not over-extended with a resultant loss in the quality of provisioning.
- Given their role as public provider institutions and against their mission to facilitate and enhance implementation and realisation of the AET Strategy, the ATIs should also focus their training ability and capacity in meeting the HRD needs of the National and Provincial Departments of Agriculture. An example of such a specific demand is the training, retraining and up-skilling of **Extension Officers**. Considering their ability to provide practical training and to integrate such with theoretical training, extension training should become a specialisation field of the ATIs. Again a full range of programmes (spanning NQF levels 1-7) should be offered. The cooperation agreement between the University of KZN and the Cedara College of Agriculture in offering of the B. Agric: Agricultural Extension and Resource Management degree (as from 2009) could serve as an example or model of how the ATIs could offer extension related programmes at HET (NQF 7) level. In addition a full range of short courses and skills programmes to provide Extension Officers with both the soft and hard (technical) skills should be on offer at the ATIs.

7.4.4. MOBILITY AND ARTICULATION OF ATI QUALIFICATIONS WITHIN THE AET LANDSCAPE

This section must be read in the context of the above indicate role and positioning of the ATIs within the larger AET landscape.

7.4.4.1. Short Courses and Skills Programmes

It is recommended that those ATIs offering short courses and skills programmes ensure that such programmes are unit standard based (credit bearing) and that all unaccredited courses and programmes be phased out.

7.4.4.2. Learnerships

Within the context of Centres of Excellence and the recommendation that Colleges focus on programmes with a practical character, it is recommended that ATIs offer learnerships within the scope and ambit of their “specialisation field”. The growing trend amongst ATIs to offer learnerships registered on and accredited by SAQA is thus strongly supported. These qualifications enjoy formal recognition.

7.4.4.3. Agricultural Certificates

There are problems and concerns regarding the vertical mobility of students who have obtained Higher Certificate and Advance Certificate qualifications from the Colleges of Agriculture. In this regard insufficient recognition is given (in the form of credits) for students with such qualifications who wish to further their education at Universities or Universities of Technology (e.g. students who want to obtain B Tech or B Agric degrees) and these students must virtually start afresh when enrolling for such programmes. It is also noteworthy that the number of students who enrol for such programmes have reduced significantly over the last decade – probably a natural market response to the diminishing demand and job opportunities for people with such qualifications. Against the above it is recommended that the ATIs reconsider the offer of Certificate Programmes.

7.4.4.4. Agricultural Diploma Programmes

The position regarding the 3 year Diploma and Advanced Diploma qualifications on offer at the ATIs is somewhat different – with better articulation and mobility to further study options and pathways.

7.4.4.5. Degree Qualifications

The proposed degree programmes (provided in cooperation and as joint venture offerings with Universities or Universities of Technology) will not have any articulation problems since they will have the same accreditation status as that of their partnering university

7.5 AET OFFERINGS AT HET LEVEL – CURRICULA STANDARDISATION, MOBILITY AND ARTICULATION

7.5.1 INTRODUCTION

Within the larger context of AET curricula evaluation, this section of the assignment aims to undertake and achieve the following:

- Assess the level of curriculum standardisation, mobility, transferability and articulation currently at institutions providing AET in South Africa,
- Review the constraints experienced by AET providers and the causes of these constraints,
- Identify current efforts to enhance and facilitate the standardisation, mobility, transferability and articulation, and
- Make recommendations and suggest means towards improving the standardisation, mobility, transferability and articulation of current curricula.

To achieve the above this Chapter is structured as follows:

- Background – outlining the point of departure and process followed in the identification and selection of critical challenges to be addressed,
- A review of current level of standardisation, mobility, transferability and articulation,
- Constraints identified by the various institutions offering AET courses,
- Review of the current efforts to facilitative standardisation, mobility and articulation between institutions that offer AET courses, and
- Recommendations – suggestions on how AET curriculum should be adjusted and upgraded to be more responsive in addressing the critical challenges in the SA agricultural sector.

7.5.2 BACKGROUND

The Higher Education Qualifications Framework as set out as policy in terms of section 3 of the Higher Education Act, 1997 (Act No. 101 of 1997) has already been published by the Minister of Education. This new qualifications framework has been designed to meet demanding challenges facing the higher education system in the 21st century. The implementation date for this policy is 1 January 2009. However, higher education institutions will need some time to phase out their existing qualifications in terms of this policy, so there will be a transition period to full compliance. The Minister of Education shall determine the date by notice in the Government Gazette. Existing qualifications and programmes that are currently offered at higher education institutions must conform over time with the requirements of this policy or must be de-registered and withdrawn. This policy provides the basis for integrating all higher education qualifications into the National Qualifications Framework (NQF) and its structures for standards generation and quality assurance. It improves the coherence of the higher education system and facilitates the articulation of qualifications, thereby enhancing the flexibility of the system and enabling students to move more efficiently over time from one programme to another.

The new National Qualifications Framework has ten levels. Higher education qualifications occupy six levels of the NQF, levels 5 – 10. Levels 5 – 7 are undergraduate and levels 8 – 10 are postgraduate. The new qualifications framework establishes common parameters and criteria for qualifications design and facilitates the comparability of qualifications across the system. Within such common parameters programme diversity and innovation are encouraged. Higher education institutions will have ample scope to design educational

offerings to realise their different visions, missions and plans and to meet the varying needs of the clients and communities they serve. The policy thus operates within the context of a single but diverse and differentiated higher education system. It applies to all higher education programmes and qualifications offered in South Africa by public and private institutions. Figure 7.2 below provides a schematic outline of the new HEQF.

Figure 7.2: The New Framework for AET Qualifications in Context – HEQF

HEQF Level	Qualification	Total Credits	Credit Structure and Levels	Approx. Years
10	D Thesis	360		2
9	M Thesis	180		1
9	M Coursework & Dissertation	180		1
8	PG Diploma	120		1
8	B Hons	120	30 credits min research	1
8	4+ year B degree	480	96 min @ level 8	4
7			120 credits min @ level 7	
6			(168)	
5			96 credits max & level 5	
7	3 year B degree	360	120 credits min @ level 7	3
6			(144)	
5			96 credits max & level 5	
7	Advanced Diploma	120	120 credits @ level 7	1
7	Diploma	360	60 credits min @ level 7	3
6			(180)	
5			120 credits max @ level 5	
6	Advanced Certificate	120	120 credits @ level 6	1
5	Higher Certificate	120	120 credits @ level 5	1

The framework is intended to facilitate articulation between further and higher education and within higher education. However, the possession of a qualification does not guarantee a student's progression and admission to a programme of study.

In terms of the Higher Education Act, 1997 the decision to admit a student to higher education study is the right and responsibility of the higher education institution concerned. A higher education institution's admissions policy and practice is expected to advance the objectives of the Act and the NQF and must be consistent with this policy.

The minimum requirement for admission to a higher education institution from 1 January 2009 is the National Senior Certificate. A qualification at level 4 on the National Qualifications Framework published in the Government Gazette, Vol. 481, No. 27819, July 2005.

The framework is designed to facilitate vertical, horizontal and diagonal progression. Vertical progression is the norm and the minimum requirements for such progression between qualification types are stipulated in the qualification type descriptors. Students may progress horizontally between qualifications if they meet the minimum requirements for admission to the target qualification, which they will often do by virtue of the credits obtained towards a cognate qualification.

The general principle must be that the admitting institution is satisfied that the applicant has competence in the appropriate field of intended study at the appropriate entry level of the target qualification.

With due regard to the policies, requirements and guidelines of the HEQC, institutions may recognise other forms of prior learning as equivalent to the prescribed minimum admission requirements, and may recognise other forms of prior learning for entry to given programmes. In this regard, vertical progression is possible where a person with a given qualification adds to that which is required to gain entry to a higher qualification type. In all cases, the admitting institution must be satisfied that the applicant has the necessary competence.

Until recently separate and parallel qualifications structures for universities and UoTs have hindered the articulation of programmes and transfer of students between programmes and higher education institutions. Currently there are several different types of tertiary institutions present in South Africa which offer AET programmes namely: Colleges of Agriculture, Universities of Technology (UoTs), Comprehensive Universities (CO's) and Universities. AET programmes at the various HE institutions differ markedly in quality, standards, outcomes and curriculum. This situation limits the opportunities for students to change from institution to institution or even within an institution from one programme to another and creates further barriers at higher levels. The challenge is to ensure that AET learning is mobile and transferable from one HE institution to another as the new framework (above) also promotes.

Enhancement of equitable access and meaningful participation in AET delivery for all South Africans is of utmost importance and therefore a systematic plan is needed to identify, prioritise and remove access barriers to AET. The new policy creates the framework for equitable access but without the cooperation of the various HE institutions it cannot be effectively realised.

To obtain information in this regard from the various HE institutions a similar questionnaire was given to each of the HE institutions to obtain information pertaining to AET offerings at HET level and standardisation, mobility and articulation related constraints that are experienced.

It should be taken into consideration that **curriculum** when applied to education and training refers to all the activities which the students do, especially those which they need to pursue if they are to finish the course and to achieve the goal of their studies. It is the path they have to follow. It is not just the contents but also the programme which they need to complete to be successful. It should be kept in mind that a curriculum is not merely a syllabus. A curriculum is:

- The aims and objectives of the education system as well as specific goals of learning institutions;
- The underlying values, the selection of content, how it is arranged into subjects, programmes and syllabi, and what skills and processes are included;
- The strategies of teaching and learning, and the relationship between lecturers and learners;
- The forms of assessment and evaluation which are used;
- How curriculum is serviced and resourced, including organisation of the learners, and of time and space, and materials and resources that are made available;
- The needs and interests it reflect of those it serves including learners, lecturers, community, the nation, employers and the economy;
- The methods used. Methods and contents are often treated separately, but in fact they cannot in practice be kept apart. Methods are a major part of the curriculum for the students learns as much from how they are taught as from what they are taught.

Our understanding of curriculum therefore must be comprehensive because the curriculum in higher education is comprehensive, incorporating many dimensions. The curriculum is not a fixed and authoritative structure which contains the organised content for learning. It is a dynamic instrument. It reflects the educational purposes to be attained and the educational experiences that should be provided to achieve those purposes. And since those purposes will change over time, so will judgements as to what are the best experiences likely to achieve the purposes. Thus, the curriculum will change and develop as the programme itself is implemented. There is a need for continuing curriculum reform as society itself develops and changes.

Portability and mobility in this instance are about students getting the opportunity to get entrance to HE institutions and being able, if necessary, to move from one institution to another and from one qualification to another.

Mobility can be divided into two sections:

- a) Horizontal mobility where students get the opportunity to move horizontally from one institution to another to continue with his/her qualification at the other institution. Students may progress horizontally between qualifications by presenting a completed qualification or credits towards a qualification in a cognate study area, and must meet the minimum requirements for admission to the target qualification, which they will often do by virtue of the credits obtained towards a cognate qualification
- b) Vertical mobility where students get the opportunity to move from one HE institution to a higher ranking institution or to move between qualifications (e.g. mobility between B Agric and BSc Agric) and the possibility of movement from lower levels of qualifications to higher levels between institutions. With due regard to the policies, requirements and guidelines of the HEQC, institutions may recognise other forms of prior learning as equivalent to the prescribed minimum admission requirements, and may recognise other forms of prior learning for entry to given programmes. In this regard, vertical progression is possible where a person with a given qualification adds to that which is required to gain entry to a higher qualification type. **Articulation** refers to the way that learners / students are able to move from institutions at lower levels to higher levels of study, i.e. (vertical) mobility and transferability of knowledge gained.

The reason why portability, mobility and articulation are important is to provide equitable access and participation and to empower specifically Black South Africans to participate significantly in the South African agriculture. The AET Strategy signals government's determination to support the objectives of the Agricultural Black Economic Empowerment (AgriBEE), African Agricultural Development Programme (AADP), Integrated Food Security

and Nutrition Programme (IFSNP) and the Comprehensive Agricultural Support Programme (CASP) which are some of the key programmes to advance the objectives of the sector as articulated in the Strategic Plan for South African Agriculture. The success of AgriBEE requires a well coordinated and quality assured AET system. A major challenge that needs to be dealt with in the quest to redress the imbalances of the past lies therefore at HET level. The challenges vary from inequities in the provision of AET to the provision of resources and access to curriculum offerings. One of the main goals that AET want from HET is to enhance equitable access and meaningful participation in AET for all South Africans and to develop and recommend a systematic plan to identify, prioritise and remove access barriers to AET.

Standardisation refers to the level of similarity of curriculum content at the various tertiary institutions. This naturally influences the ability of students to move between tertiary institutions whilst getting credit for previous study at other tertiary institutions, i.e. the (horizontal) **mobility** of students and the **transferability** of knowledge gained.

Autonomy and accountability: The concept of autonomy has always been contested in South African higher education. Within a few years of the newly-established democracy, a range of external policies created new demands on HET which were regarded in many quarters as leading to an erosion of autonomy. Government required a reformatting of academic qualifications that were assembled along the lines of the new National Qualifications Framework (NQF). Government indicated that the subsidy formula for funding universities would privilege certain academic subjects or disciplines and, in a way discourage others. Government required a process of quality assurance that pushed for explicit declaration of performance in academic enterprise. Government required mergers and incorporations of higher education institutions, with dramatic implications for staffing, students and programmes.

It should however be understood that HE institutions feel very strongly about their individual autonomy and authority to decide about their own programmes, courses and modules (curricula). The fact that the AET strategy want to prescribe to HET is creating negative feelings at HE institutions as they don't want to be prescribed on what they are teaching.

All HET institutions have however embraced the challenge to redress the imbalances of the past which vary from inequities in the provision of AET to the provision of resources and access to curriculum offerings. This however is a process that needs to be managed properly and each HE institution has its own challenges, advantages and disadvantages that do not automatically correspond with other HE institutions. This process is currently well on its way at the various HET institutions and whilst much has been attained to date there is still a lot that can be achieved.

It is important to remember that some tertiary institutions are more closely aligned in course content than others. Three different types of tertiary institutions are present in South Africa:

- the traditional Universities that concentrate mainly on theoretical knowledge and research with some practical content,
- the Universities of Technology (UoTs) which concentrate on market orientated course content , which is obtained from the industrial / commercial sector, and
- the Comprehensive Universities (CUs) that contain courses similar to both of the above mentioned institutions

Course content of CUs is generally more aligned with UoTs, and therefore mobility and transferability are achieved more easily between UoTs and CUs than between either one of these institutions and traditional Universities.

7.5.3 CURRENT LEVEL OF STANDARDISATION, MOBILITY, TRANSFERABILITY AND ARTICULATION

7.5.3.1 UNIVERSITIES OF TECHNOLOGY

Annexure C reflects the detailed responses on relevant questions from the HET Questionnaire obtained from the UoTs regarding standardisation, mobility, transferability and articulation of students between courses within institutions and between institutions. All UoTs that offer courses in AET have been included in this survey – these are:

- Cape Peninsula University of Technology
- Central University of Technology
- Mangosuthu Technikon
- Tshwane University of Technology

For the sake of anonymity (as agreed upon during the focus group sessions with the UoT's) they will be distinguished according to letters of the alphabet: A – D which have been assigned randomly to the above institutions.

With a view of shortening the main report, the detailed responses and views of the HEIs are provided in Annexure C. Summarised the responses from the UoTs were as follows:

a) *Standardisation*

According to 75% of the respondents the procedures described in DoE policies and by bodies such as the HET Council to ensure equal standards in AET at HET level are effective. However, Institution C did not agree, and pointed out that the curriculum of certain other institutions does not indicate what they offer the prospective students.

Generic programmes / qualifications offered at the UoTs are the National Diploma courses, according to 75% of the respondents. Institution B indicated that its Agricultural Management was a generic course.

In addition, all of the respondents indicated that they consider their institution to be adequate or good in comparison to other institutions which offer AET. However, Institution A pointed out that the programmes for UoTs and traditional Universities were designed for different audiences. This makes mobility and comparison difficult.

In addition, 70% of the course content at all UoTs is standardised, while 30% of the course content is specific to the region in which the UoT is situated. This also increases the mobility and transferability between UoTs.

b) *Mobility and transferability*

Mobility between courses within the same institution was possible at 75% of the UoTs. Only one of the respondents indicated that mobility between courses was not possible /applicable.

Horizontal mobility with other institutions are possible. Table 7.8 below indicates the mobility of students from the various UoTs to other tertiary institutions.

Table 7.8 Mobility between UoTs and other tertiary institutions within AET context

Institution A	Institution B	Institution C	Institution D
Institute for Agricultural Training: Elsenburg. But there are no formal arrangements.	Potchefstroom College of Agriculture Glen College of Agriculture Grootfontein College of Agriculture UNISA TUT	None due to the specificity of Agricultural Courses	Other Universities of Technology

75% of the respondents indicated that there have been cases where mobility requests from students were turned down. The reason for the refusal varies from a student's lack of modules that are applicable in the particular course, which they wish to be transferred to, to the fact that the student had an NQF 5 qualification.

Regarding special programmes to increase the degree of mobility, transferability and articulation, 75% of the respondents indicated that they have special programmes. Two of the institutions have Extended Curriculum Programmes, whilst one have a Foundation/Extended programme.

c) Articulation (Vertical Mobility)

Articulation refers to the possibility of movement from lower levels of qualifications to higher levels between different institutions. Vertical mobility with other institutions are possible. Table 7.9 below indicates the mobility of students from the various UoTs to other tertiary institutions at different levels.

Table 7.9 The mobility between UoTs and other tertiary institutions within an AET context on different levels

Institution A	Institution B	Institution C	Institution D
Institute for Agricultural Training: Elsenburg. But there are no formal arrangements.	Potchefstroom College of Agriculture Glen College of Agriculture Grootfontein College of Agriculture Elsenburg College UNISA TUT NMMU	UNISA University of Limpopo UFS all recognise the qualifications of Institution C for higher degree purposes.	A student with a basic qualification can continue their studies (B.Tech) at NMMU or TUT.

The vertical mobility is made possible by recognition of prior learning at 75% of the respondents. Whilst institution C follows specific credit requirements. In all cases specific conditions apply. These range from specific bridging courses to a complete portfolio in which a candidate must prove his/her competence which is then evaluated by a panel. All of the respondents indicated that Recognition of Prior Learning was implemented at their institution without any problems, although Institution C added that the financial impact of the procedure is not always within the reach of all students.

None of the institutions have any articulation with the FET colleges. In contrast all of the UoTs indicated that students from Agricultural Colleges are able to enter into studies at UoTs. Institution C indicated that they can enter programmes through states and equivalence procedures, whilst Institution D accepts students from Agricultural Colleges following credit procedures.

7.5.3.2 COMPREHENSIVE UNIVERSITIES

Annexure C provides detailed responses on relevant questions from the HET Questionnaire obtained from the Comprehensive Universities (CUs) regarding standardisation mobility, transferability and articulation of students between courses within institutions and between institutions. Three CUs that offer courses in AET have been included in this survey – these are:

- University of Limpopo
- University of Zululand
- University of South Africa

For the sake of anonymity (as agreed upon during the focus group sessions with the Universities) they will be distinguished according to letters of the alphabet: E, I and K which have been assigned randomly to the above institutions.

With a view of shortening the main report, the detailed responses and views of the HEIs are provided in Annexure C. Summarised the responses from the UoTs were as follows:

a) *Standardisation*

Two of the respondents indicated that the procedures for curriculum standardisation are effective, but Institution K indicated that the procedures are meaningless as they are not properly implemented. Tertiary institutions are not always aware of the policies. Institution I was adamant that the procedures are not adequate, and that non-standardised curricula remain a problem.

Institution E indicated that their National Diploma in Agricultural Management is generic as well as the BSc Agric course that is offered. Institution K indicated that their Animal Science, Agronomy and Agribusiness course is generic. Students are able to change their field of specialisation after the first year, but no later. Institution I indicated that all their courses are generic.

Two of the respondents indicated that the current curricula implemented at their institutions are not of an adequate standard. The respondent from institution K added that the low standard was due to a lack of human resources and facilities. However, institution E has indicated that they are implementing a new PQM (Programme Qualification Mix) that is state of the art. Institution I indicated that their standard compared very well with other universities and UoTs.

b) *Mobility and transferability*

Mobility between courses at the same institution was possible at institution E from BSc Agric to B Agric, and at Institution K only at first year level, because the curriculum is the same for all the courses at first year level. Institution I has mobility between courses, even to and from non-agricultural degrees.

Regarding horizontal mobility, Institution E indicated that they have horizontal mobility with all UoTs, whilst mobility to BSc degrees presents more of a problem. Institution K indicated that procedures are in place to enable students from other universities to study at their institution. Each applicant will be considered and accredited with specific courses already passed, and thus enabled to continue their studies at the institution.

Two of the respondents indicated that prospective students have been turned away mainly because of failing to meet the minimum requirements.

Special programmes to promote access are in place at all the institutions, two have science foundation programmes and one also offers access math courses. Institution I also has an Extended Degree Programme supplemented by a number of bridging and foundation courses.

c) *Articulation (Vertical Mobility)*

Articulation refers to the possibility of movement from lower levels of qualifications to higher levels between different institutions. It was established that vertical mobility between institutions are possible and is especially practiced at post graduate level. Institution E has no formal arrangements, but there is general consensus that they accept B. Tech students into their Masters programmes. Post-graduate students are accepted from all other universities at Institution K, and within the university itself vertical mobility is possible from Bachelors to Masters to PhD. Institution I has no written agreements.

The vertical mobility is made possible by recognition of prior learning at both the institutes. Institute E offers GAP courses as well and HESA requirements apply, while institute K considers each case on merit and takes their university policy exists for all possibilities. Institute E indicated that HESA requirements are a barrier to Recognition of Prior Learning, whilst the institution K has not experienced any barriers at all.

None of the institutions have any special arrangements with the FET colleges, but Institution E indicated that they assimilate FET graduates easily as a comprehensive institute. Institution E handles graduates from Agricultural Colleges in the same manner as students from FET colleges, whilst Institution K handles such graduates on an ad hoc basis where curricula are similar and recognition of individual subjects considered. Institution I indicated they have no specific arrangements with Agricultural Colleges but the training is recognised and many students enter honours level with a diploma and Recognition of Prior Learning.

7.5.3.3 TRADITIONAL UNIVERSITIES

Annexure C provides the detailed responses on relevant questions from the HET Questionnaire obtained from the “traditional” Universities regarding standardisation mobility, transferability and articulation of students between courses within institutions and between institutions. Five Universities that offer courses in AET have been included in this survey – these are:

- University of the Free State
- University of Fort Hare
- University of Limpopo
- University of Pretoria
- University of Stellenbosch

For the sake of anonymity (as agreed upon during the focus group sessions with the Universities) they will be distinguished according to letters of the alphabet: F, G, H, J and L which have been assigned randomly to the above institutions.

With a view of shortening the main report, the detailed responses and views of the HEIs are provided in Annexure C. Summarised the responses from the UoTs were as follows:

a) *Standardisation*

According to all but one of the respondents the procedures described in DoE policies and by bodies such as the HET Council to ensure equal standards in AET at HET level are not effective. This is because the matter is not always communicated to, or the documents are not always easily available to teaching staff. Two of the respondents added that inequality in terms of competent staff and infrastructure remains obstacles to equal standards at all universities.

Universities generally have programmes with generic names. However, the course content is not always generic. Mostly the course content reflects the location of the institute. Two of the respondents indicated that there is a great deal of generic content at first year level, increasing the degree of student mobility.

b) *Mobility and transferability*

All but one of the institutions allows students to switch between BSc, BSc Agric and B Agric, with certain requirements.

Regarding horizontal mobility between institutions all the respondents indicated that there is a degree of mobility present. All have indicated that there are no formal arrangements, but that each case is considered on merit. In addition, Institution J indicated that they even have mobility with students from abroad.

All the institutions provide some form of foundation course to promote the successful inclusion of students in AET programmes.

c) *Articulation (Vertical Mobility)*

Most of the respondents have some mobility after the completion of the first year, but mostly curricula differ from second to fourth year. After completion of a bachelor’s degree there is mobility to study post graduate programmes at all universities.

The Universities generally handle each case of vertical mobility on merit, and only Institution H indicated that they use Recognition of Prior Learning. Other conditions apply at all the institutions, such as specific university policy, previous academic record and courses taken.

Factors that inhibit the implementation of Recognition of Prior learning has been indicated by most of the universities:

- The content of prior learning is often not sufficiently tested;
- Prior learning provides an insufficient in science and mathematics, and
- Universities may not be prepared to deviate easily from the standard entrance requirements set by faculties for each programme.

None of the universities currently have special access arrangements for students graduating from FET or Agricultural colleges. However, Institution J has indicated that they will judge each case on merit.

7.5.4 CONSTRAINTS EXPERIENCED TOGETHER WITH THEIR CAUSES

The constraints experienced by the institutions offering AET are many, and have various causes. This section attempts to identify some of the constraints presently inhibiting mobility in AET in South Africa.

7.5.4.1 UNIVERSITIES OF TECHNOLOGY

a) Enrolment

Enrolment is a constraint to mobility as all of the UoTs indicate that they have limited room for students. Due to the facilities presently existent at the institutions, it is not likely that extra students can be accommodated when they wish to move from one UoT to the other.

b) Negative factors identified by the institutions

The following factors were identified by the UoTs as negative influences on the HET quality and standards:

- Energised members of staff with cutting edge knowledge, fresh ideas and professional expertise,
- Unavailability of facilities such as an experimental farm
- Changing of curricula are bureaucratic and this prevents the institutions to be responsive to market requirements
- Low standards
- Difficulty in acquiring competent and well qualified lecturers,
- Lecturers have no experience in practical agriculture,
- Budget constraints, and
- Mergers had a detrimental influence on staff morale and quality,
- Lectures' lack of industrial experience affects the quality of the UoT type of education

c) Differences in curriculum

This aspect was discussed in detail under section 7.5.3.1

7.5.4.2 COMPREHENSIVE UNIVERSITIES

a) Enrolment

Enrolment does not seem to be an inhibiting factor for CUs. However, the increase in student numbers may place strain on existing infrastructure. Two of the institutions have experienced a growth in enrolment. Whilst one (Institution K) at first experienced a drop in enrolment after raising admission requirements, but enrolment is recovering.

b) Negative factors identified by the institutions

The following factors were identified by the CUs as negative influences on the HET quality and standards:

- Lack of facilities and equipment,
- Non-specialised staff,
- Human resources and facilities,
- Shortage of staff with PhD qualifications,
- High staff turnover,
- High proportion of staff from foreign countries,
- Lack of commitment in some cases,
- Poor salaries,
- Brain drainage,
- Curriculum seems to be developed around available expertise and not according to the needs of the country,
- Not sufficient interaction between staff and DoE,
- Lack of expertise in certain disciplines,
- Lack of support staff e.g. laboratory technicians – Some practicals can therefore not be offered,
- Early resignations and high staff turnover, and
- Self-review and peer review is time consuming.

c) Differences in curriculum

This aspect was discussed in detail under section 7.5.3.2

7.5.4.3 TRADITIONAL UNIVERSITIES

a) Enrolment

Enrolment has increased at all but one of the Universities. Increases in enrolment will place strain on the facilities and equipment present at the Universities.

b) Negative factors identified by the institutions

The following factors were identified by the traditional Universities as negative influences on the HET quality and standards:

- New students coming from the schooling system lack the basic conceptual, writing and computational skills to effectively engage in, report on or even critically evaluate and interpret basic agricultural content essential for building agricultural training on. This also contributes largely to an important inability of students to readily assimilate agricultural information and use it to interpret the agricultural production environment,
- The very high failure level of agriculture at school level and the dismal status given to agricultural training at schools,
- The very poor initial concepts of and perceptions regarding agriculture as career option or as economic sector act as very important barriers to building a student corps of knowledgeable and able agricultural practitioners,

- The limited focus of National and Provincial agricultural departments in emphasizing the role of agriculture in the economy and the technical standards associated with sustainable and economically viable production systems tends to shed a negative impression on the emphasis placed in training on these aspects,
- The unhealthy emphasis placed on agricultural production as “social activity” and poorly managed land reform programme creates major uncertainty in the agricultural training environment as to the most sensible focuses which should be followed in training. This has particular impact on the training of agricultural extension students who are faced with very difficult and job-negative situations to face – leading to great negativity,
- The general lack of suitable practical training environments, like functionally efficient research stations and extension offices, makes practical training of students very complex and sometimes impossible, thus contributing largely to a very negative perception of agriculture as career environment or farming as potentially viable and sustainable economic activity,
- Profound negative attitudes of teaching staff and departmental officials towards practical agricultural training and the value of problem solving in agricultural decision making definitely impacts negatively on the quality of agricultural training,
- Our experience is that the gap between matric and first year university level is constantly increasing. This poses a problem in the sense that marks obtained in matric does not lately reflect the intellectual potential of a candidate,
- Although the following statement is probably a cliché, the general experience of interviewed staff is that the “quality” of students are declining. This is seen in the pass rate of first year students in especially the natural science disciplines including subjects such as Biology, Biochemistry, Chemistry, Physics, etc. The good news is that a large proportion of the underachievers succeed in adapting to the university environment during follow-up years. The latter is probably not economically viable in all cases,
- Most staff are of the opinion that the salaries offered at HETs are not in line with counterparts in the civil service and therefore the concern is that the “quality” of staff at universities is also declining,
- Interference by government in our autonomy,
- Extremely low remuneration at all levels from technicians to professors,
- Reduced resource allocation to faculty of Science and Agriculture due to declining student numbers (also due to low exit numbers in maths and science at school level),
- Academic career not perceived as well remunerated,
- Standard of lecturers at certain institutions, and
- Funding for equipment, facilities and research.

c) Differences in curriculum

This aspect was discussed in detail under section 7.5.3.3.

7.5.5 CURRENT EFFORTS TO ENHANCE AND FACILITATE THE STANDARDISATION, MOBILITY AND TRANSFERIBILITY OF AET

7.5.5.1 UNIVERSITIES OF TECHNOLOGY

a) Consultation with stakeholders

Please refer to Section 3.4 of the Report (Coordination at HET Level) to view the range of consultation that exists between Higher Education Institutions and their coordinating bodies – many of which aim to improve standardisation of curricula and to facilitate and enhance mobility of students and the portability of learning

b) Recognition of prior learning (RPL)

UoTs generally indicated that Recognition of Prior Learning is taken into account at two of the institutions, whilst one will only take previous qualifications into account and the other follows an approval of credit procedure. All of the respondents have specific conditions regarding horizontal mobility. These conditions range from strictly academic performance to a percentage of equivalence in the course content.

c) Positive factors that influence a HET qualification's standard and quality

- Availability of facilities e.g. experimental farm close to the institution,
- Relevant subjects and subject combinations,
- Competent/ well qualified lecturers,
- Lecturers with experience in practical Agriculture under South African conditions,
- Sufficient funds, and
- Energised members of staff with cutting edge knowledge, fresh ideas and professional expertise.

7.5.5.2 COMPREHENSIVE UNIVERSITIES

a) Consultation with stakeholders

Please refer to Section 3.4 of the Report (Coordination at HET Level) to view the range of consultation that exists between Higher Education Institutions and their coordinating bodies – many of which aim to improve standardisation of curricula and to facilitate and enhance mobility of students and the portability of learning

b) Recognition of prior learning (RPL)

One of the respondents indicated that Recognition of Prior Learning is taken into account. At the other institution departmental and faculty approval after oral interviews or presentations by the applicants is the only recognition. Other conditions which may apply is HESA requirements and 80% of the syllabus must be consistent. At Institution K policy is followed.

c) Positive factors that influence a HET qualifications standard and quality

Comprehensive Universities indicated the following factors as positive regarding the standard and quality of their qualifications:

- Examination standards,
- Research partnerships,
- Level of post-graduate tuition and research
- The self review and improvement plans and internal quality assurance policies (required by HEQC) force a continuous review and improvement of practises.
- Some committed staff
- Unique location
- Close relationships and proximity to the community we train students for
- Research potential is high but not possible under the current circumstances

7.5.5.3 TRADITIONAL UNIVERSITIES

a) Consultation with stakeholders

Please refer to Section 3.4 of the Report (Coordination at HET Level) to view the range of consultation that exists between Higher Education Institutions and their coordinating bodies – many of which aim to improve standardisation of curricula and to facilitate and enhance mobility of students and the portability of learning

b) Recognition of prior learning (RPL)

Only one of the respondents indicated that they habitually achieve horizontal mobility by Recognition of Prior Learning. Other respondents either have policies in place or consider each case on an ad hoc basis. In all cases particular conditions apply for the acceptance of students through horizontal mobility. Therefore, most of the institutions have refused mobility requests, mostly due to the applicants failed to comply with minimum requirements.

c) Positive factors that influence a HET qualification's standard and quality

- Current development of new approaches to agricultural training through “simulation training” in conjunction with departmental officials has opened a new realm of training focuses with the potential of a real life experience to agricultural servicing and research during the training process.
- Increased political and policy emphasis on agricultural development is increasing the level of interest in agricultural as economic sector and potential wealth creator in rural environments. This leads to a clearer picture of the value of agricultural training and improves the quality of engagement in the process.
- Greater structuring and critical evaluation of training processes definitely led to improved curriculum development and quality assurance mechanisms although it has not done much for the training process in itself. Greater entrepreneurial thinking in agricultural training should be encouraged.
- The development of a vision that agricultural commercialization is a continuum of processes and not a dichotomous system is very positive. It is increasingly contributing to establishing the absolutely critical view that migration from small scale subsistence production to commercial production is a process that should be guided by agricultural training, research and community engagement activities (extension).

- The latter positive influence now opens up the playing field for HET institutions in agricultural training to become more relevant role players in the agricultural development process through better structured involvement programmes.
- Excellent research infrastructure
- International networking
- We have prided ourselves in this faculty in addressing real industry based problems by constantly interacting with industry partners.
- Standard of lecturers;
- Good facilities; and
- Contact with agricultural industries

Note should also be taken of the DeIPHE (Development Partnerships in Higher Education) Project. This project is a joint venture between the following role players:

- University of Pretoria - the lead partner in S A
- The Royal Agricultural College (University) - the lead partner in UK
- The University of Stellenbosch
- The Cape Institute for Agricultural Training – Elsenburg
- The Lowveld College of Agriculture – Mpumalanga
- The Tompi Seleka College for Agriculture - Limpopo

The project currently focuses on the following:

- To identify access barriers for students to enrol into an education program and access barriers to progress from one institution to another and on a higher level of education
- To address the aspect of sustainability in agricultural curriculums by the development of a Curriculum Analysis Tool. The tool will be used to determine what aspects of sustainable agriculture are being addressed in curriculums/ modules /subjects and to what extent
- Curriculums/modules/subjects will then be adapt if necessary

It is believed that the in-depth research undertaken as part of the DeIPHE project could provide guidance and direction of many of the problems and constraints outlined in this chapter and should be taken into consideration once available.

7.5.6 RECOMMENDATIONS TO IMPROVE THE CURRENT LEVEL OF STANDARDISATION, MOBILITY, TRANSFERABILITY AND ARTICULATION WITHIN THE AET SYSTEM

7.5.6.1 UNIVERSITIES OF TECHNOLOGY

The following recommendations were made by the UoTs which present Agricultural courses regarding the improvement of coordination and harmonisation of AET policy and HET curriculum development:

- Communication between the drivers of the AET policy and the teaching institutions,
- A forum organising harmonisation should be established when the HEIs revise curricula (3 years), and
- Reciprocal representation on the AET national bodies and the HET committees.

Additional recommendations as informed by the key stakeholders towards improved mobility and transferability of learning and articulation between institutions and qualifications:

- The enrolment tendency at UoT's can be increased if the DoA is prepared to pour more money into providing more facilities and more staff for a higher lecturer ratio.
- Although UoT's identified their National Diplomas as 'generic' and therefore ideal to assist in mobility it became clear that horizontal mobility (movement of students between the different UoT's) seems to be quite rare due to the specificity of agricultural courses at each institution. UoT's should therefore align their National Diplomas, which are seen as 'generic', with one another to assist in horizontal mobility between the various UoT's by stripping them from the specificity of modules at least in the first year (preferably the first two years) of study which makes horizontal mobility presently quite a rare incident;
- Conditions (rules and regulations) that apply at each UoT should also be aligned with one another to assist with the horizontal mobility of a student studying a National Diploma to move from one UoT to another;
- As no single generic qualification(s) exist between UoT's and Universities (also CU's) vertical mobility between UoT's and Universities becomes a problem. The only way to address this challenge is through the implementation of an independent body representative of both UoT's and Universities to align the content of qualifications in 'generic' qualifications and as such assist in the vertical mobility of students where such a need exists;
- Financial assistance should be made available to students who want to be considered for the Recognition of Prior Learning (RPL) at UoT's;
- The new framework is intended to facilitate articulation between further and higher education and within higher education. To enhance and improve the mobility and transferability of learning and articulation between institutions and qualifications special access arrangements for students graduating from the FET sector should be considered by the various UoT's.

7.5.6.2 COMPREHENSIVE UNIVERSITIES

The following recommendations were made by the CUs regarding the improvement of coordination and harmonisation of AET policy and HET curriculum development:

- There is much need for increased policy awareness, especially of the AET strategy,
- The DoA should be better involved in curricular initiatives, since the DoA is in an excellent position to identify trends, needs and priorities in AET,
- As HET are independent a communication and marketing plan as well as a Dean's Forum coordinated by NDA would be a starting point,
- Advisory committees including government and industry should guide curricula, and
- Communication should be improved via a newsletter or workshops at certain times.

7.5.6.3 TRADITIONAL UNIVERSITIES

The following recommendations were made by the traditional Universities regarding the improvement of coordination and harmonisation of AET policy and HET curriculum development:

- The problem is not merely at HE level. It is a national structural problem. The establishment of a purposeful and sustainable communication infrastructure between the DoA and HE institutions is the basic assumption to address this matter.
- At the least a proper functioning forum should be established as point of departure where these institutions can mutually and jointly influence the AET policy making process and the HE curriculum development process in HE institutions. Without this cross coordination and influence there will be very little appreciation for the individual processes and the symbiotic relationship will be non-existing.
- Better coordination between AET policy decision makers and middle management of agricultural faculties at universities.
- Better control over the implementation of AET policy.
- AET policy should probably be communicated with HET staff in order to align the strategy with needs dictated by the agricultural industry as well as university infrastructure. A strategy that is impossible to implement due to lack of staff or infrastructure is in itself not of much use.
- Communication between decision makers and academics should be improved.
- Better communication of AET policy to HET & HEI. It seems as if DoA & DoE do not communicate well; once alignment of their own policies is obtained, facilitated implementation should proceed as transparently as possible.
- There should be a high level agreement between the two relevant ministers, where the focus on Mathematics and Science as school subjects receive the necessary attention, in order to prepare learners for university entrance.

Additional recommendations as informed by the key stakeholders of both CU's and Universities towards improved mobility and transferability of learning and articulation between institutions and qualifications:

- Universities without procedures in place for the mobility of students between qualifications in their specific faculties should consider it seriously,
- Most universities offer 'generic' programmes that are also offered 'in name' at other HE institutions and therefore suited towards improving the mobility and transferability of learning and articulation of students between one HE institution and another. Understandably each institution has its own content (curricula) for these 'generic' programmes and differences therefore do exist. Mobility between universities is therefore possible but do not go hand in hand with criteria that should be adhered to at each institution. The ideal situation for the universities will be to create a representative body that looks into the curricula of 'generic' programmes and smooth out content problems by standardising the various 'generic' programmes and make it possible for students to move from one institution to another without any problems.
- Horizontal mobility between faculties from one university to another is a reality and some agreements between faculties are in place. It however is not implicit that institution L (for instance) will accommodate a student from institution E or G or vice versa. Horizontal mobility needs to be addressed via a representative body from the various universities that should address mobility in detail. This body should identify generic programmes and develop a policy on certain conditions that should apply in generic programmes between universities and should be non negotiable.
- Universities are well aware of the importance of vertical mobility. An excellent example is the DEPHE project (Development Partnerships in Higher Education that addresses access barriers as well as sustainability in agricultural curricula). Undergraduate vertical mobility needs much more attention within institutions with regard to the different programmes and between universities, UoTs and colleges.
- A task team should investigate Recognition of Prior Learning (RPL) and develop criteria based on scientific findings that will guide HE institutions in the implementation of this important but underdeveloped tool in HE insertions.

In conclusion it is recommended that whilst differentiation and diversity must be a principal feature of a reconfigured higher education system, articulation mechanisms must exist to ensure that the system is also highly integrated. Indeed, the success of a differentiated and diverse system is dependent on structural integration. Articulation mechanisms cannot be of a solely voluntary and goodwill nature and dependent entirely on institutional partnerships. Articulation between institutions must be embedded features of, and must permeate, the entire system so that continuing education, life-long learning, horizontal and vertical mobility is all enhanced. The system of accreditation and quality assurance, the national qualification structure and national planning processes must overcome barriers and reinforce articulation.

Articulation must enable the horizontal and vertical mobility of students between institutions with different missions and mandates. It must also enable staff mobility for the purposes of teaching and research. Thus, academics that have recognised specialist expertise in particular disciplines and fields should have opportunities to teach and supervise students of, and at, other institutions. There should also be funding incentives to promote research collaboration between academics from institutions with different missions and mandates. Not only must there be articulation within the higher education system but also between this system and schooling, further education and training, the world of work and other social sectors. Appropriate admission requirements and programme development should be pursued to enable access of adult and mature learners.

Healthy partnerships should exist between higher education institutions and the Sector Education and Training Authorities (SETAs) to provide programmes that respond to the skills development needs of the country. As noted, institutions should also pursue strong partnerships with the science councils, private sector research and development establishments, industry, civil society institutions, local, provincial and national development structures and international academic and research institutions. Dense networks should be created through which there could be flows of knowledge and personnel between higher education and other institutions.