

Review

A review of Agricultural Education and Training in South Africa

T. T. Kidane* and S. Worth

School of Agriculture, Earth and Environmental Sciences, Extension and Rural Resource Management, University of Kwazulu-Natal, Pietermaritzburg, Private Bag X01, Scottsville, 3209, South Africa.

Accepted 3 April, 2012

Agricultural Education and Training is vital for economic development and food self sufficiency, poverty alleviation and environmental protection. This review assesses the Agricultural Education and Training in South Africa focusing on sub-Saharan Africa including factors affecting students and teachers attitude towards their performance and teaching. Literature shows that teaching and research system in agricultural sciences and technology requires emphasis to execute the phases in more coordinated ways. This then will lead to a responsive and coordinated system that recognizes the existing reality and need in the field. Respectively significant role has been played to solve the problem associated with Agricultural Education and Training access barriers by opening new agricultural schools with the incompatible increased dropouts. However, very limited analytical research has been conducted in area of agricultural sciences education in sub-Saharan countries including South Africa. It is recommended that it is essential to identify the existing Agricultural Education and Training problems by considering both teaching and learning processes as well as, the attitude of students and educators towards Agricultural Education and Training in order to produce efficient and capable professionals for the agricultural production and processing systems.

Key words: Agricultural educational training, factors affecting performance, sub-Saharan Africa, South Africa.

INTRODUCTION

South Africa has one of the highest rates of public investment in education in the world; about 5.3% of gross domestic product (GDP) and 20% of total state expenditure is being spent on education (Burger, 2011). Also in South Africa, agriculture is considered a key engine for economic growth, sustainable development and food self-sufficiency. In the new political era in South Africa, faster economic growth and development are encouraged by newly developed policies on land use and land ownership. In order to address the political, social, economic and environmental conditions in South Africa improvements in agricultural educational training were required (DoE, 2008). Policy argues that agricultural productivity can be improved through Agricultural Education and Training (AET), research and outreach.

Further, improved agricultural knowledge and competence are required, not only to improve primary agricultural production, but also for processing and marketing of the produce and for successful implementation of agricultural policies in the country (Sundstol, 2004). AET thus plays a major role towards agricultural development. It is concerned with the provision and maintenance of sound education and training to support environmentally and economically sustainable agriculture (AET Strategy, 2005). At present, a variety of statutory, non-statutory and private institutions provide AET in South Africa (AET Strategy, 2005).

South African AET policy indicated that the objective of AET is to play a main role by providing a strong background to produce efficient farmers, researchers, educators, extension staff, agri-business professionals and others needed to achieve sustainable agricultural development in South Africa. In secondary schools, the objective of agricultural education is to provide

*Corresponding author. E-mail: tsdanatan@yahoo.com/211546496@ukzn.ac.za.

background for further studies in various agricultural disciplines in science, engineering and technology (Vandenbosch, 2006). AET at the post-secondary education level is important for advancing agricultural productivity and the processes that move agriculture from farm-gate to markets (Rivera, 2008). In this advanced world, the future success and achievement of students in science depends on their successful completion of the secondary school education (Alam and Farid, 2011). It is proposed that three key factors leading to successful completion are the implementation (teaching and learning) process, the attitude of the participants (for example, learners and educators) and the AET curriculum secondary school leading to tertiary level education each of which need to be assessed in the context of local and global development in agricultural sciences.

Globalisation and international competition are creating a great change in agricultural curricula worldwide (AET Strategy, 2005). Furthermore, teaching and learning are dynamic processes that regularly need adjusting to meet changing needs and opportunities in the area (Creemers and Kyriakide, 2009). Therefore, AET will need to steer carefully designed curricula that will meet the demands of home and the opportunities abroad (AET Strategy, 2005). However, one of the major challenges to deliver relevant support to agricultural rural development is the challenge to reshaping the AET curricula content in the country (Worth, 2006).

This review of literature presents four key themes. It introduces the concepts of education and training, followed by a discussion of the concept of agricultural education and training in sub-Saharan Africa which leads to a brief discussion of the concept of agricultural sciences in South Africa. The paper then discusses historical perspectives of AET in South Africa which is followed by an exploration of factors affecting students' and teachers' performance in AET.

CONCEPT OF EDUCATION AND TRAINING

Education is one of the basic needs and is fundamental for the growth and development of human beings in both developed and developing countries (Rahuman and Uddin, 2009). Education incorporates the goals of training and explains why certain information is required. By nature, it is a longer-term process (Anderson, 1997). Education give emphasis to the scientific foundation of the material presented. Both training and education induce learning, a process that modifies knowledge and behavior through teaching and experience (Niosh, 1999).

Training is communication intended for the purpose of developing skills, modifying behavior, and increasing competence at a defined population and focuses exclusively on what needs to be known (Niosh, 1999). The major difference between education and training is

their purpose and process. The purpose of education is gaining knowledge and developing intelligence in a basic sense, while the purpose of training is to gain specific skills. Education transfers the basic knowledge and information to learners to create ability to generalize and learn by comparison (Subedi, 2004). Education provides less emphasis on improving skills and more emphasis on improving knowledge. On the other hand, the purpose of training is to use the acquired basic knowledge and develop specific skills based on specific requirement. Training involves the implementation of the acquired knowledge, skill and attitude to practice in a given work environment (Subedi, 2004). Also, in its process training has a specific guidelines and textbook for specialized purposes but educations has more general guideline to conduct the process. Practically, the ultimate goal of training as well as, education will not be achievable without the transfer of the acquired knowledge, skill and attitude put into practice (Subedi, 2004).

CONCEPT OF AGRICULTURAL SCIENCE IN SOUTH AFRICA

Agricultural science is the study of the relationship between soils, plants and animals in the production and processing of food, fibre, fuel and any other agricultural commodities that have an economic, aesthetic or cultural value (SAQA, 2003). It is an integrated science that combines the knowledge and skills from physical life, social, and earth sciences, engineering, mathematics and economics (SAQA, 2003).

Agricultural science aims at developing the following skills; investigate and analyse sustainable agricultural practices, indigenous agricultural knowledge and historical development, and interrelated issues in Agriculture (SAQA, 2003). Oberle and Keeney (1990) stated that "agricultural science is a complex and multidisciplinary field that represents the vital link between human (socioeconomic) systems and the natural environment." Thus, the South African education authority argues that the competencies should be developed within the context of the following knowledge areas; soil science, plant science, animal science, agricultural economics, basic chemistry, basic biological concepts, sustainable natural resource utilisation, and management of the environment (SAQA, 2003). In addition to these competencies, agricultural sciences and technology should also address social and economic justice issues such as, food security and risk management (DoE, 2008).

Similarly, at high school formal AET levels, agricultural science focuses on the relationships among soils, plants and animals to produce and process food, fibre, fuel and other agricultural products value in the society. Agricultural education and training enables students to obtain the required knowledge, skills and values and to

learn their appropriate application in the process of production and processing. In South Africa, agricultural education and training is meant to be learned in the context of promoting sustainable agriculture (DoE, 2008). In general, at high school formal education levels, agricultural sciences consist of plant science (nutrition, reproduction and propagation, breeding, protection and classification), soil science (components, forming, characteristics, organic matter, chemical and colloidal characteristics, classification and soil microbiology), animal science (nutrition, reproduction and propagation, breeding, protection and classification), agricultural economics, basic chemistry and biology, sustainable natural resource use, and management of the environment (DoE, 2008). Therefore, AET is a vast and interrelated discipline. It is important to develop the required skilled man-power for sustainable development and food security in the country. Knowledge and skill creation is the basis for sustainable development in local and regional level in the continent.

AET IN SUB-SAHARAN AFRICA

AET in sub-Saharan Africa is slow to adapt to new patterns of demand. It also lacks proper mechanisms for identifying emerging needs as well as, for reforming curricula to meet the demands in growing modern agricultural activity in the region (Wallace, 1997). In sub-Saharan Africa, different AET and research approaches were applied by different colonial regimes. AET in sub-Saharan Africa has also suffered due to inadequate and uncoordinated resources both in terms of human resources and physical infrastructures (Spielman et al., 2008).

Many developing countries adopted the integrated systems of teaching, research and extension system from developed countries. In sub-Saharan countries, formal pre- and post-secondary AET can be traced to colonial system. Many post-colonial African countries borrowed western AET systems or models rather than developing their own based on the existing demand and responding to local and global development contexts. The borrowed Western AET systems do not address the agricultural problems in the regions (Spielman et al., 2008). These adopted systems are not integrated with the existing need and reality. They are incompetent to accomplish significant socio-economic changes among the rural society for effective sustainable development and poverty reduction (Betru and Hamdar, 1997).

In many African countries, even after independence, their AET systems have been little changed (Spielman et al., 2008). In the region, AET systems are weak, outdated, under-funded, disconnected from the realities of modern globalization trends and at the point of disaster (Rivera, 2008). In addition, in many African countries, there is a common failure to ensure wide participation in

the curriculum process and a lack of appropriate adaptation which is responsive to the on-going change all over the world (Wallace, 1997). It is as though sub-Saharan African AET is trapped using an inflexible AET system which not only is not of African origin, thereby, devoid of the African context, but has been neglected in terms of reform and effectively positioning African agriculture in the world economy.

AET curricula in sub-Saharan Africa have been formulated without any systematic training needs analysis. These curricula were unresponsive to socio-economic, technological, physical and environmental changes in the rural sector and were inappropriate for the existing situation. The degree of change accepted was insufficient in meeting the true needs of the situation (Wallace et al., 1996). There has also been an urgent need for broad reviews of AET and identification of needs which processes should be seen as a prerequisite for both policy and curriculum reform. Curriculum needs to constantly adjust to the changing realities of the socio-economic development. However, in reality, few AET organizations in sub-Saharan Africa have changed significantly since their foundation. They have been in deep crises because most of them have been sluggish and unwilling to change (Wallace, 1997). There are, of course, notable exceptions in selected countries and disciplines. Zimbabwe's agricultural extension educational programme was found to be one of the most progressive in Africa (Murwira et al., 2001); as was the Sawasaka initiative in various universities in sub-Saharan Africa (Chapman and Tripp, 2003).

However, there is an ever-increasing call for sustainable reforms in AET that attempts to answer the existing changes in social, economic, political and ecological conditions of the region (Spielman et al., 2008). On the other hand, there is a need for training based on the existing increasing demand for trained human power in agricultural sciences in Africa. But on this count, AET has suffered a lack of knowledge of the training needs of its targeted groups and labour market locally and globally. AET policies, curricula, teaching methods, management styles and structures need to be kept relevant to the need and expectation of its audience. It should be more market oriented and need based in order to survive with success (Wallace, 1997). However, AET systems in the region remain attached to the teaching and research approach that are organised along a linear vision of science (Spielman et al., 2008). Also, all over Africa, policy-makers and implementers continue to adhere to a linear model, even after years of failure in situations where it does not apply (Röling, 2009).

Similarly, many studies have revealed that a number of problems exist around donor support for AET. Funding for agricultural research, extension and education in developing countries are the most neglected components of the past decade of the World Bank research-extension-education investments (Rivera, 2008). Another

problem associated with agricultural education in the region is related to the level of integration in communication in the system. In sub-Saharan Africa, there is a weak communication between all implementing agencies and various institutions. Furthermore, in most of the African countries in the region, there is no coherent policy framework for AET (Wallace, 1997). Teaching and research systems in sub-Saharan Africa lack coordination between agricultural educational training organisations and individuals, and lack linkages between themselves and other related organizations both internal and external to the systems (Spielman et al., 2008). An AET system needs wisdom to make good use of peer review, broad consultation and constant monitoring in order to ensure making timely, need-based decisions and right implementation (Wallace, 1997); hence, the need for effective coordination and consultation.

AET systems in the region also continue to struggle with inadequate communications facilities, limited human resources for teaching and research, poor incentives for teaching and research staff, and limited funding constraints that hinder teaching and research in the region (Spielman et al., 2008). In most parts of sub-Saharan Africa, staff development for AET is an area of weakness, and in some cases, may be totally lacking (Wallace, 1997).

Continent-wide, the development of human capital now constitutes a major limitation in Africa's agricultural development, and thus, greater attention should be given to build institutional capacity at the post-secondary level to deliver relevant technical and professional education and training for the agricultural sector to strengthen the efficient production of suitable man-power for the sector (Rivera, 2008). The future success of the student at post-secondary level depends on their successful completion of the secondary school education (Alam and Farid, 2011). The objective of agricultural education in secondary schools is to provide background for further studies in various agricultural education areas of science (including agriculture), engineering, and technology to create an appropriate mind-set for the prospective candidate entering at post-secondary level (Vandenbosch, 2006). Therefore, it could be fruitful if research identifies appropriate AET curricula based on the systematic training need analyses reflecting the local, regional and global contexts.

Throughout Africa, agriculture has been influenced by globalization, trade liberalization, and rapid advancement of technologies, population growth and urbanization (Vandenbosch, 2006). Together, agricultural education and training at secondary- and post-secondary levels are crucial to the production of the skilled man-power for effective development and implementation of scientific knowledge and to solve the existing agricultural knowledge and skills gap by producing skilled and competent people to help address rural socio-economic development of the region (Vandenbosch, 2006).

Africa's AET systems in the sub-Saharan are ineffective and fail to fit the existing real situation of the agricultural sector and people in the regional context. This situation obtained in many African countries including South Africa. It is evident that to address this situation requires detailed research. In particular, research is needed for the identification of existing AET needs in the local, regional, and global contexts. Such research should help sub-Saharan Africa develop appropriate AET and research systems that are relevant to the existing reality in the region.

HISTORICAL PERSPECTIVE OF AET IN SOUTH AFRICA

The AET in South Africa can be categorized into two historical perspective such as AET before 1994 and AET after 1994 (the democratic era). The literature reviewed on AET before 1994 is presented first and is subsequently followed by the review on the AET after 1994.

AET in South Africa before 1994

Before 1994, AET was designed and introduced after the necessities of the Bantu Education Act No. 47 of 1953 (DoA, 2005). This legislation widened the gaps in educational opportunities within South Africa by applying separate curricula based on racial groups (DoA, 2005). Therefore, under the then Bantu Education Act, students were trained in Agriculture as a subject combined with other non-scientific subjects such as History, Biology, Geography and Biblical studies. There was no much emphasis given to mathematics and science during the teaching of agricultural sciences (DoA, 2005). Ostensibly, education offered under so-called Bantu education was said to be specially modified to the 'needs' of indigenous cultures and to the rural context of the Bantustans. This gave Bantu education an air of legitimacy and appropriateness. Thus, it could be expressed that Bantu education was an appropriate separate education for the development of Africans in their own rural area if it really meant to consider the role of indigenous knowledge. However, the reality was far from the reflected ideas which were described in the policy (Morrow and King, 1998). In the country, schools for whites and schools for blacks had very different educational experiences under apartheid. There was unequal allocation of resources and opportunities to the various racially or geographically defined sections of the systems over and above the differences imposed by varieties of education curricula based on their colour (Morrow and King, 1998). In the 1980s, the then ruling National Party supposedly made dramatic reforms in the style and reality of educational policy for Africans through a variety of moves which were

captured by changing the title of the 'Department of Bantu Education' to the 'Department of Education and Training' (Morrow and King, 1998). However, the policy was openly aimed at keeping anyone who was not white in an inferior position in the job market and related opportunities (Morrow and King, 1998). Because of the negative impact of Bantu Education Act, AET became inaccessible to those from black communities (Didiza, 2005). At that stage, educators were known to have sufficient theory of agricultural sciences, but with limited practical knowledge in agriculture at the tertiary level. The challenge faced associated with the inadequately trained agricultural sciences educators with more theory and little practice still remains to be one of the important factors that needed attention. This specific problem was widespread in schools throughout the country (Didiza, 2005). The absence of well-trained man-power in agricultural science education and weak institutions has been a major problem for South Africa's communities' agricultural and rural development (African Development Forum (ADF), 1999).

AET after 1994 in South Africa: The democratic era

After 1994, new AET policies, programmes, strategies and governance structures have been established (Didiza, 2005). In 1995, the South African government started to develop and revise a new curriculum for the primary and secondary school system (the General Education band) to fulfil the required level of performance for the new South Africa and the needs in the 21st century (DoE, 2008). In 2005, the new agricultural sciences curriculum (the General Education Band) was developed. This curriculum created the foundation for the development of the Revised National Curriculum Statement for General Education and Training (Grades R¹-9) and the National Curriculum Statement for Grades 10 to 12 (DoE, 2008). The strategy was developed as part of South Africa's Reconstruction and Development Programme (DoE, 2008).

The process of developing the National AET strategy started in 2002 and was completed in 2005. The AET strategy was mainly focused on the provision and maintenance of sound education and training to support an environmentally and economically sustainable agriculture in South Africa (DoA, 2007).

The National AET strategy was launched with the aim to address the needs of the country's economic development and improvement of agricultural production through quality AET balancing local, regional and global needs and contexts. The implementation of the AET strategy was supported by the establishment of a National AET Forum (NAETF) (DoA, 2007). In May 2009, the National Department of Education was split into two ministries; Basic Education and Training; and Higher

Education and Training. Each ministry was responsible for its level of education across the country as a whole, while each of the nine provinces in the country has its own education department responsible for actual delivery of the national curriculum from Grade R to Grade 12 (Burger, 2011). The Ministry of Basic Education and Training also covers basic adult education and primary and secondary education. The Ministry of Higher Education and Training was responsible for tertiary education up to doctorate level including post high-school technical and vocational training (DoE, 2008).

The National AET strategy identified limitations and challenges faced by AET in still newly democratic South Africa. These included fragmentation and lack of co-ordination, poor and inconsistent quality control, ineffective and non-responsive education and training systems, poor access to AET, negative career image and a shortage of critical skills (DoA, 2005a, 2007). The AET strategy sets out an agenda to address these issues and to achieve the vision of "Accessible, responsive, quality agricultural education and training for agriculture and rural development" (DoA, 2005b).

Consequently, corresponding to other sub-Saharan countries, it is also evident that a detailed curriculum needs further assessment in order to develop the appropriate curricula that can well be suited to South Africa as a united entity. However, these curricula should also be based on the local, regional and the global context considering the South Africa's place in the world. Such research should be conducted at regular intervals to stay alongside each other of the exact need and reality of the situation as it changes with the world trends. It is then also necessary to continuously evaluate and improve the existing curriculum based on the outcomes of the research. Concerning agricultural education, an essential part of the research would be to assess the factors that are affecting the quality of AET and its ability to produce the required knowledgeable and skilled efficient man-power in the region. Moreover, the quality of education is usually determined by the curriculum and the education systems that could be well created by research based on the existing realities and needs of the implementing country.

In many sub-Saharan African countries, including South Africa, AET systems changed a little after their independence. As noted earlier, they became weak, outdated, under-funded and a point of disaster. They remain disconnected from and do not prepare African agricultural learners for the realities of contemporary local and regional contexts or globalization trends (Rivera, 2008). They keep Africa's agricultural sector at a distinct disadvantage.

To change this, curriculum must be continuously assessed and evaluated through research. This will meet the ever-increasing call for sustainable reforms in AET that answers to the changing social, economic, political and ecological condition of the region (Spielman et al., 2008). Therefore, it is important to investigate the existing gaps

¹Grade R is 'Grade Readiness' and is intended to prepare learners for Grade 1.

in AET and its compatibility with the existing realities. In particular, there is a need to strengthen post-secondary level AET by assessing the existing AET research on the provision of AET in the formal secondary educational sector.

AET in formal education in South Africa

Formal education is associated with formal schools. It is described as the hierarchically structured, pre-arranged, chronologically graded education system, running from primary school through to university (Coombs, 1974). In addition to general academic studies, it includes a variety of specialized programmes and institutions for full-time technical and professional training (Coombs, 1974).

South Africa has a single National education system which is organised and managed largely on the basis of nine provincial sub-systems. The National Department of Education is responsible for educational matters that cannot be regulated effectively by provincial legislation, and for those matters that need to be coordinated in terms of norms and standards at a national level. Hence, the National Department of Education prepares government policy on education and training for the country in entirety (DoA, 2007).

In South Africa, the number of schools offering agricultural science increased between 2008 and 2010; however, during that same period the number students sitting for the subject decreased. In addition to the decreasing student enrolment in AET during these years, the students' performance in agricultural science also continued to decline (Naidoo, 2011). This indicated that the problem is beyond merely opening access for AET by investing in physical facilities. Furthermore, in South Africa, AET at levels 2 to 4 of the country's National Qualification Framework (NQF) (that is, secondary school level) delivers poorly and failure rates are known to be high. At primary school level, agriculture as a subject has been removed from the curriculum, although, it could be included indirectly through the outcomes-based education (OBE) system. Agriculture also has a negative image as a career choice in the eyes of youth in the country which affects the entire South Africa's AET programme (AET Strategy, 2005).

A framework for research-based reform of South African AET at secondary-school level

The foregoing review of literature identifies some of the key issues facing AET in sub-Saharan Africa, including South Africa. It suggests that, in order to overcome the existing AET gaps, one important element is to answer the following question: How should AET at NQF levels 2 to 4 be designed to contribute meaningfully to the advancement of the agricultural sector in South Africa in

the context of the realities discussed earlier?

This will require research that assesses various dimensions of AET in the formal educational sector in South Africa. Such research can generate information that can be used for further analytical study which could contribute to strengthening the agricultural sector in the country through quality AET that can meet internal and external demand and opportunities locally, regionally and globally. A significant part of the research would include identifying the existing gaps and factors affecting the attitude and the knowledge of students towards AET.

Factors affecting students' performance in AET

It is reported that five principle factors influence the AET process and students' achievements. These are individual, family, socio-cultural, socio-economic and situational factors.

Individual

In the school environment, the individual factors such as student competence in the medium of instructional language, study effort, the number of lectures missed, and age are the most determining factor in students' educational successes and performance and which, if addressed can have a positive effect on students' achievements (Harb and El-Shaarawi, 2006; Clabaugh and Rozycki, 1990). Research revealed that hard work, previous schooling, discipline, and self-motivation are factors that can explain differences in grades or academic performance (Harb and El-Shaarawi, 2006; Clabaugh and Rozycki, 1990). Similarly, Tay (1994) explained that student capacity and effort have a positive effect on student's performance in the school. These confirmed that individual factors have positive intervention on student performance and achievement. Identifying and controlling of these factors have a positive effect on students' success in school.

Family

Parents are the major role players in academic achievement (Alam et al., 2011)). In the teaching and learning process, family factors influence student success and school achievement. Parental expectation and aspiration, home environment and parental involvement in their child's education, such as creating conducive home environment and the consistent provision of assistance in their studies, are the main factors that could affect the student's academic achievement (Christenson et al., 1992). Kloosterman (1999) studied the effects of home environment on learners' socio-emotional and cognitive development. The author clearly showed that

the family and school environments play important roles in learners socio-emotional and cognitive development.

Emotional support, family values such as respect, strong maternal role, legacy and maintenance of the home language were identified as the most essential family factors (Kloosterman, 1999). Marks (2006) reported that both family size and family type have effect on students' academic achievement. Students from large, single-parent and re-constituted families were found to be grouped in the academically weaker categories in the school. The study also clearly showed that family types such as single-parent and reconstituted family had negative effects on student performance. These empirical studies showed that family factors can and do affect students achievement. AET programmes need to be conscious of this reality and be designed to help students overcome any negatively influencing family factors.

Socio-cultural

The socio-cultural factors have major implications in the school and student achievement. Socio-cultural factors that contribute to quality agricultural education implementation are student mobility and racial background (Cooper and Center, 1998) and social class, discriminatory language and ethnicity (Emmitt et al., 2003). Furthermore, Otsuka (2004) confirmed that student achievement varies based on their different ethnic background. Jegede and Okebukola (1989) reported that socio-cultural factors such as goal structure, the African world-view and societal expectation have significant effects on student achievement in science subjects. Students from different ethnicities have cultural differences in values, beliefs and practices. Racial differences course for the formation of difference in cultural respects and values towards education. These all have impact on a student's academic performance.

Socio-economic

Socio-economic factors are related indirectly to children's academic achievement through parental belief, income and behaviour (Davis-Kean, 2005a). Socio-economic status is estimated as an arrangement of factors including income, level of education and occupation (Boskey, 2009). Based on Davis-Kean (2005a) findings, there are three indicators that characterize family socio-economic status and structures. These indicators are parental education, parental income and family size. Furthermore, much empirical evidence shows that parental education, children's education, and earnings are strongly related to each other (Arias et al., 2004). Van Steensel (2006) showed that learners' family socio-economic status and home learning environment have noticeable effect on learners' performance. Similarly,

Davis-Kean (2005b) identified that parental education and family income as factors can explain differences in grades or performance of the students in school (Harb and El-Shaarawi, 2006). Additionally, parent education and family income determine the living condition of a student. Another factor that contributes to differences in grades and academic performance of students is how crowded the household is. The more crowded the household the poorer a student performance (Harb and El-Shaarawi, 2006; Omar et al., 2002; Rahuman and Uddin, 2009).

Situational factors in the teaching and learning process

The school environment, such as safe school environment, flexible grouping and provision of language support for learners, was found to affect academic achievement. A positive school culture including a shared vision, an orderly climate and positive reinforcement each play a crucial role in academic achievement in the teaching and learning process (Teddle and Reynolds, 2000, 2001, 2010). Killian and Baker (2006) suggested that an improvement in situational conditions in the school, namely; increased support from school administration and the reduction of student discipline problems in the school would improve student achievement. Moreover, the research results showed that lack of enforced policies and weak administration are the main sources of student stress in the school environment. Similarly, lack of connection between administration support and student discipline also create stress in the school. Higher stress leads to poorer performance (Killian and Baker, 2006).

Creemers and Kyriakides (2009) reported that the development of comprehensive school policies for teaching has stronger beneficial effects in schools where the quality of teaching at classroom level is low. Schools and educational systems that are able to identify their weaknesses in the teaching and learning process and develop a policy to address the teaching and learning environment of the school are able to improve the performance of classroom, thereby, improving the performance of the student (Creemers and Kyriakides, 2009).

The within-school factors that contribute to high quality implementation require the creation of a supportive culture for institutional change. This can be achieved by overcoming the resistance of a minority of teachers to such changes, motivating a devotion to implement the structures of a program, creating a strong school-site facilitator, devotion by teachers for handling an increased workload and securing the availability of program materials (Cooper and Center, 1998). A good match between students' learning style and instructors' teaching style will have a positive effect on students' performance

in the teaching and learning process (Clabaugh and Rozycki, 1990). However, different organizational structures in the school such as libraries, different organised educational clubs and mini-media may influence the socialization of students in the ways which may undermine as well as, support educational goals.

The school is a complex organization where decision-makers, educators, learners, parents, public education supporters interact and work in harmony in order to enhance educational success as well as individual student academic achievement (Clabaugh and Rozycki, 1990).

Factors affecting teacher's performance in AET

The agricultural education community across the world is expected to create understanding about the central role of agriculture, food, fibre, and natural resource systems. This can be achieved through strategic planning for agricultural education which in turn calls for a rich supply of highly motivated well-educated agricultural science teachers in the system to produce agricultural experts (Lashgarara, 2011). In the teaching and learning process, teachers and parents are the major role players for the success of the system (Alam and Farid, 2011).

Teachers' attitude towards teaching has an effect on their performance in the school and students success, teachers are significant role players in shaping students attitude and achievement in their study (Erawan, 2010). In addition to this, teachers have greater satisfaction when they believe that they can make positive impact on their students' academic achievements (Hoy and Miskel, 2001). Therefore, agricultural science education teachers are the main source and facilitators of agricultural science knowledge transfer in the schools. In this respect, however, the level of knowledge being acquired by students depends, in part, on the level of knowledge and attitude of their teachers (Rezaei et al., 2008a; Lashgarara, 2011).

In the school environment, teachers are the major role players in the attributed teaching and learning process for effective implementation of AET (Rezaei et al., 2008b). In teaching, job satisfaction is the attitude of a person reflecting the degree to which his/her self-esteem needs are satisfied by his/her job in relation to positive and negative contributing factors. In the teaching profession, different factors influence the teachers' job satisfaction, attitude towards teaching agricultural science and their relationships with students. These factors include student numbers, daily class time, practical schedule time, level of education, previous job experience, realistic expectations of teachers by society, burn-out levels, student-teacher ratios, the work environment and the teachers' emotional conditions. Currall et al. (2005) reported that school academic performance is positively correlated with teachers pay satisfaction, whereas, it is

negatively correlated with the average teacher's intention to give up.

Agricultural education teacher job satisfaction had been increased as the number of student taught increased each year, daily class time and level of education (Rezaei et al., 2008b). Insufficient practical teaching programs and inappropriate teacher: Student ratios in the classroom had a significant and negative relationship with agricultural teachers' job satisfaction. Similarly, Bennett (2001) and Rezaei et al. (2008b) described that the level of education and class time per day were positively related with agricultural teachers' job satisfaction. On the other hand, Iverson et al. (2004) reported that agricultural teachers with previous agricultural occupation experience had higher job satisfaction in teaching agricultural sciences. However, the absence of a positive perception of teachers by society had a negative impact on agricultural teachers' job satisfaction.

The work environment in schools, such as the behaviour of principals and the nature of communication within a school and pay satisfaction, plays an important role in shaping teachers' attitudes in the process of effective teaching (Flores, 2001; Currall et al., 2005). Likewise, Ispir (2010) further argued that, there is a significant relationship between teachers' attitudes towards the teaching profession and the burn-out levels of teachers. Croom and Moore (2003) reported that there was no significant relationship between student misbehavior and teachers' burn-out. The authors also indicated that teachers have a high degree of satisfaction when they feel they have made successful contributions to their students and the community. Similarly, Croom and Moore (2003) reported that agricultural teachers, in most cases, experience moderate levels of emotional tiredness, low levels of changing their behavior in relationships with students, colleagues and others, and a high degree of personal accomplishment in their work. An agriculture teacher's gender, academic degree, their school field preparation methods and their annual contract length do significantly influence the teacher's responses on each of the sub-scales such as the size of the school, the type of community and the size of the agricultural education department. The age and years of teaching experience of the agricultural teacher is related to emotional dissociative disorder in which there is loss of contact followed by feelings of unreality and strangeness. However, personal emotion scores were found to be significantly influenced by age and years of experience (Croom and Moore, 2003).

CONCLUSION AND RECOMMENDATION

AET is one of the most important elements for the development and achievement in the agricultural sector. It is believed that colonial and apartheid rule had a negative impact on AET in sub-Saharan Africa and South

Africa, respectively. Sub-Saharan Africa adopted integrated systems of teaching, research and extension system from developing countries. These systems are unable to fit and solve the existing problems and needs. Furthermore, limited funds, poor communication, and weak linkages between implementing agencies NEGATIVELY impact the SUCCESS of AET systems in the region. In South Africa, before 1994, the education was racially segregated and unresponsive to the needs and aspirations of the majority and their future progress. After 1994, significant effort has been made to remove access barriers to AET by investing in AET. Further, the South African agricultural science curriculum in the General Education Band was revised reputedly to reduce the gaps in the system and to broaden access. In parallel, a new AET strategy was developed to address broader aspect of the whole AET system. Despite these advancements, South African AET (as a system) and students studying the curricula (particularly at the secondary level) are not faring well. There is actually an inverse relationship between agricultural science student numbers and increase in the number of high schools in the country offering agricultural science. AET continues to struggle to deliver the quality professionals so urgently needed by South Africa's agricultural sector. In the midst of this, literature clearly showed that different factors are responsible for the success of students' performance in AET. However, further studies are required to identify factors affecting the quality of AET as a system and process. It is vital to evaluate the knowledge, attitude and AET process dimensions in formal educational sector to clearly understand the problems. This will give meaningful answers and basic information to address the shortcomings in the sector.

The review indicated that it is important to strengthen the bases of AET processes by encouraging and investing in research. This could help to identify and fill the existing gaps by providing innovative solutions that will help in the processes of designing and implementing AET policy, programmes and curricula. Moreover, quality agricultural education and training derived from an improved AET system would also significantly contribute towards sustainable agricultural development, food security and rural wealth creation.

REFERENCES

- ADF (1999). Theme 4 – Democratizing access to the Information Society. Economic Commission for Africa Accessed on 04/01/08 at <http://www.uneca.org/adf99/democratising.htm>.
- Alam MT, Farid MS (2011). Factors Affecting Teachers Motivation. *Int. J. Bus. Soc. Sci.*, 2(1): 298-304
- Anderson J (1997). Agriculture-advancing Australia, a statement by the Primary Industries and Energy Minister. Commonwealth of Australia, Canberra.
- Arias O, Yamada G, Tejerina L (2004). Education, family background and racial earnings inequality in Brazil. *Int. J. Manpow.*, 25: 355-374.
- Bennett PN (2001). The Relationship between Job Satisfaction of Agriculture Teachers in Georgia and their Risk of Leaving the Teaching Profession. Unpublished Master's Thesis, The University of Georgia, Athens, GA.
- Betru T, Hamdar B (1997). Strengthening the linkages between research and extension in agricultural higher education institutions in developing countries. *Int. J. Educ. Dev.*, 17(3), 303-311.
- Boskey E (2009). Socioeconomic Status (SES) [Online]. Available: <http://std.about.com/od/glossary/g/segsgloss.htm> [Accessed March 22 2011].
- Burger D (2011). South Africa Government Information, Education Retrieved March, 15, 2011, from <http://www.info.gov.za/aboutsa/education.htm>.
- Chapman R, Tripp R (2003). Changing incentives for agricultural extension: A review of privatized extension in practice. ODI Agricultural Research and Extension Network. Network Paper No. 132, July 2003.
- Christenson SI, Rounds T, Gorney D (1992). Family factors and student achievement: An avenue to increase students' success. *School Psychol. Quart.* 7: 178-188.
- Clabaugh GK, Rozycki EG (1990). *Understanding schools: The foundations of education*, Harper and Row.
- Coombs P (1974). *Attacking rural poverty: how non formal education can help*: Baltimore: Johns Hopkins University Press for the World Bank.
- Cooper R, Center ERI (1998). Socio-cultural and within-school factors that affect the quality of implementation of school-wide programs, Center for Research on the Education of Students Placed at Risk, Johns Hopkins University & Howard University.
- Creemers B, Kyriakides L (2009). Situational effects of the school factors included in the dynamic model of educational effectiveness. *South Afr. J. Educ.*, 29: 293-315.
- Croom B, Moore GE (2003). The relationship between teacher burnout and student misbehavior. *J. South. Agric. Educ. Res.*, 53: 262-274.
- Currall, S. C., Towler, A. J., Judge, T. A., & Kohn, L. (2005). Pay satisfaction and organizational outcomes. *Personnel Psychol.*, 58(3): 613-640.
- Davis Kean PE (2005). The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. *J. Family Psychol.*, 19: 294.
- Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: the indirect role of parental expectations and the home environment. *J. Family Psychol.*, 19(2): 294.
- Didiza T (2005). AET Strategy Launch. Speech by Honorable Minister for Agriculture and Land Affairs, Pretoria. Available at: http://www.nerpo.org.za/news_detail.asp?NID=29.
- DoA (2005a). Address by Minister for Agriculture and Land Affairs, Ms Thoko Didiza, at AgriSA Congress on 12 October 2005 in Kimberley, South Africa. Available at: (<http://www.info.gov.za/speeches/2005/05101710451001.htm>).
- DoA (2005b). Agricultural Education and Training Strategy for Agriculture and Rural Development in South Africa. Available: http://www.nda.agric.za/doaDev/sideMenu/educationAndTraining/AET_%20executive_summary.pdf [Accessed 20 February 2011]
- DoA (2006). Keynote address delivered by Honourable Minister for Agriculture and Land Affairs Ms Lulu Xingwana at the launch of the College of Agriculture and environment Sciences on 30 August 2006 at the University of South Africa, Pretoria.
- DoA (2007). Terms of Reference for the Appointment of a Service Provider to Develop an Analysis Report on Agricultural Education and Training Barriers: A Document to Service Providers.
- DoE (2008). South African National Department of Education, National Curriculum Statement Grades 10-12 (General) Learning Programme Guidelines Agricultural Sciences Retrieved 8, March, 2011, from <http://www.education.gov.za/LinkClick.aspx?fileticket=Gz%2FJlzz9mrI%3D&tabid=247&mid=595>.
- Emmitt M, Pollock J, Komescaroff L (2003). *Language variation. Language and learning: An Introduction for Teaching*. 3rd Edn Oxford University Press.
- Erawan P (2010). A Path Analysis for Factors Affecting Pre-service Teachers' Teaching Efficacy in Thailand.
- Flores MA (2001). Person and context in becoming a new teacher. *J.*

- Educ. Teach., 27(2): 135-148.
- Harb N, Ahmed E (2006). Factors Affecting Students' Performance. *J. Bus. Educ.*, 5(82): 282-290.
- Hoy WK, Andmiskel CG (2001). *Education Administration: Theory, research and practice*, 6th ed., McGraw Hill, New York, NY.
- Ispir OA (2010). Teachers' Burnout Levels And Their Attitudes Towards Teaching Profession. *EABR & ETLC Conference Proceedings*, pp 229-233.
- Iverson MJ, Rohs FR, Langone CA, Edwards MC (2004). Job Satisfaction of Agriculture Teachers in Georgia and Selected Variables Indicating Their Risk of Leaving the Teaching Profession.
- Jegede OJ, Okebukola PA (1989). Some socio-cultural factors militating against drift towards science and technology in secondary schools. *Res. Sci. Technol. Educ.*, 7(2): 141-151.
- Killian JN, Baker VD (2006). The effect of personal and situational factors in the attrition and retention of Texas music educators. *J. Music Teach. Educ.*, 16: 41-51.
- Kloosterman VI (1999). *Socio-Cultural Contexts for Talent Development: A Qualitative Study on High Ability, Hispanic, Bilingual Students*.
- Koroma M (2003). Reshaping Extension Education curricula For 21st century Agricultural Development in Sub-Saharan Africa.
- Lashgarara F (2011). A study on Required Characteristics of Effective Teachers in Entrepreneurship Education in Iran. *J. Am. Sci.*, 7: 146-150.
- Marks G (2006). Family size, family type and student achievement: Cross-national differences and the role of socioeconomic and school factors. *J. Comp. Family Stud.*, 37(1): 1-24.
- Morrow W, King K (1998). *Vision and reality: Changing Education and Training in South Africa*. 1st Edition, ISBN: 1919713271, Juta Academic. pp 1-304.
- Murwira K, Hagmann J, Chuma E (2001). Mainstreaming participatory approaches to SWC in Zimbabwe. In: Reij C and Waters-Bayer A (eds.) (2001). *Farmer innovation in Africa: a source of inspiration for agricultural development*. Earthscan, London, UK. Pp. 300-309.
- Naido K (2011). *Agricultural Educational Training in South Africa*. ASAAE Conference, Jewish Conference Center. Durban, South Africa, February 18-20.
- NIOSH (1999). A Model for Research on: Training Effectiveness [Online]. Available: <http://mpr.a.ub.uni-muenchen.de/13621/> [Accessed March 31 2011].
- Oberle SL, Keeney DR (1990). "A Case for Agricultural Systems Research", *J. Environ. Qual.* 20: 4-7
- Omar A, Gustavo Y, Luis T (2002). Education, Family Background and Racial Earnings Inequality in Brazil. 7:1-28.
- Otsuka, S. (2004). Cultural influences on academic achievement in Fiji. Pacific Service Region–American Samoa, US Territory. Retrieved on November, 11.
- Rahuman UA, Uddin S (2009). Statistical Analysis of Different Socio Economic Factors Affecting Education Of N-W.F.P (Pakistan). *J. Appl. Quant. Methods*, 4: 88-94.
- Rezaei A, Rezvanfar A, Akbari M, Hassanshahi H (2008a). XML Job Satisfaction of Agricultural Education Teachers in Yazd Province of Iran.
- Rezaei A, Rezvanfar A, Akbari M, Hassanshahi H (2008b). Job Satisfaction of Agricultural Education Teachers in Yazd Province of Iran. *J. Agric. Sci. Technol.*, 10: 431-438.
- Rivera WM (2008). Three (Post-secondary Agricultural Education and Training) Challenges and the Concept of 'Workforce Education Systems'. *J. Agric. Educ. Ext.*, 14: 53-68.
- Roling N (2009). Innovation Africa. Conceptual and methodological developments in innovation. In, 2009. Earthscan in the UK and USA.
- SAQA (2003). South African Qualification Authority [Online]. Available: <http://www.saqa.org.za/> [Accessed].
- Spielman DJ, Ekboir J, Davis K, Ochieng CMO (2008). An innovation systems perspective on strengthening agricultural education and training in sub-Saharan Africa. *Agric. Syst.*, 98: 1-9.
- Subedi BS (2004). Emerging trends of research on transfer of learning. *Int. Educ. J.*, 5(4): 591-599.
- Sundstøl F (2004). *Poverty Reduction Strategies and Relevant Participatory Learning Processes in Agricultural Higher Education*. Ås: Agricultural University of Norway.
- Teddlie C, Reynolds D (2000). *The international handbook of school effectiveness research*. London: Falmer Press.
- Teddlie C, Sammons P (2010). Applications of Mixed Methods to the Field of Educational Effectiveness Research, In B. P. M. Creemers, L. Kyriakides and P. Sammons (Eds.). *Methodological Advances in Educational Effectiveness Research*. Taylor Francis.
- Teddlie C, Reynolds D (2001). Countering the critics: Responses to recent critics of school effectiveness research. *School Effectiveness and School Improvement*. 12: 41-82.
- Van Steensel R (2006). Relations between socio-cultural factors, the home literacy environment and children's literacy development in the first years of primary education. *J. Res. Read.*, 29(4), 367-382.
- Wallace I (1997). Building better learning systems through the development of formal/non-formal linkages in agricultural and rural education. *Education and development: Tradit. Innov.*, 4: 117-125.
- Wallace I, Mulhall A, Taylor P (1996). *Developing a Research Framework for Improved Policies for Agricultural Education and Training in Sub-Saharan Africa: Report of an International Consultation held at Reading, UK*.
- Worth S (2006). Agriflection: a learning model for agricultural extension in South Africa. *J. Agric. Educ. Ext.* 12: 179-193.