

## The Attitude of High School Agricultural Science Teachers towards Agricultural Education Training in South Africa

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**ABSTRACT** The aim of this paper was to determine the attitude of Agricultural Science teachers toward Agricultural Education and Training (AET). The Nested Concurrent Mixed Sampling Design was employed. A multi-stage random purposeful sampling procedure was implemented to select the 180 agricultural science teachers. Over 91 percent of the teachers had a positive attitude towards teaching professions, further studies in Agricultural Sciences, Agricultural Science qualifications, their contribution to students achievement, models teacher character, job and entrepreneurial opportunities, agricultural career success and AETs' contribution to future economic development. Seventy-four percent of the respondents had positive attitude towards teaching aids, availability laboratory and field or farm for practice and additional relevant support. The analysis of the pooled data displayed that 88 percent of the teachers had positive attitude towards AET. Teachers who have the agricultural science qualification had the highest positive attitude towards AET. The responsible body should focus on in-service agricultural science teachers training programs, to upgrade teachers for efficient agricultural science curriculum delivery and efficient student's outcome.

### INTRODUCTION

The quality and availability of skilled manpower determine the sustainability of well-being of a community. Education is a means for ensuring the continuity of economic and social development in developed and developing countries (International Labour Organization 2011; Kidane and Worth 2014a). To secure environmentally-friendly and sustainable agriculture sector development, Agricultural Education and Training (AET) should be able to make skilled manpower available in the market (Vandenbosch 2006; Atuland Kumar 2014). Teachers play a major part in preparing and producing well-trained professionals in various areas of agriculture and science (Bruner 2009). Teachers' attitudes towards AET need to be assessed to address the changing needs and new challenges in the demanding, fast-changing and developing economy (Kumar and Kashyap 2012).

Trained agricultural science manpower with the required levels of competencies could introduce innovative technologies, as well as build the capacity of farmers to use the technologies (Antholt 1994; Watkins and Verma 2008; Khardel et al. 2014). The consistently growing demand for high agricultural productivity and the scarcity of natural resources needs a new agricultural

science paradigm shift to improve the existing agricultural production, food processing and post-harvest sectors (Khardel et al. 2014; Saikia 2014; Atuland Kumar 2014). AET is the source for the required manpower to introduce modern agriculture and technologies, such as genetics and agricultural biotechnology (Madan 2005). Today, many governmental and non-governmental organizations are investing and increasing school participation (Bregman and Bryner 2003).

In the teaching and learning process, teachers are the major role-players in shaping learner behavior for the future success and development of the agriculture sector. The role of teachers in secondary schools is the most important, when imparting a required level of agricultural science knowledge and skills to the students. Literature shows that levels of motivation and the attitude of teachers are important, as they directly affect the student's perception, knowledge and skill (Alam and Farid 2011; Kumar and Kashyap 2012).

Behavioural studies, including the attitude of teachers towards AET, are important to generate primary information directly from the educators (Grossman et al. 2007). This can only be achievable by generating the background information on the attitude and linkages that are useful for the effective delivery of AET curriculum

at secondary schools, which was also recommended by (Spielman et al. 2008; Kidane and Worth 2014a, 2014b). Within this context, this study was designed to identify the attitude of teachers towards AET, in South Africa.

### **Purpose**

The primary purpose of this paper was to determine the attitude of high school Agricultural Science teachers, towards AET in the context of their interest in Agricultural Science qualifications, their contribution to students' achievement, models teacher character, agricultural career success and entrepreneurial opportunities and achievements. The question that was used to guide the study was: What is the attitude of the secondary schools agricultural science teachers towards AET?

### **Objective**

The objective of this study was to determine the attitude toward AET among high school agricultural science teachers that are teaching in the province of KwaZulu-Natal, South Africa towards AET.

## **METHODOLOGY**

### **Source of Data and Sampling Design**

The study area, KwaZulu-Natal Province, is one of the nine provinces in South Africa. The province is located in the eastern part of South Africa. For this study, due to the homogeneity and the nature of the sample, 180 high school agricultural science teachers were used. A multi-stage random sampling technique was used to select the 180 teachers. These teachers were selected from the teacher population that was actively involved in teaching Agricultural Science lessons during the 2012 academic year. The Nested Concurrent Mixed Sampling Design (NC-MSD) was used in this study (Johnson and Christensen 2012). The quantitative and qualitative data were collected almost at the identical occasion (that is, concurrently), but the qualitative sample was employed as a subset of the quantitative sample (that is, nested relation). The data were collected in the presence of the researcher. The response rate of this sample was 97 percent.

### **Data Collection and Analysis**

This study was carried out in two stages, using qualitative and quantitative data collection methodologies. Quantitative data were collected using a pre-tested structured interview schedule. Qualitative data were collected from respondents, using an open-ended questionnaire, observation and interviews. The qualitative data was analysed using a spiral; content analysis. The quantitative data was analysed using descriptive statistics, such as percentage and chi-square. The survey data were analysed using the Stata Statistical Software computer package. Both primary and secondary data were gathered during the data collection from teachers engaging in teaching at different secondary schools in the province during the 2012 academic year.

### **Attitude Measurement**

Attitude is used to understand and predict people's reactions to an object or change and how behavior can be influenced (Fishbein and Icek 1975). Attitude is created due to the direct exposure to a given object or idea (Ahmed et al. 2012; Beyene and Tizazu 2010). For the purpose of this study, the focus of this parameter was the attitude of educators towards AET. In this case, attitude is the degree of positive or negative attitude of teachers towards AET. Measuring teachers' attitudes towards AET was achieved largely through structured survey questionnaire using Likert Scale. The Likert Scale was selected due to the real strength and simplicity of the scale (Neuman 2000).

The attitude of a respondent was measured by adding the total scores obtained for the total item in the scale, by attributing 5-score for 'strongly agree', 4-score for 'agree', 3-score for 'undecided', 2-score for 'disagree' and 1-score for 'strongly disagree' responses in the case of positive items. Fourteen statements containing an equal number of favorable and unfavorable statements were prepared (McIver and Carmines 1981). These were developed after they had been commented on by a panel of experts. Pre-testing was conducted before the actual data collection. This was carried out to look at the relevancy of the selected items. The relevancy test was conducted, using Cronbach's Alpha (Gliem and Gliem 2003). As a rule of thumb, the items with

the total correlation result less than 0.40, were excluded from the scale (Gliem and Gliem 2003). The pre-testing of the structured interview was conducted before the actual data collection. The total scores were calculated by adding individual scores that each respondent obtained for all statements. For pooled data the total scores of attitude varied from 10 to 50. For the descriptive analysis three categories were employed: Low (10-23), Medium (24-37), and High (38-50). For the grouped data category, Low is equal to the number of attitude statements in that group, and High is equal to the number of attitude statements times five (5) which is the highest score on the Likert scale. Low, Medium and High were calculated by dividing the gap between High and Low by three and grouping accordingly. The Cronbach's alpha liability coefficient was 0.8. This shows that the scale has good internal consistency of the items in the scale (Gliem and Gliem 2003).

Cronbach's Alpha was calculated to test and to look at the internal consistency, reliability for scale and sub-scales (Gliem and Gliem 2003).

The standardized Cronbach's Alpha can be calculated from the following equation:

$$\alpha \text{ standardized} = \frac{Kr}{(1+(K-1)\bar{r})}$$

Where

$K$  = is the number of components ( $K$ -items),

$\bar{r}$  = the mean of the  $K(K-1)/2$ .

$A$  = alpha is a coefficient of reliability

Based on the Cronbach's alpha values, ten items were identified, selected and further used in the final data analysis. The total Cronbach's

alpha reliability coefficient result was found to be 0.73 (Table 1). A high Cronbach's alpha, which means that the reliability coefficient nearer to one indicates that there is good internal consistency of the items in the scale (Gliem and Gliem 2003).

## RESULTS AND DISCUSSION

### Descriptive Analysis of Survey Data

Based on the descriptive statistical analysis in Table 2, the respondents' population consisted of 56.7 percent (102) male teachers and 43.3 percent (78) female teachers. In terms of educators teaching experience, 26.1 percent (47), 26.7 percent (48), 23.9 percent (43), 12.2 percent (22), 8.9 percent (16) and 2.2 percent (4) of the educators had teaching experience in the ranges of 1-5, 6-10, 11-15, 16-20, 21-25, or >25 years, respectively. In terms of teachers' area of qualification or specialisation, 40 percent (72), 45 percent (81) and 15 percent (27) of the respondents' population had qualification in agriculture, life science and social science, respectively. Forty percent (72) of the teachers replied that they had opportunities to participate in short-term training that were related to agricultural education, while the majority of respondents (60%) indicated that they had no opportunity to participate in short-term training with relevance to AET (Table 2). Half of the population of teachers had less ( $P \leq 0.05$ ,  $\chi^2 = 57.3$ ) than five years teaching experience. Sixty percent of the respondents did not have agricultural science qualification and did not participate in agricultural science short-term

**Table 1: The attitude of teachers' towards AET (n = 180)**

<i>Attitude statements</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Cronbach's alpha if item deleted</i>
1. I love teaching professions.	4.38	0.923	0.718
2. I want to pursue further studies in Agricultural Sciences.	4.49	0.822	0.709
3. Relevant qualifications are necessary to teach Agricultural science.	4.57	0.733	0.704
4. Agricultural training leads to better job and entrepreneurial opportunities.	4.61	0.735	0.709
5. Agricultural Education is important for career success and achievements	4.60	0.744	0.723
6. Agricultural Education is important for the future of the country.	4.23	1.354	0.706
7. Teaching aids, laboratory and field practice are important to teach	4.53	0.828	0.694
8. I am doing my best to change the student future in agricultural education	4.44	0.898	0.715
9. I am a responsible exemplar teacher for my agricultural education students.	4.38	0.741	0.688
10. Agricultural Educational and Training lacks relevant support from the responsible body for the better achievement.	3.48	1.275	0.702

Cronbach's Alpha = 0.73

**Table 2: Summary of descriptive statistics for explanatory variables (n = 180)**

<i>Variable definition</i>	<i>Symbol</i>	<i>Mean (Std)</i>	$\chi^2$
Male	AM	0.567 ( $\pm 0.496$ )	3.200
Female	AF	0.433 ( $\pm 0.497$ )	
Age 20-29 years	AGE1	0.311 ( $\pm 0.464$ )	30.08 <sup>(1)</sup>
Age 30-39 years	AGE2	0.339 ( $\pm 0.475$ )	
Age 40-49 years	AGE3	0.272 ( $\pm 0.446$ )	
Age 50-59 years	AGE4	0.078 ( $\pm 0.268$ )	
Racial background African	RBG1	0.833 ( $\pm 0.374$ )	327.067 <sup>(1)</sup>
Racial background White	RBG2	0.056 ( $\pm 0.230$ )	
Racial background Coloured	RBG3	0.072 ( $\pm 0.259$ )	
Racial background Indian	RBG4	0.039 ( $\pm 0.193$ )	
Teaching experience 1-5 years	TEY1	0.261 ( $\pm 0.440$ )	57.267 <sup>(1)</sup>
Teaching experience 6-10 years	TEY2	0.267 ( $\pm 0.443$ )	
Teaching experience 11-15 years	TEY3	0.239 ( $\pm 0.428$ )	
Teaching experience 16-20 years	TEY4	0.122 ( $\pm 0.328$ )	
Teaching experience 21-25 years	TEY5	0.089 ( $\pm 0.285$ )	
Teaching experience >25 years	TEY6	0.022 ( $\pm 0.148$ )	
Qualification certificate	QLN 1	0.189 ( $\pm 0.393$ )	171.033 <sup>(1)</sup>
Qualification diploma	QLN 2	0.783 ( $\pm 0.413$ )	
Qualification degree	QLN 3	0.028 ( $\pm 0.1648$ )	
Area of specialization Agricultural Science	AOS 1	0.400 ( $\pm 0.491$ )	27.900 <sup>(1)</sup>
Area of specialization Life Science	AOS 2	0.450 ( $\pm 0.498$ )	
Area of specialization Social Science	AOS 3	0.150 ( $\pm 0.358$ )	
Library resources (Yes)	LIB 1	0.056 ( $\pm 0.230$ )	142.222 <sup>(1)</sup>
Library resources (No)	LIB 2	0.944 ( $\pm 0.228$ )	
Access to a farm (Yes)	AF 1	0.256 ( $\pm 0.437$ )	43.022 <sup>(1)</sup>
Access to a farm (No)	AF 2	0.744 ( $\pm 0.437$ )	
Access to internet (Yes)	IA 1	0.261 ( $\pm 0.441$ )	41.009 <sup>(1)</sup>
Access to internet (No)	IA 2	0.739 ( $\pm 0.441$ )	
Heavy teachers' workload (Yes)	TWL 1	0.556 ( $\pm 0.498$ )	2.222
Heavy teachers' workload (No)	TWL 2	0.444 ( $\pm 0.498$ )	
High social value (Yes)	SV 1	0.522 ( $\pm 0.501$ )	0.356
High social value (No)	SV2	0.478 ( $\pm 0.501$ )	
Correct teacher-student ratio (Yes)	TSR1	0.339 ( $\pm 0.475$ )	18.689 <sup>(1)</sup>
Correct teacher-student ratio (No)	TSR2	0.661 ( $\pm 0.475$ )	
Salary satisfaction (Yes)	TSS1	0.400 ( $\pm 0.491$ )	7.200 <sup>(2)</sup>
Salary satisfaction (No)	TSS2	0.600 ( $\pm 0.491$ )	
Satisfactions on the school ministration (Yes)	TS1	0.739 ( $\pm 0.441$ )	41.089 <sup>(1)</sup>
Satisfactions on the school administration (No)	TS2	0.261 ( $\pm 0.441$ )	
Satisfactions on nature of school communication (Yes) (Yes) (Yes)	SNC 1	0.717 ( $\pm 0.452$ )	33.800 <sup>(1)</sup>
Satisfactions on nature of school communication (No)	SNC 2	0.283 ( $\pm 0.452$ )	

Significant at: (1) = ( $P \leq 0.01$ ), and (2) = ( $P \leq 0.05$ )

training. This implies that the majority of agricultural science teachers' respondents who were currently teaching agricultural science at high schools are offering the subject using their natural or social sciences qualification. In the education system, having qualified and experienced teachers is important to produce competent students. Literature also shows that teachers with relevant qualifications and experience could have an effect on student achievement (Croninger et al. 2007).

In terms of practical education and an availability of fields for practicals, 25.6 percent (46) of the total respondent indicated that there was

a farm or field for practicals in their respective schools. Seventy-four percent (134), on the other hand, responded that there was no field or farm for Agriculture Science practicals in their respective schools (Table 2). Concerning the availability of laboratories, it was found that only 2.2 percent (4) of the sample teachers' positively responded that their schools had a laboratory to support theoretical teaching agriculture, whereas, interestingly a quite high percentage (97.8%) out of 176 teachers indicated that they were teaching agricultural science at secondary schools without supporting the theoretical lessons with practice due to the unavailability of

laboratories in their respective schools. The results of this study demonstrated that high schools were delivering the subject without provision of sufficient teaching aids, infrastructure and support to deliver the agricultural science curriculum. This could have a commendable effect on the knowledge and skill shortcoming in the expected output of knowledge and skills when training efficient productive manpower for the agricultural industry (Hofstein and Lunetta 2004). This might also have an impact on the preparedness of high school students who are taking pathway to agriculture studies in higher education.

Regarding the teachers evaluation in terms of the teaching learning process, 50.6 percent (91), 32.6 percent (57) and 18.3 percent (32) of the respondents' reported that they were assessed once in each term, once in a year or more than one visit in each term respectively (Table 2). This assessment was carried out by different stakeholders, which might still need more detailed studies.

Fifty percent (90) of the teachers' responded that they have specific departments for each one of the major subjects that their schools offer. The other half (50%) of the population of Agricultural Science teachers' indicated that there was no departmentalization in the structure for each major subject that they are currently delivering in their respective schools (Table 2). The lack of a mechanism for evaluation and departmentalization in the schools could have a certain level of an influence on delivery of AET. Evaluation and departmentalization have strong support in the teaching and learning process. The teachers' evaluation could help in improving instruction and teachers can be held accountable for their performance and their outcomes (Milanowski et al. 2004).

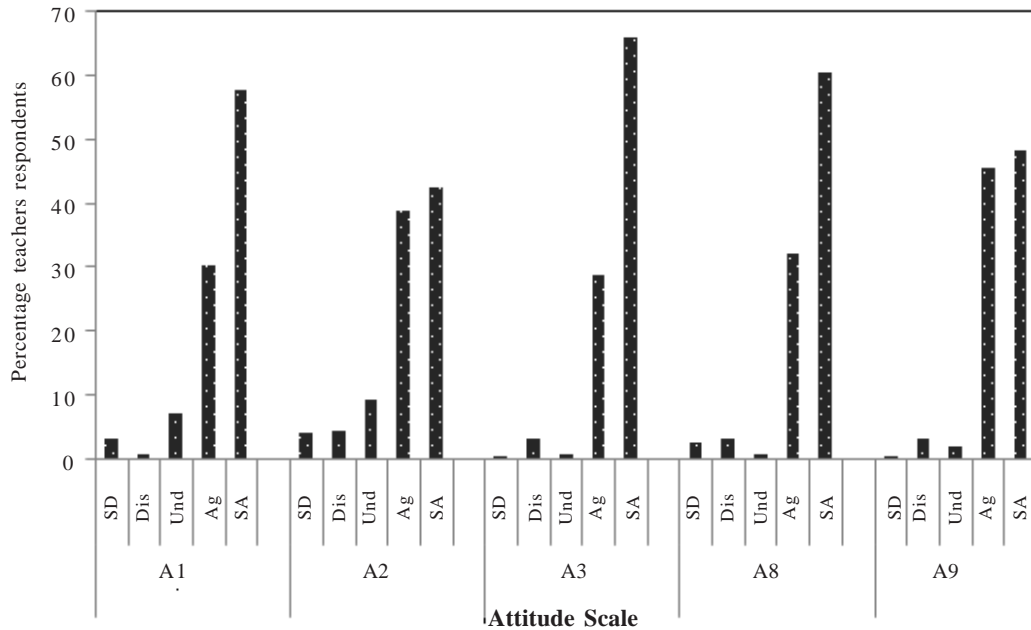
The teacher to students' ratio is also reported to be a good indicator of quality at secondary schools (Lee and Barro 2001). In this study, 33.9 percent (61) of the teachers believed that their respective schools had an appropriate teacher-student ratio. While 66.1 percent (119) of the teacher population indicated that the current teacher-student ratio in their respective schools is not in line with the recommended teacher-student ratio (Table 2). The majority of educators indicated that there was an unbalanced student-teacher ratio. The lower student-teacher ratio may lead to the effective use of school

resource inputs and produce a higher level of academic achievement (Dahar et al. 2009). Similarly, Katie et al. (2003) reported that a manageable minimized ratio has its own positive effect on learners' attitude and achievement. Hence, there is a need to create and manage a student-teacher ratio, in order to improve the teaching and learning environment and thereby upgrade the quality of learning outcome.

### **Attitude of Teachers towards AET as Career, Profession and Responsibility**

As shown in Figure 1, over 90 percent of the teachers agreed that relevant qualifications are vital to teach Agricultural Science. They were responsible exemplar teacher and doing their best to make change on their student's achievement. Over 80 percent of the teachers indicated that they love teaching Agriculture Science as a profession and plan to pursue their further studies in the field of agriculture. The results in Figure 1 show that teachers have a favorable attitude towards AET, qualification and goals in their profession. Efficient Agricultural Science curriculum delivery needs teacher's relevant skill and knowledge in the area. It was evident from the qualitative data that teacher's qualifications in Agricultural Science empowers them to become more innovative and engaged in combining theory and practice during the subject delivery. Competency and relevant qualifications play an important role in enhancing the quality of Agricultural Science teaching to produce manpower at the required level of competency (Osborne et al. 2003). Teachers' qualifications and school inputs availability have a significant effect on the students' attitude towards AET and their academic achievement (Darling-Hammond 1999). Good school outcomes and improved learner's perceptions towards the subject requires comprehensive knowledge, unshakable convictions and a high level of pedagogical skill (Boyd et al. 2006; Gay 2010). Teachers with the required knowledge and skills could create and stimulate student interest and engagement in subject delivery. The attitude of learners was influenced positively with qualifications of teachers and the quality of Agriculture Science delivery, while the inverse is true with teachers having qualifications in other natural or social science areas (Boyd et al. 2006; Osborne et al. 2003). Agricul-





**Fig. 1.** Teachers' attitude towards AET. SD: strongly agree; DI: Disagree; UND: Undecided; AG: Agreed; and SA: Strongly Agreed. A1: I love teaching professions. A2: I want to pursue further studies in Agricultural Sciences. A3: Relevant qualifications are necessary to teach Agricultural Science. A8: I am doing my best to change the student future in agricultural education and A9: I am a responsible exemplar teacher for my agricultural education

tural Science teachers with desired knowledge and skill in their subject matter could be innovative in combining theory with practicals under farm or field conditions or in a controlled laboratory. At present the majority of educators are teaching agricultural science without having a relevant qualification. Desouza et al. (2004) and Boyd et al. (2008) found that the teacher's qualifications have an effect on the school outcomes. Teaching agricultural science subjects based on teachers experience without the Agricultural Science qualification could affect school and student outcomes. Similarly, the qualitative data indicate the need for short and long-term training in agricultural science to upgrade the educators' knowledge to handle both theoretical and practical lessons. Likewise, the data presented in Figure 1 show that agricultural science teachers have a favorable attitude towards AET and they love their profession and are willing to participate in agricultural science teacher training and skills upgrading.

The data presented in Table 3 displays that 91.1 percent and 8.9 percent of high school ag-

**Table 3: The attitude of teachers towards AET as career, profession and responsibility**

Variable	Attitude	f	%	$\chi^2$
Agricultural science profession (A1, A2, A3, A8 and A9)	High	164.0	91.1	121.7***
	Medium	16.0	8.9	
	Low	0.0	0.0	
	Total	180	100	

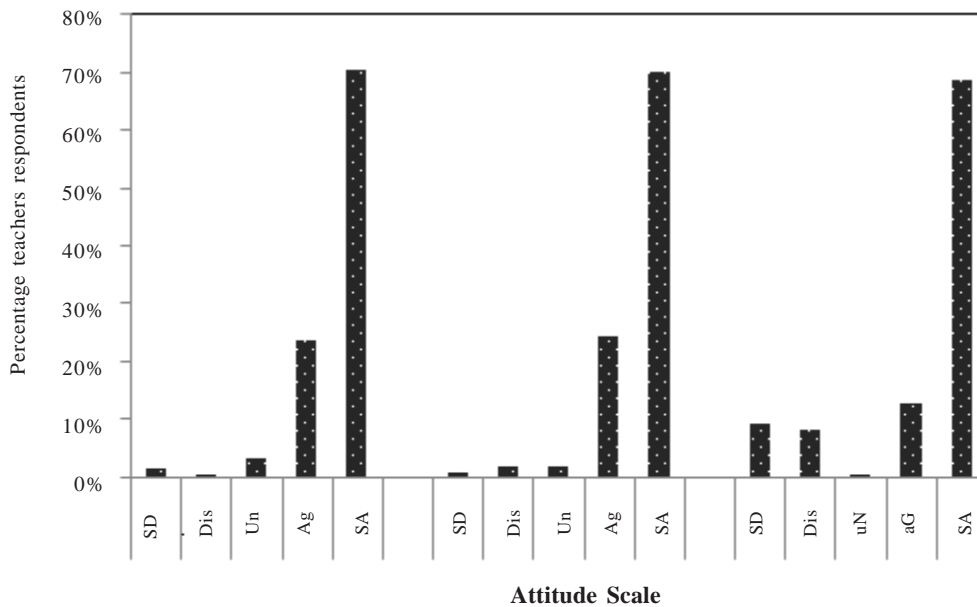
\*\*\* significant at  $P \leq 0.01$ . A1: I love teaching professions; A2: I want to pursue further studies in Agricultural Sciences; A3: Relevant qualifications are necessary to teach Agricultural Science; A8: I am doing my best to change the student future in agricultural education; and A9: I am a responsible exemplar teacher for my agricultural education.

ricultural science teachers were found to be in the high and medium attitude categories, respectively. There were no respondents in the low attitude category. Thus, the vast majority of agricultural science teachers have high and favourable attitudes towards teaching Agriculture Science, agriculture as a career choice, and the importance of having relevant qualifications, personal good character and the overall importance

of AET for future advancement. In summary, the data shows that, in general, agricultural science teachers have favourable high attitude towards AET, such as their profession, a need for qualifications, their teaching outcome consequences and personal good character in the teaching learning process. High and favourable agricultural science teacher's attitudes could have an important effect on the teaching outcomes and process. Kennedy and Kennedy (1996) found that teaching is a complex process involving several factors, the main one being the role of favourable teachers' attitude towards teaching. Teachers play a considerable role in the implementation of AET curricula at secondary school level. Their attitude towards agricultural AET has an impact on the student's achievement and agricultural sectors future development. Student achievement could also be influenced by the areas of the teachers' qualifications and experience (Sanders and Rivers 1996). Quality AET curriculum delivery could have an influence on the production of skilled youth, which could play important part in food self-sufficiency, poverty alleviation and job creation; these are the positive aspects of the findings of this study.

**Attitude of Teachers towards AET Related Job Opportunities and Career Choice**

The results showed that 94.5 percent, 94.4 percent and 81.7 percent of the secondary school teachers' responded that there are potential of agriculture jobs, entrepreneurial opportunities in the field of agriculture and AET contribution for the future development of the country, respectively (Fig. 2). This implies that teachers had a positive perception towards the importance of AET for job and entrepreneurial opportunities. Cognitive and emotional identities of teachers towards AET jobs and entrepreneurial opportunities could have a significant effect on a student's cognitive and emotional ability towards job creation and entrepreneurship. The educator's favorable attitude plays an important role in preparing learners to develop workplace skills and to prepare for self-employment in the agriculture sector and could ultimately contribute positively towards job creation and poverty reduction in the country (Dailey et al. 2001). In the teaching and learning process, having entrepreneurship intention, attitude and content



**Fig. 2. Teachers' attitude towards job and entrepreneurial opportunity.**SD, strongly disagree; Dis, disagree; Un, undecided; Ag, Agree; SA, Strongly Agree. A4: Agricultural training leads to better job and entrepreneurial opportunities. A5: Agricultural Education is important for career success and achievements in life. A6: Agricultural Education is important for the future of the country

were shown to have a significant influence on a student's self-employment intentions and job creation (Emmanuel et al. 2012; Atul and Kumar 2014). Teacher's favorable high attitude towards entrepreneurship and job creation was found to be positive aspect, which needs further study in curriculum content evaluation in delivery process at secondary schools.

**Table 4: Teachers' attitude towards job and entrepreneurial opportunity arising**

Variable	Attitude	f	%	$\chi^2$
(A4,A5 and A6)	High	165	92.0	125.0***
	Medium	15	8.0	
	Low	0	0	
	Total		180	

\*\*\*significant at  $P \leq 0.01$ . A4: Agricultural training leads to better job and entrepreneurial opportunities. A5: Agricultural Education is important for career success and achievements in life. A6: Agricultural Education is important for the future of the country.

Table 4 presents the details and summary of teacher attitude towards the role of AET from the job, entrepreneurial and development aspects. The majority of high school agricultural science teacher 165 (92%) respondents had high favorable attitude towards the role of AET in job creation, entrepreneurial opportunities and contribution to the future development of the country. Only 15 (8.3%) of the respondents was found to be in the medium attitude category with none in the low attitude category. This demonstrated that the majority of high school agricultural science educators had favorable high perception towards AET roles in creating job and entrepreneurial opportunities, career success and achievements, as well as the future of the countries development.

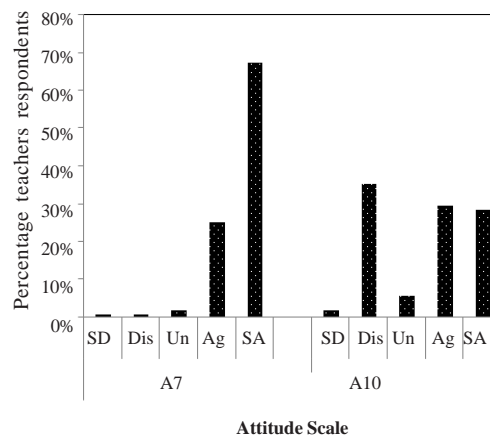
The teacher's highly favourable attitude should be coordinated with the interrelated theoretical and practical entrepreneurial curriculum content and delivery. Coordinating educator's a favourable job and entrepreneurial attitude with efficient curriculum delivery could encourage the development of Agricultural Science student's entrepreneurial skills and self-reliance (Henderson and Robertson 2000; Maina 2014).

In South Africa and other developing countries, agricultural development could increase GDP by improving export earnings and unemployment. In the heart of high inequality and unemployment, producing a younger agricultural student population with a favourable entre-

preneurial attitude could contribute positively to the economic transformation of the country.

### Attitude of Teachers towards Teaching Aids and Support

Ninety-two percent of the high school Agricultural Science educators agreed to the statement that "teaching aids, laboratory and farm or field practice is important to teach agricultural sciences" (Fig.3). Teachers suggested that to implementing agricultural science curriculum practical's is the main component to complement the theoretical lessons. However, the challenge was associated with the availability of fields or farms, to deliver agricultural science more meaningfully. Agricultural science involves as interplay between theoretical and practical teaching. Practical teaching in agricultural science could help students to develop links between theoretical concepts and practical teaching. The educators' qualitative response showed the need for short or long-term trainings to upgrade theoretical and practical knowledge and skills in agriculture sciences. Agricultural science teachers' qualifications and teaching experience could result in agricultural science students' achievements (Yeh and Santagata 2015; Croninger et al. 2007; Darling-Hammond 1999). AET theoretical



**Fig. 3. Teachers attitude towards teaching aids and relevant teaching and learning support.**SD, strongly disagree; Dis, disagree; Un, undecided; Ag, Agree; SA, Strongly Agree. A7: Teaching aids, laboratory and field practice are important to teach, and A10: Agricultural Educational and Training lacks relevant support from the responsible body



presentation should be supported by practical lessons. Students might learn theoretical ideas from what they did and observed in the field or laboratory. Theoretical teaching, in collaboration with practice, could maximize the effectiveness of teachers and assist in implementing the agricultural science curriculum in a more effective and meaningful way. The teacher's attitude towards teaching aids and relevant support indicates the teacher's positive attitude towards acquisition of skills in agricultural lesson. Teachers could implement the presentation of theory mixed with actual field practice. Teacher's instruction approach determines student school achievement and achievement in life.

Figure 3, displays the summary of agricultural science teacher respondents' attitude towards the importance of teaching aids, laboratory and field practice and a lack of relevant support to teach agriculture. The result indicates that 57.7 percent of respondents agreed to the statement "AET lacks relevant support from the responsible body". The minorities of respondents (42.3%) either disagreed or were undecided about the statement that states "AET lacks relevant support from the responsible body". 36.7 percent of agricultural science teachers disagree with the statement that "AET lacks relevant support from the responsible body". This implies that 36 percent of teachers indicates that the availability of relevant support from the responsible body. This indicates what the agricultural science teachers believe about the nature of agricultural science curriculum delivery and what they require to deliver it. High school agricultural science teachers must have subject methodological knowledge and experience to recognize the type and source of support (McComas et al. 2002; Clotfelter et al. 2007; Yeh and Santagata 2015). Their methodological and pedagogical knowledge depends on the relevancy between the subjects they deliver and the type of qualification they have (Singh and Sarkar 2015; Yeh and Santagata 2015). As shown in Figure 4, the variation of Agricultural Science teachers' responses was based on the type of qualification they have.

AET as a vocational science depends on the support that assists its effective delivery during the teaching and learning process. Eighty-one percent, 34.6 percent and 66.6 percent, of agricultural science teachers with the educational background in agricultural science, life science and social science, respectively, responded that they

agreed to the attitude statement which states "AET lacks relevant support from the responsible body", as shown in Figure 4. The minority of respondents, 6.9 percent, 65.5 percent and 29.6 percent of agricultural science educators with the educational background in agricultural science, life science and social science, respectively, perceived that they disagree with the statement "AET lacks relevant support from the responsible body". The majority of agricultural science high school teachers' with agricultural science qualifications believed that the agricultural science lesson needs more support to implement the curriculum effectively, by properly combining theory and practice, which is in agreement with the nature of AET.

As indicated in Figure 4, 100 percent, 80 percent and 96.2 percent of teachers with agricultural science, life science and social science qualifications had a favorable attitude towards an importance of teaching aids and support to deliver of AET curriculum. Having qualifications improves and helps teachers to recognize what support they need to effectively implement the curriculum. Using school resources, teaching infrastructure and support are positively related to school outcomes and changes in social capital, which is students' achievement and effective implementation of curriculum (Greenwald et al. 1996; Kidane and Worth 2014b).

**Table 4: Teachers' attitude towards job and entrepreneurial opportunity arising**

Variable	Attitude	f	%	$\chi^2$
(A4, A5 and A6)	High	165	92.0	125.0***
	Medium	15	8.0	
	Low	0	0	
	Total		180	

\*\*\*significant at  $P \leq 0.01$ . A4: Agricultural training leads to better job and entrepreneurial opportunities. A5: Agricultural Education is important for career success and achievements in life. A6: Agricultural Education is important for the future of the country.

Based on the total attitude score data presented in Table 5, 74.4 percent, 19.4 percent, and 6.1 percent of agricultural science teachers have high, medium and low attitude towards teaching aids and relevant support to teach agricultural science at high school level, respectively. There was a significant difference between the percentages of respondents in the three attitude categories. Generally, the majority of the respondents had favourable high attitude towards the

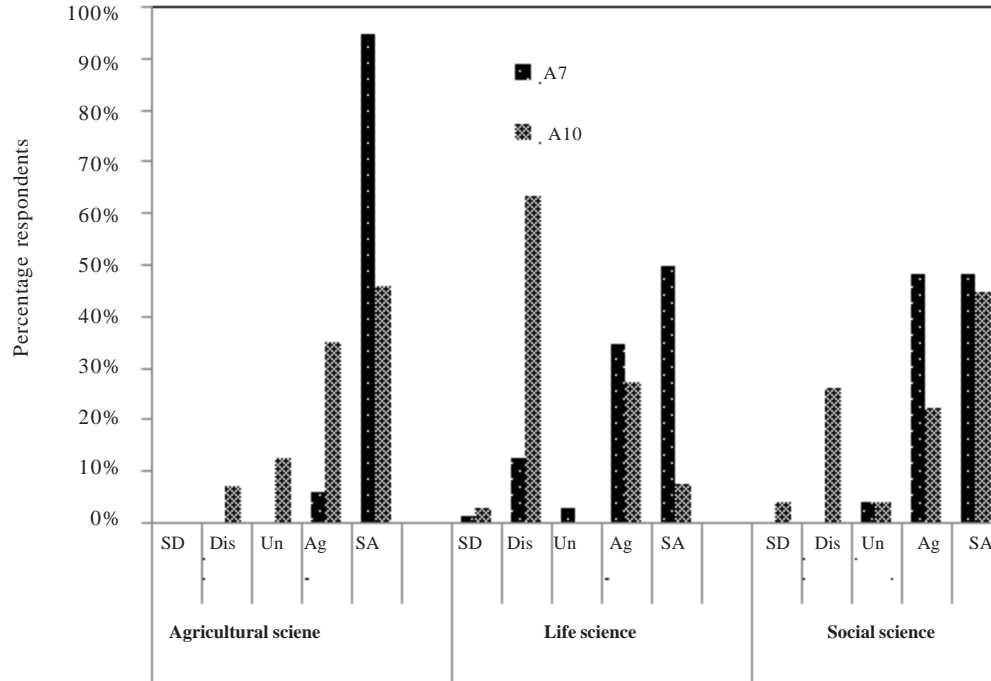


Fig. 4. Teachers' attitude towards teaching aids and relevant support. SD, strongly disagree; Dis, disagree; Un, undecided; Ag, Agree; SA, Strongly Agree. A7: Teaching aids, laboratory and field practice are important to teach. A10: Agricultural Educational and Training lacks relevant support from the responsible body

need for teaching aid and support in the delivery of AET curriculum in secondary schools, which were indicates the favourable educator's attitude and agricultural science curriculum delivery for efficient student's outcome.

**Teachers Attitude towards AET Using Pooled Data**

Table 6 shows that 158 (87.8%) of the agricultural science high school teacher's attitudes

**Table 5: Teachers attitude towards teaching aids and relevant support**

Variable	Attitude	f	%	$\chi^2$
(A7 and A10)	High	134	74.44	141.7***
	Medium	35	19.44	
	low	11	6.11	
	Total		180	

\*\*\* significant at  $P \leq 0.01$ . A7: Teaching aids, laboratory and field practice are important to teach. A10: Agricultural Educational and Training lacks relevant support from the responsible body.

**Table 6: The attitude of Teachers towards AET using pooled data**

Variable	Attitude	f	%	$\chi^2$
Attitude of teachers towards AET (A1-A10)	High	158.0	87.8	102.8***
	Medium	22.0	12.2	
	Low	0.0	0.0	
	Total		180	

\*\*\*significant at  $P \leq 0.01$

towards AET was found to be in the high attitude category. This means that the majority of teachers had a positive perception towards AET. Only 12.2 percent of high school agricultural science teachers' attitude towards AET was found to be in the medium attitude category. This verified that high school agricultural science teachers had high and positive attitude towards AET. However, teachers with qualifications other than agricultural sciences, had a medium attitude scores, compared to the attitude of teachers with agricultural science background. As discussed

earlier in the previous section, the qualitative data showed that the majority of agricultural science teachers (60%) were teaching agricultural science at secondary school without having an agricultural science qualification. Teachers' qualifications could have a significant influence on students' achievements. If teachers teach without the relevant qualifications, this could lead to lower student performance (Goldhaber and Brewer 2000; Barnett 2003). Similarly, Singh and Sarkar (2015) reported that students learning performance has positive correlation with teaching quality which in turn depends of teachers' qualification.

As can be seen from the data presented in Table 7, 98 percent, 82.7 percent or 74.1 percent of agricultural science teachers had Agricultural Science, Life Science or Social Science qualifications, respectively. This was found to be in the high category of attitude towards AET, which was found to be significant. The majority of high school agricultural science teachers with agricultural science qualifications were found to be in the high attitude category, when compared to those with either a life science or social science background. This emphasized that there is a strong positive correlation between the teacher's qualifications and their attitude towards AET. Moreover, teachers were found to be highly useful in order to improve the attitude of teachers towards teaching agricultural science. Investing in teachers' qualifications proven to be important and could have a positive influence on teachers' attitude towards the agricultural science. Similar findings by Aikens and Barbarin (2008), Darling-Hammond (1999) and Singh and Sarkar (2015) indicated that investing in teacher's training in the area of the subject they are teaching benefits the AET. Relevant teacher

qualification is one of the contributing factors for the students' achievement. Literature also supports that subject matter knowledge has a strong effect on student's achievement (Darling-Hammond and Youngs 2002; Desimone 2009).

In general, the results show that the majority of the educators had a favourable attitude towards AET (Table 6). The educators have favorable and positive attitude towards teaching aids, laboratory, field for practice and support to teach agricultural science, which is in agreement with the findings of Rice et al. (2011). Rice et al. (2011) reported that having motivated learners, good classroom and laboratory conditions were found to be effective motivational factors to implement and motivate teachers to teach agricultural science. In turn, when considering the delivery of AET, the perception of teachers' towards the importance of teaching aids and support have a remarkable effect on students' achievements (Hofstein and Lunetta 2004; Mbajiorgu et al. 2014). This is mainly because teachers are the medium in the delivery of Agricultural Science curriculum (Shuell 1996). Moreover, teachers' knowledge and skill is crucial to determine the mode of curriculum delivery and to identify or use the existing teaching infrastructure and support (Yeh and Santagata 2015). AET is an application of science in which the acquisition of skills is very crucial. It is argued that teachers' practical skill is considered to be the most desirable quality that should be considered in teaching agriculture science (Kumar and Kashyap 2012; Kidane and Worth 2014b; Singh and Sarkar 2015). This was evident from the qualitative data obtained in this study that teachers' perceptions towards the use of teaching aids and support during delivery of the subject contribute significantly to the success of learners.

**Table 7: The attitude of teachers' based on their areas of qualification towards AET using pooled data**

Area of specialization		Attitude			Total	$\chi^2$
		Low	Medium	High		
Agricultural science	<i>f</i>	0.0	1.0	71	72	14.5***
	%	0.0	1.4	98.6	100.	
Life science	<i>f</i>	0.0	14	67	81	100.0
	%	0.0	17.3	82.7	100.0	
Social science	<i>f</i>	0.0	7.0	20.0	27	100.0
	%	0.0	25.9	74.1	100.0	
Total	<i>f</i>	0.0	22	158	180	100.0
	%	0.0	12.2	87.8	100.0	

\*\*\*significant at  $P \leq 0.01$

## CONCLUSION

The majority (91%) of agricultural science high school teachers had a favourable attitude towards teaching occupations, needs for advanced study in Agricultural Sciences, the importance of relevant qualifications in AET, their contribution to the students impending opportunities in AET, their character and commitment to teach AET, AET-related careers and entrepreneurial opportunities, importance of AET for future development and the importance of teaching aids, laboratory and field or farm for practicals to teach agricultural science. There were significant differences between the educators' attitudes towards the importance of teaching aids, laboratory, field or farm for practice and support. This difference was influenced by their qualifications. The teacher's attitudes favourably increased when they had relevant agricultural science qualifications. The pooled data showed that 87.8 percent of agricultural science teachers have high and favourable attitude towards AET. Teachers who have the agricultural science qualification had the highest positive attitude towards AET, when compared to the attitude of teachers with life and social science qualifications, which were found to be significant at  $P \leq 0.01$  levels.

## RECOMMENDATIONS

This study suggests that policy-makers and the Department of Education should give consideration to teacher's qualification, in order to ensure proper delivery and student achievement in the teaching learning process at secondary schools. It is recommended a mechanism to arrange in-service agricultural science teachers training programs. The Department of Education should give emphasis in teacher training, relevancy of their qualifications and professional development in agricultural science, in the context of secondary school teachers' capacity building. It was recommended that a government should give special grants for practical subjects like agriculture. Schools should also start viable income-generating activities to raise funds, which in-turn, can be re-invested in agricultural production. Schools should establish small agriculture projects, which do not require a lot of funds to train students in agricultural skills.

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