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FACTORS INFLUENCING COMPETENCE ACQUISITION THROUGH FIELD ATTACHMENT AMONG MAKERERE UNIVERSITY UNDERGRADUATE STUDENTS OF AGRICULTURE IN UGANDA

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ABSTRACT: *The agricultural sector in Uganda is still underdeveloped partly due to the low competence of agricultural professionals. Universities adopted practical training approaches including field attachment, to train and supply professionals who possess leadership, entrepreneurship, communication, facilitation, negotiation, teamwork and organizational planning competences in addition to their formal knowledge in areas of specialization. However, the extent to which graduates acquire these competences through field attachment remains unclear given continued reports of limited work-related competences among agricultural graduates. This study assessed the learning process, motivations as well as constraints to competence acquisition through field attachment using the experiences of undergraduate students of the School of Agricultural Sciences (SAS), Makerere University – Kampala. Data were collected through document review of 437 students' field attachment reports and individual interviews with 65 students. Data were analyzed using SPSS 18 and thematic content analysis. The findings showed that trough field attachment, students participated in agricultural field activities and acquired both technical and work related competences. However, most placement organizations had a limited span of value chain activities; the attachment duration was deemed very short; the timing was inappropriate and the quality of supervision was low. These challenges limited skills acquisition to basic crop and animal husbandry and less of the value addition, entrepreneurship and marketing competences. To enhance the quality of field attachment, duration of the programme ought to be reviewed to at least a full semester or a year. Strengthening collaboration with other stakeholders could be helpful to improve programme financing and supervision. It is critical to ensure that the university result into graduates with the right knowledge, attitudes and skills to make meaningful contribution to agricultural development.*

KEYWORDS: Field Attachment, Graduate Competences, Higher Education, Practical Training, Programme Design, Stakeholder Engagement, Undergraduate Students

INTRODUCTION

Agriculture remains a central pathway to economic development in Uganda. The sector employs over 70% of the total labour force, contributed to 23.6% GDP and 53% exports in 2015/16 (UBOS, 2016). It is thus, a livelihood source for majority households and foreign exchange for the country. In spite of this importance, the sector is still characterized by low productivity, limited value addition and poor quality products (MAAIF, 2010a). One of the key missing links in the agricultural sector transformation efforts especially in developing countries like Uganda, is the low competence of agricultural professionals (Mugisha and Nkwasibwe, 2014). According to Okeowo (2015); Melak and Negatu (2012); World Bank (2012), universities have a role to play in training and supplying these professionals who should

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not only possess technical but also 'soft' competences including leadership, entrepreneurship, communication, facilitation, negotiation, teamwork and organizational planning. Well-trained graduates with competences for solving contemporary development challenges are a key requirement in strengthening university-engagement with other stakeholders (Owusu-Acheampong, Asamoah, and Azu 2014; Sunmonu and Tijani 2013) thereby ensuring proper functioning of agricultural innovation systems (World Bank 2012) for social transformation (Mugabi 2015; Openjuru and Ikoja-Odongo 2012).

Field attachment, also referred to as internship, industrial attachment, industrial training, service learning, community-based learning, work integrated learning (Maertz, Stoeberl, and Marks 2014), is one of the approaches that universities have used to engage with stakeholders and build students' competences (Mugisha and Nkwasibwe, 2014; Sumathi *et al*., 2012). It is indeed the most widely accepted and effective way of incorporating real life experiential learning into training curricula (Hawkins, 2010). With increasingly changing and multicultural working environments, field attachment enables students to acquire interdisciplinary and trans-disciplinary competences (Adomβent *et al.* 2014; Miller *et al*., 2010; Lambrechts *et al.* 2013) to positively influence real development processes. However, in most universities, other than being a curriculum routine, the extent to which graduates actually acquire these competences through field attachment remains a subject of scholarly research. The overarching global concern is about the effectiveness of the design and implementation of field attachment to achieve the desired goals (Radigan 2010; Stirling *et al*. 2014).

Field attachment provides benefits to students, universities and host organizations (Holyoak 2013; Millican and Bourner 2011) but the pivotal role of field attachment is facilitating actual practice in learning. Although there are generic outcomes, the nature, aims and objectives of field attachment vary from institution to institution or country to country (Sumathi, Zainal, and Chong 2012). At the same time, with the persistent food insecurity, unemployment and poverty challenges in developing countries, effectiveness of training approaches such as field attachment continue to be questioned. Understanding the extent to which a given field attachment programme is enabling students gain the competences for addressing contemporary development challenges and bringing stakeholders closer to universities is important. As Sturre *et al.* (2012); World Bank (2012) recommend, field attachment experiences ought to be rigorously assessed from time to time to ensure responsiveness to the changing needs of agricultural development.

In successful experiential learning and community engagement models, field attachment plays a critical role in continued interaction between universities and communities. Effectiveness of field attachment as a tool for experiential learning in Earth and Land Grant Universities for example, is attributed to a number of factors. Hawkins (2010); Damian *et al*. (2007) observe that: the practice is accorded sufficient time in the curricula; the host organizations and students are involved in developing learning outcomes and assessment; it carries sufficient credit units; host organizations have capacity for student supervision and; are adequately funded through cost sharing with private sector and/or governments. Above all, field attachments are used to expose students to diverse career settings by ensuring selected organizations offer broad scope of activities for learning processes and communication. As a learning tool, attachments early in academic programmes provide experience for learning in new courses while later attachments facilitate the application of theory into practice. In these scenarios/models, coordination mechanisms are well integrated to the formal structures in the universities.

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Field Attachment at Makerere University

Field attachment programme at Makerere University was approved by the Makerere University Senate in 2006 and made mandatory for all academic programmes (Openjuru and Ikoja-Odongo 2012). Being part of the curriculum, the term 'field attachment' was adopted to differentiate it from the conventionally known post-graduate 'internship' programme mainly applied in the health discipline (MAK, 2005). The overall objective of the programme is to "*produce practically oriented graduates that meet required job-related competences of their future employers as well as serve as a linkage between the University and various stakeholders who consume services/products of the University*". This was in response to stakeholder outcry of, and study findings indicating the inadequate competences among agricultural graduates. A tracer study on graduates' performance conducted by the Makerere University faculties of agriculture and veterinary medicine found that agricultural graduates had limited practical, managerial, entrepreneurial, communication, organizational, social and leadership skills (Isubikalu *et al.* 2013; MAK 2006). This limitation became more apparent in the late 1990's when the Ugandan government deployed degree holders as field agricultural extension workers, replacing diploma and certificate holders (MAAIF 2010a). Practically, diploma and certificate holders had for long been perceived to be better than degree holders by employers and farmers (Mugisha and Nkwasibwe, 2014). Field attachment thus, became a vital training element for equipping university students with work-related competences.

Spanning a period of ten (10) weeks, all students participate in field attachments at the end of their second year for the three-year programmes and at the end of third year for the four-year programmes. Prior to attachment, students are briefed on what is expected of them and provided with logbooks in which to record their daily activities, major achievements and reflections. At the end of the internship, each student submits a report, whose structure is provided in advance within the log books, for grading. The students report majorly on the activities undertaken, knowledge and skills gained and level of accomplishment of duties, relationship with other staff, things most or least enjoyed and why, problems faced, major benefits derived as well as major strengths and weaknesses of the attachment programme (MAK, 2005).

The field attachment programme has been going on for ten years, since its general adoption by the university. In spite of the programme, a study by Mugisha and Nkwasibwe in 2014 showed that Makerere University agricultural graduates already in the field (working) still had inadequacies with regard to the work-related competences. There is a clear need to improve the effectiveness of the programme. Improving the programme may have financial implications for the university and more so students in Uganda who are economically disadvantaged but it is inevitable. To justify investment in enhancing the quality of training programme, understanding the strengths and existing gaps is critical (Kalule *et al*., 2014; World Bank, 2012). With limited empirical assessment done, so far, there is paucity of information on what is working well, what is not and the reasons why to guide efforts to improve the programme. Circumstances may be different from developed systems such as Earth University, but the role of field attachment in training and enhancing university responsiveness is more-or-less universal. This paper assessed the contribution of field attachment to competence acquisition among undergraduate students of agriculture, in the School of Agricultural Sciences (SAS), Makerere University – Kampala. The study focused on how and what the students learnt, as well as factors that motivate or constrain students' learning and competence acquisition to inform further improvement of both theory and practice.

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Analytical framework

Field attachment is meant to provide field experience to aid learning and appropriate graduate positioning in the real world of work and is an approach through which experiential learning is promoted (Chupp and Joseph 2010). Experiential learning (learning through action and reflection) guided by the Experiential Learning Theory (Kolb, 1984), helps learners make sense of their environment, a process referred to by Moon (2004) as effective learning. In this way, gaps in conceptual and management (soft) competences among graduates (Kibwika, 2009, 2006; Selvaratnam, 2013) can be addressed.

To achieve this, field attachment programmes should be designed in a way that enables students to apply theory while gaining work-based competences (Chupp and Joseph 2010). Inappropriate designs for a programme limit the level of critical reflection and the advancement of required competences (Wang, Chiang, and Lee, 2014). Therefore, activities undertaken during field attachment should meet the expectations of students and other stakeholders and enable students to develop the competences required to contribute to development (Chen and Shen, 2012; Millican, 2008). There should also be clarity among stakeholders on factors that may impede rather than facilitate learning and competence acquisition (Sturre *et al.* 2012). The effects of these factors can be gauged from the experience of those involved like students (Chen and Shen, 2012). The study therefore, used the students' experiences to assess the activities undertaken, competences acquired, other benefits and constraints to the implementation and effectiveness of the programme.

DATA AND METHODS

Sampling and data collection

The study was undertaken in the School of Agricultural Sciences (SAS), College of Agricultural and Environmental Sciences, Makerere University, Kampala, between 2014 and 2015. Data were collected through document review of students' field attachment reports submitted in the five SAS programmes during the 2010/11, 2011/12 and 2012/13 academic years. The total number of reports for the three academic years was 330, 350 and 310 for 2011, 2012 and 2013, respectively. Slovin's formula $n = N/1+ (Ne^2)$ (Tejada and Punzalan, 2012; Torres *et al.* 2013) was used to determine the number of reports reviewed for each year, where n = sample size; N = total population and e = desired error of margin (0.05). For example for year 2011; $n = 330 / 1+ (330 \times 0.05^2) = 181$. The target number of reports for the three years was 543. The number of reports accessed was 437, representing 80.5% of the target sample size (Table 1). Not all reports could be accessed from the SAS book bank as some had either been borrowed by other undergraduate students or could not be easily traced. The document review generated unobtrusive data and provided a rich portrayal of unexplored documented information (Bowen 2009; Monageng 2006).

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Table 1: Percentage composition of students' field attachment reports reviewed

Year	Percentages by programme					
	[1]AGRIC. (n=109)	[2]BARI (n=104)	[3]HOT (n=43)	[4]LUM (n=14)	[5]AGM (n=117)	Total (%) (n=437)
2011	24	26	11	13	27	100
2012	23	22	09	21	24	100
2013	28	23	10	08	31	100
Total	**25**	**24**	**10**	**14**	**27**	**100**

[1]BSc. Agriculture; [2]Bachelor of Agriculture and Rural Innovation; [3]Bachelor of Horticulture; [4]Bachelor of Land Use Management; [5]Bachelor of Agribusiness Management.

To attach meaning to the themes and codes generated from the reports given the limited span of inferential reasoning that can be performed with document review data (Bowen 2009; Monageng 2006), in-depth interviews aided by a semi-structured questionnaire were conducted with a total of 65 students across the three SAS departments (Table 2).

Table 2: Percentage composition of SAS students interviewed by programme and gender

Programme pursued	*Male (n=42)*	*Females (n=23)*	*Pooled* sample (n=65)
BSc. Agriculture IV (AGRIC)	27.7	3.1	30.8
B. Agric. and Rural Innovation (BARI)	15.4	16.9	32.3
B. Agribusiness Management (AGM)	21.4	14.4	36.9
Total	**64.6**	**35.4**	**100**

The students interviewed were final (2014/15) year students in Agriculture (AGRIC), Agribusiness Management (AGM) and Bachelor of Agriculture and Rural Innovation (BARI) who had undertaken field attachment but were not the authors of the reviewed reports because those students had already graduated. The three programmes with the largest enrolment were considered to represent the three departments of SAS. The students were sampled through snowballing until saturation (Guest *et al*., 2006) was reached at about 20 students. Snowballing was useful for identifying students who participated (through their fellow students) in the field attachment and would be open in sharing their in-depth experience of the programme.

Data analysis

The data collected from the students' reports were analyzed using thematic content analysis and categorized into themes and patterns (Miles and Huberman 1994). Data were coded following a process developed by Charmaz (2006). First focused coding was done to generate common categories relevant to the study aims. Secondly axial coding was done to develop categories and linking them to each other. Twenty axial codes were developed (Table 3). Categories were then synthesized and summarized into four (4) major themes i.e. activities undertaken, competences gained, other benefits of the programme and constraints to learning.

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The themes were then linked to the report review aims of how and what the students learnt and, motivating and constraining factors to competence acquisition. Due to the big number of reports reviewed and data generated, the frequencies of the axial codes in each theme were tallied into quantitative figures. The tallied data from the reports and from the student interview questionnaires were summarized using SPSS version 18 computer software to generate descriptive and inferential statistics, with mean scores indicating the students' learning experiences from the field attachment.

Table 3: Aims, themes and axial categories of the learning process, motivations and constraints to competence acquisition through field attachment

Aim	Theme	Axial codes/Categories
How students learn	*Activities undertaken*	Crop husbandry
		Animal husbandry
		Agro-processing
		Marketing
		Facilitation
		Research
		Irrigation
		Mechanization
	Competences gained	Technical
		Soft
Motivating and constraining factors	*Benefits*	Potential employment
		Practical experience
		Network formation
		Field exposure
		Career development
	Constraints to learning	Timing
		Duration
		Nature of organizations
		Supervision
		Student knowledge gaps

RESULTS AND DISCUSSION

The findings of the study and discussion focus on the role of field attachment in competence development of graduates based on SAS students' experiences. It is neither an evaluation nor a critique of the programme but a description of the learning processes, its benefits and challenges with a view to proposing recommendations for optimal competency development by SAS through field attachment.

How and what students learnt during field attachment

The students are meant to be involved in hands-on practical work in places of attachment so as to gain new knowledge and practical competences in agriculture. Findings from the review of students reports show that the students participated in various activities grouped into eight categories including; crop husbandry (95%), facilitation (85.4%), animal husbandry (59.7%), agro-processing (17.6%), marketing (15.3%), research (37.5%), irrigation (16%) and

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mechanisation (13%). Having participated in these activities and associated with managers and workers, students reported acquiring both technical and soft competences (Table 4).

Table 4: Competences acquired by students from field attachment

Competence category		Programme (%)					
		AGRIC (n=109)	BARI (n=104)	HOT (n=43)	LUM (n=64)	AGM (n=117)	**Pooled (N=437)**
Technical	Crop husbandry	93	94	98	94	94	**94**
	Animal husbandry	72	53	28	59	49	**55**
	Agro-processing	18	14	16	9	31	**19**
	Marketing	5	15	12	9	26	**14**
	Irrigation	13	6	26	8	10	**11**
	Mechanization	21	6	14	5	11	**12**
	Research	38	47	28	30	32	**36**
Soft	Management	85	87	79	88	81	**84**
	Communication	76	71	53	66	66	**68**
	Entrepreneurship	14	38	28	17	41	**29**
	Facilitation	73	74	74	72	67	**72**
	Emotional	70	77	74	73	69	**72**

Technical aspects entail agricultural-specific competences, whereas the soft aspects are social and managerial competences essential for succeeding in real work environments and self-employment (MAK 2006; Selvaratnam 2013). More crop than animal husbandry related competences were reported because there were more crop related activities that students got involved in as compared to the animal related activities. This is explained by the fact that over 80% of agricultural households in Uganda practice crop farming, compared to just over 20% that practice livestock farming (UBOS 2011). Among the technical competences, students reported low acquisition of irrigation, mechanisation, marketing and agro-processing. Agro-processing competences were reported to be the least acquired among land use management (LUM) and HOT students. AGRIC and LUM students reported the least acquired competences in marketing, whereas irrigation and mechanisation were least reported competences among the BARI and LUM students.

Overall, the findings show that students acquired various competences but at varying levels within and across programmes. Students acquired technical work-related competences, which is consistent with other studies on field attachment (Knouse and Fontenot 2008; Maertz, Stoeberl, and Marks 2014). However, there are still only limited competences acquired in some of the areas considered critical for spurring agricultural development in Uganda. From the reports reviewed, less than 20% of the students reported acquiring technical competences in agro-processing, marketing, mechanisation and irrigation, whereas less than 30% of students, on average, reported the acquisition of entrepreneurship skills. Agro-processing and marketing are competences that are relevant to higher levels of the value chain, and limited professional

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competence in these, has constrained upgrading the agricultural value chains in Uganda (MAAIF 2010b, 2012). Mechanisation and irrigation are critical as production and productivity enhancing interventions in a bid to ease farm operations as well as adapt to the negative effects of climate change (MAAIF 2012).

In terms of soft competences, there was no significant difference ($p < 0.05$) within and across the different programmes in their acquisition except for entrepreneurship. The demands in the job market highlight the need to equip students with more practical, managerial, communication, interpersonal relations and entrepreneurial competences (MAK 2006). Although verifying the job-related performance of graduates was beyond the scope and intention of this study, Sumathi, Zainal, and Chong (2012), Millican and Bourner (2011) and O'Connor, Lynch, and Owen (2011), state that the competence levels of graduates enhance their demand and employability. Indeed, feedback from Makerere University agricultural graduates who are in employment indicates a continued acknowledgement of on-the-job competence gaps (Mugisha and Nkwasibwe, 2014).

For graduates to be relevant in agricultural development requires that they have ability to manage farm production and processing units, service markets, operate and repair machinery, undertake food quality and safety assurance as well as facilitate stakeholders in the innovation processes (World Bank, 2012). All students across all programmes need to acquire technical and job performance competences to be able to compete in the job market as well as effectively contribute to agricultural transformation. It is therefore important that modalities for ensuring students get opportunity to undertake most of the critical value chain activities so as to attain the required competences are developed.

Motivating and constraining factors to learning during field attachment

The motivations for field attachment captured from the student's reports were the benefits for undertaking the exercise while the challenges faced were considered constraining factors. Interviews with students provided explanatory information.

Benefits

The students also reported the benefits of field attachment, such as gaining hands-on practical experience (86), being exposed to the realities of the field (80%), establishing potential employment contacts (67%), forming professional networks (54%) and clarifying career development paths (20%) as presented in Fig. 1.

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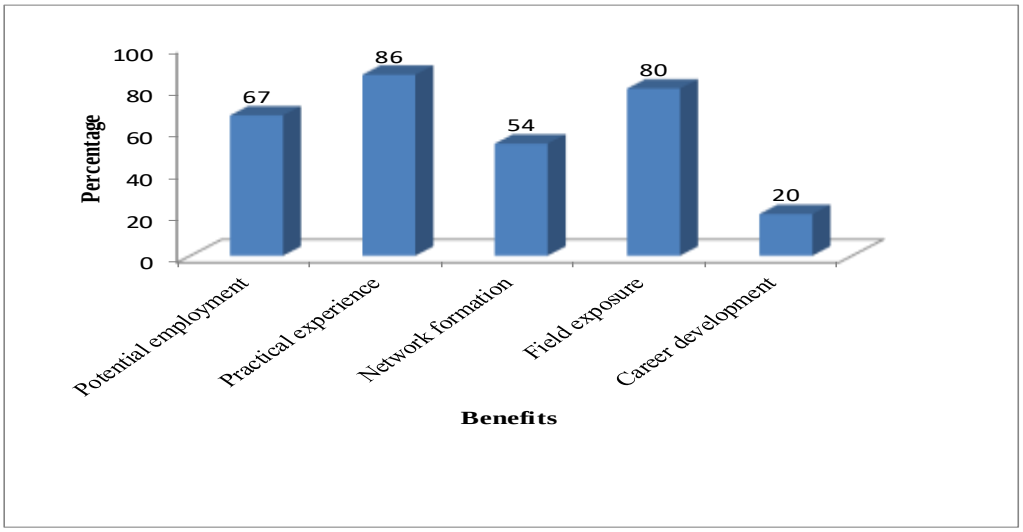

Figure 1: Other benefits of field attachment reported by students

Exposure to the field and gaining practical experience are primary and basic expectations of the programme. Opportunities for employment, network formation and career development are secondary objectives and depend on the social relation abilities of the student and the behavior of the host or workers in the applicable organization (Kim and Park 2013). Career development was the least considered benefit probably because the students were more focused on completing their university courses than their careers outlook. In addition, they are exposed to realities in the field, which enables them to reflect upon their learning and to assess their capacity to make a contribution to development (O'Connor, Lynch, and Owen 2011), as some interviewed students noted: "*It helped link what was taught in class and real farm activities and understanding of how to apply knowledge to improve farming*" (Student interviewee, June 2015). Sumathi, Zainal, and Chong (2012), O'Connor, Lynch, and Owen (2011) and Millican and Bourner (2011) assert that field attachments enable students to apply concepts and theories learnt in class to real work situations.

There were opportunities to become known to organizations that were potential employers and these opportunities link with the formation of professional networks (54%) and fostering career development (20%), elements that are critical in developing students' zeal for pursuing the profession. Some responses in this regard by students interviewed were that: "*Field attachment helped me get connections which may be helpful when it comes to searching for jobs"* and *"...I found places that will be my first working places after university" (Student interviewee, June 2015).* An exciting social experience during field attachment positively impacts students' interest in remaining within the profession (Kim and Park (2013). The positive benefit of the programme to the students notwithstanding, the extent to which graduates get employed in the organization they were formally attached to could not be ascertained in this study. In the same way, there was no mechanism for determining and certifying the practical competences acquired by students post-attachment before graduation. Avenues for validating this information need to be sought to justify the practice and enhance competence building among agricultural graduates.

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Challenges

Some of the challenges constraining learning in field attachment that the students indicated in their reports are shown in Table 5.

Table 5: Challenges of field attachment obtained from students reports and individual interviews

	Field attachment reports (n = 437)	Individual interviews (n = 65)	Average
Challenge	**%**	**%**	**(%)**
Poor timing of field attachment	54.0	39.3	46.6
Short duration of field attachment	61.1	73.8	67.4
Unsuitable placement organizations	46.0	74.6	60.3
Limited Academic and Field Supervision	87.2	69.0	78.1
Knowledge gaps among students	21.1	6.2	13.6

There is poor timing of the programme (46.6%). Field attachment takes place in the months of June – August, a period in which there is little if any field (crop) activities. During the same period, most organizations are completing the financial year, and thus had limited field operations. This frequently leaves students either redundant or mainly doing office paper work, sometimes unrelated to the expected learning. This has also been reported in other countries (Perlin 2012; Lam and Ching 2007). The challenge therefore is in aligning the teaching curriculum to cropping seasons and financial years so that students are sent for the field attachment when there are activities to learn from. To most students (67.4%), the ten (10) weeks allocated for field attachment was inadequate given the range of activities to be undertaken for one to acquire competences required all through agricultural value chains. Students proposed a period ranging between six (6) to twelve (12) months as being optimum for useful learning. Other students did not desire more time largely because of lack of financial incentives. A statement like "*will I be paid? I cannot continue to offer labour for free but need to earn income to improve my livelihood"* arose from the interviews (Students interviewees, June 2015). In Makerere University, field attachment as per guidelines (MAK, 2006) is part of the training curriculum for students to gain competences rather than financial rewards.

On the other hand, longer durations would ensure students become competent and master the social dynamics of working with communities, Selvaratnam (2013), O'Connor, Lynch, and Owen (2011), Hynie *et al*. (2010) and Mihail (2006). In situations where the training is not as practical, an extra year after the university programme is adequate for competence proficiency (Ayanda *et al*., 2013). This of course has financial implications and a dilemma for financially disadvantaged students, who are under pressure to graduate, get jobs and earn a leaving. Staying the way it is though, the relevance of university training and ability of graduates to impact on agricultural development remains a challenge. An informed financial and time

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investment position needs to be developed to address this dilemma that universities and students find themselves in amidst calls for production of competent graduates.

Finding a 'suitable' organization, farm or firm for a fruitful field attachment was the other key challenge mentioned in reports and interviews (60.3%). Most organizations were said to have had a limited scope of activities, equipment and qualified staff to facilitate comprehensive learning. It was expressed that "*the University should analyse host organizations before attaching students, as some are not credible* (Student during interview, June 2015)*"*. While this is what the guidelines provide, in practice students are issued letters for '*to whom it may concern*' sending them to find places for attachment by themselves. Peggy, Kweku, and Agbeyewornu (2014), Rowe *et al*. (2012) and Oladele, Subair, and Thobega (2012) observed that such a practice seldom guarantees proper placements for acquisition of required competences. As shown in Table 6, there were variations on the level of skills students gained from the organizations they were attached to.

Table 6: Skills acquired by students from respective organization

Skill category	Level of skills acquisition by organization (Frequency (%))						
	Agro-industrial firms	Private Farms (n=57)	NGOs (n=125)	District Local Governmen...	Ministry of Agriculture (n=14)	Research institutes (n=90)	Average (n=437)
Crop husbandry	71	89	96	96	93	97	94
Animal husbandry	41	53	49	63	21	61	55
Agro-processing	76	19	25	7	21	18	19
Marketing	53	12	22	8	29	6	14
Management	71	72	88	90	71	82	84
Communication	59	51	77	70	14	76	68
Entrepreneurship	41	30	38	27	36	14	29
Facilitation	65	89	67	70	79	69	72
Emotional	59	84	66	75	93	69	72
Research	29	11	35	31	14	67	36

The skills gained mirror the scope of activities available in a given organization that students got involved in. For the technical skills beyond crop and livestock husbandry, students who were attached to agro-industrial firms acquired more skills in processing (76%) and marketing (53%). This can in reality be explained by these organization being complete value chain enterprises undertaking activities from production, processing to marketing. Students who were attached to Ministry of agriculture reportedly followed in acquiring marketing skills (29%). This however, seems to be associated with the annual national agricultural (source of the Nile) show where interns are deployed to manage the ministry's information dissemination stalls.

The district local governments are the least in exposing students to agro-processing (7%) while research institutes score least in marketing (6%) skills. There is equally a variation in the acquisition of soft skills gained by students from the various organizations. District local governments, NGOs and research institutes provided higher management skills to students.

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Agro-industrial firms by their entrepreneurial nature provided students with greater exposure to entrepreneurial skills (41%) followed by NGOs (38%) and ministry of agriculture (36%). What is apparent from the findings is that there is no single organization that provided all the required skills set in equal measure. However, agro-industrial firms, NGOs, research institutes and district local governments provide more skills exposure to students. The challenge is that field attachment is a one-off activity and therefore, a student may graduate without practically acquiring some of the necessary skills. The need to match competence needs with host organizations' capacity to provide them is of critical importance (Radigan, 2010). It is also a reality that there are few organizations with activities spanning entire value chains in Uganda. However, a quick scan accreditation criterion for potential placement organizations ought to be developed and implemented. Extended attachment time would also allow for rotation of students to different organizations. This calls for efforts to engage both public and private sector organizations to participate in students' training.

In terms of supervision, 78.1% of students in the reports and interviews indicate that the two visits by the academic supervisor, which sometimes occurred almost towards the end of the field attachment period, were inadequate for constructive guidance. Similarly, most field supervisors were said to have limited technical capacity to offer appropriate guidance to students. In addition, the only assessment tool was the logbook, which students found inadequate because there was no provision for scoring the levels of competence acquired. Some students stated that "*there is need for tighter supervision in the field, and students must be made to defend their field attachment reports/accomplishments before a college panel*". Supervision challenges are extensively reported elsewhere (Peggy, Kweku, and Agbeyewornu, 2014; Sunmonu and Tijani, 2013; Perlin, 2012; Allen, 2011; Foltz and Devados, 2008). With these supervision constraints, ascertaining the level of competence acquired by graduates through field attachment as required by the world of work remains a challenge. In line with finding suitable organizations, ways of collaborating with other stakeholders need to be explored so as to develop supervision capacity. A capacity needs assessment for field supervisors to determine and/or certify ability to supervise is important. It is equally useful that academic supervisors spend more time in the field with students to assess and guide practical activities. Integration of assessment methods, including field performance, oral presentations, logbooks and a final report (Sumathi, Zainal, and Chong 2012), is necessary to establish the extent of learning achieved. What needs to explored is how to integrate and sustain these improvements.

The least mentioned in the students' reports and during the interviews (13.6%), is the challenge of having limited knowledge of some problems faced by farmers in the field. Some students explained the cause of this as being inadequate theory covered before attachment as per this response "*some course units relevant in the field should be taught before field attachment"* and *"…field attachment should be undertaken after the final year when students have acquired enough theory to apply in the field*". While practice should reinforce theory, strong theory guides practice (Wang, Chiang, and Lee, 2014). The question here is: to what extent are the attachment assignments matched with the competence requirements basing on the theory covered? What is the extent of pre-attachment practical training to enable students have some basic competences that can be improved through attachment and also be able to make meaningful contribution to the host organizations?

Some universities often have difficulty balancing theory and practice during the prescribed training programme duration (World Bank, 2012). In this regard, Ayanda *et al*. (2013) opined that attachment is best suited after the university training programme when students have had

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theory adequate for a university degree award. On the other hand, through curriculum review with a view to improve practical training (Mugisha and Nkwasibwe, 2014), universities like Makerere could intensify the use of university farm facilities. It is a question of finding a mechanism through which the university directly engages students in agricultural enterprise development as well as extension and research activities. This could enhance the competence acquisition among students and prepare them better for field attachment as well as post-graduation work.

Implications for practice

The study findings affirm the usefulness of field attachment to competence development of agricultural students and inherent constraints in its design and implementation. Consistent with ELT, the study findings demonstrate that students acquired technical and soft competences as a result of undertaking agricultural activities. The perceived necessary practice responses to the study findings are explicitly outlined hereunder. All students should be exposed to entire value chain activities. There is an undisputable variation in the required competences based on the different academic programmes but the 'soft' (job performance) competences should be common to all. Even with the technical competences and in as far as developing countries where staffing numbers are often kept low due to budgetary constraints, graduates with comprehensive competences are critical for attainment of sustainable agricultural development (Okeowo, 2015; Peggy *et al.*, 2014). Field attachment should thus provide a broad scope of experiences to students (Stirling *et al*., 2014). Mechanisms for identification of suitable organizations and/or rotating students to different organizations so as to gain a great extent of competences as well as developing approaches for validating competences acquired from the attachment are key elements here.

There is need to adopt a partnerships approach in the design, implementation and assessment of field attachment. Thinking beyond the routine training and passing out graduates and focus on the role graduates play in enhancing agricultural development is needed (World Bank, 2012). With partnerships, stakeholders can easily come together and design appropriate mechanisms for implementation of the programme with shared roles and responsibilities. A strong collaboration between the university, public and private sector institutions is critical in improving the quality of training. This for a while has been the practice in the health, education and most recently in engineering sectors (Hawkins, 2010). What is important for stakeholders is to review the competence needs of the sector, develop criteria for accrediting suitable organizations, set standards/requirements for field supervisors, and develop standards and tools for competence assessment as well as graduate competence certification schemes (Chinyemba and Bvekerwa 2012; Wong 2011, Foltz and Devados, 2008). Clarification will need to be sought therefore, on what each stakeholder will contribute in building the desired competences among graduates as well as joint planning, monitoring and evaluation mechanisms.

Students should be enabled to have balanced theoretical and practical training before undertaking field attachment. While students are meant to learn from the field, the largely illiterate and semi-literate agricultural labour force in developing countries that they work with look upon them as 'experts' (Mihail 2006). The host organizations too expect students to not only learn but also add value, technical or otherwise to the performance of the organization. Failure to meet such expectations affects the students' confidence and stakeholders' perception of the value of the programme. It is thus imperative that the students are better trained at the university so they are able to link and apply theory to practice during field attachment (Kibwika 2006; Stirling *et al*. 2014). Using university farms and facilities, students' practical

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competences can be enhanced through direct engagement in production, value addition and marketing (Mugisha and Nkwasibwe, 2014; World Bank, 2012). The questions that may need to be answered are: at what stage of the course are students considered to have covered adequate theory for practice? What practical training approaches, facilities and human capacities are available to enable practical training at the university? To what extent does the curriculum allow for experiential and practical learning? The required investment in practical training facilities may be high but churning out graduates with limited competences retards development and thus, more costly in the long run.

Reviewing the period and duration of the field attachment will enable comprehensive competence acquisition. Training in all aspects of the agricultural value chain, i.e. production, value addition and marketing, makes students more technically functional (Hynie *et al*. 2010). This in is not practically possible in a period of ten weeks. The study findings establish the necessity for longer attachment duration. An extra year after the designated academic programme duration has been found adequate in other countries and professions (Ayanda *et al*., 2013). There is a demonstrated precedence elsewhere that students need more contact time with hands-on agricultural value chain activities throughout their university training (Sherrard and Alvarado, 2017). Curriculum review to provide for increased practical training (Mugisha and Nkwasibwe, 2014; World Bank, 2012) is another option. This would minimise competition for time with lectures, rotation of students to different organizations for comprehensive exposure as well as be able to time the active periods in farms and organizations.

Both scenarios have design, organizational and cost implications. One extra year for attachment would necessitate an element of motivation or reward mechanism in terms of pay. This cost to a developing country university may be prohibitive. This calls for partnership between universities and relevant public and private sector institutions to devise and facilitate a reward model for students. In Uganda for example, the intern health workers are paid by the Ministry of Health while engineering interns are remunerated by the private or public companies they are attached to. On the other hand, enhancing practical training requires that universities set up farm enterprises for training purposes. Besides being done within the academic programme schedule, well managed enterprises with students as workers, would bring in market proceeds for sustainability as well motivate students while imparting competences. The Earth University model for instance (Sherrard and Alvarado, 2017), provides for students to produce, add value and market the outputs of their selected enterprise which contributes to their motivation and university revenues. As Damian *et al*. (2007) emphasize, undergraduate agricultural internships should cover entire agricultural value chain activities so as to develop not only skills but also systems-oriented thinking.

However, given their teaching and research core functions, the extent of commercial activities universities can undertake may be limited. In essence, an integration of the two approaches; enhancing practical training in university curricula and collaboration with other stakeholders for post-graduation attachment may be appropriate for imparting desired competences to agricultural graduates. Developing a stakeholder engagement framework for implementation of field attachment is essential here. It is important to note here that Makerere University in this drive, developed policy guidelines and institutionalized field attachment to enhance skilling of students (MAK, 2005). However, as the findings of this study show, there are still weaknesses in achieving the desired objectives of this policy. Review of the policy guidelines to deliberately strengthen or establish formal collaborative arrangements with potential

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employers in public and private sectors. This could be useful in providing for appropriate placement organizations as well as increased duration for field attachment and effective supervision. Further curriculum review to emphasize more problem-based learning (Katunguka, 2005) for agricultural students may be useful as well. Otherwise, the aspirations of the guidelines of ensuring students acquire the right skills for the market may be put to jeopardy. Improved competence of graduates who form a body of professional agricultural work-force, translates into improved agricultural sector performance as result of improved agricultural extension, research and management (Ayanda *et al*. 2013). Resolving the evident constraints to graduate competence acquisition will make university training responsive to contemporary agricultural development challenges. This will endear stakeholders to seek more university products thereby giving credence to efforts of strengthen university-farming community engagement for improved agricultural development.

CONCLUSION AND RECOMMENDATION

This study has generated empirical evidence on the role of field attachment in contributing to competence acquisition among undergraduate students of agriculture in Uganda. Consistent with the Experiential Learning Theory, the study findings demonstrate that through engaging in agricultural activities, students acquired both technical and work related competences. However, most placement organizations had a limited span of value chain activities; the attachment duration was deemed very short; the timing was inappropriate and the quality of supervision was low. These challenges by and large limited skills acquisition to basic crop and animal husbandry and less of the value addition, entrepreneurship and marketing competences. To enhance the quality of field attachment, guidelines could be reviewed to deliberately provide sufficient time for the programme. To improve from the current practice of 10 weeks, the programme duration could be increased to cover an entire semester plus the recess term as well. This requires curriculum adjustment to block off such time for field attachment. On the other hand, as practiced in the health, veterinary and engineering colleges of Makerere University, field attachment could last a whole year post graduation. This may be useful in providing for appropriate and rotational placement so students get exposure to comprehensive agricultural value chain activities with enhanced supervision. Strengthening or establishing formal collaborative arrangements with public and private sector farms or firms to be part of the process design and implementation could be helpful in addressing some of the challenges like programme financing and supervision. This should be seen as a way of ensuring the university training activities do not remain as routine but rather to result into graduates with the right cognitive, affective and psychomotor (knowledge, attitudes and skills) abilities to make meaningful contribution to agricultural development.

FUTURE RESEARCH

This study investigated the usefulness of field attachment in higher education and the findings serve to stimulate further interest in the study of field attachment. The findings show a general need to improve the field attachment program at SAS. To do this however, there may be a number of issues that need further research in respect of the different academic programmes. Examining ways of balancing the theoretical coverage and adequate practical training to guide curriculum review and timing for field attachment for the respective programs may be

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necessary. It may also be important to undertake an assessment of the facilities and human resource skills challenges to facilitate improvement of practical training at SAS. It is also necessary to explore ways of developing a framework for universities to work with other stakeholders in graduate competence development through field attachment to inform efforts directed towards bolstering the role of higher education in strengthening agricultural innovation systems for sustainable agricultural development.

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