Understanding Learning Styles of Secondary School Agriculture Students in Eldoret East Sub County, Kenya

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Abstract

This study was designed to investigate the preferred learning style of secondary school Agriculture students. The students' mean scores in the subject from the year 2007 to 2013 were less than 50 percent of the expected score nationally. The mean scores in Agriculture in Eldoret East Sub County ranged between 5.11 and 5.62 out of the possible 12.00. This poor performance has been partially attributed to students' learning styles; their interest in the material under study, motivation and the learning environment. However, few empirical studies have been done to determine the learning styles of secondary school agriculture students. The target population was 1200 form three agriculture students. The sample of the study consisted of 291 agriculture students. Descriptive survey study design was adopted for the study. Kolb's (1999) learning style inventory (LSI) was used in this study to profile the preferred learning styles of agriculture students as converging, accommodating, diverging and assimilating. The findings of the study reveal that majority of the students converging learning style and diverging learning style least preferred. Descriptive statistics was used to analyze the data. The analysis of data revealed that secondary agriculture students posse all the four learning style. The study also depicts that gender affects learning styles.

Keywords: Learning styles; secondary school students.

INTRODUCTION

Teaching and learning situation is no longer limited to the talk and chalk method. However, it should be noted that individuals have difference in the way they take in and process information (Chang, 2010). Knowing students' learning styles can enhance learning and teaching of secondary agriculture (Liu, 2009). It is indeed vital for Secondary agriculture educators to have awareness of their learners' learning styles preferences for effective classroom teaching and learning .Agriculture is the mainstay of the Kenyan economy. It accounts for nearly twenty seven percent of Kenya's Gross Domestic Product (GDP) and about 80 percent of the population in rural areas depends on it (Ministry of Agriculture [MoA], 2014). Agriculture is a significantly source of income for small scale farmers and through foreign exchange earner it also contribute to the country's economy (Gor *et al.*, 2012).

The importance of agriculture to the economy may account for its inclusion in school curriculum as a subject for every child of school age to gain the suitable skills that will facilitate him cope with life challenges. There are several learning style models and instruments used in evaluating students' learning styles. Kolb (1986) experiential learning model is one that is established and extensively used by researchers (Claxton & Murell, 1987). This model identifies four learning styles: converging, diverging, assimilating, and accommodating. Therefore the aim of this study is to determine whether an individual learner's learning style affect his or her performance in Eldoret East Sub County, Kenya.

Students' learning styles make an important component in the learning environment. Learning Style refers to ways learners concentrate, process, internalize, and remember new and difficult academic information and skills (Shaughnessy, 1998). Every student learns and responds to information uniquely (Chang, 2010). The learners' learning style is one factor researchers acclaim influence students' educational performance. Matthews (1996) noted that learning style had a significant effect on the perceived academic achievement.

Aligning learning styles of students with teaching styles of instructors could lead to an improvement in academic achievement (Zeeb, 2004). Information obtained from assessing learning styles could help teachers modify their teaching styles to accommodate varying learning preferences, which may result in improving students' achievement in secondary agriculture. According to Zapalska and Dabb (2002), an understanding of the way students learn improves the selection of teaching strategies best suited to student learning. For students, this matching of instructional strategies to their individual learning styles has consistently evidenced positive results in empirical studies (Minotti, 2005).

Male and female students learn differently from each other (Cavanaugh, 2002). Males are more nonconforming and peer motivated than female. Males tend to learn less by listening. Females, more than males, tend to be auditory, authority-oriented, quieter while learning, and are more conforming than males (Pizzo, 2000). Social preferences of males and females are also different during the process of learning. Male students prefer learning tasks connected with competitions in hierarchical groups, while female students learn by collaboration in small groups in which mutual liking is important (Dorval, 2000).

Studies conducted by Leet-Pellegrini (2000) and Fox (1999) suggest that males feel more comfortable in a lecturing role, which is a demonstration of expertise and status, but females feel more comfortable in a listening role, which show a desire to collaborate and bond. Dunn and Dunn (2009) asserted that valid and reliable instruments are available for assessing the learning styles of students of all ages; additionally, they claimed educators can effectively utilize results gathered from such assessments to develop instructional lessons that are responsive to student needs. Meeting the needs of students is essential if educators are to make substantial progress toward the goal of developing lifelong learners

LITERATURE REVIEW

In organizations, education and training programs, learning is a vital process that occurs in every part of human life, (Martin, 1999). The process of learning is centrally imperative and the way individuals learn is the crucial to educational improvement (Griggs, 2000). There is a strong intuitive appeal in the idea that instructors should pay closer attention to students' learning styles- by diagnosing them, by encouraging learners to reflect on them and by designing teaching and learning interventions around them. When this is done, learners will become more motivated to learn by knowing their strengths and weaknesses as learners. In turn, instructors can respond to individuals' strengths and weaknesses, and then retention and achievement rates in formal programs are likely to rise and learning to learn skills provide a foundation for lifelong learning.

If we accept that we are all different in similar ways and that it's possible to identify and measure these differences reasonably accurately, then the potential benefits for teachers and learners are phenomenal. A greater knowledge of a range of learning styles will help the

instructors to be more aware of their preferred teaching style (Coffield, Moseley, Hall, & Ecclestone, 2004). This might include the way they communicate and the kinds of methods and techniques used to explain things. It might also include the way they plan lessons and the kinds of tasks and activities devised for learners; recognize their students learning style preference, particularly those that are different from their own and also understand better the difficulties and barriers that young people experience in their learning. Potentially, the most attractive claim is that teachers will be able to match their teaching to their students learning styles by explaining and presenting things in different ways using alternative teaching aids and techniques and tailoring the activities that they provide to suit their students learning styles. Greater awareness of their own dominant learning styles can help teachers to provide learning activities that are more inclusive of the other styles and which reach all students.

According to Hawk and Shaw (2007), knowledge of the overall learning style profile of classes allows us to make adjustments to our learning approaches as the profile changes from course to course and across semesters. Utilization of information regarding the learning style profile of a cohort of students to tailor pedagogy to enhance student achievement is consistent with the Dunn and Dunn learning styles methodology (Dunn 2000). Given the impracticality of designing a teaching strategy that matches each student‘s learning style, Dunn (2000) suggests an alternative method that allows instructors to capitalize on students learning style preferences. The method involves the use of an instrument to identify individual and group patterns among students learning style preferences and develop teaching style strategies to respond to those patterns (Dunn, 2000).

It can be assumed that learning occur when someone knows something which s/he did not know before or is able to do something which she/he was not able to do formerly (Honey, 1999). An individual's ideal way for getting information in any learning environment is the learning style of that individual. Different people have diverse ways of learning which seem natural and desirable for them. Therefore some types of learning practices suit them better than others. By a suitable, ideal learning type, the individual can learn lots of things, if not; all of the experience can turn to be a waste of time. The extension of the individual differences in cognitive style and learning preferences can be deliberated through the Experiential Learning Theory of Kolb (Honey, 1999; Hsu, 1999; Kolb, 1985).

Generally most people think that attending some formal courses or classes and receiving a certificate at the end is the only and best way of learning. These are the external factors of learning process, but they cannot work alone. There are also internal factors in learning process such as individual differences. These factors are considered as the learning styles of the individuals. An individual's preferred way for receiving information in any learning environment is the learning style of that individual.

All human beings are mentally, psychologically, and physiologically different from each other, therefore, the learning processes of each individual differ. This means the knowledge that is obtained from the same information; transfer process differs from individual to individual. Smith and Kolb (1996) said that while we all learn, we do not all learn alike. As a result of our unique set of experiences, we each develop preferred styles of learning. These learning styles are simply the way we prefer to absorb and incorporate new information. Our learning style affects the way we solve problems, make decisions, and develop and change our attitudes and behavior. It also largely determines the career in which we will find the most comfortably fit; and perhaps most important for the trainer or teacher, it determines

what kind of learning experience each type of learner will find effective, comfortable, and growth promoting".

The key for an effective learning in this case is to understand the range of learners' styles and to design the instructions in a way that they respond to the learning needs of all individuals (Hsu, 1999). However learning can be defined as an internal process that is different for every individual and learning style can be described as the way individuals acquire new information. Hsu, (1999) describe learning styles as a biological and developmental set of personal characteristics, which is defined by the way individual process information. Kafee, (2001) described the learning style as cognitive, affective and psychomotor characteristics that are relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. Each learner has her/his preferred ways of perception, organization and retention that are distinctive and consistent (Chou and Wang, 2000: Hsu, 1999).

Studies on learning processes are formalized to understand these individual differences. The starting point is that different people have different ways of learning which seem natural and preferable for them. This means that some types of learning experience suit them better than others. By a suitable, preferred learning type, the individual can learn lots of things, if not; all of the experience can turn to be a waste of time. The extension of the individual differences in cognitive style and learning preferences can be considered through the Experiential Learning Theory of Kolb (Honey, 1999; Hsu, 1999; & Kolb, 1985).

The study of learning styles has received significant attention in recent years, and in a time when academic achievement is under scrutiny, it is vital that educators know and utilize the best possible methods for helping students learn successfully. The educational world is opening up to the importance of understanding the various ways students learn and recognizing the vital role this plays in attaining widespread academic success (Collinson, 2000).According to Evans and Waring, (2006), teachers benefit from developing an understanding of how their students learn as well as the effect this has on their teaching. Thus, educators must develop a true understanding of learning differences and strive to provide instruction that is intentionally diverse to suit the learning styles of the learners, (Guild, 2001)

Knowledge about students' learning style can benefit students and teachers. For students it will help them understand their own strengths and weaknesses and consequently learn more effectively and take responsibility for their own learning (Honey & Mumford, 1992). For teachers it may help them consider appropriate teaching strategies that enhance students learning strength. Their awareness of students learning styles would help them in making informed choices in course material and learning process.

Effective learning requires matching materials to learner's abilities and learning styles (Honey & Mumford, 1992). If these do not match, frustrations set in making learning more difficult. When the learning style of students in a class and the teaching style of their teacher are mismatched the students may become uncomfortable and inattentive in class. This possesses further challenges for educators in assisting students in learning and succeeding academically (Felder & Spurling, 2005). A student's style of learning, if accommodated, can result in improved attitudes toward learning and an increase in thinking skills, academic achievement, and creativity (Irvine & York, 1995). Some past research on learning styles attempted to categorize learners by ability has produced some convincing results. For

example, Kolb (1984) identified four learning styles (i.e. accommodation, assimilation, converging, and diverging) and four learning modes (i.e. concrete experience, reflective observation, abstract conceptualization, and active experimentation) (Kolb D. A., 1984). Dunn and Dunn (1978) developed a comprehensive model dealing with environmental, emotional, sociological, physical, and psychological learning style elements and concluded that these elements could provide information directly related to teaching strategies and academic achievement.

Most researchers in the field of learning styles agree that enabling learners to reflect on how they learn best helps to develop their meta-cognition: fostering meta-cognition is perhaps the most important advantage that can be claimed for applying learning style theory to teaching and learning which in turn develop effective learners who can handle challenges in a learning context and excel in examinations. Learning style consideration in learning is therefore an approach that is directed at meta-learning, similar to setting goals, choosing appropriate strategies and monitoring progress which are more effective ways of improving learning outcomes and achievement than those which simply aim to engage learners at the level of presenting information or understanding and use (Schunk - 2012).

Agricultural education began during the late 19th century in USA with the aim providing educators and practitioners with good practices and tools that promote agricultural training and education systems development (InnovATE, 2013). These views gain the support from UNESCO (2012) which focuses on qualitative education in which the youths acquire skills for reducing unemployment, poverty and promoting rural economic growth. This report urged the adaptation of education to the needs of the people as the first requisite of school activities in African schools. Special attention was to be devoted to the teaching of Agriculture due to the fact that African economy was mainly agricultural; (UNESCO 2012). The Kenya Government has over the years viewed the inclusion of agriculture in the curriculum as a priority in the creation of relevancy in education. Secondary education is considered particularly important in education system because a majority (about 60 percent) of students terminate their education at this level, (World Bank 2013). Although agriculture is taken as an optional subject in secondary school, the teaching of agriculture is a vital strategy for rural development: for improving peasant farming, for increasing food production, for creating employment, for earning foreign exchange and ultimately for promoting national development (UNESCO, 2012).

Agricultural education for sustainable development in the third millennium is not only option, but this is an essential process. Agricultural education is particular important for sustainable development as it is seen as a strategy for combating unsustainable consumption pattern, hunger , issues of illiteracy and rapid population growth which keeps large population in poverty. Agriculture is the mainstay of the Kenyan economy. It accounts for approximately 27 percent of Kenya's Gross Domestic Product (GDP) and the main source of livelihoods for about 80 percent of the population in rural areas (Ministry of Agriculture [MoA], 2014).

The prime movers for sustainable agricultural production are the production of suitable secondary agriculture graduates, who are equipped with the necessary skills and able to work with local and especially rural communities. Students' learning styles if understood can be used to transform secondary agriculture. Learners can be encouraged to demonstrate the best practices which if applied in secondary agriculture can address the social, economic and social challenges.

Findings by Smart (2010) established that students have a tendency of focusing their study on the things that are assessed and graded. Assessing and rewarding individual students in secondary agriculture would reinforce the learning within a secondary school set up. This will translate into improves KCSE performance. The target for this study was the secondary agriculture students who make up the futures' human resource not only in agriculture but also in all the other economic activities. Therefore promoting evergreen agriculture in secondary schools will help bring up youths who are conscious of their environment.

To promote this, agriculture teachers need to form a team with the relevant club patrons in the school as well as extension officers in the surrounding. This will lead to a strong linkage between the school and the surrounding community boosting the schools' role as a learning institution and an information dissemination agent. For sustainability and relevance of this project both in schools and the surrounding community teachers involved and the extension agents need regular training and motivation (Doan *et al.,* 2012).

METHOD

This study adopted a cross-sectional survey research design. A group of 291 form three agriculture school students in Eldoret East Sub County (248 male and 243 female), were randomly selected and participated in the study. They were asked to fill out Kolb's Learning Styles Inventory in order to determine their learning styles. The study was carried out in Eldoret East Sub county of Uasin Gishu County, Kenya. Eldoret East is one of the three sub counties of Uasin Gishu County. It borders Eldoret North, Eldoret South, Keiyo South, Keiyo North and Eldama Ravine Sub County. It is approximately 1.891 square kilometers. It has a population estimate of 622,705. It has a secondary school enrolment rate of 18.1% and ranked 38th in the nation, (Economic Survey Report, 2014).

In this study, the target population consisted of twelve hundred (1,200) form three agriculture students in the forty seven secondary schools in Eldoret East Sub County. According to the Eldoret East Sub County Education Report, (Feb 2015), the numbers of Form 3 students that were registered in agriculture in the sub county were twelve hundred (1,200). The researcher selected form three students on the assumption that they were more mature than the Form 1 and 2 students and were able to report their cognitive process of mind which was necessary to answer the Kolb learning style inventory. The Form 4 students were candidates and therefore they required ample time to prepare for examinations without any external or internal interference.

Using the formula and the table developed by Krejcie and Morgan (1970), a sample size of two hundred and ninety one respondents was randomly selected from the twelve hundred form three agriculture students. In their table, Krejcie and Morgan recommended that for a population of 1200 units, a sample size of 291 units may be used as illustrated below:

$S = \frac{x^2 NP(1-P)}{d^2(N-1)+x^2 P(1-P)}$, in which

S=required sample size

N= the given population

P=population proportion assumed to be .50

$\boldsymbol{x^2}$=the degree of accuracy set at .05

d=table value of chi square which is 3.841 for the .95 confidence level

$$S = \frac{x^2 NP(1-P)}{d^2(N-1) + x^2 P(1-P)}$$

$$\frac{3.841\text{x}1200\text{x}0.5(1-0.5)}{0.052\text{x}(1200-1) + 3.841\text{x}0.5(1-0.5)}$$

$$\frac{1{,}152.3}{2.9975+0.96025} = 291$$

Instrument

The Kolb Learning Style Inventory (Kolb, 1999), which contains 12 sentences with four statements each, was used to evaluate the students' learning preference. Individuals were asked to rank the endings for each sentence ranging from "4" for the sentence that best describes the way that the learner learns to"1" for the sentence that least describes the way that the learner would learn. The four endings correspond to the four learning modes of Active Experimentation (AE), Concrete Experience (CE), Reflective Observation (RO), and Abstract Conceptualization (AC), (Kolb, 2005). The Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC) and Active Experimentation (AE) scores for each participant was determined. By subtracting each student's CE scores from AC scores and RO scores from AE scores the learning style of each participant was classified either as 'accommodating', 'diverging', 'assimilating' or 'converging' (Kolb, 2005). The LSI has been found to possess adequate validity and reliability (Barmeyer, 2004). The Kolb LSI was chosen because the inventory is relatively simple to administer and score and it has demonstrated a high degree of reliability (Willcoxson & Prosser, 1996).

Theoretical Framework

The theoretical framework guiding this study is Kolb's theory of experiential learning (Kolb 1984). Experiential learning theory (ELT) builds on this idea, grounded in the theory that all learning begins with an experience, which is then processed into knowledge. This theory of learning is congruent with the secondary agriculture syllabus which focuses on hands-on application, where student experience is given an essential role in the learning process. The agriculture syllabus in secondary school is designed to give students experiences that simulate tasks that are performed in the school farm which act as an agriculture laboratory. This model is relevant to this study in that the study of agriculture is based on Experiential learning as an integral element, (Roberts, 2012). The experiential learning model, when placed on the agricultural education model, illustrates the total learning experience of agricultural education, where the learner in the three cycle model sees, say something and the SAE portion allows students to take what they have seen in the classroom and apply it in real life agriculture experiences.

The experiential learning cycle provides a good framework to complement the existing agricultural education model. In general, agricultural education teachers are naturally covering a lot of the learning emphasis on the different modes of the learning cycle. Kolb (1984) asserted that all learning is experiential. Therefore, experiential learning plays a vital role in agricultural education. Convergers learn by active experimentation combined with abstract conceptualization, Assimilators learn by reflective observation combined with abstract conceptualization, Accommodators learn by active experimentation combined with concrete experience and Divergers learn by reflective observation combined with concrete experience Smith and Kolb (1996).

RESULTS AND DISCUSSION

All the participants completed Kolb learning style inventory. Using the results of the Learning Style Inventory, the distribution of the students according to the four learning styles was determined as shown in Table 1.

Table 1: Learning Styles of Secondary school Agriculture Students

Learning styles	Frequency	Percent
Accommodating	46	15.8
Assimilating	65	22.3
Converging	131	54.0
Diverging	49	16.8
Total	291	100.0

Majority of the respondents, 54% had the Converging learning style, followed by 22.3% assimilating, and 16.8% diverging learning style. Accomodating learning style was the least owned by the agriculture students with only 15.8%. This study supports the findings by Adel and Louis (2003) who examined into the preferred learning styles of 274 accounting and Marketing students in the Clayton State University and their findings were that all the four learning styles exist. Further analysis was done to establish the differences in learning styles of students who participated in this study based on gender. The findings were as presented in Table 2.

Table 2: Cross Tabulation of Gender and Learning Styles

Gender		Learning Styles				Total
		Accommodator	Diverger	Assimilator	Converger	
Male	Frequency	24	25	29	70	148
	% within Gender	16.2%	16.9%	19.6%	47.3%	100%
	%within learning style	52.2%	51.0%	44.6%	53.4%	50.9%
	% of Total	8.2%	8.6%	10.0%	24.1%	50.9%
Female	Frequency	22	24	36	61	143
	%within gender	15.4%	16.7%	25.2%	42.7%	100%
	%within learning style	47.8%	49.0%	55.4%	46.6%	49.1%
	% of Total	7.6%	8.2%	12.4%	21.0%	49.1%

There were more male accommodators (8.2 percent), divergers (8.6 %), and convergers (24.1%) than female (7.6 %, 8.2% and 21% respectively). There were more female students (12.4 %) who were assimilators than male (10%) students. This implies that female and male students perceived learning styles differently. This compares well with Cezair, (2003) findings that female students extremely preferred assimilating learning style whereas male students were in favor of converging learning style. Both male and female student's least preferred Accommodating learning style.

CONCLUSIONS AND RECOMMENDATIONS

The study findings generally indicate that there were four learning styles among the secondary agriculture students; Converging. Diverging, Assimilating and Accommodating. Convergers (those who use abstract conceptualization and active experimentation) were the majority compared to those who preferred assimilating, diverging and accommodating. Specifically, the accommodating learning style was the least preferred. Male students tended more to converging learning style, while girls preferred assimilating learning styles. The least preferred learning style was converging for girls and accommodating learning styles for boys.

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