

## **ICT Knowledge Transfer for Development in the Non-Formal Education: A Case of *Jua Kali* Sector in Kenya.**

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**Abstract**—One of the millennium development goals is the attainment of Education For All (EFA). Attainment of Education For All means inclusion of those in the informal sector in the skill training programmes. Large gaps in skill training exist in the informal sector which is commonly known as *Jua Kali* sector, knowledge transfer can bridge these gaps. Training highly skilled manpower for economic development is a challenge. The formal education system has not addressed this challenge. Development cannot be achieved without knowledge transfer; training in skills will entail training skills that can be transferred to other areas through knowledge transfer.

Vocationalisation of education as means of improving skills development in the informal sector seem to have failed as the Vocational Training Institutions set up by the government are seen to be institutions for failures, there is more emphasis on certificates rather than on practical skills. Thus leaving those in the informal sector to acquire skills through apprenticeship. Not all vocational institutions teach ICT skills due to the exorbitant costs.

A group of 60 *Jua Kali* artisans was selected from a group of artisans who had undergone ICT and Business skills training, a comparison was done with another 60 artisan from the same are using a Z test statistic. From the data obtained it was proved that the trained artisans were far better than those not trained. Another analysis was done on knowledge transfer; it was found that the trained artisans had acquired other skills they were not directly taught during the training.

**Index Terms**—*Jua Kali*, knowledge transfer, non-formal education.

### **1.0 INTRODUCTION**

Use of communication to foster development can be traced back to 1960s where information technologies played a leading role in development research (Heeks, 2008). It has also been noted to be the fifth phase of development characterized by information technology which is the forerunner in the digitization processes (Freeman and Louçã, 2002). The United Nations has identified eight MDGs drivers that will lead to global development. One of the drivers identified was information technology. In a world summit on the information society (WSIS) held in Geneva Switzerland in 2003, it was noted that steps have been made on how ICT can support development. The summit underscored the need to integrate ICT in development strategies and plans to underpin the position by economist who postulate that rates of adoption

of modern technologies may accelerate the development process (Romer, 1986; Lucas, 1988).

To achieve the desired growth enabled by the use of ICT, knowledge in this area is critical. It is also argued that the bedrock for successful adoption of ICT is on knowledge on the technology itself. Education will thus play a leading role in the transferability of the appropriate knowledge and skills required in the ICT enabled environment. Furthermore, ICT provides alternative solutions in provision of access and equity, and for collaborative practices to optimize costs and effectively use resources (Reddi and Usha, 2011).

In the ICT knowledge transfer cannot only take place in the formal learning but also in the non-formal learning. Critical in this is the understanding of the views of learning in this kind of environment. From the point of view of the participants in the informal sector (*Jua Kali*) in Kenya, there are different views of learning that have affected the ICT knowledge transfer and influenced their associated outcomes.

Knowledge transfer has been described by two classes of theories. The first class of theories are based on the notion that the conditions for transfer are established when an original learning event and a transfer event share common stimulus properties (Royer, 2009). The second class of theories takes the position that facilitative transfer is a product of a successful memory search process (Royer, 2009). In the ICT sector, the first theory is applicable to the transfer of knowledge considering that the original learning event (instructional teaching) and the transfer event (application of the knowledge in a work place) share a common goal.

A research on the transferability and the effect of acquired ICT knowledge on the informal business sector in Kenya underscores this fact (Momanyi, 2008). The study, found out that since the motivation between the transfer event and the learning event had a common aim, that integration of ICT knowledge and skills in the *Jua Kali* artisans, it was easy to realize the objectives of improved business performance. It was also observed from the study that artisans who are trained in ICT are better than the untrained ones and therefore are better in knowledge transfer.

Broadening and enhancement of the number of people who are computer literate particularly in the informal sector has also been identified to be core in the realization of the MDGS. Momanyi (2014) quoting the UN says that literacy for knowledge is constantly changing along with advances in technology. This can be achieved if the vital role played by education in knowledge transfer and economic development

can be crystallized and aligned with the fast evolving technology (UN, 2013).

## 2.0 Learning theories in a non-formal Education

Individual learning theories are critical in understanding the individual learning and hence the knowledge transfers that takes place in the non-formal learning environment. Some of the individual learning theories that affect learning in the non-formal learning include:

### 1.1 Theory of Constructivism

It presupposes that a learner actively constructs a new set of ideas of concepts based on the past and current knowledge (Middleton and Goldberg, 1998). This means that one's experiences and present knowledge is critical in making decisions in a real-world. It therefore calls for personalized learning with internalization of concepts, competences, rules and principles as applicable in a context.

### 1.2 Theory of Experiential learning

This theory has been described to be the most descriptive model of adult learning process (Kolb, 1984). Experiential learning is marked with four important stages, that is, concretization of experience, reflection, derivation (conceptualization) of abstract rules to describe the experience and construction of the next possible occurrence of the experience (Middleton and Goldberg, 1998).

### 1.3 Theory of Situated learning

The theory underscores the fact that learning does not take place in a classroom alone but also at any functional areas like place of work. It therefore contrasts with the abstract and out of context classroom learning. The underlying tenets of this theory are the activity, context and culture where learning is taking place. Through this approach of learning, learners are able to develop some communities of practice which defines the beliefs, norms and behaviours to be acquired. It has been described to be unintentional rather than deliberate learning, generally considered to be "legitimate peripheral participation", (Lave and Wenger, 1991).

## 3.0 Effects of ICT knowledge transfer in the informal Sector

The informal sector is characterized by Small and medium enterprises (SME). The SMEs are an important component of the East African economies because they create employment (Matambalya and Susunna, 2001). Nairobi has consolidated the status of a leading economic city of Eastern-Central Africa, albeit characterized by unprecedented growth in the informal sector and industry-education mismatch. Studies have shown that high drop-out students together with existing theoretical curricula are not meeting the Industry needs to train middle-level technicians (ISBI 2013).

Low levels of literacy and education can impede the economic development of a country in the current rapidly changing technology driven world (African Economist, 2013). The increasing competition through globalisation puts them under considerable pressure. Through the rapid spread of ICT and ever decreasing prices for communication, markets in different

parts of the world become more integrated enterprises that use different forms of ICT rate; their effects mostly positive the use of ICT could on the one hand increase the competitiveness of SMEs; it helps bigger enterprises to increase their flexibility (Susunna, 2001).

Evidence on the ICT knowledge transfer on businesses in the Kenyan perspective can also be traced to the mobile phones sector that has emerged to be the leading source of business opportunities and government revenue through taxation (Waburi, 2008; Litondo, 2010). The Kenyan government has taken up this challenge and in its education policy framework; ICT is considered to be one of the core pillars. In the vision 2030 strategic plan, ICT is identified by the Kenya Vision 2030 as a vital growth area. The Effective and full exploitation of all the opportunities in the ICT sector is expected to translate into high and sustainable economic growth and boost international competitiveness (Kenya ICT Board report, 2007-2013).

A project's success lies in its long term sustainability, creation and transfer of knowledge as a basis for competitive advantage. The Informal Sector Business Institute (ISBI) has shown that training *Jua kali* artisans in ICT skills is beneficial in improving their business skills and putting them under a mentorship programme aimed at nurturing them to succeed in business endeavours (Momanyi, 2008). In Building a framework of knowledge reservoirs is to show why knowledge transfer can be difficult and to identify the kinds of knowledge to be transferred in different context are the most difficult (Argote, 2000). The Informal Sector Business Institute (ISBI) contends that by training *Jua kali* artisans in the ICT knowledge is part and parcel of creating a reservoir of knowledge which can be transferred to other fields. It has been established that ICT skills support business and without them ones business is impaired (Momanyi, 2008). Applying the Theory of Situated Learning and since the *Jua Kali* artisans are more similar in their manner of operation, interactions involving them lead to transfer of knowledge more easily than between firms. Furthermore, learning centres like ISBI provides an environment where there is use of literacy for the knowledge transfer in the ever changing technological world (UNESCO, 2013).

The effects associated with ICT knowledge transfer within the informal education sector have also been felt in the SMEs. For instance, the use of ICT has increased the competitiveness of SMEs as they enable the creation of more flexible links with trading partners because of faster and more reliable communication channels. On the other hand ICTs has helped larger enterprises to increase their flexibility through a restructuring of the organisation which will enable them to adapt quicker to changing conditions respectively. From a survey conducted in Tanzania and Kenya it was noticed that those enterprises using different forms of ICT rate their effects mostly positive. On top are computer applications that are assumed to increase management efficiency and competitiveness significantly by 88% and 76% respectively (Susanna, 2001).

Since SMEs can also use ICTs both as an input in the production process, and during the transaction process while selling their products or acquiring inputs, there are various ways by which they can influence the performance of an enterprise. ICTs can enhance enterprise performance with indirect cost savings. In addition to these short run impacts of ICT adoption in the production process, the use of ICTs in the transaction process can also foster input and output market expansion. However, in the long run, ICTs might have an even bigger impact in terms of completely restructuring the production process, influencing transaction methods, increasing flexibility and improving outputs (Chowdhury, 2006).

The Kenyan government policy framework for Small and Medium enterprises (SME) development completed in early 2004 relates to the overall goal of developing vibrant small and medium sized enterprises within the informal *Jua Kali* sector. It is envisaged that the policy framework will be capable of promoting the creation of durable, decent and productive employment opportunities and stimulating economic growth while leveraging on ICT knowledge transfer (ILO, 2001). Medium and Small Enterprises (MSE) sector in Kenya contributes to GDP, creates jobs, develops a pool of skilled labour for future needs, provides managerial learning opportunities, increases the savings and investments of local Kenyans and reduces poverty (Republic of Kenya, 1992). The informal sector, consisting primarily of NGOs, plays a significant role in advancing efforts at building ICT development in Africa, especially with a view to the use of ICT technologies and applications for dealing with the scope of issues which have become traditionally associated with NGO efforts (Okpaku, 2002).

Warschauer (2002) notes that literacy and ICT access have many similarities; they are closely connected to advances in human communication and the means of knowledge production. Access to ICT is embedded in a complex array of factors encompassing physical, digital, human, and social resources and relationships. Content and language, literacy and education, and community and institutional structures must all be taken into account if meaningful access to new technologies is to be provided. They involve not only receiving information but also producing it. The Informal Sector Business Institute has helped *Jua kali* artisans integrate ICT in their business. The artisans trained at ISBI were noted to have learned how to apply ICT skills to business, besides they leaned more ICT skills on their own.

Access to technology has however affected the level of knowledge transfer due to the uneven society caused by social-economic dynamics. Emphasis on ICT skills training can reduce not only the digital divide but also lead to knowledge transfer in the informal sector. The 'digital divide' is not just an issue of the polarization of the information rich versus the information poor. It is also a divide between men and women everywhere (UNESCO, 2013). Therefore efforts must be made to reduce this digital divide for more benefits to accrue to less privileged people in the informal sector. Investment in ICT should be a priority for skill enhancement

and knowledge transfer in the informal sector. Education for all (EFA), Technical Vocation Education and training (TVET) for all and ICTs are main keys to empowering people in the informal sector. The action plan for empowerment and capacity-building must start in the millions of villages and city slums spread all over Africa, Asia and Latin America (Basu and Majumdar, 2009)

#### 4.0 Benefits of ICT knowledge transfer to the *Jua Kali* sector in Kenya

A study on the effects of ICT knowledge transfer to the *Jua kali* sector in Kenya have revealed positive learning points. Momanyi (2008) on a study done in The Informal Sector Business Institute (ISBI) established that artisans who had gone through the training offered at the institute were able to achieve economic growth in their business ventures than those who did not have the ICT skill. The ICT knowledge and skills imparted at the institute were aimed at re-engineering the business performance practices within the *Jua Kali* sector in Kenya. The outcomes from the study are outlined below.

#### 4.1 The extent to which *Jua Kali* artisans have benefited from the ICT knowledge transfer

A study was done on 120 artisans, 60 who had been trained in ICT at ISBI and 60 who had not been trained at but from the same environment. A Comparison was done between the artisans who had undergone the ISBI training and those who had not undergone it in practicing of business ethics, taking credit from financial institutions, having business plans, keeping business records and use of Information Technology skills in business. In business practices such as the use of Information Technology in business and marketing techniques. using a Z- test statistic at 1% level of significance. The data obtained is summarised in table 4.1

**Z – test statistic on business practices**

Business practices observed by artisans	ISBI ARTISANS		NON-ISBI ARTISANS	
	No.	%	No.	%
Practice business ethics	25	41.67	7	11.67
Have taken credit	37	61.67	5	8.33
Have business plans	56	93.33	26	43.33
Keep business records	32	53.33	0	0.00
Use IT in business	38	63.33	6	10.00

Table 4.1 summarises data in terms of frequencies and percentages on the *Jua Kali* artisan's practice of business ethics, taking credit, having business plans, keeping business records and use of Information Technology skills in business.

Ho – there is no significant difference in practice of business ethics, keeping business records, having business plans, taking credit from financial institutions and using Information Technology skills in business management between artisans who have undergone the ISBI training and those who haven't undergone it i.e.

$$p_1 = p_2$$

H<sub>1</sub> – there is a significant difference in practice of business ethics, keeping business records, having business plans, taking

credit from financial institutions and using Information Technology skills in business management between artisans who have undergone the ISBI training and those who have not undergone it i.e.

$$p_1 \neq p_2$$

$$p_1 = \frac{41.67 + 61.67 + 93.33 + 53.33 + 63.33}{5} = 62.67\%$$

$$p_2 = \frac{11.67 + 8.33 + 43.33 + 0.00 + 10}{5} = 14.67\%$$

$$p_1 = 62.67\%, \quad p_2 = 14.67\%$$

$p_2 = \pi$  We use the Z statistic for difference in proportions,

$$Z = \frac{p_1 - p_2}{\sqrt{p_c(1-p_c)(\frac{1}{n_1} + \frac{1}{n_2})}}$$

Where;  $p_c = \frac{p_1 - p_2}{n_2 - n_1}$

In this case;  $p_c = \frac{62.67 - 14.62}{60 + 60} = 0.65$

$$Z_c = \frac{62.67 - 14.67}{\sqrt{0.65(1-0.65)(\frac{1}{60} + \frac{1}{60})}} = \frac{48}{\sqrt{0.65 \times 0.35 \times 0.033}} = \frac{48}{0.0867} = 553.63$$

At 1% level of significance the tabulated  $Z_T$  value is 2.58

Since  $Z_c > Z_T$ , the null hypothesis is rejected in favour of the alternative hypothesis. We therefore say that there is a higher percentage of artisans who have undergone through the ISBI training who practice business ethics, keep business records, have business plans, have taken credit from financial institutions and use Integrated ICT skills in business management than those who hadn't undergone through the ISBI training.

#### 4.2 Level of use of Information Technology skills in business

A Comparison was done between the artisans who had undergone the ISBI training and those who had not in use of Information Technology in business using a Z - test. The data is summarised in table 4.2.

#### Z-test statistic on use of Information Technology skills in business

How artisans use IT skills in their business	ISBI ARTISANS		NON-ISBI ARTISANS	
	No.	%	No.	%
Marketing	20	33.33	3	5.00
Keeping business records	32	53.33	0	0.00
Writing business plans	46	76.67	0	0.00
Writing other business documents	56	93.33	3	5.00

Table 4.2 summarises data in terms of frequencies and percentages on the Jua Kali artisan's use of Information Technology skills in marketing, keeping business records, writing business plans and other business documents.

#### Hypothesis

$H_0$  - there is no significant difference in percentage in the usage of ICT skills in marketing, keeping business records, writing business plans and other business documents between artisans who have undergone the ISBI training and those who have not undergone through the ISBI training i.e.

$$p_1 = p_2$$

$H_1$  - there is a significant difference in percentage in the usage of Information Technology skills in marketing, keeping business records, writing business plans and other business documents between artisans who have undergone the ISBI training and those who have not undergone through the ISBI training i.e.

$$p_1 \neq p_2$$

$$p_1 = \frac{33.33 + 53.33 + 76.67 + 93.33}{4} = 64.17\%$$

$$p_2 = \frac{5.00 + 0.00 + 0.00 + 5.00}{4} = 2.5\%$$

We use the Z statistic for difference in proportions,

$$Z = \frac{p_1 - p_2}{\sqrt{p_c(1-p_c)(\frac{1}{n_1} + \frac{1}{n_2})}}$$

Where;  $p_c = \frac{p_1 - p_2}{n_2 - n_1}$

In this case;  $p_c = \frac{64.17 - 2.5}{60 - 60} = 0.56$

$$Z_c = \frac{64.17 - 2.5}{\sqrt{0.56(1-0.56)(\frac{1}{60} + \frac{1}{60})}} = \frac{61.67}{\sqrt{0.56 \times 0.44 \times 0.033}} = \frac{680.46}{0.0911} = 7469.37$$

At 1% level of significance the tabulated Z value  $Z_T$  is 2.58 Since  $Z_c > Z_T$  The null hypothesis is rejected in favour of the alternative hypothesis. We conclude that the percentage of the artisans who have undergone the ISBI training who use ICT skills in marketing is significantly higher than those artisans who haven't undergone through the ISBI training.

#### 5.0 Indicative measure of the ICT Knowledge transfer among the ISBI trainees

##### Business records

All the artisans who were trained at ISBI were able to learn on their own how to keep business records. Some bought their own computers to enable them keep their records. The records enabled the artisans get loans form financial institutions as the records proved their creditworthiness. Because of these knowledge transfer there was evidence that all the artisans who were trained took loans to expand their businesses. Up to 76.6 % had proper business records; the financial institutions were able to establish their creditworthiness.

##### Marketing

The artisans after leaning basic ICT skills diversified to learn how to market their products using short text message (SMS).

After making a call an SMS will be send to the caller or receiver with a short message about the artisans' products. Their sales increased and some ended up employing more workers to meet the demand for their products. This is a clear example of knowledge transfer from ICT to marketing. The lives of artisans have improved due to high sales of their products. Most of the artisans started using Pay per Call Mobile (click-to-call) SMS marketing, whereby a mobile advertisement contain a phone number that the customer can select and call instantly from their cell phone.

### **Internet**

The artisans who had vocational skills were able to learn on their own various design software (graphic, building, cloth etc) and using these knowledge were able to search for online jobs which increased their income. Whatever, they designed as per the specifications of the customer once approved, money was sent to their accounts at the end of the month for work done. Although this was not explicitly taught, the artisans learnt it on their own and transferred the knowledge to business.

### **Business outsourcing**

Some artisans went ahead and learnt how to design tables, desks and front offices and partitioning using design software. This enabled them earn extra income besides their original work as artisans before the training. The ICT skills were transferable to other areas thus confirming that training in ICT skills has a knowledge transfer whereby the artisans used the knowledge of the internet to get business offers advertised on the internet.

### **CONCLUSION**

To attain the EFA and MDGs there is need to identify skills transfer in the informal sector. Although a lot has been achieved, development will not be fully achieved if there is no skill training for disadvantaged groups with an emphasis on transferability of these skills. From the data presented, the ISBI training helped the *Jua Kali* artisans who attended the course realize certain aspects of business by applying ICT skills. Skills transfer should be a factor in all skills training programmes. The net effect of transferability of skills is felt once certain core skills are mounted as a basis for development of other skills. ICT skills are core skills in this digital era. Artisans who were trained in ICT skills learnt on their own more skills that they were not directly trained in and transferred them to other areas. Their profits went up thus creating more employment opportunities as their businesses expanded.

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