IMPROVEMENT OF KNOWLEDGE TRANSFER SKILLS OF BUILDING TECHNOLOGY UNDERGRADUATE STUDENTS OF KADUNA POLYTECHNIC IN KADUNA STATE

BY

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CERTIFICATION

I OMOKE DAVID OGONNAYA with matriculation number 2007/27292BT, an undergraduate student of the department of Industrial and Technology Education, Federal University of Technology, Minna, hereby certify that this research work is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

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APPROVAL PAGE

This project work has been read approved as meeting the requirements for the award of Bachelor of Technology (B.Tech) degree in Industrial and Technology Education of the department of Industrial and Technology Education (ITE), School of Science and Science Education, federal University of Technology, Minna.

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DEDICATION

This research work is dedicated to the almighty God for His mercies and strength throughout this work, and also to my entire family and friends for their great support and encouragements.

ACKNOLEDGEMENTS

When I started my journey into the deep world of the university, friends and enemies were locked into debate of the possibility of my graduation till the final bell rang. I am happy today not only because I am a graduate but also that I am going home with a cargo of knowledge.

All I have to say is ‘’To God be all the Glory’’.

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Abstract

This study examined the methods used in transferring knowledge, the factors that hinders knowledge transfer skills and also the techniques/ways for improving knowledge transfer skills of building technology undergraduate students of Kaduna polytechnic. This study was specifically carried out to ascertain the factors affecting knowledge transfer skills of building technology students and ways of improving their knowledge transfer skills. Three research questions were raised with two hypotheses formulated and tested at ($P \leq 0.05$) level of significance with t-critical of 1.96. The population of this study comprises the entire lecturers and students in the department of building technology education programme. A stratified sampling method was used to draw 100 respondents from the population, out of which copies of questionnaire were filled and returned. The data collected from the population were analysed using statistical tools and t-test. Some of the findings related to the methods used in transferring knowledge skills to undergraduate students are; the use of lecture methods, demonstration methods, discussion methods among others. while the findings related to factors hindering knowledge transfer are; mode of students evaluation, insufficient qualified building technology lecturers, too much courses offered by the students etc. the findings also reveal that; through diverse skills practices, using proper teaching methods and aids etc. are amongst the ways for improving knowledge transfer skills of building technology undergraduate students. Based on the findings, it is recommended that the learning environment should be made conducive for learning activities, proper evaluation mode should be employed, and Governments should try to motivate students through their lecturers towards learning etc. Suggestions for further research were made.

CHAPTER 1

INTRODUCTION

Background of study

In this modern age of technological advancement and innovations, there is a need for adequate and efficient transfer of knowledge. According to (Hornby 2008), Knowledge is the information and skill acquired through experience or education. Hence, Knowledge transfer is the ability to transfer information learnt in one context to another. Transfer of knowledge skills is also defined by Dukku (2000) as ‘’skills developed in one situation which can be transferred to another situation’’ and are also known as key, core or generic skill in the field of building technology education. Knowledge transfer is an important aspect of educational organization. This is because without proper or good knowledge transfer skill, there would be lack of cohesion in our educational system.

Hench, one of the acquired knowledge through knowledge transfer is experienced in the aspect of building technology. The importance of building technology education cannot be overemphasized; since this field of study represents core indices of national development. A major distinction between an advanced country and a developing one is to a large measure the difference between their levels of scientific and technological development in various areas of technology education, building technology inclusive. There is no exaggeration to exert that technological education is the bedrock upon which advanced nations are based (Egbor, 2009). Going by the present trends of learning or acquiring knowledge, the knowledge transfer skills in building technology needs to be improved.

The need for improving knowledge transfer skill cannot be overemphasized. Knight and Yorke (2002) noted that the first cycle of undergraduate study is about being an “enabling device for future learning, with an emphasis on improvement of transferable

knowledge skills, qualities and dispositions''. This broadens the concept of transfer of skills by focusing on knowledge transfer skills which are already inherent in that process, but which often times are not made explicit to students of building technology education programme. Knight and Yorke (2002) felt that a skills-based, task-based approach to teaching building technology could add significantly to the more normal dexterity, content-based approach, as it had the added value of including all latter but also of raising awareness of an improvement in the knowledge transfer skills themselves.

In the skill-based economy, higher education especially technology education programme improves building technology undergraduates' students' skills. Through education, undergraduates of building technology programme gain skills that improves their individual development and capability (Alavi and Leidner, 2001). Liao (2004) states that in light of skilled- based economy and new competitive dynamics, educational institutions must combine speed and skills to improve quality responsiveness and competence of its undergraduate students of building technology programme that can lead to competitive advantage of educational institutions.

The nature of knowledge transfer skills in technology education programme is to improve the abilities and skills of building technology undergraduate students as related to professional application. This process is based on the interaction between the educator(lecturer) and students (Alavi and Leidner, 2001). Alvarez, (2004) stated that learning is related to knowledge transfer and knowledge transfer is related to outcomes.As a skill source in technology education programme, a highly effective teacher, should be able to transfer knowledge skills successfully to students, such skills transferred should be relevant enough to enable the students use them effectively and be able to transfer it when necessary.

Technology education consists of four closely inter-linked elements: namely, technique, skill, organization and product. However, skill contributes the major part to

technology education programme, which is a major key to control over technology as a whole. Skill management has been widely accepted and implemented in educational institutions and skill is recognized as the most important resource of institutions (Spender and Grant, 1996). Manipulating skill creation, skill storing, skill sharing and application helps institutions gain competitive advantage (Nonaka, 2000). In the context of technology education programme, sharing skill is paramount to the existence of an educational institution (Liao, 2004). One of the reasons for this increased interest in knowledge transfer skills is the dynamism of today's educational system which requires a much broader knowledge skills set from undergraduate students of building technology education programme than previously.

The national policy on education (FRN 2004), defined technology education as the aspect of education which leads to acquisition of applied skills as well as basic scientific knowledge. Therefore, among the various objectives of technology education programme as outlined in the National Policy on Education(FRN 2004) is; to provide technological knowledge and conventional skills necessary for industrial and educational development, to provide people who can apply scientific knowledge to the improvement and solution to societal problems, for the use of man and to give training and impact necessary skills leading to the production of skilled technologists and other skilled personnel who will be enterprising and self-reliant in the field of building technology.

Therefore, with this view above, like any other country, Nigeria believed that technology education is very much vital to both its economy and educational development. Since the early 20th century, it is awell-known fact that undergraduate students of building technology programme needs many opportunities tobe able to transfer knowledge skills from one context to another and be able to update their skills of building technology through the society in which they belong.

It is well known fact that government policy on technology education in recent time is quite unfavourable, one would expect that most graduates of technology education programme will be able to perform better in the area of building technology. The implication is that, the reverse is now the case, since the undergraduates of building technology are having problem in transferring knowledge from one context to another. Based on the foregoing, this study is designed to determine the factors affecting knowledge transfer skills of building technology undergraduate students and to find out ways of improving this knowledge transfer skills.

Statement of Problem

Technology education programme has been an integral part of national development strategies in many societies because of its impact on human resources development, productivity and economic growth. Despite its proven contribution, stakeholders in educational sector do not seem to give attention to the lack of knowledge transfer skills of technology education students. Assiter (1995) observed that the knowledge transferskills exhibited by undergraduate students of building technology are on the decline. The teaching and learning strategies as adopted in the National Policy on Education (FRN, 2004) ensure the integration of theory with practicals. There are differences between policies, strategies and implementation. Ivowi (2000) noted that curriculum invalidity in terms of teach-ability and learnability is a major hindrance to knowledge transfer. Apart from the above problem of curriculum invalidity, there are other problems such as; Poor teaching strategies and methods, Political instability- this problem leads to inconsistency of curriculum, Inadequacy of teaching materials/ facilities, Dearth in qualified teachers in building technology Education.

It is upon this background that this study is aimed at examining the techniques for improving the knowledge transfer skills of building technology undergraduates of Kaduna Polytechnics.

Purpose of the Study

The main purpose of this study is to identify the needs for improving knowledge transfer skills of building technology students in the polytechnics specifically. The study seeks to:

1. Determine the methods adopted in the knowledge transfer of skills.
2. Examine the factors that hinders the effectiveness of the method being used
3. Determine the ways for improving the methods available.

Significance of Study

when the knowledge transfer skill needs of building technology students in polytechnics are identified and improved upon, the school, industry, government as well as the students will benefit from this study in the following ways:

The government will achieve its aim of setting up higher technical institutions by improving the funding of the institutions; this will result in turning out skilled and competent graduates for use in the industry as well as in the schools. This will add more value to the nation's economy.

The students on the other hand, will be self-employed as they will be well equipped with adequate skills capable of setting up and handling small building firms. They will also have confidence in their jobs and will progress steadily through their career. This again can also assist students to be competent and also be able to pass across this their acquired knowledge to other students more efficiently and effectively.

The industries will not seek to re-train employees at entry level, and it will also reduce the cost of re-training in the industry.

Scope of Study

This research work is delimited to determining the knowledge transfer skill of building technology students in Kaduna polytechnic. The study will examine the strategies for improving the knowledge transfer skills.

Research questions

The following questions were formulated to guide the study,

1. What are the methods adopted for knowledge transfer skills?
2. What are the factors that hinder effective knowledge transfer skill?
3. What are the ways for improving the knowledge transfer skills?

Hypotheses

The following hypotheses are formulated and will be tested at 0.05 level of significance to guide the study.

Ho_1 There is no significance difference between the mean responses of the lecturers and students regarding the methods adopted in knowledge skilltransfer.

Ho_3 There is no significant difference between the mean responses of the lecturers and students regarding the ways for improving knowledge transfer skills.

CHAPTER II

LITERATURE REVIEW

Work related to the present study will be reviewed under the following subheadings:

- Concept of knowledge skills transfer and its importance
- Factors affecting transfer of knowledge skills
- Conditions for successful knowledge skills transfer
- Mechanisms of knowledge skills transfer
- How to teach for transfer
- Summary of literature review

Concept of knowledge skills transfer and its importance

Knowledge transfer skills occur when skill acquired in one context or the other can be used to impact knowledge in another context or with other related material. For example, skill acquired on how to analyse a building project helps a student later to learn more quickly how to design a building. Knowledge transfer skill is a key concept in building technology education programme and learning theory because most technology education programme aspires to knowledge transfer skills. Usually the context of acquiring skills differs markedly from the ultimate contexts of application. Consequently, the ends of education are not achieved unless transfer occurs. Thus the prospect and conditions of knowledge transfer are crucial educational issues.

Knowledge transfer skill in technology education and individual psychology receives much attention with several mechanisms for knowledge transfer skills described (Argote,

2000). These mechanisms include; movement, training, communication and students observation, technology transfer, replication routines, scientific publication and presentation.

The concept of knowledge transfer skills of undergraduate students of building technology education programme has engendered considerable debate (Mestre, 2005). Some believed it rarely occurs (for example, Detterman, 1993). Others deem it to be an unworkable concept (for example, Hammer, 2005) and to others, it is ubiquitous (Dyer, 2000). However, as Mestre notes, the problem of improving knowledge transfer skill is connected to the narrow and reduced definition it is given and if a more general approach is adopted and less emphasis given to the stimulus generalization view, then the identification of knowledge transfer would be less problematic. For example, as Bransford and Schwartz (1999) observe, knowledge transfer is best defined in terms of preparation for future learning, not in terms of identical elements.

Thorndike (1989) identified two major types of skills transfer. These are; Positive knowledge transfer and negative knowledge transfer. Knowledge transfer is deemed positive, if acquisition and performance are facilitated. Bemett (2002) defined negative knowledge transfer skills as skills inhibited, stopped or disturbed.

Others forms of knowledge transfer according to Gayne, (1999) are, the vertical and horizontal knowledge transfer. Vertical transfers of knowledge occur when knowledge acquired at lower level, in this aspect, the knowledge acquired can be applied to other levels. Horizontal transfer of knowledge occurs when knowledge gain in one situation or level is applied at the same level.

Knowledge skills transfer is the process of applying acquired knowledge during a learning programme to field of study. The successful application leads to an improvement in academic performance and has a lasting effect. Knowledge transfer skills is one of the most general phenomenon of education and by means of its influence, almost all acquired skills are interrelated in complex ways.

A differing view of knowledge transfer is suggested by Bereiter (1995), who considers knowledge transfer skill as the ability or as a set of disposition, not a process, with the potential for transfer in the learner, rather than in what has been acquired. He argues that teaching should focus on character education, so that students are able to think about situation rather than try to reproduce their learning. He supports the work of Levi and Wenger (1991) who argue that people learn skills by entering ongoing ‘’communities of practice’’ and gradually work their way into full participation. This of course underscores the importance of social-cultural context.

If knowledge skills, is the basis of all we do these days, then gaining an understanding of what types of knowledge skills that exists will enable us facilitate and improve knowledge transfer skills in all educational programmes/domains. Bereiter expands on categorization of skills types that were suggested by Cohen (2000), being: embrained knowledge skill, embodied knowledge skills, encultured knowledge skills, embedded knowledge skills, encoded knowledge skills. Embrained knowledge skill is that which is dependent on conceptual skills and cognitive abilities. This could be considered to be practical, high-level skill, where objectives are met through perpetual recognition and revamping. Tacit knowledge skill may also be embrained, even though it is mainly subconcious. Embodied knowledge skill is an action oriented type of skill and consist of contextual practices. It is more of a social – acquisition, as how students interact in and interpret their environments create this non-explicit type of knowledge. Encultured knowledge skill is the process of achieving shared understanding through socialization and acculturation. Language and negotiation is the basic tool of this type of skill in an organization. An embedded knowledge skill is explicit and resides within systematic routines. It relates to the relationship between roles, technologies, formal procedures and emergent routines within a complex system. Encoded knowledge skill is the information that is conveyed in signs and symbols (books,

manual, data bases etc.) and decontextualized into codes of practice. Rather than being a specific type of skill, it deals more with storage, skill interrogation and transmission.

From the above analysis of the various types of knowledge skills, it is very obvious that students in building technology programme in polytechnics in Kaduna state strive to acquire both the embedded and embrained types of knowledge skills. There are two components of knowledge skills which all the above types of skills could be derived from. These are; explicit knowledge skill (embedded) and tacit knowledge skill (embrained). However, the greater the extent to which a technology exist in the form of softer, less physical resources, the greater proportion of tacit knowledge skill it contains. Tacit knowledge skill, due to its non codifiable nature has to be transferred through intimate "student's interaction".

Therefore, there is no more important aspect of building technology education programme than knowledge transfer skills. Practically, all educational and training programmes are built upon the fundamental premise that students have the ability to transfer the skills they have acquired from one situation (context) to another. The basic psychological problem in the knowledge transfer skills pervades the whole psychology of students learning. There is no point to education apart from knowledge transfer skills. There is considerable debate about the nature and occurrence of knowledge transfer, as well as an unequivocal awareness of the central importance of transfer. Among many reasons why knowledge transfer has to occur are;

There is recognition that knowledge transfer is a core concept in building technology education and relates to both process and outcome. It helps us learn by facilitating the storage, processing, remembering and retrieving of information. Every time new skill is acquired, previous skill is used as a building block. Not only is it the very foundation of all subsequent skill acquisition, but is also important for other cognitive activities such as thinking, reasoning, planning, meta-cognitive, decision making and problem solving. It is

therefore the very essence of understanding, interacting and creating. Furthermore, it is the ultimate aim of teaching and learning. According to Bennet 1993 and Gardner 1991 they identified knowledge transfer as a fundamental issue and increasingly, its importance in building technology cannot be over looked (Haskell 2003, Assiter 1995).

In a world of today where globalization, technological advances and increased interdependence are required, there is an increasing acknowledgement that we need information, thinking and skills that will be transferred. As Haskell (2001) observes, the information age, necessitates innovative responses, and some see the need for educational institutions to reposition themselves in order to be able to maintain high quality outcomes (graduates). A key prerequisite of this is of course, the knowledge transfer skill. The rapid growth in skill, technology and scientific changes combined with the job changing of workers will favour those undergraduates who will acquire broad-based and transferable set of skills. Life-long learning has become a necessity and knowledge transfer skill provides the vehicle for this to occur.

The students and the educators want knowledge transfer to occur, but there is a clear understanding, that education is often too theoretical and consequently there is a failure to integrate the learning to impact on the context (Haskell 2001). This promotes disillusionment and frustration in students and educators alike. Attention to the needs of the students and institution require balancing, so that the transfer outcomes benefit both and enhance development.

Improved accountability and evaluation systems have highlighted the need to promote knowledge transfer in technology education that does have impact. Throughout the world, large amounts of funding are devoted to skills acquisition and it is suggested that the impact is often minimal (Wang 2007). At the tertiary levels of education, knowledge transfer is now increasingly being related to proficiency in a chosen discipline, personal employability and well-being (Berryman 2005).

Another learning experience that might impact broadly on cognitive is literacy, the mastery of reading and writing. Wide- ranging transfer of knowledge might be expected from experience with the cognitive demand of reading and writing, and the cognitive structures that text carries. However, Salmi and Torkkeli (2009), argued that the impact of literacy depends on immersion in diverse activities surrounding literacy not on acquisition of reading and writing skills per say.

While the preponderance of results concerning knowledge transfer appears to be negative, it is important to recognize that occasional positive findings have appeared. For instance, Cabrera and Salgado (2006) achieved positive knowledge transfer from engagement in logo computer programming to certain psychomotor level or measures, including some measures of cognitive ability. Campione (1991) report that when undergraduate students are taught to self-monitor and self-direct themselves during practical works in what has been called ‘’reciprocal teaching’’, this transfer to learning in other practical mediated areas of learning such as automobile and metalwork technologies.

Factors affecting transfer of knowledge skills

Knowledge transfer success has been defined in the literature using various approaches. One approach of defining transfer success is by measuring the number of knowledge transfers has engaged during a certain period of time (Cummings and Teng, 2003). A second approach was suggested by Laframboise *(*2007) as the one that is both effective (properly transmitted and used) and efficient (using minimal resources). A third approach to defining knowledge transfer is by assessing the extent to which the recipient perceives the knowledge transferred from the source as comprehensive, useful and satisfactory (Li and Hsieh, 2009). The success of knowledge transfer not only depends on the capability of the source to provide the necessary knowledge, but also on the characteristic of the knowledge (Argote 2000; McEvily and Chakravarthy, 2002) and the intention and the ability of the receiver to absorb and utilize the transferred knowledge (Steensma and Lyles, 2000; Tsang, 2002; Zahra and George,

2002). Moreover, differences in cultures, structures and goals between the source and the recipient of knowledge may impede collaboration and consequently hinder knowledge transfer (Lee, 2001; Levina and Vaast, 2008; Salmi and Torkkeli, 2009).

In spite of the recognized importance and the potential value of knowledge transfer in the educational circuit, little systematic and holistic research has been pursued to understand the key factors affecting knowledge transfer success from the teachers/lecturers, to the students. Furthermore, without a comprehensible understanding about the key factors that contributes to effective knowledge transfer, educators are left in the dark as to what they can do to foster valuable knowledge transfer when in school (Levin, 2004). Therefore, the aim of the present paper is to analysis the literature to answer the following question: What are the key factors that facilitate or inhibit knowledge transfer success from educators to educationists? In this study, the educator (i.e. knowledge provider) is the source of knowledge and the educationists (i.e. knowledge receiver) is the recipient of knowledge. There are four main sets of factors that influence knowledge transfer. These sets are: knowledge-related factors, recipient-related factors, source-related factors and communication-related factor between the teacher and students.

Knowledge-related factor

The nature and the characteristics of the knowledge being transferred have been recognized as important factors that impact knowledge transfer success. Blumenberg (2009) studied knowledge transfer process and found that knowledge transfer success is affected by the tacitness of the knowledge or how easy or difficult it is to codify and articulate the knowledge that need to be transferred. Tacit knowledge is hard to be transferred verbally or in writing as it resides in the minds of people (Gottschalk, 2006). The complexity of knowledge has also been regarded as a major impediment to the success of knowledge transfer. Knowledge complexity refers to the number of interdependent routines, individuals,

technologies and resources linked to a particular knowledge (Gosain, 2007). Narteh (2008) contended that complex knowledge is likely to involve many interdependent components and may be difficult to be communicated between the source and the recipient. Causal ambiguity is another inhibitor of knowledge transfer success. Xu and Ma (2008) defined causal ambiguity as the lack of understanding of the logical linkage between action and outcomes, inputs and outputs, and causes and effects. Timbrell(2001) examined the characteristics of knowledge transfer and found that knowledge with high causal ambiguity is more challenging and much harder to transfer than less ambiguous knowledge. It can be concluded, therefore, that the greater the ambiguity of the causes and effects of the knowledge, the more difficult is to identify the related knowledge elements and subsequently the chances of transferring the knowledge are limited. Knowledge related factors are absorption capacity, shared understanding etc. Cohen and Levithal, (2000) considered absorptive capacity (AC) as the ability to value, assimilate and apply new knowledge, Zahra and George (2002) expanded the theory to a more comprehensive concept of absorptive capacity as two dimensions; potential absorptive capacity, and realized absorptive capacity. Potential absorptive capacity comprises of knowledge acquisition and assimilation capabilities while realized absorptive capabilities include skill transformation and exploitation capabilities. The higher level of absorptive capacity may lead to better understanding of a new skill acquired and a higher level of harnessing skill from external sources. In education, especially in technology education, absorptive capacity is directly related to the students and it influences knowledge transfer (Alvarez 2004). Shared understanding considered is pivotal for the quality of interaction between teacher and the learner which represent the extent to which problem solving approaches are similar (Osterloh and Frey 2000).

Recipient-related factor

The transfer of knowledge depends not only on the characteristics of the knowledge transferred but also on the learning intent, absorptive capacity and motivation of the recipient of knowledge. Learning intent is the extent to which the recipient has the potential to learn and acquire new knowledge and skills proposed by the source (Tsang, 2002). Learning intent is found to enhance the amount of knowledge transferred (Narteh, 2008). If the recipient has a high learning intention and is very self-motivated to acquire knowledge possessed by the source, it will be better prepared psychologically to understand and assimilate the knowledge (Easterby-Smith, 2008). Bandyopadhyay and Pathak (2007) explored knowledge sharing in outsourcing project and found that knowledge sharing success depends on the learning intent of the recipient and the time and efforts employed to acquire the knowledge. Another factor that is found to influence knowledge transfer success is absorptive capacity. Absorptive capacity is defined as the ability of the recipient to recognize the value of the new knowledge provided by the source, assimilate it and apply it to another context (Schmidt, 2010). The study of Ko(2005), mentioned above, explained how knowledge transfer success is much related to that capacity of the students (recipient) to absorb the transferred knowledge from the consultants (source) and effectively apply it to commercial ends. Zahra and George (2002), on the other hand, found that *lack of absorptive capability* is one of the primary factors that hamper knowledge transfer success. The underlying premise is that a recipient‘s stock of prior related knowledge and experience is essential to effectively absorb and utilize external knowledge (Srivardhana and Pawlowski, 2007). An important factor that has been identified by the literature to impact knowledge transfer success is the motivation of the recipient to explore and acquire valuable knowledge (Ko, 2005). Xu and Ma (2008) investigated the key determinants knowledge transfer and found that the stronger the motivation to learn, the more likely it is that individuals will attempt to master and use new

external knowledge. Practical factor such as active practical in building technology by students improve retention of knowledge and distributed practice is usually more effective than mass practice. The advantages to distributed practice are especially noticeable for fast presentation rates or unfamiliar stimulus material. This occurs apparently because mass practice allows the learners to associate only with a single context, but distributed practices allow association with many different contexts.

Source-Related Factor

The third set of factors is related to the source of the knowledge. The two factors that are identified in this set are called source capability and source credibility. Source capability is the extent to which the receipt views the source as capable and expert and has a wealthy technical and knowledge-base (Joshi, 2007). Capable and committed educators tend to devote time and resources to support the transfer of knowledge to the recipient (KO, 2005). Tsai (2001) investigated the factors affecting success and found that teacher's capability is essential as a capable teacher tend to possess great reservoirs of knowledge, skills and expertise. A study by Wang, (2007) on knowledge transfer highlighted the importance of educators'(i.e. source) capability to offer related and needed knowledge, to mobilize various skills, and to help the students configure and derive value from it. Source credibility is also found to facilitate knowledge transfer. Joshi(2007) defined source credibility as the extent to which a recipient perceives a source to be trustworthy and reputable. Lee(2008) investigated the impact of trust on knowledge transfer and found that mutual trust facilitate knowledge sharing between teachers and students. Reputation has been regarded as central for knowledge transfer success because it is often used in evaluating the value of the source of knowledge (Joshi, 2007). Initiating a knowledge transfer from a credible and trustworthy source tend to be less challenging (Lander, 2004). However, in the absence of trust, recipient perceives a source's knowledge to be less valuable and not much

persuasive (Ko, 2005). Motivation is another attribute that the teacher should possess which helps in developing student's interest. Motivation affects the amount of time and energy that students are willing to devote to learning or skill acquisition. Students are motivated to develop competence and to solve problems they have. Although extrinsic rewards and punishment clearly affect behaviour, students work hard for intrinsic reasons, as well, according to Joshi (2005). The nature of building technology students motivation is related to students desire to participate in the skill acquisition process.

It is important to view knowledge transfer as a dynamic process, so it requires students to actively take part in this process. Argote (1999) found a positive relationship between motivation and knowledge transfer skill. This active view of knowledge transfer assumes that transfer is adequately reflected by students' abilities to be aware of, to acquire and to solve a set of transfer problems right after they have engaged in an initial learning task. Those students who exhibit more intrinsic motivation should also exhibit greater knowledge transfer skills within building technology education programme.

Communication related factor

Communication related factors such as face-to-face communication is a crucial factor influencing the quality of knowledge transfer skill (Alavi and Leidner 2001). Here, we are concerned about the qualification and the psychomotor skills of the technology education teacher. Communication processes and information flows drive knowledge transfer in institutions (Alavi and Leidner 2001). In technology education, the teacher's communication will affect the knowledge transfer process.

Source credibility (the extent to which students perceive source to be trustworthy to acquire skill) is another factor that affects knowledge transfer skill by students. Szulanski discovered that when a source is not perceived as trustworthy or reliable, the recipients are less motivated to internalize the skill that is communicated to them by the teacher. In

technology education, the teacher's credibility not only affects knowledge transfer, but also affects the attitude and the relationship between teacher and students.

It is important to note that the discovering of these above factors will lead to better knowledge transfer in technology education. This research study extends prior knowledge transfer research by empirically examining the antecedents to knowledge transfer skill by surveying undergraduates' students in building technology education programme in Kaduna polytechnic, Kaduna state.

Furthermore, various articles and journals written by different researchers had listed various factors affecting the knowledge transfer skills. Their different views are based on researches carried out by each of them. According to Mbawo (1995), he identified five factors affecting knowledge transfer skills to include; individual/trainee characteristics, environment, learning styles, learning strategies and learning design. According to Gayne (1999), he identified three major factors affecting transfer of knowledge skills to include; lack or poor instruction, lack of motivation and lack of underlying learning skills.

It has been recognized by educators and researchers that knowledge transfer process is influenced by five components: source context, recipient context, skill context, relational context and situational context (Joshi, 2004). Davenport and Prusak (2000) suggested that knowledge transfer process involves two actions; transmission of skill to a potential learner and absorption of the skill by the learner that could eventually lead to changes in behaviour or the development of new skills.

In technology education, the nature, degree and appropriateness of knowledge transfer are related to the students of building technology cognitive, psychomotor, motivational and emotional capacity to adapt (Volet, 1999).

Albino (2001) identified nine areas which causes knowledge fade or decay: These are; knowledge retention interval, degree of over learning, task type, speed versus accuracy,

methods of testing for original learning retention, conditions of retrieval, evaluation criteria, instructional strategies/training methods and individual difference in ability.

It is widely accepted that the longer the period of non-use of skill, the greater the probability of decay. Over learning is the amount of extra training beyond the point required to reach initial proficiency. Over learning possibly reduces the amount of concentration required and effort. According to Albino (2001), cognitive task which requires perpetual input, decision making, mental operations and problem solving are better retained than psychomotor task which requires physical strength, exertion of forces, endurance and coordination. Speed (time to complete a task) and accuracy (number of errors) are dependent variables used in the measurement of knowledge decay. Albino (2001) found that, in experiments investigating knowledge decay, task accuracy was three times more susceptible to skill decay than task completion time. This finding while intuitive is caveat due to their lack of data when performing their statistical analysis.

The usual structure for testing for original learning and retention sees the subject training to a specific criterion and tested for retention at a later date. The retention test usually takes two forms, recall and recognition tests. An individual's ability to recognize a skill is separate from their ability to recall it. The meta-analysis findings were that recall test shows greater knowledge fade than recognition tests. The similarity between the functional task and environment in training condition had a positive correlation with knowledge retention in the test environment.

Both the amount and quality of knowledge retention appear to depend on how the information was encoded and the types of cues present at retrieval. ''Encoding specificity principle'' states that if the conditions at retrieval (testing) are the same as the conditions at retention (learning), the knowledge decay will be decreased. The recall or knowledge retention is also increased if the test and learning environment are similar as the trainee or

learner has more environmental cues to draw upon when encoding and recalling the information.

Evaluation criteria affect skill fade as they are only the ruler by which skill fade is measured. They can be based around four different criterion measures. These are: reaction (trainee's feelings), learning, behaviour and result. Behaviour and results criteria consistently show less skill fade than those with lower abilities. There is evidence to suggest that this is because the lower ability students forget larger chunks of abstract, theoretical material than the higher ability students.

Conditions for successful knowledge transfer

Positive findings of knowledge transfer skill, near and far, suggest that whether knowledge transfer occurs is a huge question. One needs to ask, under what conditions does knowledge transfer occur.

Thorough and diverse practice: Luria and Cole suggest that knowledge transfer skill depends heavily on extensive practice of the knowledge in question, in a variety of context. This yields flexible relatively automatized bundle of knowledge skill easily evoked in new students.

Explicit abstraction: Knowledge transfer sometimes depends on whether learners have abstracted critical attributes of a situation. In one demonstration, Gick and Holyoak (1990) presented subjects with a problem story that allowed a particular solution from subjects that solved the problem**;** they elicited what the subject took to be the underlying principle. Then, they presented the subject with another analogue problem that invited a similar approach. Those subjects with the fullest and soundest summary of the principle for the first puzzle were most successful with the second. These and other results suggest that explicit abstraction of principles from a situation foster knowledge transfer.

Active self-monitoring: Related, meta-cognitive reflection on students thinking processes appears to promote knowledge transfer skills. This contrast with the explicit abstraction category above, abstraction focuses on one's own thinking processes. Belmont (1999) undertook a synthesis of a number of efforts to teach retarded students simple memory strategies and to test whether the students would apply these in slightly different context. Many of these studies showed no knowledge transfer, while a few revealed some. The researchers isolated the factor that appeared to account for success: teaching the students not just to apply the strategies but to monitor their own thinking processes in simple ways. Presumably, this activation of self- monitoring helped the students later to recognize when they might apply the strategy they had acquired.

Arousing mindfulness: Mindfulness refers to a generalized state of alertness to the activities one is engaged in and one's surroundings, in contrast with a positive reactive mode in which cognitions, behaviours and other responses unfold automatically and mindlessly (Langer). More encompassing than explicit abstraction and active self- monitoring, mindfulness would foster both of these.

Using a metaphor or analogy: knowledge transfer skill is facilitated when new material is studied in light of previously learned material that serves as an analogy or metaphor. Things known about the ''old'' domain of skill can now be transferred to a ''new'' domain thereby making it better understood and learned. For example, students may initially understand the idea of an atom better by thinking of it as a small solar system, or how the heart works by thinking of it as a pump. Of course, most of such analogies are limited and need elaboration and qualification.

Mechanisms of knowledge transfer skill

A central goal of cognitive science is to develop a general theory of transfer to explain how people use and apply their prior knowledge to solve new problems. Previous work has identified multiple mechanisms of transfer including (but not limited to) analogy, knowledge compilation, and constraint violation. The central hypothesis investigated in the current work is that the particular profile of transfer processes activated for a given situation depends on both (a) the type of knowledge to be transferred and how it is represented, and (b) the processing demands of the transfer task. In order to understand human thinking and problem solving in complex and novel situations we need to have a general theory of how people use and adapt their prior knowledge to solve new problems. Aspirations towards such a goal have traditionally been discussed in terms of transfer, or how knowledge acquired from one task or situation can be applied to a different one (Barnett & Ceci, 2002; Bransford & Schwartz, 1999; Lobato, 2006). Work in cognitive science over the past 30 years has taken a ‘‘divide and conquer’’ approach to attaining this goal. Researchers have pursued separate lines of inquiry by investigating the cognitive processes of transfer for particular learning and problem-solving scenarios. This work has led to the development of several specialised theories of transfer including analogical transfer, knowledge compilation (Anderson, 2002), constraint violation (Ohlsson, 1996), and transfer appropriate processing (Bransford, & Brown, 2002), among others. Although this research strategy has contributed to our understanding of particular kinds of transfer, it has done little to address how these different transfer processes relate to and interact with one another. A complementary research approach is theory unification. If our ultimate goal is to develop a general theory of transfer we need to articulate how each local theory ‘‘fits together’’ within a larger cognitive framework (Newell, 1990). The present work investigates the possibility that there are multiple mechanisms for transfer, each of which has psychological reality. If people have multiple transfer mechanisms then it is likely that they apply or engage those

mechanisms adaptively, in response to the transfer conditions, i.e., what relevant knowledge they possess, how it is encoded, and the relation between the training and transfer problems. In this study, I am investigating the application conditions and interaction of three proposed mechanisms of transfer including analogy, knowledge compilation, and constraint violation. Understanding when these mechanisms are applied and how they interact is critical for developing a general theory that incorporates each mechanism in principled ways. The central hypothesis is that the particular profile of transfer processes triggered for a given situation depends on (a) the type of knowledge to be transferred and how it is represented, and (b) the processing demands of the transfer task. It is hypothesised that there is a trade-off between the mechanisms in terms of their scope of application (i.e., near vs far transfer) and the amount of cognitive processes required to transfer the knowledge. The first mechanism of interest is analogical transfer (Gentner, Holyoak, & Kokinov, 2001). Analogical transfer is composed of three components: retrieving a prior example, creating a mapping between it and the current problem or situation, and then using that mapping to draw an inference relevant to the application context. The transferred knowledge is typically assumed to be a declarative representation, but it can also include procedural attachments (Chen, 2002). A large amount of empirical work has shown that analogical retrieval is facilitated by the surface similarity to the target scenario (Catrambone, 2002) The second mechanism of interest is knowledge compilation proposed by John Anderson and co-workers (Neves & Anderson, 2002). This mechanism acts as a translation device that interprets prior declarative knowledge (e.g., advice, instructions, or tactics) into a set of procedures that can be used to solve new problems.

Knowledge compilation operates through the step-by-step interpretation of a declarative statement that generates new production rules as a side effect. Those production rules are then optimised via rule composition (production compilation; Taatgen & Anderson, 2002; see also Anderson 2004). And the result is a procedural representation of the content of the

declarative knowledge given a particular goal. Knowledge compilation is the process of figuring out the action implications of the tactics for the particular situation or problem encountered. Since knowledge compilation operates on declarative knowledge representations, it can be brought to bear in a wide variety of application contexts because the knowledge has yet to be categorised or tied to the goals of a particular problem-solving context. This mechanism embodies a trade-off between applicability and efficiency in that it has wide applicability across many contexts but requires a complicated and lengthy application process to translate the declarative knowledge into a set of actions. Previous work has shown that declarative knowledge can apply to a variety of different surface features but is costly in terms of the time required to categorise that knowledge to the current problem context (e.g., Nokes & Ohlsson, 2005).

The third mechanism of interest is constraint violation proposed by Stellan Ohlsson and co-workers (Ohlsson, 1996; Ohlsson, Ernst, &Rees, 1992). This mechanism is also a declarative-to procedural type of transfer but implements a different set of cognitive processes from those used in knowledge compilation. Constraint violation is a three-part process that involves a general evaluation cycle in which a learner uses prior knowledge of the domain constraints to evaluate and correct her or his task performance. According to the theory, the learner generates an initial solution based on general problem-solving strategies and then evaluates that solution with respect to her or his prior knowledge of the domain constraints. If a constraint is violated, the learner attempts to revise the faulty procedure(s) and generate a new solution. This process is repeated until a correct solution is found that satisfies all of the constraints. Transfer is the process by which the learner uses her or his prior constraint knowledge to identify and remedy the errors generated while performing new tasks. The theory postulates that constraint knowledge applies to a wide variety of tasks but is costly in the amount of cognitive processes that it requires to go through the general evaluation cycle to obtain a correct solution. Each of these mechanisms has been

hypothesised to use different cognitive processes and has been associated with a particular type of transfer scenario (i.e., type of prior knowledge and application context). Analogy transfers prior exemplar knowledge and is applied by novices to near transfer problems that look similar on the surface. This kind of transfer is beneficial when the source has the same deep structure as the target (if the structures differ it may lead to inappropriate analogies and problem-solving errors). If procedural knowledge from the exemplar is mapped to the target problem, the solution can be articulated with minimal cognitive processing.

Knowledge compilation transfers prior declarative knowledge including facts, instructions, or tactics, and can be applied to multiple problem contexts because the knowledge has yet to be categorised for any one task. Although the declarative knowledge can apply across a variety of different surface features, interpreting that knowledge for a particular problem requires significant cognitive processing. Finally, constraint violation transfers prior knowledge of the domain constraints and can be applied to a wide variety of problems within the domain. Although such knowledge can be applied generally, using it to derive a specific solution requires multiple repetition of the general evaluation cycle. Comparing these mechanisms to one another suggests a trade-off between their scope of application and the amount of cognitive effort. Analogy applies to near transfer problems and is fast and efficient; knowledge compilation applies across a variety of surface features but the knowledge must be systemised; and constraint violation applies to many problems in a domain but requires several repetition of the general evaluation cycle. Furthermore, there are other mechanism of knowledge transfer, which are discussed below

Abstraction: Research suggests more complex picture of how identical elements figure in the process of knowledge transfer. An identity that mediates transfer can sit at a very high level of abstraction. Such a degree of abstraction helps to account for far transfer of skill, because highly abstract identical elements can appear in very different context.

Transfer by affordance: Writing from the perspective of situated cognition, Greeno argued that knowledge transfer need not depend on mental representations that apply to the learning and target situations. If the potential learning knowledge transfer situation presents similar affordances, the students recognizes them, the students may apply the same or a somewhat adapted action schema there. External or internal representation may or may not figure in the initial learning or the resulting action schema.

High road and low road knowledge transfer skill: Solomon and Perkins (1998) synthesized findings concerned with knowledge transfer by recognizing two distinct but related mechanisms, the ‘’low road’’ and the ‘’high road’’. Low road transfer happens when stimulus conditions in the knowledge transfer context are sufficiently similar to those in a prior context of skill acquisition to trigger well- developed semi-automatic responses. In keeping with the view of Greeno, these responses need not be mediated by external or mental representations. A relatively reflexive process, low road transfer figures most often in near transfer.

High road transfer, in contrast, depends on mindful abstraction from the context of learning or application and a deliberated search for connection: what is the general pattern? What is needed? What principles might apply? What is known that might help? Such transfer is not in general reflexive. It demands time for exploration and the investment of mental effort. It can easily accomplish far transfer, bridging, between contexts.

In a particular episode of knowledge transfer skill, the two roads can work together- some connection can occur reflexively while others are sought out. But in principle, the two mechanisms are distinct. This framework matches well a number of points made earlier. It acknowledges that sometimes knowledge transfer is stimulus driven, occurring more or less automatically as a function of much and diverse practice. On the other hand, sometimes it involves high levels of abstraction and challenges of initial detection of possible connections.

This analysis emphasizes that the conditions for transfer are stringent. Reflexive (low road) transfer skill requires well automatized patterns of response that are thus easily triggered by similar stimulus conditions and it requires stimulus conditions enough like prior contexts of skill learning to act as triggers. Many situations of knowledge skill acquisition offers practice only for a narrow range of examples and not enough practice to achieve significant automaticity, providing a poor basis for reflexive transfer. Mindful (high road) transfer requires active abstraction and exploration of possible connections. Many learning situations do not encourage such mental investments, although people more inclined to mindfulness or meta-cognition are by definition more likely to make them.

How to teaching for transfer

When students go out into the world and encounter new experiences, rarely will they have a manual telling them exactly what to do? They will need to draw on what they have learned before to solve new challenges. How do we teach them to transfer what they have learned from one situation to another? How can we teach them to use their knowledge in new ways? That is the challenge of transfer: How can students use what they have learned by applying it to solve new problems? Given the vast array of knowledge needed in life, the teacher's challenge is to determine what is the *least* amount of material that she can teach really well that will allow students to use that knowledge in the *widest* possible range of situations. Transfer is the ability to extend what one has learned in one context to new contexts. In some sense, the whole point of school learning is to be able to transfer what is learned to a wide variety of contexts outside of school. Yet the ability to transfer information or ideas is not feasible. Quite often, information learned in a specific way, or in a particular context, does not transfer to another. For example, students may memorize vocabulary words for a quiz, but they cannot use the words in their writing. Students may learn mathematical facts, but they do not know how to apply these concepts when they are confronted with a

different kind of problem outside of school. Students may conjugate verbs in a second language, but they cannot remember how to use them correctly in conversation. If the ultimate goal of schooling is to help students transfer what they have learned in school to the everyday settings of home, community, and work, we have much to learn from the non-school environments where people work. Studies conducted in places like, hospital emergency rooms, and dairy farms have found at least three contrasts between schools and everyday settings:

1. School environments place more emphasis on individual work than most other environments, which tend to emphasize collaboration.
2. School work tends to involve more "mental work," whereas everyday settings invest more in tools and technologies to solve problems.
3. Abstract reasoning is emphasized in school, whereas contextualized reasoning is used more often in everyday settings (Bransford, Brown, & Cocking, 2000).

The overall implication is that for effective transfer to take place, learning should be organized around the kinds of authentic problems and projects that are more often encountered in non-school settings. However, as we discuss below, overly contextualized reasoning can limit an individual's ability to transfer. It is thus important to provide opportunities for students to use knowledge in multiple contexts so that they can see how skills or problem-solving strategies can be generalized. All new learning involves transfer to some extent; learning can be transferred from one problem to another, from one class to another, between home and school, and between school and the workplace. Specific transfer (horizontal transfer) refers to the application of knowledge to a specific, very similar situation. General transfer (also called far transfer) refers to the application of knowledge or general principles to a more complex, novel situation. An example of general transfer is a student who understands the principles of the scientific method and applies them to design and conduct an experiment, to critique other experiments, and to test competing hypotheses

in an area where she has developed content knowledge. General transfer is more broadly useful, and it is also more challenging to develop. In order to teach for transfer, a number of factors influence a learner's ability to understand or apply new Knowledge:

- The nature of the initial learning experience
- Transferring knowledge in and out of different contexts
- Seeing similarities and differences across contexts

For transfer to occur, learning must involve more than simple memorization or applying a fixed set of procedures (Bransford, 2000). Learners must understand a concept or have command of a skill in order to be able to use it themselves. They must know how to apply what they have learned to new situations or problems, and they must know *when* it applies. To teach for transfer, teachers must ask, "What is it about what I am teaching now that will be of value, of use, and a source of understanding for my students at some point in the future, when they are in a situation that is not identical to the one they're in now?.

The nature of initial learning experience: an important point about transfer is that the initial knowledge that is intended for transfer needs to be *well grounded.* One factor that influences initial learning is whether students have learned something so that they understand it or whether they have simply memorized facts or procedures. Learning with understanding includes grappling with principles and ideas, and structuring facts around these organizing ideas. This latter understanding allows learners confronted with the challenge of creating solutions to problems, to figure out that there are alternative ways of solving the problem of variable situations. Students who possess this deeper understanding of the original material—how and why problems occur the way they do, are better equipped to transfer this initial knowledge to a new situation and grapple with this more complex problem. Another factor that influences initial learning is the *time* students are given to explore ideas, offer predictions, process information, and make sense of new tasks and situations. Ideas cannot

just be mentioned; they must be examined and pondered in order to be understood. Bransford and colleagues noted that "it is important to be realistic about the amount of time it takes to learn complex subject matter. It has been estimated that world-class chess masters require from 50,000 to 100,000 hours of practice to reach that level of expertise" (Bransford 2000). That practice involves learning to recognize patterns and to anticipate and execute complex series of moves, among other things. The development of expertise in any subject area takes a major investment of time. Students need time to understand the meaning of new ideas, to draw connections to other ideas, to apply what they are learning to real tasks, to determine patterns of relationships, and to practice new skills. Bransford and colleagues observe: Attempts to cover too many topics too quickly may hinder learning and subsequent transfer because students (a) learn only isolated sets of facts that are not organized and connected or (b) are introduced to organizing principles that they cannot grasp because they lack enough specific knowledge to make them meaningful (Bransford 2000). This same principle causes many educators and learning theorists to argue for a "less is more" curriculum that carefully selects important concepts for students to explore deeply, rather than a "coverage" curriculum that superficially mentions lots of ideas that are never really applied or understood (Bransford 2000;Gardner, 1999). The way in which teachers *organize ideas and learning experiences* is a third factor that makes a difference in how deeply students understand. Understanding requires drawing connections and seeing how new ideas are related to those already learned—how they are alike and different. One way to facilitate learning with understanding is to offer "contrasting cases": Appropriately arranged contrasts can help people notice new features that previously escaped their attention and learn which features are relevant or irrelevant to a particular concept. For example, the concept of linear function becomes clearer when contrasted with nonlinear functions (Bransford 2000). Structuring the learning environment in strategic ways can also foster understanding. For instance, experiential learning can be made even more powerful when coupled with a structured examination of the

central ideas to be learned. Creating a simulation or an inquiry experience in which students explore materials or data and then following it with a structured explanation of those ideas through a lecture or guided discussion can produce stronger learning than either experience or explanation alone. A fourth influence on initial learning is *motivation.* Motivation affects the amount of time people are willing to put into learning .Motivation can be seen as a function of how learners see themselves, how they see the task at hand, whether they think they can succeed, and whether teachers help them engage with the material in productive ways (Blumenfeld & Mergendoller, 1992). Motivation is enhanced when learners see themselves as capable. Teachers can support this perception by choosing tasks at appropriate levels of difficulty, carefully supporting each student's learning process, providing multiple entry points into the material, and creating opportunities for students to receive feedback and revise their work. Motivation is also enhanced when learners value a task and find it interesting, something teachers can support by relating material to students' lives and experiences. Allowing choice and assigning tasks that are active, authentic, and challenging can serve to engage students in the work at hand. Interest and value are also enhanced by having an audience for one's work, seeing the usefulness of an activity, and having an opportunity to influence others (Bransford 2000). Applying knowledge in real-life contexts can support deeper initial learning. At the same time, knowledge too closely tied to only one specific situation may not transfer to others unless general principles for its use are also understood. In short, transfer is affected by the context in which the initial learning takes place. If a fact is "learned" by simple memorization in a rote fashion and never applied to an authentic task that provokes understanding, the student may be able to recite the fact when specifically asked, but is unlikely to be able to call upon and use the information in new situations. For this reason, "active" learning in which students are asked to use ideas by writing and talking about them, apply what they have learned to more complex problems, and construct projects that require the integration of many ideas has been found to promote deeper learning and

stronger transfer. Although applying ideas and skills in real-life contexts is important to initial learning, it is also important to learn how to use skills across problems and settings. People may learn a skill in one context, but fail to apply this learning in other contexts. People have to be taught how to transfer their knowledge - that is, they need to understand how it may be relevant to a wide variety of situations. As educators we need to ask ourselves, "What are those simpler skills that turn out to be useful in more complex performances we want students to learn? We want to make sure students learn those simpler skills well so that when they confront the more complex performances they can put into practice what they already know. We frequently possess some simpler skills or simple kinds of knowledge, but when we confront the new task we do not realize that we already possess what we need to complete that task. Metacognition is important to transfer because it involves being wise enough to know that we already know something and will use it when it is necessary.

Transferring knowledge in and out of different contexts: Students transfer knowledge *into* a new learning situation, just as they transfer *out* newly formed understandingsto other settings. Transferring knowledge *in* raises a number of challenges for bridging contexts: First, students may have knowledge that is relevant to a learning situation that is not activated. By helping activate this knowledge, teachers can build on students' strengths. Second, students may misinterpret new information because of previous knowledge they use to construct new understandings. Third, students may have difficulty with particular school teaching practices that conflict with practices in their community (Bransford 2000). Teachers can build on the knowledge students bring to the classroom by providing opportunities to discuss what they already know about a topic, relating problems to familiar contexts, and working with other teachers to build curricula that build across grade levels. Teachers can also build on students' cultural expectations and knowledge. Researcher and teacher Carol Lee studied how cultural practices outside the classroom can be transferred into the classroom to facilitate learning. She documented how a teacher helped urban, African American students apply the linguistic

knowledge they already had about words, rhymes, and symbolism from their lives outside the classroom to academic tasks (Lee, 1995). Her studies show how helping students become more conscious of the ways they were already using language could help them apply this knowledge to literature analysis inside the classroom. At the same time, teachers should be aware of the many ways a student's prior experiences and understandings may impede new learning. Similarly, students may overgeneralize what they have already learned in another entirely different context. It becomes the teacher's role to unearth these misconceptions, explain the differences in the situations under study, and help students to reshape their thinking. Careful observation of language patterns and misconceptions, as well as pre assessment tools that offer a snapshot of students' current understandings, can help teachers gain these insights. Although students can transfer a great deal of knowledge into a learning situation, one of the primary goals of school is to help students transfer knowledge out to new situations. One kind of transfer occurs when we learn the parts of a task and then use those parts to do something much more complicated, just as football players do when they practice specific skills and then put them together into a new play. For instance, we can transfer an idea from one situation and use it in a new, but similar context. Encouraging the transfer of knowledge out to new, more complex situations might involve asking students to study a particular problem in the classroom and then assigning a project that requires applying these understandings outside the classroom. Teachers can show their students how a particular set of ideas they learn in the classroom can be useful in a variety of settings.

Seeing similarities and differences across contexts: Part of the challenge of transfer isknowing when two situations share a fundamental structure and thus should trigger the use of a previously learned concept or principle. Teachers can help students use their knowledge across dissimilar situations in at least three ways:

i. Provide a context for the subject matter

ii. Capitalize on general principles, and

iii. Encourage the understanding of structures that tie subject matter knowledge together.

These three instructional principles have all been found to influence learning and transfer. In school settings, the ways in which teachers present ideas and engage students in working on them have a great deal to do with whether transfer of learning will later occur. Learning discrete, unconnected facts outside of a broader *context* reduces the likelihood that students will be able to remember and apply their knowledge later. Learning information that is never applied or put into practice also reduces the likelihood of later transfer. For instance, students will be less likely to remember the formula for volume if they memorize it than if they derive the formula themselves through the exploration and manipulation of substances encapsulated in different shaped containers.Researchers have discovered that learners can be taught how to recognize when problems may share certain elements or similarities.

Analogies are particularly powerful forms of representation that are instances of transfer in and of themselves since they require applying what one know about one thing to another. Two additional ways to increase flexibility entail asking learners to think about alternatives to the original case or having them create general principles that apply to a whole class of related problems: For example, instead of planning a single boat trip, students might run a trip planning company that has to advise people on travel times for different regions of the country. The more teachers make clear the fundamental *structure of the subject* and where an idea stands in relation to many others, and the clearer they make the general principles that apply to what is being studied, the more likely that students will be able to understand the idea and use it later. One technique for making these structures visible is generating a visual representation (e.g., a table or diagram) that illustrates the relationships among ideas or classes of problems. In addition, if students are asked to apply what they are learning to a particular task or analysis, they are more likely to be able to use their knowledge again later.

Similarly, if students are taught how to figure out the features of different kinds of problems and to compare them with others, they can begin to understand when a certain kind of prior learning may apply to a newproblem .Furthermore, those points about mechanisms; clarify why transfer does not occur as often as would be wished. They also provide guidelines for establishing conditions of learning that encourage knowledge transfer skills.

In many contexts, knowledge transfer will indeed take care of itself in situations where the conditions of reflexive knowledge transfer are met more or less automatically. For example, building design normally involves extensive practical with diverse materials to the point of considerable automaticity.

Bridging exploits the high road to knowledge transfer. In bridging, the instruction encourages the making of abstraction, searches for possible connections, mindfulness and meta-cognition. For example, a teacher might ask students to devise an exam strategy based on their strong points and weak point, and then make a plan to highlight the former and down play the latter in an interview. The instructions thus would emphasize deliberate abstract analysis and planning of course, in the case of exam technique and job interview, the teachers might do both. Instruction that incorporates the realistic experimental character of the thoughtful analytic character of bridging seems most likely to yield rich knowledge transfer.

Solomon and Perkins (1998) summarized the following as what the teacher should do to encourage knowledge transfer skill by students. These are; engage students into practice studies, proper organization of learning, emphasis on principle, develop process scale, interaction with students and using proper teaching aids.

Summary of literature review

So far in this chapter, we have looked at the concept of knowledge transfer skills to be skills acquired in one context, which impacts on knowledge in another context. This is a key concept in building technology programme because most technology programme aspires to knowledge transfer. This involves two basic types of knowledge transfer, positive and negative transfer. It describes positive transfer to be that which occurs when acquisition and performance are facilitated, while negative transfer occurs when transfer of knowledge is inhibited or stopped. This chapter also looked at various types of skill which students of building technology should be able to transfer. For the fact that there is no more important aspect of building technology education programme than knowledge transfer skills, the importance of knowledge transfer were also looked because it helps us in cognitive activities such as thinking, reasoning, planning, meta-cognition, decision making and also in problem solving.

Many factors affecting knowledge transfer skills were also discussed to include source context, recipient context, skill context, relational context and situational context. Other factors which affect knowledge transfer were also looked into which include; knowledge related factor, source related factor, recipient related factor as well as the communication related factor between students and lecturer. Conditions for successful knowledge transfer were analysed critically, to include: explicit abstraction, active self-monitoring, arousing mindfulness and using a metaphor. This chapter also looked at the mechanism for knowledge transfer which is: analogical transfer, knowledge compilation, constraint violation, abstraction, transfer for affordance and high road transfer among others. The ways building

technology teachers can teach for transfer to occur was also talked about. All these are put together to enable the researchers adopt adequate and far reaching recommendations that would have direct positive bearing on the life of the students.

CHAPTER III

METHODOLOGY

This chapter describes the research design, area of study, population of the study, sample of study, instrument for data collection, validation of the instrument, administration of the instrument, method of data analysis and decision rule.

The Research Design

The method employed in this research work is a descriptive survey research design. Thus, a descriptive survey is one that involves the collection of data, organize them, analyse them, and describe them as they exist naturally.

Area of the Study

This study covers the students and lecturers of building technology education programme of the Kaduna polytechnic, Kaduna, Kaduna state.

Population of the Study

The target population of this study is the entire lecturers and students of building technology education programme of Kaduna polytechnic.

Sample of the Study

The sample of this study consists of 80 third year (HND1) students and 20 lecturers of building technology education.

Instrument for Data Collection

The instrument used for data collection was a structured questionnaire designed by the researcher, consisting of 40 items raised from three research questions. The data for this study were analysed by using the statistical analysis and t-test. The questionnaire contains

three sections, A, B, and C. Question and response made is on a four-points rating scale of strongly agree (S.A), Agree (A) Disagree (D) and strongly Disagree (S.D). In the questionnaire, respondents were requested to indicate by ticking (√) against the most appropriate options in the space provided in the response column.

Validation of the Instrument

A draft of the questionnaire was designed and constructed by researcher and was validated by the researchers supervisor and some professionals in the department of industrial and technology education of federal university of technology Minna. Corrections and additions were made from the validation before production and administration of instrument.

Administration of the Instrument

The researcher administered the questionnaire to the respondent and collected back the completed questionnaire. It was administered to Kaduna polytechnic students and the respondents reported no difficulty in understanding the items of the instrument.

Method of Data Analysis

The data collected by the researcher was analysed using frequency count, mean, standard deviation, and t-test as statistical tools rating used. The mean response was used to ascertain the central tendency of the respondent's opinion to decide on the items and answers to the three research questions used, while t-test statistics were used to test the hypothesis.

Modified scale was developed using strongly agreed, disagreed and strongly disagreed

Decision Rule

To determine the acceptance, a mean score of 2.50 was chosen as decision point between strongly agreed and strongly disagreed. In other words, any response with a mean score of 2.50 and above was considered agreed while response with a mean score below 2.50 was

regarded as disagreed. For the t-test, a t-critical of ±1.96 at 0.05level of significance determines the acceptance and rejection of items.

CHAPTER IV

PRESENTATION AND DATA ANALYSIS

This chapter deals with the presentation and analysis of data with respect to the research questions formulated for this study, the result of this data analysis for the research questions are presented as follows.

Research Question 1

What are the methods adopted in transferring knowledge?

To determine the methods adopted in transferring knowledge to undergraduate students of building technology, 5 Questionnaire items were drawn for the respondents to express their opinions. The opinions of the respondents are represented in Table 4.1 below

Table 4.1: Mean scores of the respondents on the methods adopted in transferring knowledge skills to building technology undergraduate students.

N_1=80, N_2=20

S/N	ITEMS	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	Remarks
1	The use of lecture methods of teaching	3.14	3.25	3.20	Agreed
2	The use of demonstration method of teaching	3.23	2.95	3.09	Agreed
3	The use of discussion method of teaching	3.15	2.75	2.95	Agreed
4	The use of project method of teaching	2.19	2.75	2.47	Disagreed
5	The use of practical method of teaching	3.23	3.10	3.17	Agreed

Keys:

N1 = Number of students N2 = Number of lecturers

$\bar{x}_1$ = Mean score of students $\bar{x}_2$ = Mean score of lecturers

$\bar{x}_t$ = Average mean score

Analysis of the two groups of respondents from Table 4.1 reveals that 4 out of 5 items were rated agreed with a mean score ranging from 2.75-3.25. But item 4 was disagreed with a mean score of 2.19- 2.47.

Research Question 2

What are the factors hindering knowledge transfer skills to building technology undergraduate students?

In determining the factors hindering knowledge transfer skills to building technology undergraduate students, 17 items were provided to the respondents in order to express their opinions. The opinions of the respondents are represented in Table 4.2 below.

Table 4.2: the mean score of respondents on the factors hindering knowledge transfer to building technology students

S/N	ITEMS	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	Remarks
6	Insufficient qualified building technology lecturers	3.38	3.60	3.49	Agreed
7	Too much courses offered by the students	3.00	2.90	2.95	Agreed
8	The poor relationship between building technology education lecturers and students	3.18	3.45	3.32	Agreed
9	The training environment is not conducive for learning	3.13	3.00	3.07	Agreed
10	Students are not well motivated	3.36	3.25	3.31	Agreed
11	The longer the period of non-use of already acquired skills by student	3.13	2.90	3.02	Agreed
12	The teaching method employed in the teaching building technology courses	3.06	3.35	3.21	Agreed
13	Inadequate instructional facilities	3.38	3.50	3.44	Agreed
14	Mode of students evaluation	3.41	3.05	3.23	Agreed
15	Low intelligent quotient (IQ) of the students	3.09	1.85	2.47	Disagreed
16	The manner in which building technology curriculum is developed	2.96	2.50	2.73	Agreed
17	Insufficient period for teaching building technology courses	3.09	2.10	2.60	Agreed
18	The ability to value, assimilate and apply new skills (absorptive capacity)	2.56	2.50	2.53	Agreed
19	The condition of retrieval and retention of learning	2.94	3.15	3.05	Agreed
20	The method used for testing of original learning of skills and retention	3.50	2.75	3.13	Agreed

21	The psychomotor skill of the building technology teachers	3.06	3.25	3.16	Agreed
22	Students attitude towards learning (read-to-pass exam attitude)	3.56	3.35	3.46	Agreed

Analysis of the two group of respondent from Table 4.2 reveals that items 6,7,8,9,10,11,12,13,14,16,17,18,19,20,21 and 22 were rated agreed with a mean score ranging from 2.10-3.60. But item 15 was rated disagreed with a mean score of 1.85-2.47. This shows that 16 out of 17 items are factors that hinder knowledge transfer skills to building technology undergraduates students of Kaduna polytechnics.

Research Question 3

In what ways can knowledge transfer skills of undergraduate students of building technology programme be improved?

To determine the ways in which knowledge transfer skills of building technology students can be improved, 18 items were provided to the respondents in order to express their opinions. The opinions of the respondents are represented in Table 4.3 below.

Table 4.3: the mean score of respondents on the ways in which knowledge transfer skills of undergraduate students of building technology programme be improved?

S/N	**ITEMS**	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	**Remarks**
23	There should be means of students applying the skills they have learnt	3.54	3.80	3.67	Agreed
24	Proper organization of learning	3.13	3.15	3.14	Agreed
25	Good lecturer-students relationships	3.13	3.50	3.32	Agreed
26	Using proper teaching methods and aids	3.25	3.20	3.23	Agreed
27	Skill learning process should be challenging enough to stimulate learning	3.21	2.85	3.03	Agreed
28	Lecturers should try to motivate students in order to retain skills learnt	3.41	3.40	3.41	Agreed
29	Skills acquisition by building technology students should proceed in a logical way	3.11	3.05	3.08	Agreed

30	Development of process scales by building technology lecturers	2.94	2.85	2.90	Agreed
31	Knowledge transfer should be built on something the students already know	2.98	3.00	2.99	Agreed
32	Transfer of knowledge is facilitated when new materials are studied in light of previously learned materials that serve as an analogy	3.10	2.80	2.95	Agreed
33	Emphasis on basic skill principles	2.56	3.45	3.01	Agreed
34	Through diverse skills practices	2.96	3.30	3.13	Agreed
35	The rate of over-learning should be reduced	3.40	3.25	3.33	Agreed
36	The mode of students evaluation should be improved upon	2.98	3.00	2.99	Agreed
37	There should be sufficient period for teaching building technology courses	3.00	3.35	3.18	Agreed
38	There should be improvement in the manner in which building technology curriculum is developed	2.50	3.05	2.78	Agreed
39	The training environment should be made conducive for learning	3.44	3.40	3.42	Agreed
40	Using Demonstration method of teaching	3.15	3.65	3.40	Agreed

Keys:

N1 = Number of students

N2 = Number of lecturers

$\bar{x}_1$ = Mean score of students

$\bar{x}_2$ = Mean score of lecturers

$\bar{x}_t$ = Average mean score

Analysis from the two groups of respondents from Table 4.3 indicates that the respondents agreed with all the items with mean score ranging from 2.78-3.67

Hypothesis one

There is no significance difference between the mean responses of the lecturers and students regarding the methods adopted for transferring knowledge skills to building technology undergraduate students.

Table 4.4:

t- test analysis of the respondents regarding themethods adopted in transferring knowledge skills to building technology undergraduate students.

N1 = 80 N2 = 20

S/N	ITEMS	X_1	X_2	SD_1	SD_2	T-cal	Remarks
1	The use of lecture methods of teaching	3.14	3.25	0.96	0.77	-0.54	NS
2	The use of demonstration method of teaching	3.23	2.95	0.72	0.92	1.27	NS
3	The use of discussion method of teaching	3.15	2.75	0.95	0.89	1.77	NS
4	The use of project method of teaching	2.19	2.75	1.07	1.13	-2.00	S
5	The use of practical method of teaching	3.23	3.10	0.81	1.09	0.50	NS

KeyS

N1 = Numbers students.

N2 = Numbers of lecturer.

S.D1= standard deviation of students.

S.D2 = standard deviation of lecturer.

t= t-test value of students and lecturer.

S= Significant.

NS= Not significant.

The analysis in this table 4.4: showed that the t-cal values of all the 5 items were below the t-cal ±1.96 except for 1 item (4). Therefore, the null hypothesis was rejected for the one item while it was accepted for each of the other four items. Hence the opinion of the respondents

differed in one items but did not differ in four items in relation to the methods adopted for transferring knowledge skills.

Hypothesis two

There is no significance difference between the mean responses of the lecturers and students on the ways for improving knowledge transfer skills

Table 4.5: t- test analysis of the respondents regarding theways for improving knowledge transfer skills

N1 = 80 N2 = 20

S/N	ITEMS	X_1	X_2	SD_1	SD_2	T-cal	Remarks
6	There should be means of students applying the skills they have learnt	3.54	3.80	0.55	0.40	-2.40	S
7	Proper organization of learning	3.13	3.15	0.93	0.73	-0.10	NS
8	Good lecturer-students relationships	3.13	3.50	0.93	0.81	-1.77	NS
9	Using proper teaching methods and aids	3.25	3.20	0.83	0.87	0.23	NS
10	Skill learning process should be challenging enough to stimulate learning	3.21	2.85	0.68	0.96	1.58	NS
11	Lecturers should try to motivate students in order to retain skills learnt	3.41	3.40	0.75	0.73	0.05	NS
12	Skills acquisition by building technology students should proceed in a logical way	3.11	3.05	0.81	0.74	0.32	NS
13	Development of process scales by building technology lecturers	2.94	2.85	0.91	0.79	0.44	NS
14	Knowledge transfer should be built on something the students already know	2.98	3.00	0.91	0.71	-0.11	NS
15	Transfer of knowledge is facilitated when new materials are studied in light of previously learned materials that serve as an analogy	3.10	2.80	0.96	0.98	1.23	NS
16	Emphasis on basic skill principles	2.56	3.45	0.93	0.59	-5.30	S
17	Through diverse skills practices	2.96	3.30	0.81	0.56	-2.20	S

18	The rate of over-learning should be reduced	3.40	3.25	0.89	0.62	0.88	NS
20	The mode of students evaluation should be improved upon	2.98	3.00	1.00	0.71	-0.10	NS
21	There should be sufficient period for teaching building technology courses	3.00	3.35	1.06	0.79	-1.65	NS
22	There should be improvement in the manner in which building technology curriculum is developed	2.50	3.05	0.94	0.92	-2.38	S
23	The training environment should be made conducive for learning	3.44	3.40	0.83	0.92	0.18	NS
24	Using Demonstration method of teaching	3.15	3.65	0.95	0.65	-2.78	S

The analysis in this table 4.5 shows that the t-cal values of all the 18 items were below the t-cal ±1.96 except for 5 items 6, 16, 17, 22 and 24. Therefore, the null hypothesis was rejected for each of the five items while it was accepted for each of thirteen items. Hence the opinion of the respondents differed in five items but did not differ in thirteen items in relation to the strategies for improving knowledge transfer skills.

FINDINGS

Based on the data collected and analysed, the following findings were made according to the research questions raised for the study.

Findings related to the methods adopted in transferring knowledge

1. The use of lecture methods of teaching.
2. The use of demonstration method of teaching.
3. The use of discussion method of teaching.
4. The use of practical method of teaching.

Findings related to the factors hindering knowledge transfer to building technology students

1. Inadequate instructional facilities.
2. The teaching method employed in the teaching building technology courses.
3. The condition of retrieval and retention of learning.
4. The training environment is not conducive for learning.

Findings related to the knowledge transfer skills of undergraduate students of building technology programme be improved.

1. There should be means of students applying the skills they have learnt.
2. Skill learning process should be challenging enough to stimulate learning.
3. Emphasis on basic skill principles.

DISCUSSION OF THE FINDINGS

The discussions of the findings are based on the research questions raised for the study.

From table 1of this study confirm that the use of practical method of teaching and use of lecture methods of teaching. According to Mbawo (1995), he identified five factors affecting knowledge transfer skills to include; individual/trainee characteristics, environment, learning styles, learning strategies and learning design. According to Gayne (1999), he identified three major factors affecting transfer of knowledge skills to include; lack or poor instruction, lack of motivation and lack of underlying learning skills.

The findings also indicated that the use of discussion method of teaching. This is in line with Bereiter (1995), who considers knowledge transfer skill as the ability or as a set of disposition, not a process, with the potential for transfer in the learner, rather than in what has been acquired. He argues that teaching should focus on character education, so that students are able to think about situation rather than try to reproduce their learning. He supports the work of Levi and Wenger (1991) who argue that people learn skills by entering ongoing ‘’communities of practice’’ and gradually work their way into full participation.

The study also revealed that the use of practical method of teaching. This is in line with Albino (2001), cognitive task which requires perpetual input, decision making, mental operations and problem solving are better retained than psychomotor task which requires physical strength, exertion of forces, endurance and coordination. Speed (time to complete a task) and accuracy (number of errors) are dependent variables used in the measurement of knowledge decay. Albino (2001) found that, in experiments investigating knowledge decay, task accuracy was three times more susceptible to skill decay than task completion time. This

finding while intuitive is caveat due to their lack of data when performing their statistical analysis.

Finding from table 2 indicated that Inadequate instructional facilities. This is in line with Mbawo (1995), he identified five factors affecting knowledge transfer skills to include; individual/trainee characteristics, environment, learning styles, learning strategies and learning design. According to Gayne (1999), he identified three major factors affecting transfer of knowledge skills to include; lack or poor instruction, lack of motivation and lack of underlying learning skills.

Findings from the study also indicated that the teaching method employed in the teaching building technology courses. This is in line with Haskell (2001) observes, the information age, necessitates innovative responses, and some see the need for educational institutions to reposition themselves in order to be able to maintain high quality outcomes (graduates). A key prerequisite of this is of course, the knowledge transfer skill. The rapid growth in skill, technology and scientific changes combined with the job changing of workers will favour those undergraduates who will acquire broad-based and transferable set of skills. Life-long learning has become a necessity and knowledge transfer skill provides the vehicle for this to occur.

Findings from the study further indicated that the condition of retrieval and retention of learning. This is supported by Gayne, (1999) who said the vertical and horizontal knowledge transfer. Vertical transfers of knowledge occur when knowledge acquired at lower level, in this aspect, the knowledge acquired can be applied to other levels. Horizontal transfer of knowledge occurs when knowledge gain in one situation or level is applied at the same level.

Findings from table 3 of this study revealed that there should be means of students applying the skills they have learnt. This was supported by Blumenberg (2009) who studied knowledge transfer process and found that knowledge transfer success is affected by the tacitness of the knowledge or how easy or difficult it is to codify and articulate the knowledge

that need to be transferred. Tacit knowledge is hard to be transferred verbally or in writing as it resides in the minds of people and also agree with it by (Gottschalk, 2006; Hackney, 2008). The complexity of knowledge has also been regarded as a major impediment to the success of knowledge transfer. Knowledge complexity refers to the number of interdependent routines, individuals, technologies and resources linked to a particular knowledge.

Findings from the study indicated that skill learning process should be challenging enough to stimulate learning. Cohen and Levithal, (2000) considered absorptive capacity (AC) as the ability to value, assimilate and apply new knowledge, Zahra and George (2002) expanded the theory to a more comprehensive concept of absorptive capacity as two dimensions; potential absorptive capacity, and realized absorptive capacity. Potential absorptive capacity comprises of knowledge acquisition and assimilation capabilities while realized absorptive capabilities include skill transformation and exploitation capabilities. The higher level of absorptive capacity may lead to better understanding of a new skill acquired and a higher level of harnessing skill from external sources. In education, especially in technology education, absorptive capacity is directly related to the students and it influences knowledge transfer.

Findings from the study revealed that emphasis on basic skill principles. This is in line with Cabrera and Delgado (2004) and Lehrer (2008) achieved positive knowledge transfer from engagement in logo computer programming to certain psychomotor level or measures, including some measures of cognitive ability. Campione (1991) report that when undergraduate students are taught to self-monitor and self-direct themselves during practical works in what has been called ‘’reciprocal teaching’’, this transfer to learning in other practical mediated areas of learning such as automobile and metalwork technologies.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the procedure used in the study, the implication of the study, conclusion and recommendations.

Summary of the Study

The study is about the improvement of the knowledge transfer skills of building undergraduate students of technology education programme. The first chapter expresses the problem associated with lack of knowledge transfer skills in building technology education undergraduate students. The purpose of the study was itemized and the significance identified. Three (3) research questions were raised and two (2) hypotheses formulated from the research questions to guide the study. The second chapter reviewed some literatures necessary and related to the study.

Chapter three (3) involves the research methodology which includes research design that employed a descriptive survey of Kaduna polytechnics, Kaduna that offers building technology as the area of study of which 100 respondents were derived. The instrument for data collection was a well- structured questionnaire of 40 items. The data collected were analysed using statistical tools and t-test to determine the hypotheses responses. The presentation and analysis of data were made in chapter four with tables 1, 2 and 3 presented and analysed the average mean score of the questionnaire items for the three research questions at 2.5 level of significance and table 4 and 5 presented the hypothesis at 1.96 t-cal value. Major findings were derived from the study and discussed

extensively. Finally, the study was summarized, implications were stated and discussed, the study was concluded and recommendations made.

Implications of Study

The findings of this study have a far reaching implication on the undergraduate students of building technology education programme, the school and Nigeria at large. However, since the study is focused on the improvement of knowledge transfer skills of building technology education students, it implies that proper adherence to the recommendations made in this study is fundamental to the improvements of knowledge transfer skills of these students.Thus, it is through this implementation that Nigeria can achieve a technologically driven economy, which is an integral part of its efforts in realizing vision 20:20:20 through manpower development.

The study also revealed that competencies of technical teachers on knowledge transfer is also vital, to serve as a pivot for students interest in acquiring knowledge. This is important for easier classroom management to prevail by teachers, with this, student's interest and anticipation will be greatly influenced when they see the use of what they have learnt. Lastly, the findings revealed that if teachers adhere strictly with the use of instructional materials, it will increase the efficiency of the teacher and knowledge transfer will be even faster.

Conclusion

Based on the study, the following conclusion among others were drawn, that the use of instructional materials in teaching will accelerate the rate at which knowledge will be transferred, also instructional material will make the teacher manage the classroom efficiently because it is used to stimulate appropriate interest in the students. Technology

education has been an integral part of national developmental strategy because of its impact on the human resources development, productivity and economic growth. The nation's drive to achieve its vision will only be a mirage, if adequate effort is not given to improvement of knowledge transfer skills of undergraduate students of technology education programme.

Recommendations

In line with the study, the following recommendations were made:

1. Government should try and motivate students through their lecturers to acquire new skills and also retain already acquired skills.
2. Skill learning process is expected to be challenging enough to stimulate learning.
3. Proper evaluation model such as the CIPP model should always be adopted when evaluating technology education students.
4. There should be an avenue where students can apply the skills they have acquired.
5. Government and the public, private sectors should strive to make all learning environment conducive for learning.
6. The lecturers should always use proper methods of teaching and instructional aids.
7. There should be good and proper lecturers /student's relationship.
8. Students should try to improve on their attitude towards learning, and not just reading towards passing exams alone.
9. There should be proper curriculum planning, development and implementation by those in charge.
10. There should sufficient supply of efficient and qualified teachers.

Suggestions for Further Research

The following suggestions are made for future research study:

1. The role of practical work in teaching building technology in Kaduna polytechnics, Kaduna.
2. Improvement of employable skills of building technology graduates of technology education programme.

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