

FOSTERING CREATIVE THINKING SKILL AMONG BUILDING
TECHNOLOGY STUDENTS OF TECHNICAL COLLEGES IN
NIGERIA

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DEDICATION

This thesis is dedicated to the glory of God (the Author and Finisher of my faith)

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ABSTRACT

Creativity is needed in schools to develop students' innovative ideas. However, the Federal Government of Nigeria has not been able to integrate creative thinking skill into the Building Technology curriculum of technical colleges as enshrined in the National Policy on Education due to lack of model to foster the skill. This study therefore was aimed at developing two models for fostering creative thinking skill among the Building Technology students in Nigeria technical colleges based on teachers and students' perception. The design of the study was an explanatory sequential mixed method. The quantitative aspect of the design utilized questionnaire for data collection; while the qualitative aspect utilized interview protocol in collecting data from its participants. The quantitative research purposively made use of 215 Building Technology teachers/ experts/ principals and 638 Building Technology students proportionally sampled from all the technical colleges offering Building Technology in the South-West Geopolitical Zone of Nigeria. The qualitative research also purposively involved 14 participants for interview either through direct contact or the use of Social Media. In addition, direct observation technique was carried out on six students during preliminary study to elicit the process involved in creative thinking skill. Data collected in quantitative research were analysed using Statistical Package for Social Science (IBM SPSS version 21.0) and Analysis of Moment Structures (AMOS version 18). Data were analysed with percentages, mean, standard deviation and t-test. On the qualitative aspect of the research, content analysis was used. The major findings of the study showed that creative thinking skill can be fostered in Nigeria technical colleges with due consideration for: background information that will warrant students selection; necessary social environmental factors; the required resources; the required creative thinking skill teaching techniques; the motivational techniques; the creative thinking skill process as well as the expected creative thinking skill. Two measurement models were developed using maximum likelihood. Therefore, the models fulfilled the threshold values of Modification Indices such as absolute fit, incremental fit and parsimonious fit. The values obtained also confirmed the validity and reliability of the models across the samples. The developed models were therefore recommended for the use of the Federal Government of Nigeria, the curriculum planners and building technology teachers as guide for fostering creative thinking skill in Nigeria technical colleges.

ABSTRAK

Kreativiti diperlukan di sekolah-sekolah untuk membina idea inovatif pelajar. Walau bagaimanapun, Kerajaan Persekutuan Nigeria belum dapat mengintegrasikan kemahiran berfikir secara kreatif ke dalam kurikulum Teknologi Bangunan Kolej Teknikal seperti yang termaktub dalam polisi kebangsaan tentang pendidikan disebabkan kekurangan model untuk memupuk kemahiran ini. Maka kajian ini bertujuan untuk membangunkan dua model bagi memupuk kemahiran berfikir secara kreatif dalam kalangan pelajar Teknologi Bangunan di kolej-kolej teknikal Nigeria yang berdasarkan persepsi guru dan pelajar. Reka bentuk kajian ini adalah kaedah gabungan *explanatory sequential*. Aspek kuantitatif bagi reka bentuk ini menggunakan soal selidik bagi pengumpulan data; manakala aspek kualitatif menggunakan protokol temubual dalam mengumpulkan data daripada responden. Kajian kuantitatif menggunakan pensampelan secara bertujuan 215 guru/ pakar/ pengetua dan 638 pelajar yang dipilih secara pensampelan berkadaran daripada semua kolej yang menawarkan teknologi binaan di Zon Geopolitik Barat Daya Nigeria. Kajian kualitatif juga menggunakan persampelan secara bertujuan melibatkan 14 peserta untuk ditemu bual sama ada secara bersemuka atau menggunakan media sosial. Selain itu, teknik pemerhatian langsung dijalankan terhadap enam pelajar semasa kajian awal bagi memperoleh proses yang terlibat dalam kemahiran berfikir secara kreatif. Data yang dikumpulkan dalam kajian kuantitatif dianalisis menggunakan *Statistical Package for Social Sciences (IBM SPSS versi 21.0)* dan *Analysis of Moment Structures (AMOS versi 18)*. Data telah dianalisis dengan peratus, min, sisihan piawai dan ujian-t. Bagi aspek kualitatif kajian, analisis kandungan digunakan. Dapatan utama kajian menunjukkan kemahiran berfikir secara kreatif boleh dipupuk di kolej teknikal Nigeria dengan memberi pertimbangan sewajarnya terhadap : maklumat latar belakang yang akan menjamin pemilihan pelajar; faktor-faktor persekitaran sosial yang utama; sumber-sumber yang diperlukan; teknik-teknik pengajaran kemahiran berfikir secara kreatif yang diperlukan; teknik-teknik motivasi; proses berfikir secara kreatif serta kemahiran berfikir secara kreatif yang diharapkan. Dua model pengukuran dibina menggunakan *Maximum Likelihood*. Oleh itu, model-model memenuhi nilai-nilai *threshold indeks* pengubahsuaian seperti padanan mutlak, padanan tokokan dan padanan parsimoni masing-masing. Nilai yang diperoleh juga menunjukkan kesahan dan kebolehpercayaan model merentas sampel. Oleh itu, model yang dibangunkan dicadangkan untuk kegunaan Kerajaan Persekutuan Nigeria, perancang kurikulum dan guru Teknologi Bangunan sebagai panduan bagi memupuk kemahiran berfikir secara kreatif di kolej-kolej teknikal Nigeria.

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LIST OF ABBREVIATIONS

| | | |
|-------|---|---|
| CAT | - | Consensus Assessment Technique |
| CFA | - | Confirmatory Factor Analysis |
| df | - | Degree of Freedom |
| CFI | - | Comparative Fit Indices |
| CR | - | Composite Reliability |
| FGN | - | Federal Government of Nigeria |
| IFI | - | Incremental Fit Indices |
| NFI | - | Norm Fit Indices |
| RMSEA | - | Root Mean Square Error of Approximation |
| TTCT | - | Torrance Test of Creative Thinking |
| TVET | - | Technical and Vocational Education Training |

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Creativity is highly required for sustainability in the industry, offices, business centres, at home, in school and every facet of life. Creativity is therefore an indispensable factor that is involved in causing economic growth in modern society (Amabile and Khaire, 2008). Although, creativity is perceived in different ways from one environment to another (Wadaani, 2015); yet, it remains an element that every nation should constantly encourage and promote to enhance the desired national economic development because it is seen as the key to individual and societal success (Yunos, Sumarwati and Abdullah, 2015).

According to Csikszentmihalyi (2014), creativity has become more critical in the present world in as much that new solution which will enhance personal survival and development is often needed due to increase in population. Thus creativity is the focal point of human activities and practical skills that facilitate survival from the time immemorial (Neumann, 2007). Although in the past, practical skills are usually learnt from the elders through imitation, but at the present dispensation, practical information which will enhance survival in a given environment is now acquired in schools (Csikszentmihalyi, 2014).

Wong and Siu (2011) opined that problem solvers in specific expertise are needed to help us solve the problems we are facing and improve the way we live in our immediate environment. These problems however, could be solved by combining the knowledge acquired with manipulation of the knowledge and necessary

information. Ability to manifest this combination according to Wong-kio and Siu (2011) is often referred to as creativity.

Creativity is always preceded by one's positive imagination or thinking (Sharp, 2004). Which means sometimes, a thought may come into one's mind and latter spurs one into developing new things. This type of thinking is referred to as creative thinking. In addition, the thinking that proceeds from man has been described by Neumann (2007) as a force that produces innovation in the history of man. Thus innovation can take place especially when one engages in unique thinking with an intrinsic desire to find new things (Lee, 2005).

Among many other professionals, creative thinking skill is expected to be possessed and consistently manifested by the Engineers and Technicians who have been described as "the hope of the nation" and "the central point between the society and creativity" (Nichols and Weldon, 2012). This is necessary to enable them play their roles of initiating regular innovations as technology develops globally.

Every nation that conscious of its economic growth should include creative thinking skills in all aspects of the school's curriculum especially in Building Technology curriculum. The reasons are: in building construction, creative achievement is basic to progress in this modern world (Paul and Partlow, 2012); Also, building industry in particular serves as one of the most enterprises world-wide with many assets tied to it (Institute of Technology 2002); As new materials are being constantly discovered, so also is the style of building construction changing in the building industry (Fagbenle and Oluwumi, 2010). In addition, nations depend on youths (students) to maximize their creative ability for economic growth and development (Wadaani, 2015). In other words, the youths need to acquire training that will enable them build shelter, accommodation and physical infrastructures for human welfare (Ministry of Education Science and Sport (MESS), 2008).

Consequently, Yunos et al., (2015) described the students as the assets for improving the progress of the economy of any country. This virtue is easily attainable when students are developed creatively in their lessons at school levels;

especially in design education of which Building Technology belongs as suggested by Wong et al., (2012). Therefore, this Thesis is focusing on how creative thinking skill could be fostered among the Building Technology students in Nigeria Technical Colleges.

1.2 Background of the Study

Many scholars have different views about creativity and therefore have attempted to define it in different ways. For this reason, creativity has been adjudged a construct with no universal and precise definition (Sharp, 2004; Neumann, 2007). Mumford (2003) saw creativity as “the process of producing something that is both original and worthwhile”. Other scholars who shared the same view as Mumford added that creativity requires the ability to produce an outcome that is novel, highly qualitative and appropriate to the required or specific task (Sternberg, Kaufman and Prez, 2002; Crospley and Crospley, 2010). The implication of these concepts is that creativity is not limited to a single subject; rather, it cuts across all domains (Csikszentmihalyi, 2000).

Therefore based on the above definitions, it can be deduced that creative people have the quality to work hard continually, improve on existing ideas and find solutions to prevalent societal and national problems. Hence, the quest of the creators often gear towards originality, problem-solving, productivity and worthy outcomes (Sharp, 2004). In addition, creative people always seek for avenue to initiate growth and development by making systematic refinements and alterations to their works. Thus according to Neumann (2007), creativity which is noted to be the driven force for all innovations in the history of man, is placed at the pivotal point of human activity and thought.

Consequently, Hsiao, Ling and Lin (2004) encouraged the contemporary work place to lay more emphasis on creativity and innovation. The encouragement of innovation alongside with creativity is necessary because Ismail, Mohd and Jailani (2014) described innovation as the engine for economic growth. From this

description, innovation and creativity are seen to be mutually related and both are preceded by creative thinking skill. Hsiao, Ling and Lin (2004) further recommended that objective of Technical/Vocational Education should therefore be to prepare and develop in students the ability to create and innovate, while thinking skill practices should be part of the generic skills that should be infused in all technical/vocational subjects.

In an attempt to distinguish between creativity and creative thinking, Lau, Hui and Ng (2004) expressed that creativity and creative thinking are though conceptually related; but further drew a line of demarcation between them. The line of demarcation drawn by Hui and Ng (2004) emanated from the views of authors like Treffinger (1995) and Lau et al. (2004) who saw creative thinking as a way of thinking that eventually leads to generating new ideas. The new ideas arise after identifying certain problems and following specified process in searching for solution to the problems (Baker and Rudd, 2001).

Judging from the definitions provided so far, the line of demarcation which can be drawn between the two constructs is that creative thinking is subsumed by creativity (Hsiao et al, 2004; Lau et al., 2004). That is, creative thinking leads to creativity especially when it does not remain dominant. In addition, creativity depends on dynamic shifts in thinking (Boden, 2004). Thus an individual who has potential ability for creative thinking may not be creative especially when he or she fails to develop and actualize his potentialities.

However, deBono (1971; 2004) and Kaufman et al (2008) asserted that everyone has the potential of being creative. Based on this assertion, Mohamed (2006) suggested the need for gathering information about students' thinking skill potentials so that the students can be helped to apply their thinking skills. Application of thinking skill will not only enhance their ability to adapt to their environment, it will also lead to technological development.

Consequently, some researchers advocated for the study of creative thinking skill of a child using different creative dimensions, which include the creative press,

products, process and persons (Lau et al., 2004). Hence, adequate concentration on all these areas can bring perfection to the students' skill without fear; but with emotional stability (Siu, Kal and Changua, 2004).

Siu et al., (2004) however opined that students who have a dominant natural flair for creativity tend to find success more than those who move away from logical deductive subjects like Technical/ Vocational and Engineering. Thus natural flair for creative thinking skill as pointed out by Siu et al., (2004) will facilitate encouragement to expand on what is already on ground; rather than having contentment in any previous idea gathered in Technical and Vocational skill acquisition. This idea however supposed to take pre-eminence globally and especially in countries like Nigeria which aims at developing creativity in her technical and vocational education programmes.

The Federal Government of Nigeria (FGN, 2004) in her educational policy named her technical /vocational education programme as Technical and Vocational Education Training (TVET). The TVET was defined by FGN (2004) as that form of education, which is obtainable at the technical colleges. The programme is equivalent to the Senior Secondary education, but meant to prepare individuals as craft-men as well as technicians at sub-professional levels. In line with the FGN (2004), Oziengbe (2009) also described TVET as any form of education aiming at preparing persons for occupation or groups of occupation. The goals of TVET at this level as stated by the FGN (2004, 2013) are to:

1. Enable individuals acquire vocational and technical skill;
2. Explore the individual to career awareness by exposing useable options into the world of work;
3. Enable youth acquire an intelligent understanding of the increasing complexity of technology and;
4. Stimulate creativity among the youth.

From the goals stated above, it is apparent that the Federal Government of Nigeria is aspiring through her educational policy, to stimulate the creative thinking skill training of the youths who attend her technical colleges. The reason is that, Nigeria as a developing country, seeks more economic and technological

development which could majorly be achieved through the training of highly skilled and creative Building Technologist at technical and vocational schools as recommended by (Olaitan, 1996). The goals are however in line with the submission of Oziengbe (2009) that the aims of vocational and technical education should not be limited to developing the practical skills alone, but also attitudes and habits that make the recipients creative, innovative and resourceful persons.

In addition, Lin (2004) suggested that all technical college education programs should be run well to enhance the economic and environmental consequences of the professional tasks involved. The professional tasks referred to here could only be maximally carried out through the knowledge of the students' creative ability (Bestfield et al, 1998). Moreover, Rowe (2004), Heong (2011) and Omar, Bakar & Rashid (2012) who strongly advocated for infusion of creative thinking skill into the school curriculum saw students who are trained to think creatively as those who can make our society viable and gain employment easily. Therefore, Omar, Bakar and Rashid (2012) stressed that acquisition of technical skill alone without the creative thinking skill cannot guarantee employment because technical skill only equips students on how to perform some specific tasks.

Consequently, Odu (2011) and Salami (2013) who observed the rate of unemployment in Nigeria in different studies they carried out, concluded that implementation of creative thinking in Nigeria Technical Colleges will serve as a means to reduce the rate of unemployment in the country. Salami (2013) produced a data on unemployment rate as at 2011 in the country. The data showed that the rate of Economically Active was 92.38%, Labour Force was 67.25%, Employed was 51.18% and Unemployed was 16.07% .

Therefore, in an attempt to combat unemployment through production of creative youths, the Federal Government of Nigeria developed various vocational and technical educational programmes aimed at training skills at different levels. The educational programme which is referred to as the 6-3-3-4 System of Education and renamed as 9-3-4 System of Education begins at primary school and the Junior Secondary School (JSS) levels. The Pre-vocational education is obtainable at the JSS level where Building Construction is taken as sub-topic under Basic Technology

(FGN, 2004, 2013). At the Senior Secondary School (SSS) level, vocational education subjects (including Building Construction) are offered (FGN, 2004; 2013). Hence, students are expected to transit from JSS level to SSS level or Technical College. After the SSS programme, students can proceed to University, Polytechnics or College of Education. A graduate of technical college is expected to either establish on his own or transit into a tertiary institution to study courses like Civil Engineering, Building Technology or any course of his choice. The educational structure is as shown in Figure 1.1.

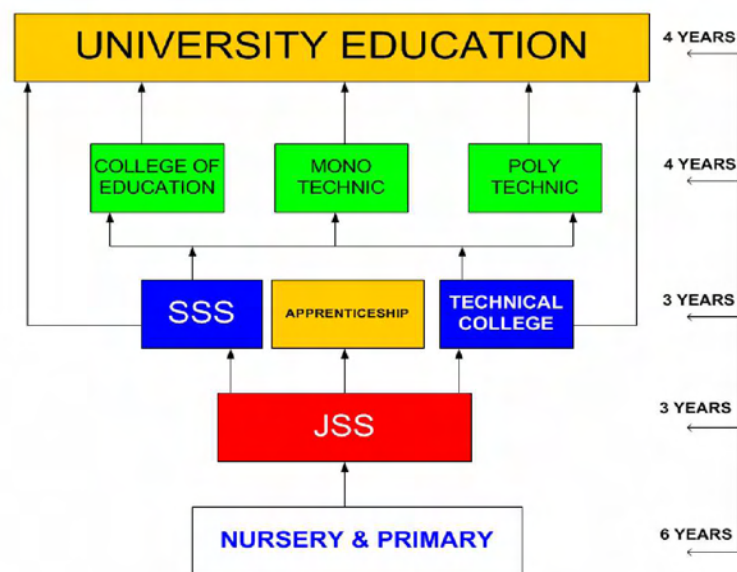


Figure 1.1 Structure of Technical/ vocational Education in Nigeria as Emphasized by (NPE, 2004)

Furthermore, the educational programme of Nigeria is well structured to give equal opportunity to all citizens. The country is however made up of conglomeration of more than two hundred and fifty (250) ethnic groups and with diverse cultures (Clark, 2004; Population Census, 2013). The total population of the country was given as 170.1 Million (Population Council, 2013). The most predominant among the ethnic groups are the Hausas/ Fulanis, Yorubas and Igbos (Ibos) which form almost 68 % of the total population respectively. Next are Ijaw, Kanuri Ibibio, Tiv and others (Clark, 2004). Table 1.1 shows the Population Percentage of the Ethnic Groups in Nigeria.

Table 1.1 Nigeria Populations

| Ethnic Group | Percentage Population |
|---------------------|------------------------------|
| Hausa/ Fulani | 29 |
| Yoruba | 21 |
| Igbo(Ibo) | 18 |
| Ijaw | 10 |
| Kanuri | 4.0 |
| Ibiobio | 3.5 |
| Tiv | 2.5 |
| Others | 12.0 |

Source: Population Council (2013)

The nation has 36 states and a Federal Capital Territory (FCT) in Abuja. The states are structured into six Geo-Political zones for easy and balanced political, economic and educational administrations from the federal level. The zoning include: North East Zones (comprising six states which are: Adamawa, Borno, Gombe, Taraba, Yobe and Bauchi state); North-West Zone (Comprising seven states which are: Kaduna, Katsina, Kano, Kebbi, Sokoto, Jigawa and Zamfara State); North-Central Zone (comprising six states which are: Benue, Kwara, Nasarawa, Niger, Plateau, Kogi and the Federal Capital Territory); South-West Zone (comprising six states which are: Ekiti, Lagos, Ogun, Ondo, Osun and Oyo State.); South- East Zone (comprising five states which are: Abia, Anambra, Ebonyi, Enugu and Imo State) and South- South Zone (comprising six states which are: Akwa Ibon, Bayelsa, Cross Rivers, Delta, Edo, and Rivers State).The entire 36 states and The FTC are further subdivided into 774 Local Government areas. Each state is empowered to control its educational system but with the educational policy, guideline and quality control coming directly from the Federal level through the Zonal levels.

The Technical College programme generally is primarily under the control of the National Board for Technical Education (NBTE) which has its Zonal and State branches (NBTE, 2007; 2014). Some selected technical colleges were therefore,

accredited to run Building Technology programmes and train skilled men in Building Technology who would boost the nation's economy through their creativity (FGN, 2004; Abuja Leadership, 2012).

According to NBTE (2007), the objectives of the Building Technology programme as presented in the curriculum are to train the craftsmen who should be able to among others: read and interpret building construction drawings; identify block laying and concreting materials and their uses; set up subcontract business in Block-Laying and Concreting works and supervise simple projects.

Building structure has been described as the largest enterprise worldwide (Institute of Technology, 2002). The reason is that apart from serving as shelter, industrial, domestic, official and economic purposes for the citizens; it also promotes comfort and standard of living (Ayuba, Olagunju and Akande, 2012). Therefore, there is need to ensure that buildings in Nigeria are planned, designed and erected properly to reflect the desired environmental satisfaction, new innovations, innovative materials and physical sustainability (Ayuba et al., 2012). Hence, the Ministry of Education and Science (2008) emphasized the need to train human resources who will be able to harness their creativity to build the shelter and related physical infrastructures that will help promote national economy and employment. Therefore, Building Technology students have no option than to develop positive attitudes and thinking skills that will enable them secure employment. Their development in creative thinking skill will help guide against the problem of poor design and incessant infrastructural failure in Nigeria caused by utilization of the unskilled craftsmen in the building industry as found by (Ayuba et al., 2012).

Some scholars in their findings also attributed the major factors causing building collapse in Nigeria to: employment of incompetent artisans and weak supervisors (Oloyede, Omoogun and Akinjare, 2010); poor workmanship with wrong interpretation of building design (Opara, 2007); as well as design errors (Babatunde, Olusola and Akintayo, 2009). Therefore, it was suggested in a study that design errors could be avoided if building clients can learn to depend on qualified and competent construction professionals (Fagbenle and Oluwunmi, 2010). The Town Planner were also advised in another study to utilize competent and well

trained professionals and creative building experts who can apply new techniques and utilize new materials for construction of buildings (Arayela, & Adam, 2001).

The national goal and quest to train competent TVTE building technology graduates however, may not be realized if the conditions that can enhance creativity are not met by the individual students, teachers, the environments and even the educational policy makers (Pucker, Begheto and Dow, 2004). Also, TVET programme according to Alhasan and Tyabo (2013), supported by Okolie and Ogbaekirigwe (2014) has the potential to provide youth the necessary skills to become creative, innovative and self-reliant only if it is maximally coordinated.

On this note, it is expedient to point out that despite the need to train the building technology students in Nigeria technical colleges to acquire creative thinking skill, a missing link between the technical college curriculum and the National Policy on Education was found in a study conducted by Usoro and Ogbuanya (2009). The study revealed that the entire curricula of technical colleges in Nigeria (including the Building Technology curriculum) only emphasized theories and practical without emphasis on creativity. Similarly, Odu (2011) in a study found that the situation in skill acquisition in Nigeria technical colleges is that which lacks novelty and creativity. This is based on the fact that there is no model to foster the said creative thinking skill among the technical college students. Furthermore, a documentary review of the technical college curriculum showed that creative thinking skill is conspicuously omitted in the technical college's Building Tecnology curriculum; while only theory and practical are emphasized (see the curriculum as presented in Appendices E and F with full detail in NBTE website (www.nbte.ng)).

In addition, some other studies were recently carried out by Usoro and Essien (2012) and Atsumle, Raymond, Idris and Mele (2012). The researchers again found the absence of creative thinking skill in Nigeria technical colleges' Building Technology curriculum. Consequently, the teachers who served as participants in the study of Usoro and Essien (2012) saw the need to develop creativity among the students.

Therefore, based on this need arising from the aforementioned problem, Usoro and Ogbuaya (2009; 2012) and Alade (2011) in their recommendations advocated for reconfiguration of the present Building Technology curriculum and suggested a creativity curriculum that will help the graduate of technical college generate employability skill as enshrined in the National Policy on Education. Alade (2011) emphasized that the curriculum to be implemented in Nigeria technical colleges should be more practical rather than being theoretical. Furthermore, Nwakwo, Onyali and Obikese (2011), salami (2011) and Magida, Saba and Namkere (2011) who also recommended acquisition of creative thinking and innovative skills in Nigeria Technical Colleges (especially for building technology students), stressed that doing so, will engrave creativity and innovation in the memory of the students who will apply them later in life. Inculcation of creative thinking skill will also lead to job improvement after graduation (Atsumle, 2012).

However, before creative thinking skill can be effectively developed in schools, there is need to understand the creative functions and ability of a technical or engineering student. Hence Amabile (1983; 1996 and 2012) identified the variables needed by the students to enhance their creativity to include: creative environment; domain relevant skills (area of specialization); creativity relevant skills and task motivation (such as intrinsic and extrinsic motivation).

Beyond the propositions made by Amabile (1983;1996 and 2012), Hsiao, Liang and Lin, (2004) had earlier recommended that the creative functions and ability of a technical or engineering students could be realized by first considering the background of the students (Hsiao, Liang and Lin, 2004). Some of the backgrounds highlighted include: the students' perception or knowledge about creativity; their thinking style and their willingness to explore, think creatively and discover new things. Identification of their thinking styles can inform on their area of strength or weakness in thinking (Piaw, 2004). This will lead to increase in the students' potentiality, confidence and interest for creativity.

Therefore, educators are advised not to chide away from considering the interest, ability, skills and creative thinking potential of students before admitting them and even as they progress on their course of study. On this note, Kim (2011)

advocated that creative thinking skill potentials of the students should be taken to consideration at the early stage of vocational training of students. The reason given by Kim (2011) is that children's ability to produce ideas (fluency) increases up to Third Grade (JSS Level in Nigeria educational system) and remains static between 4th and 6th Grade (SSS or Levels 1 to 3 in Nigeria Technical College). This shows that the students at the JSS Level in Nigeria situation can become alert to issues like accuracy and appropriateness in generating ideas before gaining admission into the Technical Colleges. Students at this stage have the increased potential and motivation for creativity up till the high school level but with decrease in elaboration after graduation.

Furthermore, Kim (2011) asserted those eminent adults' creative ability and elaboration increase with age. The reason for this is that eminent adults often generate a lot of ideas in their early career but later focus on elaboration of their ideas which enables them to increase in creative productivity. Thus creative output for eminent creators does not decrease with age, but rather increases with age, especially in the aspect of elaboration (Simoton, 1983). The implication of this assertion therefore is that productivity of Nigerian technical college graduates are expected to increase after being exposed to creative thinking skill development training. Therefore, Kotirde and Yunos (2014) recommended that teachers and school administrators should monitor the quality of the inputs (students being admitted) and the outputs (the graduates) to ascertain that proper process that will help them acquire relevant and adequate skill are passed through.

Apart from positive perception of students on creativity, some other factors found to influence creativity among others include: gender difference; socio-economic status, academic achievement; availability of human and material resources; the use of effective creative process, social environment; ethnicity and cultural difference (Runco, 2004; Chamorro-Premuzic, 2006; & Wang, 2011).

As a matter of fact, Lee (2005) stressed that social-cultural context is an important factor to be considered while referring to creativity and when carrying out creativity studies. The implication of this is that culture cannot be separated from creativity. Based on the recommendation of Lee (2005), it is necessary to note that

the cultural differences among Nigerians and even those within the same Geo-Political Zone may have different impacts on the level of creative thinking skill and creativity of the people.

On gender difference, several studies have been carried out on difference in creativity of boys and girls (Runco, 1993; Stephe, et al 2001); but only few have been found to concentrate on Nigeria technical colleges. Though most researches carried out on gender difference in creativity have come up with different results. In some studies, no significant difference was found in creative performance of boys and girls (Chavez-Eakle, Lara, & Cruz-Fuentes, 2006; Szobiova, 2006; Kaufman, Baer and Gentile, 2009; Genifer, etal, 2011). In some studies, boys were found more creative than girls (Cox, 2000; Dollinger, Dollinger and Centeno, 2002). Yet in others, girls were found to surpass boys in creative ability (Wolfradt and Pretz, 2001; Reuter et al 2005). Hence, no conclusion has been reached on empirical study based on gender difference in creativity (Baer et al., 2008). In Nigeria, few girls take up their careers in technical and vocational colleges compared to boys as reported by Igbiniedion (2011) and as noted in the enrolment list of NBTE (2010 -2014). Still on the negative side, the few girls that attend technical colleges seem to limit their courses to those ones that require less logical reasoning.

Although the idea of whether Nigerian boys are more creative than girls seems to be partially supported by a study carried out by Nwakwo, Onyali and Obikese (2011). It was found in the study that male students in Anambra State, Nigeria; which represents the youths in South-East Zone, have conventionally creative insight (creative thinking skill) more than the female students. While in the same study, female students were found to have exhibited more academic creativity insight (critical thinking skill) than the male students. The findings of this study was replicated by Jabor et al.(2011) who found statistical evidence in a study on students' achievement that female students scored better than male students in their GPA . In spite of this finding, the authors recommended that more studies should be carried out on gender and achievement in the area of cognitive ability among others.

Apart from consideration for the students' background information, the social environment and resources needed to enhance creativity are very paramount. Despite

the the importance of resources in creativity training, Yomide, Okwelle, and Okeke (2014) found that the objectives of building technology trades in Nigeria technical colleges have not been achieved due to inadequate material and human resources. On material resources needed for creativity, Musta'amal, Norman, Jabor, Buntat (2012) suggested in a study that the use of CAD (Computer Aided Design) can help enhance the emergence of creative design which forms one of the major aspects of Building Technology. Similarly, Saud, Babaworo, Buntat and Jabor (2011) emphasized the inclusion of ICT in skill development in TVTE curriculum in order to meet up with global challenges. On human resources, Usoro and Essien (2012) suggested among others the need for availability of creative building technology teachers who will train the students creatively, cultivate the habits of providing advice to students about how to become creative and learn to make decision on issues that need fresh thinking.

On social environment, Amabile (2012) and Kaufman and Baghetto (2013) opined that time and places for creativity are very much important and so, they are having strong relationship with each other. Therefore adequate time and space should be given to creativity training in schools.

Furthermore, on teaching of creativity, Olanisimi (2015) recommended that teachers should apply different teaching methodologies to impart skill on the students. The scholar recommended brainstorming and other techniques which could boost the thinking capability of the learners. In a study that centered on teaching of creative thinking, Hsiao (2004) suggested that the use of questioning, brainstorming and attribute listing will encourage creative thinking skill, while Kaufman et al. (2008) emphasized tolerance of ambiguity.

Couple with application of appropriate teaching techniques, some scholars such as Amable (1996, 2012); Kaufman and Baghetto, (2013) emphasized the need for application of motivation in creativity development. Kaufman and Baghetto (2013) emphasized that motivation will help students to demonstrate good creative behaviour especially when the teachers give them good examples which can motivate the students intrinsically. However, students can be motivated both intrinsically and extrinsically Kaufman et al. (2008).

After creativity training, a positive feedback should be expected especially when a new idea has emerged. Hence Nuemann (2007) suggested that a creativity process that will lead to the end product must first take place. Many authors such as: Wallas (1926); Rosman (1950); Laura (2005); Amabile (1996, 2012); Howard et al., (2008); Wong-Kto and Siu (2011) have developed Models of creative thinking process with different stages. But Wong-Kto et al., (2011) argued that the stages involved in creative thinking process are the same. Wallas (1926) emphasized the period of illumination of which according to Wong-Kto and Siu (2011), many scholars have disregarded as a stage in creative process.

In order to solve the prevalent problem among the building technology students in Nigeria Technical colleges, a critical review of past study was carried out by the researcher. Hence it was found that many studies have been conducted to measure creative thinking skill and creative achievements or performance including Hyatt (2000); Kathapine and Bouman (2000); Crospley and Crospley, 2008); Kampylis (2010); Buelin-Biesecker (2012); Fakhia (2012); Fisher (2013). Nevertheless, only few including Howard et al (2008); Wong and Siu (2011) have tried to find solution to how creative thinking skill can be effectively fostered or nurtured to help the youth trained creatively. Out of the few that concentrated on fostering of creative thinking skill, none has focused on the Technical Colleges in Nigeria and especially among building technology students, thereby creating a big gap which needed to be filled. Also, the model developed by these studies such as Wallas (1926) Amabile (1996; 2012); Howard et al.(2008); Wong and Siu (2011) focused mostly on creative thinking process without reflecting the background of the trainees, the human and material resources input, teaching techniques required together with the expected creativity outputs or products as suggested in literature.

In all, it should be put on notice that some authors have also argued that in developing any curriculum, the teachers who know the needs of the students very well should be involved (Jagersma, 2011; Russell 1997). The reason is that the teachers have the responsibility of training the students and modifying the classroom environment continually in response to the students' needs. Webbs (1997) also opined that active involvement of students when developing or modifying a curriculum can facilitate greater students' interest and satisfaction in learning.

Carini, Kuh, and Klein's (2006) balanced the two suggestions by pointing out that a research finding has emphasized the need to understand the expectations of both teachers and students and to also involve them in curriculum planning. Mitra & Gross, (2009) further revealed that though, the issue of consideration for students' view in curriculum development is relatively new in the field of education, but the trend has started gaining ground a decade ago (Rudduck & Fielding, 2006). Conclusively, Konings et al. (2010) Stressed that learning will suffer if students are robbed of their chances of contributing their perceptions (which may differ from teachers' perception) to guide instructional change.

Therefore, based on the findings and recommendations reviewed so far there is need to develop two alternative models for fostering creative thinking among the building technology students in Nigeria technical colleges. One model is based on the responses of the Building Technology teachers/ experts and the other is based on the responses of Building Technology students.

1.3 Statement of problem

Nigeria is though blessed with wealth and natural resources, yet many people are poor due to high rate of unemployment among the youth (Salami, 20011; Magida, Saba and Namkere, 2013). Among the areas where unemployment is hitting the society is the building industry which has been noted to be one of the largest enterprises worldwide that can help combat unemployment (Institute of Technology, 2002). Therefore, there is need to ensure that buildings in Nigeria are planned, designed and erected properly to reflect the desired environmental satisfaction, new innovations, innovative material and physical sustainability (Ayuba et al., 2012). In order to accomplish this, the Ministry of Education and Science (2008) emphasized the need to train Building Technology students who will be able to harness their creative thinking skill for economic development of the nation.

In line with this suggestion, the desire of the Federal Government of Nigeria is to promote technical and Vocational Education skills (which can help combat

unemployment among the youths) at all levels of its educational programmes. At the technical college level, the National Policy on Education states among its goals the need to train skill workers who could help develop the country technologically (FGN, 2004; FGN, 2013). It also emphasizes the need to stimulate the creativity of the youth that are admitted into the TVET programme.

However, despite the fact that training of youths in creativity forms one of the major goals in Nigeria technical college programmes, there has been persistent degeneration and a missing link to produce creative and self-reliant technical college graduates as found in a study by Usoro and Ogbuanya (2009). The missing link arises because the Building technology curriculum of the technical colleges has been found to only emphasize theories and practical without emphasis on creativity (Usoro and Ogbuanya, 2009). It means there is no model to foster the said creative thinking skill among the building technology students.

In addition, it was found in the preliminary interview conducted in August, 2013 and March, 2014 respectively, among a few teachers in technical colleges that there was no such model to foster creativity in the schools, and that it would be a welcome idea if such a programme could be imbedded in the curriculum (see Appendix I for the result of the interview). Also, the preliminary study carried out through observation on six Building Technology students showed that they underwent nine stages of creative thinking skill process as shown in Appendix I. The nine stages of creative thinking process however, required further investigation through quantitative study.

Aderonmu (2014) also noted that the technical education curriculum in Nigeria has been laying emphasis partly on the theory and academic certification as against its original cardinal objective to promote creative skills among the youth who can contribute well to technological development of the country. The author was even in doubt as whether any sustainable curriculum to solve the problem could appear in shortest time. Although this problem of laying emphasis on technical skills alone and neglecting the skills which can help the technical graduates to secure employments appear to be rampant among the developing countries like Nigeria as noted by Deba, Jabor, Buntat, & Musta'amal (2014). Therefore there is need to

emulate the Curriculum of England which lay emphasis on creativity as suggested by Fautley and Savage (2007).

Based on the need arising from the aforementioned problem, some Nigerian scholars such as Usoro and Ogbuaya (2009; 2012); Usoro and Esien (2012); Nwako et al (2011); Aderounmu (2014) in their recommendations advocated for reconfiguration of the present technical/technology curriculum and recommended a creativity curriculum that will help the graduate of technical college to generate employability skill as specified in the National Policy on Education . Usoro and Essien (2012) also in a study recommended that the building technology teachers needed to cultivate the habits of creativity on students and help them develop and improve on it.

In fostering creative thinking skill in Nigeria technical colleges, there is need to consider some issues which have been suggested by some scholars. Such issues include: the background of the students; that is, their gender, creative thinking potentials and creative perception etc. (Runco, 2004; Chamorro-Premuzic, 2006; & Wang, 2011). Other issues that should be considered, include the social environmental condition where creativity could be fostered (Amabile, 1985; 1996; 2012); resources needed for fostering creative thinking (Neumann , 2007); the strategies that could be involved in motivating and teaching the students to acquire creative thinking skill (Amable, 1996, 2012; Kaufman and Baghetto, 2013) creative thinking process to be involved (Wallas 1925 ; Amabile 1986; 2012) and the creative thinking outputs required (Wong-Kon et al., 2008).

A critical study of the past model developed on creative thinking skill showed that much gap is left to be filled. Apart from the fact that none is concentrating on Nigeria Technical College programmes, the few that were developed majorly concentrated on creative thinking process e.g Wallas (1926); Amabile (1996; 2012); Howard et al.,(2008); Wong-Kto and Siu (2011). Although the Model of creativity developed by Amabile (2012) also has a shortfall of other areas suggested in literature as it only emphasized motivation and social environment needed to foster creativity in Organizational Management.

In addition, the feedback of a model is a crucial issue that should not be neglected. In the model of creative thinking skill developed by Amabile (1983; 2012) three conclusions were reached as feedback. The author concluded that when the trainees exhibit creativity immediately after their training, it means the programme is successful; while partial exhibition of creativity conotes progress but the programme would have to be revisited for proper adjustment; and non-exhibition of creativity immediately after training shows that there is failure in creativity training. This idea was however refuted by Yunos et al (2015) who concluded that once a student is exposed to creativity; such a student will always be successful. This conflicting opinion therefore has created a gap which needed to be investigated and resolved in this study. The outcome therefore will form the feedback for this study.

Furthermore, observation has shown that students' interest have been neglected in the curriculum and model development by the curriculum designers. On this note, some authors have argued that in developing and designing any curriculum, the teachers who know the needs of the students very well and modify the classroom environment should be involved (Russell, 1997; Clark, 1997). Also the expectations of the students together with that of teachers must be put into consideration by the curriculum designers (Kuh, and Kleins, 2006).

The problem of this study therefore is to develop two alternative models (based on teachers/experts and students' perception) for fostering creative thinking skill among Building Technology students in Nigerian Technical Colleges. The models will consider the students' background, the school environment, the resources needed, motivational techniques, teaching techniques, the creative thinking process to be involved and the expected creative thinking products (outputs).

It is expected that if this study is successfully carried out, there will be models to implement creative thinking skill in the domain of Building technology thereby leading to production of marketable graduates and prevention of skills gaps that the current TVET scholars like Omar, Bakar and Rashid (2012); Deba, Jabor, Buntat, & Musta'amal (2014) are contending in different studies as they have resounded to the educators in TVET institutions on the need to equip the forthcoming

TVE graduates with the necessary renown and superior instructional skills for employment in order to ensure no skill- gap is allowed in the institutions.

If on the other hand the study is not carried out, there will be no model to foster creative thinking skill among the students. If this persists, non-availability of creativity development will make the nation to revert to the old lifestyle of our ancestors and regress to the way in which many of the underdeveloped parts of the world exist (Omar, Bakar and Rashid, 2012). Also, acquisition of technical skill alone without the people skill (creative thinking skill inclusive) cannot guarantee employment. More so, only the students who are trained to think creatively can demonstrate the positive impact of the skill they have acquired (Olateju, 2013).

1.4 Aim and Objective of the Study

The main purpose of this research was to develop models for fostering creative thinking skill among the Building Technology students of technical colleges in Nigeria. The study was aimed at infusing creative thinking skill development into the existing curriculum of the technical colleges so as to produce creative and employability technical college graduates. Specifically, the study sought to:

1. Determine the personal factors / background information to be considered in selection of BuildBng Technology students for creative thinking skill development in Nigeria Technical Colleges.
2. Determine the social environmental factors necessary for fostering creative thinking skill among Building Technology students in Nigeria Technical Colleges.
3. Determine the resources needed in fostering creative thinking skill among the Building Technology students in Nigeria Technical Colleges.
4. Determine the motivational techniques needed by the Building Technology students in Nigeria Technical Colleges to acquire creative thinking skill.
5. Determine the teaching techniques to be adopted in fostering creative thinking skill among the Building Technology students in Nigeria Technical Colleges

6. Determine the process required in fostering creative thinking skill among Building Technology students in Nigeria Technical Colleges
7. Determine the creative thinking skill output expected from the building technology graduates of Nigeria Technical Colleges at the end of the programme.
8. Develop models for fostering creative thinking skill among the Building Technology students of Nigeria Technical Colleges.

1.5 Research Questions

The study sought to answer eight major Research Questions with Research Questions 1 and 7 having four and two sub-questions respectively under them. The sub-questions were generated to give further explanations to the results obtained from the major Research Questions.

1. (a) What are the personal factors/ background information necessary for consideration in selection of Building Technology students for creative thinking skill development in Nigeria Technical colleges?
- b) Why should gender difference not be considered as a personal factor for selecting the students for creative thinking skill?
- (c) Why should social economic background of the students not be considered as a personal factor their selection for creative thinking skill development?
- (d) Why should ethnicity not be considered as a personal factor for selecting the students for creative thinking skill?
- (e) Why should culture not be considered as a personal factor for selecting the students for creative thinking skill?
2. What are the social environmental factors necessary for fostering creative thinking skill among Building Technology students in Nigeria Technical colleges?
3. What are the resources needed in fostering creative thinking skill among building technology students in Nigeria Technical Colleges?

4. What are the techniques to be applied in motivating the Building Technology students in Nigeria Technical colleges to acquire creative thinking skill?
5. What are the teaching strategies that could be applied to enhance creative thinking skill among the Building Technology students?
6. What is the process required in fostering creative thinking skill among the Building Technology students?
7. (a) What are creative thinking skill outputs expected of the Building Technology graduates of Nigerian Technical Colleges at the end of the programme?
 (b) Why the programme is successful even if the creative thinking skill expected of the students of Technical Colleges are not exhibited before graduation?
 (c) What measures can be taken to improve upon the programme?
8. Is there any relationship among the constructs of the model for fostering creative thinking skill among the Building Technology curriculum of Nigeria Technical Colleges?

1.6 Research Hypothesis

The study was out to test the following four Alternative Hypotheses:

- H₁:** There is significant relationship among personal factors or background information, social environment and resources needed for creative thinking skill development among Building Technology students in Nigeria Technical colleges.
- H₂:** There is significant relationship among motivational techniques, teaching methods and creative thinking process required for fostering creative thinking skill among Building Technology students Nigeria Technical Colleges.
- H₃:** There is significant relationship among the elements that make up the creative thinking process for fostering creative thinking skill among Building Technology students in Nigeria Technical Colleges.

H₄: There is significant relationship among the components that make up the input process and output of the structural model for creative thinking skill among Building Technology students in Nigeria Technical Colleges.

1.7 Significance of the Study

Creative thinking skill development is highly needed in schools in order to acquire not just the technical skill, but also the creative and innovative skills. A school curriculum that is void of creativity development training will lead to production of graduates who will rely on traditional ways of doing things. Hence, they will lack the ability to come up with new ideas; thus their thinking skill will remain shallow. This has however been the situation of things in Nigeria Technical Colleges for failure to integrate creative thinking skill into the school curriculum (especially the Building Technology curriculum).

This problem therefore, has led to the development of models for fostering creative thinking skill in Nigeria Technical College and among building technology students. It is therefore hoped that the outcome of this study would be of great significance to both the Federal and the State Governments of Nigeria; the National Board for Technical Education, The Technical college teachers and students; the parents or guidance and the experts in the field of technical education and creativity.

The findings of the study could help the Federal and the State Governments to provide information that would assist in adjusting their educational policy and provide a curriculum that will cater for creative thinking skill development of building technology students in technical colleges. The study was aim at revealing the background information, social environmental factors and the resources needed in fostering creative thinking skill in Nigeria technical colleges. The outcome of this study in these aspects could help the Government to have an effective planning, supervision and budgetary allocation for creative thinking skill development in schools.

Also, the outcome of this study could help the curriculum planners to identify the strategies that would be used in enhancing and promoting creative thinking skill in schools. In planning the curriculum, the strategies that have been revealed through this study could serve as a basis for restructuring the technical college Building Technology curriculum to incorporate the neglected areas such as: the motivational strategies, teaching strategies, creative thinking process, creative thinking products and evaluation techniques for implementing creative thinking skill in Building Technology.

The role of curriculum implementation lies with the teachers. Therefore, the overall achievement derived from a well-planned curriculum is obtained through ability to implement them very well. The outcome of this study would inform the teachers of the adequate information and the steps required in implementing creative thinking skill curriculum in schools; how to motivate the students and the methods required to assess the skill. The teachers could also be assisted through the outcome of this study on adequate information necessary in guiding building technology students towards acquiring creative thinking skill right from the onset of admitting students into the school and throughout the duration of their training.

The outcome of the study would also be of a great benefit to the students as the overall findings concentrated on the development of their creative thinking skill. The models would be used to train the students creatively and hence, they would eventually become skillful and employable.

The outcome of the study could also have direct or indirect implications on the parents as well as the entire society. The society does not actually see technical education as education for the thinkers, but rather for the school dropouts. Hence, this has so far caused low enrollment in the colleges almost every year. Inculcation of creative thinking skill as revealed by this study could portray technical and vocational education as education for creative thinkers and innovators. This could however change the perception of the societal members about technical vocational education generally. Hence many people could be drawn into the schools.

Lastly, the conceptual model to be developed could guide the school teachers and experts in creativity and administrators in all the necessary steps required to infuse creativity into the technical college building technology curriculum. The findings of this study and the critiques it contains would be a great contribution to literature.

1.8 Theoretical Framework

This study was guided by four theories. The theories are: Amabile Componential theory of creativity (Amabile, 1933); Wallas Theory of Creative Thinking Process (Wallas, 1926), Social Capital Theory (Albert Bandura, 1986) and the General System theory (Bertalanffy, 1950).

The componential theory of creativity was propounded by Teresa Amabile in 1983. The theory presented creativity as the end product of an ideas that are not only novel, but also appropriate to some extent (Mumford, 2003). The theory, among others considers creativity in a divergent form; that is, as one which should provide many solutions rather than a convergent thinking which only seeks to solve problem in a single form (Baker and Rudd, 2001).

Four major components were identified to be influencing creativity. Three components are within-individual domain while the remaining one component is outside-individual domain. The four things influencing creativity within-individual domain as identified by Amabile (1983;1996 ; 2012) are:

1. Domain relevant skill: (expertise in the relevant domain(s)).That is being specialized in a specific field. In this study, the area of specialization being considered is Building Technology. Amabile (1997) therefore suggested that if creativity assessment is to be carried out, the experts in that domain must be used especially to compare the intrinsic and extrinsic levels of motivation (Kufman, 2008). Thus the domain specific knowledge is central to development of creative thinking (Simiton, 2003).

2. Creativity- relevant processes: (cognitive and personality processes conducive to novel thinking. It involves all the processes that the creators must pass through before they can attain the level of desired creativity.
3. Task- motivation (which could either be intrinsic or external motivation.

On the other side, the theory presented the social environment as the major thing that influences creativity outside individual environment. The social environment (the components outside the individual) is the school environment as applied to this study (Schilling, 2005 and Kilgow, 2006).

The Componential Theory of Creativity is applicable to this study as two of the research questions center on social environment and motivation for creative thinking. However, the theory stressed that a strong relationship exists among the four components which are task motivation, domain-relevant skill, and creativity relevant process and the social environment. The Social environment under the school system, according to Amabile (1983) consists of the classroom environments as the major factors which can influence creativity.

The domain relevant skill represents the building related-courses curriculum. The school curriculum contains the theory, practice, the selected content as well as the other activities required by the teachers and students. The creativity relevant skill processes recommended for creativity implies the various procedures the students have to pass through to think creatively and also achieve creative performance as recommended by Wallas (1926). In all, Tan (2000) suggested a shift from the traditional way of looking at curriculum. The creative thinking process involved some stages in causing creative thinking to take place. However, Amabile (1983,1996 and 2012) identified five stages as against the four stages of Wallas (1926). The stages in Componential Theory, begins with problem identification to problem solving with assessment. Componential theory of creativity therefore guided the research question on social environmental factors, motivational techniques and creative thinking process required by the Building Technology students.

The Wallas theory of Creative Process is connected with Componential theory of creativity in the aspect of creative thinking process. The theory is believed

to have started by Helmholtz who identified the first three stages of creative process; while the fourth stage was latter added by Wallas (Piaw, 2004). The theory stated that creative thinking skill process can take place in stages. Hence, four stages were identified by Wallas (1926) which include the periods of preparation, incubation, illumination and verification. The theory expressed that before creative thinking can take place, an individual needs to be prepared in a field of study and then define the problems they are willing to solve. The theory also propounded that there is period of sub-consciousness which usually precede an illumination.

The period of preparation According to Wallas (1926) is meant to clearly define the problems to be solved; making of observations and studying the environment before beginning to find solutions to the identified problems. This stage focuses on the problem as it is pictured in the mind of the problem-solver and then explores the problem's dimensions. It means that the person who wants to gain a new insight must know his field of study or the contents in it very well (Amabile, 2012).

At the period of incubation,, the creative thinkers or problem solvers will lay the observed issues aside for some time to gain more insight. Hence, Wallas (1926) propounded that at incubation, stage, the problem is internalized and moved into the unconscious mind. Though on the outside, nothing seems to be happening. Archimedes got his idea in the public bath while he was trying to solve a problem. Having withdrawn from that problem, an insight emerged to him in a bath (Fautely, 2007).

Illumination is the period that comes after incubation stage. At this stage, a new idea or insight suddenly emerges from the preconscious stage into conscious awareness. This period has been regarded as a mysterious phase experienced by a problem solver. The new idea comes in alike a "flash". The only explanation and suggestion Wallas (1926) could offer about this phenomenon was that the mind need to be rested, rather than being exhausted.

Verification is a stage at which the idea is consciously tested or verified, and then applied. The purpose of this final step is to check whether the idea actually

solves the problem. This step is very much important for the success of any creative activity, because some great ideas in a real life setting do not necessarily work without additional efforts.

The Wallas four stages of creative thinking is relevant to this study on the basis that one of the research questions is focusing on creative thinking process expected of the building technology students. Although Wallas' four stages differs from the five stages of Amabile's Componential theory of creativity (Amabile (1983; 2012). The period of incubation and illumination are two periods that have been left with controversy among creativity researcher; while some approved of it, others jettisoned it because they said it portrays creative thinking as a subconscious experience (Wong, 2011). Notwithstanding, Fautley (2007) opined that incubation and illumination are necessary in experimentation as experienced by Archimedes who got an illumination to his research when he was taking his bath in the public.

Social Cognitive Theory (SCT) was presented in 1986 by Albert Bandura as part of the Social Learning Theory. According to Pajares (2002), the change came due, to the fact that Bandura became awareness of the impact that cognition has on human learning process (Grusec, 1992; Pajares, 2002). The Social Cognitive theory is premised on the reciprocal relationship that exists among individuals' personal factor, their environment and the expected behaviour (Warren, 2010). The SCT, propounded by Bandura is of premise that cognitive processes play an intermediary role on human functioning and therefore it largely influences both the environments and human behaviour (Price and Archbold, 1995). Thus the interaction between the behaviour, environment and personal factor is reciprocal Therefore; the personal factors (the human thoughts, emotions and beliefs) can interact with the behaviour bi-directionally while the behaviours also influence the human factors. The second interaction is that as behaviour has influence on the environment, so is the environment having influence on behaviour (Warren, 2010). In the arrangement, the final bi-directional relationship or interaction takes place between the environment domain and personal factors.

This theory is useful in this study as it shows the relationship that exists among the individual factors, environment and human behaviours which are

creativity process and products (Warren, 2010). Thus the theory also connects with the GST and Componential theory of Creativity. The theory however is related to the research questions that are based on identification of the background information of the students before selecting them for creative thinking skill as well as the type of social environment needed for creativity. Lastly, the behaviour as identified in the theory goes with the final creative thinking products expected of the Building Technology students.

Lastly, the behaviour as identified in the theory goes with the final creative thinking products expected of the Building Technology students. The Model in Figure 1.2 shows the relationship in the constructs of Social Cognitive theory.

The system theory divides the framework into three major components or subsystem. The components are input, process and the output. The input units incorporate both the personal and social environmental factors. Therefore, integration of the Social Cognitive Theory with the Componential Theory on the aspect of environmental factors will enhance creativity. Thus these three theories were applied in this study on personal factors, environmental factors and resources needed in selecting students for creative thinking skill development.

The processing unit of the General System theory incorporates the Wallas and Amabile componential theories. The Wallas theory is applied to determine the processes that will be involved in acquiring creative thinking skill., while Amabile componential theory is also incorporated into the processing units to reflect the three basic elements that influence creativity within-individual domain which are domain-relevant skills, creativity-relevant process and task motivation.as propounded by Amabile (1983, 1997; 2012) The processing unit is meant to determine the methods to be used in motivating the building technology students in acquiring creative thinking skill and the step by step activities to be carried out to encourage creative thinking skill.

The output unit shows the creative thinking products expected of the students while the General system theory (which is an open system), the Componential theory

and the Social Cognitive Theory are meant to expose the entire system to the influence of social environment.

1.8.1 The Framework Derived from the Theories

Figure 1.2 is the framework derived from integration of the four theories applied for this study. as discussed above, The study incorporates the General system theory, The Graham Wallas creative thinking process theory, the Amabile Componential theory of creativity and the Social Cognitive theory.

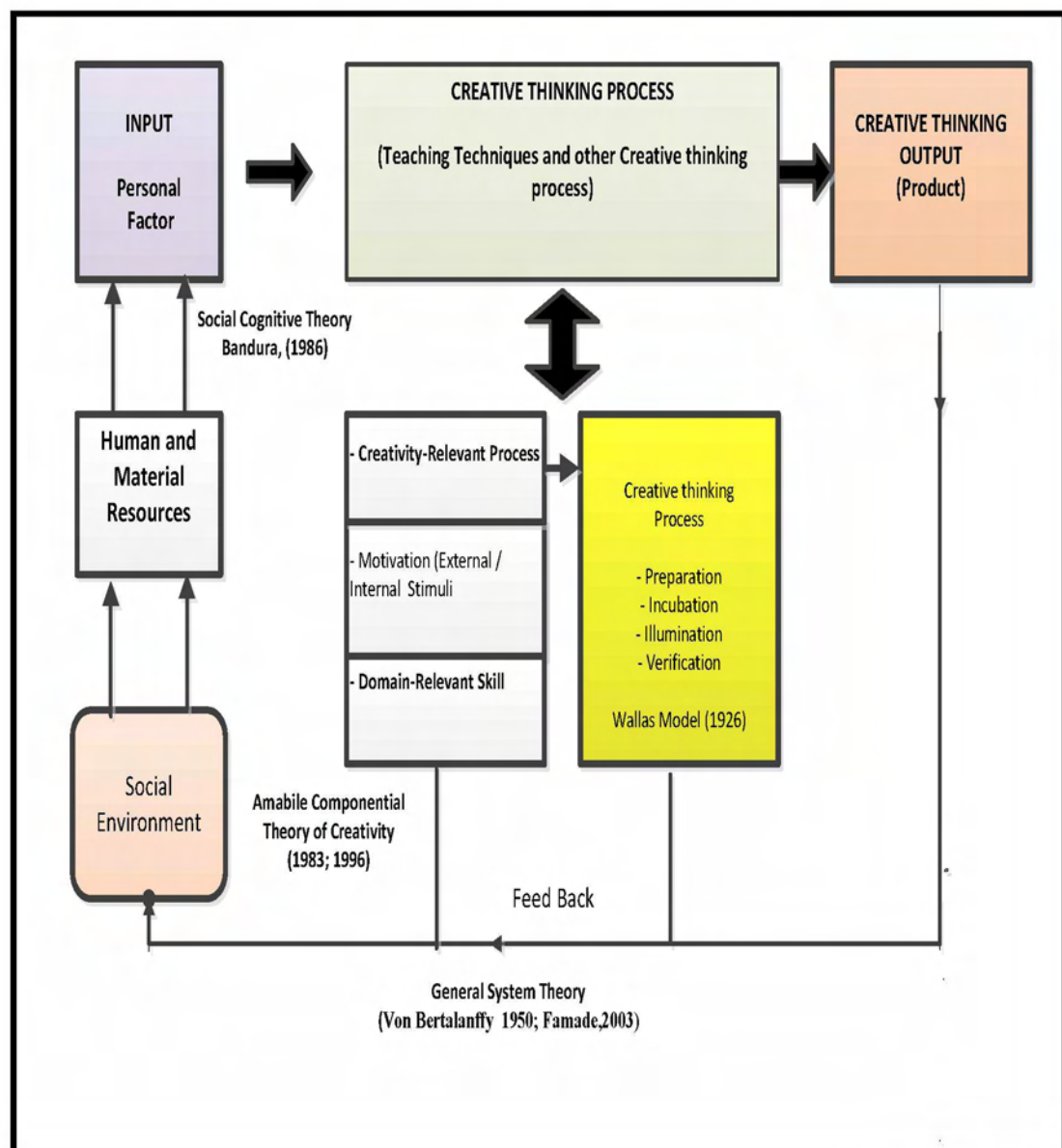


Figure 1.2 Theoretical Framework Model Derived From the Three Theories

1.8.2 The Conceptual Framework

The conceptual Framework of this study is based on integration of the four theories identified above which are: the General System Theory; the Amabile Componential Theory of Creativity; the Wallas theory of Creative Thinking Process and the Social Cognitive Theory. The conceptual framework is also derived from the statement of problem and the purpose of study of this research. The statement of the problem arises from the fact that the technical colleges in Nigeria lack a model for fostering creative thinking skill in the school curriculum, especially in the Building technology curriculum and others. Therefore the statement of the problem is simply stated to mean that before creative thinking skill can be fostered among the Building Technology students in Nigeria Technical colleges, there will be need to identify certain variables which form the basis for this study. They include: the students' personal factors, social environment, resources, motivational techniques, teaching techniques, creative thinking process and the creative thinking output.

The variables are divided into three units as Input, process and output. The Dependent variable is the output, which is the creative product while the Independent variable is the input which involves constructs such as the students' personal factors, social environment, Resources. The intervening variable is the process unit which involves the motivational techniques, teaching techniques, and creative thinking process.

The framework shows a triadic relationship among human factors, resources and social environment which also serve as endogenous variables to the input. It also shows a triadic relationship among motivational techniques, teaching techniques, and creative thinking process which also serve as exogenous variable to process unit. It also presents a relationship among the input process and output while a feedback line is shown from the output back to input and process to determine what amendment is required in the model in case it comes short of the expected goal. The Conceptual Framework is shown in Figure 1.2.

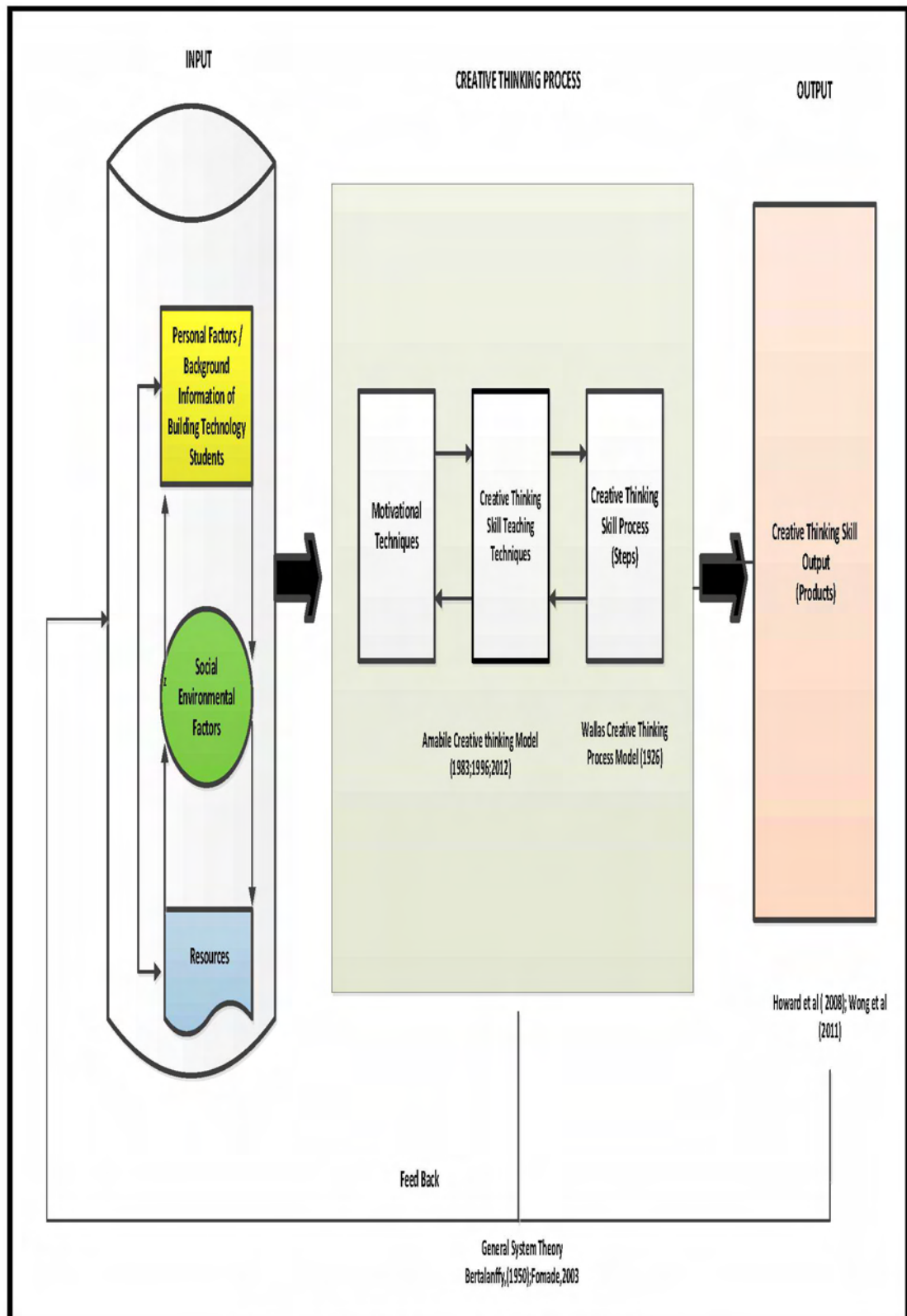


Figure 1.3 The Conceptual Framework

1.9 Scope of the Study

The focus of this research is to determine how creative thinking skill can be fostered among the building technology students in Nigeria technical colleges. The aim was to develop models which would help to infuse creative thinking skills into the school curriculum.

The study made use of the students as well as teachers/experts of Building technology trade-related courses in technical colleges situated in the South-west Zone of Nigeria. The Zone was made up of six states including, Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States. The study was delimited to determining the personal factors / background information; social environmental factors; resources needed; motivational techniques; teaching techniques and creative thinking process and the expected creative thinking skills output (product) to be considered in selection of building technology students for creative thinking skill development in Nigeria Technical colleges.

Lastly, the study sought to develop two alternative models for fostering creativity in the technical colleges. One was based on Building Technology students' perception and the other was based on the perception of Building Technology teachers/ experts.

1.10 Operational Definition

This section is concentrated on the definition of the constructs or terms used in this study. The constructs are defined as follows:

1.10.1 Block -laying and Concreting

Building technology/ Building Construction-related course offered at the technical colleges in Nigeria. In Nigerian context, Building Technology is referred to as Blocklaying and Concreting in the Technical college curriculum.

1.10.2 Background Information

These are information about the Building Technology students' bio-data which include their gender, ethnicity etc with their previous technical knowledge or experience which can enhance creativity development.

1.10.3 Social Environment

The social environment as used in this study involves the location of schools, circumstances that surround the school environment and the individuals that the students can interact with within and outside the school environment.

1.10.4 Resources

Resources are categorized as human and material resources. The human resources is used to represent the teachers, students, principals and all the other people who are utilized directly to facilitate creative thinking skill in technical

colleges. Material resources on the other hand, refer to all the instructional aids, equipment, tools and machines which are manipulated to facilitate creativity.

1.10.5 Motivation

Motivation as used in the study, involves all the activities carried out aside teaching methods to encourage students to get involved and interested in creativity.

1.10.5 Teaching Techniques

Teaching techniques are the various teaching methods and approaches which can help impart creative thinking skill on students.

1.10.6 Domain Specific

Domain specific is a particular subject area or course of study or area of specialization where creativity is required. The domain specific in this study is Building Technology.

1.10.7 Input

Input is the part of the conceptual model that contains the individual information, social environmental factors and the resources that are imbedded into creative thinking skill development in schools.

1.10.8 Process

All possible activities carried out to facilitate creative thinking skill development. The problem solvers or the creative thinkers are made to carry out the activities step by step.

1.10.9 Output

The output is the expected creativity products or results obtained after undergoing some stages of creative thinking skill. The output will emerge and produce a feedback based on the activities carried out at the input and process units.

1.10.10 Technical and Vocational Education Training (TVET)

It refers to Vocational and technical Education, Vocational Career Education, depending on what it is called from country to country. It is a training imparted on students in technical colleges.

1.11 Summary

The concluded chapter concentrates extensively on the background of the study, purpose of study, research questions and hypotheses. It unfolded the importance of creative thinking skill as that which helps to produce employability skill among Building Technology graduates who would latter facilitate national economic development. More so, it is established from literature that creative thinking skill development is missing in Nigeria technical colleges despite the agitation of the Federal Government of Nigeria to stimulate creativity in the colleges, as stipulated by the National Policy on Education. The need to produce a model for fostering creativity in Nigeria technical colleges especially among the building technology students is established through literature and the statement of the policy.

The chapter reveals eight major research purposes and seven major research questions and four Hypotheses that guided the study. The purposes of the study and the research questions sought to identify: Students' background information, social environmental factors; resources needed; motivational techniques; teaching techniques; creative thinking process and the required creative thinking products.

Four major theories which are: Amabile Componential Theory of Creativity; Wallas Theory of Creative Thinking Process; General System Theory and Social Cognitive Theory are the theories that backed up the study. The four theories therefore are merged to generate both the Theoretical and Conceptual Frameworks for the study.

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