ANALYSIS OF FACTORS INFLUENCING THE TEACHING OF CREATIVITY AT UNIVERSITY LEVEL

BY

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DECLARATION

DECLARATION BY STUDENT

I Otii, Leonard Omondi declare that this thesis is my original work and has not been submitted for the award of a degree in any other university/college. No part of this thesis may be reproduced without prior permission of the author and or Moi University.

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DEDICATION

This Master's thesis is dedicated to the memory of my beloved late mother and father and of my mentor Mr. Ng'ang'a. In their own ways, they handed down to me fundamental values of self-respect, Perseverance, honesty and coherence and they always taught me to always pursue things I believe in. They would also be very proud of my accomplishments.

I wish to dedicate thesis to these fundamental people in my life who strongly supported me during this amazing adventure through creativity studies: my wife Pamela and sons Nimrod and Derrick. They all believed in me more than I ever did. I have become a stronger person because of their unconditional love and generosity.

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ABSTRACT

Universities have the unenviable challenge of producing and injecting graduates into the labour market who have not only the capacity to solve problems afflicting society but also to come up with new solutions to new problems that come up as the society develops and technology changes. To this extent, the purpose of this research was to explore the extent to which the Universities prepare graduates for this noble challenge that would see communities have an enhanced quality of life by establishing the extent to which the teaching of creativity is dependent on the aptitude of the student, the programs, the facilities used, and the faculty members, teaching methods employed and used to a varying degree in the University. The study was based on the production function theory. The schools were picked using random sampling. Quota sampling procedure was used to pick respondents from schools of education, engineering and Business and economics. Data was collected from Moi University final year students from the schools above who undertook special projects as a means of nurturing and developing creative abilities by using structured questionnaires and administered by the researcher from a sample size of 132 respondents. The data was analyzed quantitatively with the use of descriptive and inferential statistics. It was found out from the research that there was a positive correlation between the creativity learning at the university and some of the variables that were investigated such as student aptitude, faculty members, and academic programmes. It was also found out that the teaching facilities and methods employed had negative correlation coefficients. The study reveals that although creative abilities are imparted to some significant extent, resource utilization at the university level is suboptimal and there is need to invest more on factor inputs such as teaching facilities, teaching methods, faculty members and continuous review of programs. Since a creative student will be an innovative one, it is recommended that there is need to improve on the various factors that enhance learning of creativity.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Creativity is a mental and social process involving the discovery of new ideas or concepts, or new associations of the creative mind between existing ideas or concepts. Creativity is fuelled by the process of either conscious or unconscious insight. An alternative conception of creativeness (based on its etymology) is that it is simply the act of making something new (Harris, 1998).

From a scientific point of view, the products of creative thought (sometimes referred to as divergent thought) are usually considered to have both originality and appropriateness. Although intuitively a simple phenomenon, it is in fact quite complex. It has been studied from the perspectives of behavioural psychology, social psychology, psychometrics, cognitive science, artificial intelligence, philosophy, aesthetics, history, economics, design research, business, and management, among others (Sternberg,1999). The studies have covered everyday creativity, exceptional creativity and even artificial creativity. Unlike many phenomena in science, there is no single, authoritative perspective or definition of creativity. And unlike many phenomena in psychology, there is no standardized measurement technique (Guilford, 1977).

Creativity is a highly ambiguous concept that tends to be given different meanings depending on the discipline or practice to which it is related (Runco, 2004). This diversity becomes evident not at least in the discourse on enterprise and entrepreneurship. Writers such as Schumpeter and Kirzner emphasise the abstract

economic function embodied in the creative and alert actions of daring entrepreneurs, whereas management oriented writers often treat creativity in a hands on manner emphasizing the creative behaviours and thought styles apparent in opportunity search, business model development, social networking, etc. (Drucker, 1985; Fiet, 2002; Sarasvathy, 2001).

In entrepreneurship education, an additional tension is added as entrepreneurial demands for creativity, novelty and synthesis often clash with the traditional academic focus on rigour and analysis. This tension is increasingly becoming clear as researchers now tend to distinguish between small firm management and entrepreneurship through concepts such as emergence, evolution and variation (Gartner, 1993). This issue also transcends academic discourse, as poor pedagogy and course content risks doing more harm than good to prospective entrepreneurs (Gibb, 1996).

There are usually challenges posed by ever changing environment, in work places which need an all-round person. The ever changing work environment requires people who can be adaptive to technological changes and innovations. This calls for creativity among our graduates, the skill which they are expected to have learnt /gained in college.

Universities have long been viewed as crucial to the processes of learning, innovation and knowledge creation, and this is more important now than ever before. Given that universities are key institutions of knowledge production, integration and inclusion, it is important to get to know the role these institutions of research and graduate education play.

The 21st century and beyond signals an era of unprecedented breakthroughs in technology and constant change in many aspects of life in the economy of this nation. Educators are therefore challenged more than ever before with the need to develop graduates who will be adaptable in fast-changing environments. Kenyan universities do have vibrant technology infrastructure as well as a wide range of training facilities which need to be improved regularly to enhance the learning process (Alumni News, 2005).

Since the beginning of 1990 a country such as Singapore embarked on a policy of rapid expansion in higher education (Brown, 1996), particularly polytechnic education. The expansion of polytechnic education was in line with the national strategy to create a better trained workforce. Polytechnic education in Singapore is primarily concerned with preparing graduates for the world of work and entrepreneurship in industry and business especially in areas such as engineering, applied sciences, business and information technology. Human resource is the key to Singapore's economic competitiveness (Committee on Singapore Competitiveness, 1998). According to Porter (1990) there is a need for a more creative workforce as a nation progresses in economic development. Singapore is at the innovation-driven stage of economic development and Thurow (1992) argued that an important consideration at this innovation stage is the upgrading of human and knowledge resources. This calls for equipping our universities graduates with not only logical reasoning and analytical abilities but also creative abilities.

Peterson (1997) notes that there has been a revolutionary rather than evolutionary change in the environment of colleges and universities in many developing countries as well as developed countries which is being seen through changes in technologies.

Ramsden (1998) observes that the challenges include new forms of learning, new technologies for teaching and new requirements for graduate competence. Educators need to ask if the skills imparted are really transferable to the workplace. Teachers would have failed if they use learning processes that do not impact on lifelong learning. Indeed, the challenge is for educators to design new learning environments and curricula that really encourage motivation and independence to equip students with learning skills, thinking and problem solving skills. Employers are looking for attributes such as problem solving skills, adaptability, initiative, creativity, communication skills, technological literacy, real work experience, leadership ability, logic and reasoning, systems thinking and so on.

Kenyan Public universities based systems of teaching, programmes and trainings are structured to prepare the learners/students to be practically creative and innovative enough for the world of work. In view of these Kenyan public universities produce majority graduates who are able to fully participate in solving problems in organizations where they are employed as problem solving abilities of college graduates can only be improved when they get involved in practical aspects of what they could have learnt, considering that the environment which is ever changing. Universities administrations have fully engaged the students with the world of work implying close partnership between the universities and the prospective employers. Universities have been working closely with the industrial sector, including in co-curriculum development, to ensure their graduates are relevant to market demand. The co-operation is crucial to avoid a gap between the graduates churned out by local universities and the industries' needs. University co-curriculum must be compatible and relevant to the industrial sector's requirements (Bernama, 2007). Even, Rogow

(1993) mentioned that curricula must balance theoretical knowledge with industrial knowledge.

In Malaysia, the importance of this skill is documented in Quality Assurance in Public Universities of Malaysia: Code of Practice (Quality Assurance Division, 2004) which states that the quality of university programs is assessed by the ability of its graduates to carry out their expected roles and responsibilities in society. Among the competencies that students should demonstrate at the end of the program, as stated in the document, are critical thinking, problem solving, creative decision making, and ability to communicate, apart from mastery of knowledge in specific fields.

Raymond, McNabb and Matthaei (1993), in a survey of teaching methods to develop competencies for the workplace, found both employers and students ranked cooperative education as the most important educational method, and pointed to a critical need for student thinking and ability to learn.

1.2 Problem Statement

Creativity literacy is an important educational goal for all high school students as well as University students. Experts in technological fields, and the general public, are expressing the need for creativity literacy and asserting that our educational system must address the issue (Gamire & Pearson, 2006; Gorham, 2002; ITEA, 1996, 2000; Pearson & Young, 2002). The impact of decisions related to creativity and technologies are complex, and the ability to make thoughtful decisions regarding our relationship between society and technological creativity is essential for our nation’s continued prosperity.

The existing public universities curricula/ programmes do encourage students to merely pass examinations but fail to adequately assess competence and/or skills on practical work (Spencer, 1999). For this reason, Spencer (1993) argued that there is a misconceived premise for designing the creativity and innovation studies at our public universities. A curriculum in the universities is placing limitations on the wider use of technology in the country; thus, Stephenson (1997) sees capability as the integration of knowledge, skills, personal qualities and the ability to learn to deal effectively with unfamiliar and familiar situations or tasks. The curricula designed at our public universities aim at preparing technology students and young engineering professionals to have a chance to design and effect practical based innovative projects. Apart from theoretical academic training in technology education and engineering, the graduates should be able to handle the technical works, research or be an inventor so that they become creative and innovative entrepreneurs in economy. However, it has not been established empirically how allocative efficiency in the use of factor inputs that maximize production of acceptable levels of technologically creative and productive abilities among graduates of Kenyan universities is realized. Weisz (1999) noted that there is little correlation between academic achievement and levels of generic skills, suggesting that employability is not necessarily related to academic ability.

1.3 Objectives of the Study

1.3.1 General Objective

The general objective was to explore factors influencing the teaching of creativity at university level and determine the extent of their contribution to creativity learning at the University and especially to those students who were undertaking special projects in their final year of study.

1.3.2 Specific Objectives

The study sought to achieve the following specific objectives;

(i) To determine the extent to which individual learner's aptitude, ability and inherent creative traits influence the creativity of a student.

(ii) To examine the extent to which University faculty members influence the teaching of creativity at University.

(iii) To determine the contribution of teaching (learning) facilities to the teaching of creativity at University level.

(iv) To establish the extent of contribution of University programmes in creativity learning at the University level.

(v) To examine the extent to which the teaching methods employed by faculty members influence the teaching of creativity at University level.

1.4 Research Questions

The study was guided by the following research questions;

(i) Is the training at the university capable of promoting creativity and innovation?

(ii) What are the constraining factors to the enhancements of creative thinking among final year students at Moi University?

1.5 Significance of the Study

The study of teaching creativity at university level is aimed at benefiting the graduates from the various departments under study, the faculty members and the community at large. The graduates will come out of the university creative people, the faculty staff will be able to note the successful areas and the deficit areas that need to be improved and the community will gain by absorbing creative graduates within their midst hence

accepting creative entrepreneurs. The creative graduates released to the job market (community) would assist in the widening the scope and spheres of operations (doing business).

Zucker et al (1998), say that the university is viewed as a key institution that enhances competitiveness and connecting city-regions (and nations) to global flows of knowledge and talent. Furthermore, universities build social inclusion and cohesion by creating more diverse and tolerant communities and society. However, this is a virtuous circle, since diverse and tolerant communities in turn help to build stronger universities. Through this process, the university acts as an anchor for creative thinking and activity within the economy.

In any community, in most instances, the university is typically seen as a "knowledge factory". The university produces knowledge and technologies that are then transferred from the university to the private sector through technology transfer centres, incubators, research and development partnerships, university-industry alliances, commercialisations programmes and spin-off firms. These local interactions between firms and other institutions are crucial to economic competitiveness since it is through these interactions that cutting-edge research is transferred into commercially viable products or processes leading to prosperity for both firms and regions (Bathelt et al, 2004).

Scholars of innovation studies such as Saxenian (1999) have documented the successes (and failures) of development technologies and commercialising research through these types of government supported programmes and initiatives as well as demonstrating how the university generates knowledge spill-over to other parts of the regional economy. Unquestionably, there is an important role of the university in

bolstering the competitiveness of regions, provinces, and the nation through these types of initiatives

However, the role of the university must be seen in its wider societal context. As a key institution in knowledge based economy, the university plays multiple roles, reaching well beyond this narrow view of the university as a 'knowledge factory'. It has been recognised that technology transfer does not just occur through formalised programmes and mechanisms. An equally, if not more, important role of the university is to facilitate the indirect transfer of technology and flows of knowledge through producing well-educated talent for the local (and national) labour market. An abundance of highly skilled workers is often cited as one of the most important factors for the success and dynamism of locally based clusters and regional innovation system.

Generally the university administration stand to gain from the study as it will enable it do proper planning as regards the supposedly weaker areas which may be identified from the findings. The prospective employers of our university graduates also stand to gain in terms of absorbing graduates who are creative and their adaptability to their changing work environment is beyond reproach.

1.6 Limitation of the study

The study covered the factors influencing teaching of creativity at Moi University's Schools of Education, Business and Economics and Engineering. The study endeavoured to assess the extent to which facilities, programmes, teaching methods, individual students' aptitude and faculty contribute towards the learning of creativity at the university level. The study findings may therefore, not be generalised in other departments of the university or to cover other factors in other institutions of higher

learning that may influence learning of creativity. However, the lessons may be drawn from this study and be used elsewhere. The other limitation was the non-response by the respondents and the measurement of their responses as the researcher used the lickert scale in measuring the responses.

1.7 Scope of the study

The study covered the factors influencing teaching of creativity at Moi University's Schools of Education, Business and Economics and Engineering. The researcher had targeted a population of 571 respondents. The study involved a sample size of 180 respondents constituting students at Moi University's Schools of Education, Business and Economics and Engineering.

1.8 Assumptions

This study was based on the following assumptions;

(i) That university have students with aptitude; ability and inherent traits to learn creativity.

(ii) The university have distinct and identifiable curriculum, teaching methods, programmes and faculty members that facilitate learning of creativity.

(iii) That the faculty members have a greater influence in the teaching of creativity at the university.

(iv) The academic programmes in place at the university facilitate the creativity learning at the university.

1.9 Conceptual Framework for the study

This study employs the production function model in analyzing the various factor inputs that the university employ in trying to meet its challenges of producing

graduates that meet the demands of the market and that are able to be technologically innovative in order to address emerging issues in their work places and society. The notion of a production function relating output to its underlying factor inputs has a long history. From Turgot in 1776 to Knut Wicksell in the early 1900s, economists used the concept to explain phenomena ranging from diminishing returns to product exhaustion under marginal productivity (Humphrey, 1997). Marthus iron law of wages, Ricardos rent theory, the trend of relative income shares in a growing economy, the first order conditions of optimal factor hire, Euler's theorem on adding-up-all revealed their unique secrets through production function (Ibid).

Fundamental to economic analysis is the idea of a production function. In its allied concept, the utility function, form the twin pillars of neoclassical economics (Humphrey, 1997). The production function is expressed as **P=f (L, C, T,)** and relates total output (P) to labour (L), Capital (C), Land and Terrain (T) and other inputs that are combined to produce it.

A production function is a purely technical relationship, void of economic content (e.g. Chambers, p.7 as quoted by Harry, 1998). Harry (1998) report that according to Dorfman, Samuelson, and Solow. The production function is a description of the technological conditions of production, and the economist takes no direct responsibility for ascertaining it. Instead he regards it as falling within the purview of the technologist or engineer. Harry, (1998) notes that there seems to have been a misunderstanding somewhere because the technologists do not take responsibility for production functions either. They regard the production function as an economist's concept, and, as a matter of history, nearly all the production functions that have actually been derived are the work of economists rather than of engineers.

A production function is simply a set of recipes or techniques for combining inputs to produce output. Only efficient techniques qualify for inclusion in the function however, namely those yielding maximum output from any given combination of inputs (Humphrey, 1997). Any attempt to fit a production function immediately confronts the specification problem- choosing arguments and algebraic form of the function. Economic theory provides mainly generic conditions of specification and provides little guidance for specifying a function to describe a particular production process. Satisfactory specification must consider the technological conditions governing that production process (Harry, 1998). This research considered a simple production process: inputs in the university as a productive unit where they undergo transformation process to yield output (graduates) with desired characteristics and qualities to address society's needs as illustrated in figure 1.1.

Conceptual Framework

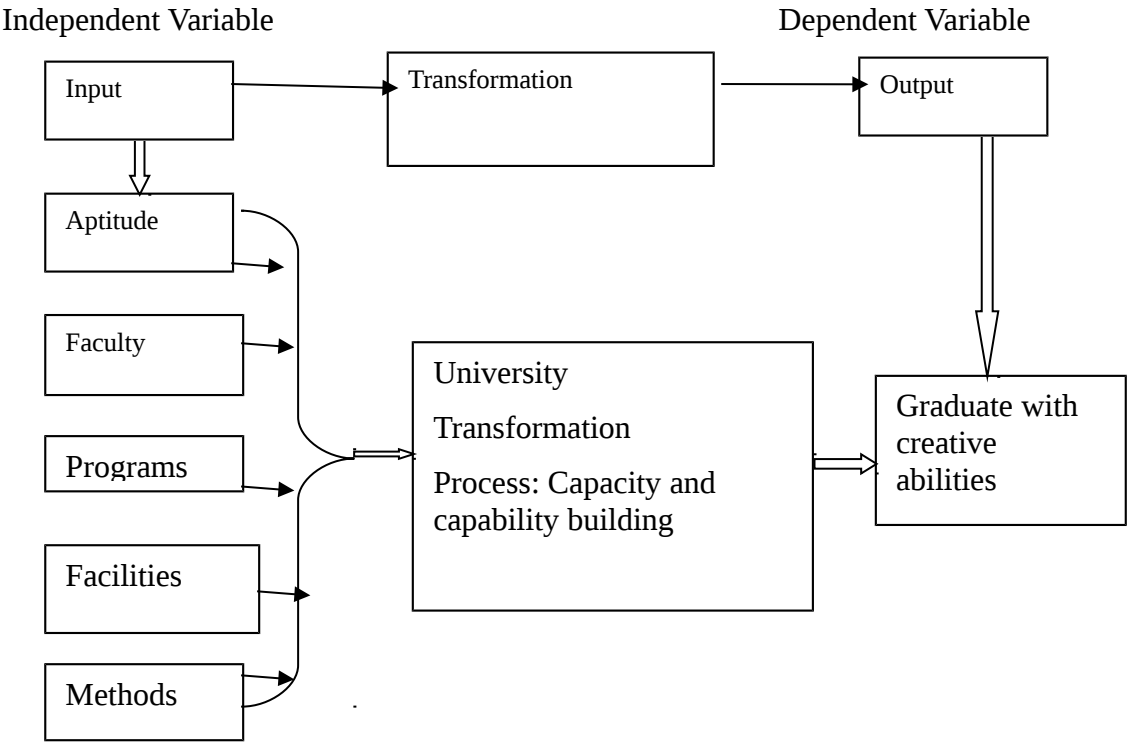


Figure 1.1*:* The productive process in an institution of higher learning

Source: Humphrey (1997) as modified by the Researcher (2010)

In this study the transformation process the product/output is the students with creative abilities and the factor inputs include but not limited to;

Production inputs -
- i) Students Aptitude - Aptitude
- ii) Teaching faculty/Lecturers competence – Lecturer
- iii) Teaching facilities - Facilities
- iv) Academic programs - Programs
- v) Teaching methods - Methods

These were the factor inputs that were being analyzed in this study whose specification details were analyzed according to the production function;

Creativity(C) is a function of Aptitude (A), Lecturers (L), Facilities (F), Programs (P), and Methods (M).

From which

$$\mathbf{C=f\ (A, L, F, P, M).}$$

And, if the function is linear, then;

$$\mathbf{C=\alpha + \beta_1 A + \beta_2 L + \beta_3 F + \beta_4 P + \beta_5 M}$$

To test this model, each variable was established and was tested individually and then collectively.

1.10 Operational definition of key terms

(i) Creativity

Creativity being the ability to come up with something new, and it being the dependent variable, it was measured by considering the creativity process, the project identification methods and the benefits that accrue from undertaking the projects.

(ii) Aptitude

This is the natural ability that makes it easy for one to do something well. The individual aptitude was measured by considering training and exposure as a means of creativity learning, how the natural talent in an individual contribute to creative learning, why the constructive discontent contribute to creativity learning.

(iii) Faculty

These are departments in a university .It also refers to all teachers (lecturers) in a university, college or school. This variable was measured by considering how the respondents rated the professional competencies of their teachers, their participation in the research work and consultancies as well as academic conferences, their access to good facilities and also their use of the new teaching methods as opposed to the old techniques.

(iv) Teaching facilities

The teaching facilities here refer to those equipment that aid the faculty members in imparting knowledge to the students. The facilities were measured by considering the supply, availability, accessibility and adequacy of the facilities for use by the students.

(v) Academic Programmes

These are the academic programmes run by the university as provided for in their catalogues. The smooth establishment of a measurement program also requires a strategy and plan. The strategy should address many of the critical success factors. The resulting plan should be flexible and evolutionary. Measurement should grow with an organization and not overwhelm the culture. To measure the programmes at the

university one need to obtain Senior Management Sponsorship/ approval, dedicate Resources for the development of programmes and train, Educate and Market the programmes.

(vi) Teaching Methods

These were the methods of instructions used by the faculty members in the process of imparting knowledge to the students. The use of these methods was measured by considering the types and the use of these kinds of instructions to students. The teaching methods' effectiveness is also measured by the participation of the students especially in the demonstrations as method of instruction.

(vii) Production function

This is a technical relationship between the output and the inputs in a production process. The output here refers to the outcome of university process which is the graduate with creative abilities while the inputs in this study refers to those variables used in an attempt to come up with graduate with creative abilities and include aptitude, faculty members(lecturers), programmes, teaching facilities and teaching methods.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter gives an outline of past studies on creativity of individuals by considering nature of creativity, the importance of creativity and innovation in entrepreneurship, factors affecting creativity and innovation in SMEs, the role of creativity in education, the role of universities in enhancing creativity in enterprises, the effectiveness of teaching creativity and its measurement and the factors that influence the teaching of creativity at university level and the summary.

2.2 Nature of creativity

Harris (1998) opines that creativity is ability, an attitude and a process. Creativity as an ability is the capacity to imagine or invent something new. It is the ability to generate new ideas by combining, changing or reapplying existing ideas. Everyone has substantial creative ability. Some creative ideas are astonishing and brilliant, while others are just simple, good, practical ideas that no one seems to have thought of yet. Just look at how creative children are. In adults, creativity has too often been suppressed through education, but it is still there and can be reawakened. Often all that's needed to be creative is to make a commitment to creativity and to take the time for it.

Creativity is the attitude of accepting change and newness, an inclination towards playing with ideas and possibilities, the habit of enjoying the good, while looking for ways to improve it. To a creative person, there is always room for improvements. Creativity as a process implies that creative people work hard and continually to

improve ideas and solutions, by making gradual alterations and refinements to their works. Contrary to the methodology surrounding creativity, very few works of creative excellence are produced with a single stroke of brilliance or in a frenzy of rapid activity. Much closer to the real truth are the stories of companies who had to take the invention away from the inventor in order to market it because the inventor would have kept on tweaking it and fiddling with it, always trying to make it a little better (Harris,1998).

Technological creativity is utilitarian in nature. This is illustrated by Ned Hermann (1989) as he defines the process of creativity to include six stages: interest, preparation, incubation, illumination, verification and application. The addition of interest to the five phases of creativity process originally clearly indicates the significance of the purpose for creativity. Technological creativity is not creation for creation's sake. Rather, it is the response to the environment that demands change. The power to direct change enables us to bring forth value added that will benefit the whole society.

While new or original ideas can come just in a flash, bringing them into application, is usually a painstaking endeavour. Therefore, technological creativity is the combination of imagination, reasoning and persistence. To be effective in technology creative activities, a person must possess the ability to sense and locate the points of interest, gather information, to come up with new ideas, to evaluate and judge the ideas, to make a decision and to implement it. In simple words, it is the integrated ability of solving problems, particularly in an innovative way (Ned Hermann, 1989).

Schumpeter in one of his classical statements introduced what constitutes entrepreneurship, which is innovation and one cannot be innovative unless s (he) is

creative. A new way of combining already existing resources is at the core of things. Schumpeter equates entrepreneurship with innovation. Importantly for him, the entrepreneur is not stable intrinsic character of a person but refers to what a person does. Schumpeter in Swedberg (2000) says that everyone is an entrepreneur only when he actually carries out new combinations and loses that character as soon as he has built up his business, when he settles down to running it as other people run their businesses.

Schumpeter sees innovation as something occurring within a limited period or a moment in time. The close ties between creativity and entrepreneurship seem to miss this temporal aspect of creativity. In the study of individual creativity, there are, as Nystrom (1979) points out, two parallel research traditions; one focusing on characteristics of creative individuals and one cognitive perspective concerned with the creative process.

Creativity from these two perspectives stress the importance of the individual, who (s) he is and thinks and therefore this gives a limited understanding of the entrepreneurial process as admitted also by those who argue for a cognitive approach. Ward (2004) said that “it is one thing, for example, to envision some desirable new internet application and quite another to implement the idea, convince others to implement the idea, convince others that it is worth pursuing, and then market the application successfully.

Another approach to creativity takes the environment as a point of departure concepts like “creative field”, “innovative milieu”, “the learning region: and the “regional innovation systems” all refer to creativity as an interactive and collective process,

Scott (2006). Here the individual is balanced up and entrepreneurship seen more as a result of collective processes. Still creativity is something separate from imitation.

The other approach is to view creativity as socially constructed coupled to organizing and is grounded in processes of identity creation. This means that it is important that the process of identity creation be viewed as a point of departure. Debono (1992) says creativity is a process that can be developed and improved. Everyone is creative to some degree. However, as is the case with many abilities and talents, (for example athletics), some individuals have greater aptitude for creativity than others. Mellow (1996) also says that some people have been raised and educated in an environment that encouraged them to develop their creativity. They have been taught to think creatively. For others, the process is more difficult because they have not been positively reinforced, and, if they are to be creative, they must learn how to implement the creative process.

Most people believe that only a genius can be creative. Eysenk (1995) says that most people are born creative and others are not or only gifted or highly intelligent person is capable of generating creative ideas and insights. This is the trait perspective of creativity.

The saying popularized by Hilary Clinton, “It takes a whole village to raise a child,” lends transcendent truth that in today’s world, it takes entire populations of individual organizations’ members acting in community to build, develop and ensure competitive success. Companies are being forced to reorganize constantly in order to stay competitive (PR Newswire, 2007) and creativity and innovation are the two main conceptual instruments needed to ensure organizations’ abilities to thrive in fluidity. Today’s globally competitive environment requires that organizations learn to leverage

all the intellectual resources available. Innovative fresh ways and means are what organizations must offer constantly in order to succeed.

2.3 Importance of Creativity and innovation in Entrepreneurship

Creativity is a crucial component of our capacity to innovate. And innovation is a key factor not just to become more competitive but also to improve our quality of life and the sustainability of our development. Creativity and innovation are important factors in organizations and to organizational leaders because much of today's competitive marketplace demands ever-increasing value to customers, which translates to lowest total cost, highest total quality, fastest total cycle time, and highest total overall customer satisfaction (Atkins, Dykes, Hagerty & Hoye, 2002). Smith and Munn, (2006) predict that future success globally will be achieved only by driving down costs as well as improving operating efficiencies. Smith and Munn are content that creativity is what it will take to do so. Shapiro (2002) agrees that today's business world thrives on creativity and innovation in a climate of uncertainty, volatility, and continuous change. As more organizations vie for significance in the global marketplace, creativity and innovation have become the most important factors in establishing and maintaining a competitive advantage (Meisinger, 2007).

Entrepreneurship is the process of creating something with value by devoting the necessary time and effort, assuming the accompanying financial, psychic and social risks, and receiving the resulting rewards of monetary and personal satisfaction and independence. It is the process of conceptualizing, organizing, launching and through innovation- nurturing a business opportunity into a potentially high growth venture in complex, unstable environment. Entrepreneur is an individual who establishes and manages a business for the principal purpose of profit and growth. The entrepreneur is

characterised principally by innovative behaviour and will employ strategic management practices in the business

The entrepreneurial challenge Novel and useful ideas are the lifeblood of entrepreneurship. To be successful, entrepreneurs must generate valuable ideas for new goods or services that will appeal to some identifiable market, and having identified those potential opportunities, they must figure out how to bring the project to fruition. Depending on the need for capital to develop the new venture, entrepreneurs may even need to craft ideas for how to convince others of the value of the project. Because novelty and usefulness are the hallmarks of creative ideas, it is not surprising that the possible connections between creativity and entrepreneurship have been of interest for some time (e.g., Gilad, 1984; Whiting, 1988).

Entrepreneurship research considers the interactions between individuals, processes, and institutions in the emergence of new organizations, and organizational forms that engender wealth creation. The combination of creativity and innovation embedded in the entrepreneurial process is fundamental to the discovery and establishment of new ways of organizing, new production processes, and new institutional forms. Creativity is broadly defined as the cognitive process by which individuals discover new patterns in familiar ideas, routines, and mental models. Innovation is broadly defined as the organizational process by which ideas are turned into economically valuable products and services. Innovation and creativity are seen as the tools for the creation of new firms, and the revitalization of state owned enterprises (Drucker, 1985).

Creativity is an essential component of continuous innovation. The results of communication, idealization of new products and problem solving are proportional to the efforts to do them creatively (Johnson, 2001). Brennan & Dooley (2005) state that

“continuous innovation means that organisations need to be able to effectively manage their creative processes to ensure their innovation process has a plentiful supply of good ideas and solutions”.

Thus, creativity and innovation are intimately correlated and often used interchangeably (Brennan & Dooley, 2005; McAdams and McClelland, 2002; Martins & Terblanche, 2003). Yet, they are not the same. In a simple way, we can say that creativity is related with the generation of totally new ideas or with the combination of existing ideas in order to provide solutions to new problems or new solutions to old problems. Innovation implies the transformation of new ideas into new products or services with commercial value. In this sense, innovation is the implementation of creativity results or the practical application of new ideas. Therefore creativity is part of the innovation process, being particularly relevant in the idea generation phases (Alves et al, 2005).

One can argue that the management of organisational creativity has become a corporate priority, as innovation and New Product Development (NPD) processes are highly dependent upon the stock of good ideas and problem solutions. Creative processes do result sometimes from individual efforts, but they seem to be strongly stimulated in groups of people working together. The mental models of individuals are challenged by multidisciplinary group initiatives (Nonaka and Takeuchi, 1995) and higher and more “radical” ideas may occur (Malerba, 2002). In fact, innovation and particularly new product developments (NPD) are complex processes, typically dependent on group efforts and, consequently, usually based on teamwork (Clark and Fujimoto, 1991). Team creativity is therefore critical to innovation performance.

Drucker (1985) argued that innovation is the tool of entrepreneurship. In addition, both innovation and entrepreneurship demand creativity. Creativity is a process by which a symbolic domain in the culture is changed. New songs, new ideas, new machines are what creativity is about (Mihaly, 1997). Creativity is the ability to make or otherwise bring into existences something new, whether a new solution to a problem, a new method or device, or a new artistic object or form. Wyckoff (1991) defines creativity as new and useful act of seeing things that everyone around us sees while making connections that no one else has made.

Innovation and entrepreneurship have attracted increasing interest in recent year among business leaders and economic development officials because creative business development is viewed as the answer to unprecedented competitive challenges in today's commoditized global economy. The dynamics of the old economy, rather than advance along familiar paths, have dramatically shifted across many dimensions to create a fundamentally new economy. Physical assets and scale of both markets and productive capabilities drove success in the slower moving, more geographically isolated economies of the 20th century. Today, however, market economies predominate globally, money and goods move freely around the world, and the Internet allows almost anyone access to information anywhere essentially for "free." In this environment, collaboration, flexibility, and innovation become much more important than physical assets and scale (Wyckoff, 1991).

Creativity is therefore considered a very crucial component of the production process as all that is manufactured and availed in the market must have been an idea before it was commercialised so that it becomes an innovation. However, considering that not all prospective employers would be willing to consider the ideas raised by the

employees, it becomes impossible for them to cope with the ever changing technological environment. But there is need to develop students who would be graduates with creative abilities such that given the opportunity they exploit the chance to give their input when called upon to do so. With creativity there is bound to be change in the way things are done at each stage even in the production process.

2.4 Factors affecting creativity and Innovation in SMEs

Drucker (1998) and Markides (2002) say that Strategic innovation can occur when a company identifies gaps in the industry positioning map and decides to fill them. Gaps refer to new emerging customer segments that other competitors have neglected; new emerging customer needs or existing customer needs not served well by other competitors; and new ways of producing, delivering, or distributing existing or new products or services to existing or new customer segments. Gaps appear for a number of reasons, such as changing consumer tastes and preferences, changing technologies, changing policies, and so on. Gaps can be created by external changes or proactively by the company (Markides, 2002).

Prior research has identified a variety of factors which potentially prevent or facilitate innovation. Factors typically preventing innovation include manager's risk-averse attitude toward change and difficulties with access to complementary assets (Delmas, 2002). Path dependency and a firm's inability to acquire knowledge have also been recognised as characteristics of a company unable to innovate (Cohen & Levinthal, 1990). A strong ability to exploit external knowledge is considered a facilitative factor of innovation in organisations as is the desire to learn by interacting (Cohen & Levinthal 1990, Lundvall 1992). According to Drucker (1985), creativity, imagination

and a generally open attitude towards change also contribute to an innovative environment.

Wright et al. (2005) suggest that the hostility of the environment influences innovativeness. Firms operating in highly competitive (hostile) markets are likely to be more successful innovators by increasing the number of new product introductions through incremental innovation in order to meet customer needs. The study suggests that the resources of firms embedded in highly competitive markets would be better spent on incremental innovations rather than radical ones because of the cut-throat nature of the environment. In contrast, Khan and Mattapichetwattana (1989) found that environmental hostility lessened SME innovativeness.

Few of the available SME studies focus on U.S. firms, and it is likely that countries differ significantly in institutional factors (e.g., government subsidies and support to SMEs) that will affect their approach and interest in innovation (Siu et al, 2006). Government plays a much more prominent role in the economies of most European and Asian countries.

The type of customers that SMEs serve also influences the type of innovation they undertake. SMEs that sell consumer products generally serve a larger number of customers directly or through distributors than do SMEs that sell products or services directly to other businesses. They also must devote more time and attention to market research and advertising and generally have more difficulty getting timely and accurate feedback from their customers. SMEs that sell products to other firms, such as equipment, components, or instrumentation, generally have fewer customers than those that sell consumer products. Pavitt (1984) referred to such firms as specialized equipment suppliers. Their customers tend to be large, scale-intensive firms in

industries such as food, metal manufacturing, shipbuilding, automobiles, glass and cement. Poor operating performance, especially downtime, is very costly for them. Thus, they may be receptive to outsourcing their in-house technical services, if convinced that a supplier can do a better job, and thereby allow them to concentrate on their core competencies (Quinn et al., 1990). In contrast, their SME suppliers are not scale intensive, but rely on firm-specific technical skills in design and manufacturing that they deploy quickly to meet their customers' needs. Small customers are candidates for services too.

Ashton et al. (2003) advises SMEs to consider segmenting their markets to identify small customers that lack the technical resources needed to effectively install, use, or maintain operations that are essential to their business. Also, high-end specialty customers may value the SMEs services more than low-end customers. SMEs can introduce process innovation to enhance the capability of their production processes or their supply chain operations (e.g., increase reliability or reduce cost). These innovations are developed for their own use; in-house engineering is used to customize them to suit specific applications. SMEs also can introduce product innovations into existing or new markets.

Product innovation can include the introduction of new functions, enhanced performance, or added features to existing products. Innovation of this type is generally incremental. The underlying technology can be new to the firm, but is unlikely to be "new to the world". Radical innovations are relatively rare events, of course, and enhance product performance significantly or even create new product categories or industries.

Innovative technology can be “pushed” by technical staff or “pulled” by customers. In the former case, products may differ significantly from the firm’s or its competitors’ existing products (Salavou, 2005). There is the risk that technical staff will push too far ahead of customers and lead to a product failure. Products with “pushed” technology may require customers to change behaviour or perception significantly before they are accepted and used. In the case of technology “pull”, “lead-users” can be a significant source of innovative ideas (von Hippel, 1988). Lead-users are firms or individuals that are on the very edge of the target market.

They are generally very highly-specialized and sophisticated, requiring different innovations than the average customer. In fact, lead-users are so advanced that they often modify existing or develop new products to meet their own needs. Thus, they can work collaboratively with the firm’s technical staff to fix shortcomings of existing products and to design new products to meet their needs (von Hippel et al, 1999). However, caution should be taken when using input from customers as they can only suggest innovative ideas from what they’ve experienced. It is more important for firms to ask customers what outcomes they value instead of just looking for solutions (Ulwick, 2002). In addition, taking ideas from lead-users can be dangerous as lead users are often a step above common users and may suggest ideas that are only considered valuable to those in lead-markets, thus making them harder to sell to common users.

Marketing innovation includes the use of new channels of distribution and new advertising approaches for selling current or new products. SMEs can expand their revenues by selling their current products in new regional or international markets or by expanding their existing product lines into new segments of existing markets

(Branzei and Vertinsky, 2006). This kind of innovation, “application innovation” involves applying existing technology for new uses in new markets (Moore, 2004).

The managers of various organisations who are not able accommodate the views of the employees who could be having good and new ideas which could lead the necessary change in the organisation may not be able to cope with the first changing work environment.

Generally speaking, there is need for enterprises to get know their clientele so that whatever idea that is brought forward by the various stakeholders are easily taken into consideration as this will influence the performance of the enterprises. If a new idea is put forward by the concerned persons then there is need to scrutinise it to see to it that if it can be commercialised(innovation) then that should be the case as this will ensure the organisation is able to compete with others in the industry. The graduates who are off-loaded to the market are expected to assists the respective enterprises where they could be employed so that their organisations could be as competitive as possible. This therefore calls for creativity which is expected of our graduates who once they are produced into the market from the universities are expected to be the agents of change. "Creativity is a crucial component of our capacity to innovate. And innovation is a key factor not just to become more competitive but also to improve our quality of life and the sustainability of our development.

2.5 Creativity and education

Contemporary society is characterised by rapid and complex change processes encompassing all spheres of life. Creativity has been identified both as a key factor for adequately addressing the challenges caused by these changes as well as a major

driving force towards knowledge creation and social and economic advancement through the development of a knowledge society.

2.5.1 Key themes in defining creativity

The development of different perspectives in describing creativity has been traced, from the concerns of the 1950s to 1970s in areas of personality, cognition and the stimulation of creativity in individuals, to the awareness in the 1980s and 1990s of the influence of environments and social contexts on the creativity of individuals, groups and organizations (Rhyammar and Brolin 1999). Cropley (2001) reviews a range of attempts to classify creativity: from Guilford's address to the American Psychological Association in 1949 in which he called for attention to 'divergent' thinking in human psychology, to the imperative to consider the role of creativity in successful technological and economic ventures after the shock to the US of Sputnick in 1957. He identified common elements to the variety of discussions of creativity – novelty, effectiveness and ethicality - and focuses his approach to creativity on people demonstrating characteristics and interacting with others in environments congenial to creativity. Jeffrey and Craft (2001) argue that thinking about the concept of creativity has changed in recent years and suggest that current creativity discourse also encompasses: operating in the economic and political field ,acting as a possible vehicle for individual empowerment in institutions and organizations and being used to develop effective learning'.

There have been several recent reviews of the literature which help to describe and theorise understandings of the nature of creativity (Yeoman's 1996; Dust 1999; Rhyammar and Brolin 1999; Sternberg 1999; Beattie 2000; Craft 2000; Edwards 2000 - 2001; Cropley 2001). Dust's review (1999) draws upon the work of a number of

researchers such as Barron, Gardner and Csikszentmihalyi to discuss the processes and levels of creativity, the characteristics of creative individuals and the role played by the domain of endeavour and the wider society. The review addresses the stated aims of the National Endowment for Science, Technology and the Arts (NESTA), making recommendations for achieving the objectives of exploration, exploitation and explanation in order to fulfil the main aim to promote talent, innovation and creativity in the fields of science, technology and the arts. Craft reminds us that much of the work cited in the literatures has been undertaken in the US, UK and Europe and the debate need to acknowledge the possibilities of 'cultural saturation' in western concepts of creativity which might limit our understandings of creativity in other cultures (Craft, 2000).

A key issue in discussing and defining creativity is whether the focus is upon exceptional creative individuals, such as Albert Einstein or Charlie Parker, who shift paradigms in society's ways of knowing, or upon all individuals and their potential for self-actualisation through 'little c creativity' or 'possibility thinking' supporting people in making choices in everyday life (Craft 2000). It is this broader view of promoting creativity in all individuals which underpins this discussion.

2.5.2 Creativity in individuals

A useful starting point for considering frameworks for creativity is to consider characteristics in individuals. Examples of personal qualities of creative individuals have been collated by Shallcross (1981) and described as: openness to experience; independence; self-confidence; willingness to take risk; sense of humour or playfulness; enjoyment of experimentation; sensitivity; lack of a feeling of being threatened; personal courage; unconventionality; flexibility; preference for

complexity; goal orientation; internal control; originality; self-reliance; persistence (cited in Craft, 2000).

Another perspective on the personal qualities of creative individuals is described in Sternberg and Lubart's 'confluence model', in which six resources converge: intellectual abilities; knowledge; styles of thinking; personality; motivation and environment (Sternberg and Lubart 1999). Gardner presents a pluralist theory of mind which recognises multiple intelligences in individuals (Gardner 1983; Gardner 1996). Csikszentmihalyi identifies a common characteristic of creative people as 'flow' – the automatic, effortless, yet highly focused state of consciousness when engaged in activities, often painful, risky or difficult, which stretch a person's capacity whilst involving an element of novelty or discovery (Csikszentmihalyi 1996). He elaborates the description of this characteristic in identifying nine elements which such activity provides: clear goals, immediate feedback, balance between challenges and skills, merging of action and awareness ,elimination of distractions ,lack of fear of failure ,lack of self-consciousness, distortion of sense of time and autotelic activity (enjoyment for its own sake).

Individual states of intuition, rumination, reverie, even boredom play a role in creativity and problem-solving, and some studies indicate how creativity is enhanced in a state of reverie and imagery (Claxton, 2000).

Such states are not just 'letting it flow' or 'leaving it to luck', but acknowledging a way of knowing which is not necessarily conscious and draws upon resources of knowledge, skill and experience in order to make new combinations, explorations and transformations (Boden 2001).

2.5.3 Creativity in Subjects

A different conceptual framework for describing creativity acknowledges the influence of a range of researchers in the field, yet presents a holistic view of people, processes and domains. Craft (2000) asserts that creativity involves people having agency over their environment, being able to make and act upon choices to be creative and inventive. People can adapt to existing problems and find ways of getting round them, or innovate and do things differently. Creativity involves being in relationship with oneself, other people and with subject domains, and such relationships can also be reflected in the need for an audience and feedback for the outcomes of creative activity. She also includes discussion of people's multiple facets of mind or intelligences, including unconscious intelligence and 'flow' as well as essentialist personality factors. The description of creative processes in Craft's framework identifies the impulse or source of creativity which feeds the unconscious, intuitive, spiritual and emotional levels, which in turn support levels of imagination, problem-solving and divergent thinking. Being able to take risks is the next level in which the person engages in the 'creativity cycle' of preparation, letting go, germination, assimilation, completion and preparation (Craft, 2000).

These processes express, shape and encourage creativity as an approach to life. Domains are suggested in her framework as a way of describing ways of knowing beyond rigid subject d c, and open up the consideration of creativity in all areas of knowledge, not just the traditional 'arts' or 'creative subjects'. The term 'creative subjects' refers to curriculum areas broadly corresponding to Bell's framework for 'Education through the Arts' (Bell 2000,):visual and performing arts, minimally music/art/drama including dance ,designing and making, minimally three dimensional

design including crafts, technology and the built environment and written arts, minimally poetry-making, creative writing and more broadly the literary arts including story-telling.

Such a conceptualisation of creativity highlights the interactions of personal qualities and creative processes within subject domains and areas of the curriculum. Beattie (2000) cites Fishkin's use of the term 'germinal creativity' to describe young people's creative potential as they develop their knowledge and understanding of particular domains (Fishkin, 1998).

2.6 The effectiveness of teaching creativity and its measurement

Creativity is increasingly gaining recognition as a human characteristic that can and should be developed through education. It is viewed as important not only for personal development and fulfilment, but also for its contribution to economic growth. Measuring of teaching of creativity's effectiveness is so important because the evidence produced is used for major decisions about the future in academe. There are two types of decisions: formative, which uses the evidence to improve and shape the quality of our teaching, and summative, which uses the evidence to "sum up" our overall performance or status to decide about our annual merit pay, promotion, and tenure. The former involves decisions to improve teaching; the latter consists of personnel decisions. As faculty, we make formative decisions to plan and revise our teaching semester after semester. Summative decisions are final and they are rendered by administrators or colleagues at different points in time to determine whether we have a future. These decisions have an impact on the quality of our professional life. The various sources of evidence for teaching effectiveness may be employed for either formative or summative decisions or both.

There are national standards for how teaching effectiveness or performance should be measured—the Standards for Educational and Psychological Testing (AERA, APA, & NCME Joint Committee on Standards, 1999). They can guide the development of the measurement tools, the technical analysis of the results, and the reporting and interpretation of the evidence for decision making. The Standards address WHAT is measured and then HOW to measure it: WHAT – The content of any tool, such as a student or peer rating scale, requires a thorough and explicit definition of the knowledge, skills, and abilities (KSAs), and other characteristics and behaviours that describe the job of "effective teaching? HOW – The data from a rating scale or other tool that is based on the systematic collection of opinions or decisions by raters, observers, or judges hinge on their expertise, qualifications, and experience. Student and peer direct observations of WHAT they see in the classroom furnish the foundation for their ratings. However, other sources, such as student outcome data and publications on innovative teaching strategies, are indirect, from which teaching effectiveness is inferred. These different data sources vary considerably in how they measure the WHAT. We need to be able to carefully discriminate among all available sources.

There are twelve potential sources of evidence of teaching effectiveness which include; student ratings, peer ratings, self-evaluation, videos, student interviews, alumni ratings, employer ratings, administrator ratings, teaching scholarship, teaching awards, learning outcome measures, and teaching portfolio. The mere mention of faculty evaluation to many college professors conjures up mental images of the "shower scene" from Psycho. They're thinking: "Why not just whack me now, rather than wait to see those student ratings again." Student ratings have become synonymous with faculty evaluation in the United States (Seldin, 1999).

In the majority of marketing management positions today, creativity is an important attribute (Slater, 1995). The most important reason for this may be that firms have discovered that creativity is a critical factor in determining company success or failure (Bhatt, 2002).In turn, creativity denotes a capability which is marked by sensitivity to problems, originality, ingenuity, usefulness and appropriateness of thought patterns, and unusual responses to stimuli (Johnson, 1972).Industry is in need of individuals who are able to conjure novel ideas for new products, advertising campaigns, packages, training programs, competitive strategies and tactics, and enumerable other elements (Gilbert & Bower, 2002). In an increasingly volatile environment, companies require a steady stream of new conceptions, in order to survive and prosper (Hogg, 1989).

This research examines the effectiveness of four redefining methods in a university setting. All of these involve group effort. This appears to be in accordance with experience in industry where much of the current effort involves networks of creative people collaborating in the steps from developing new ideas to introducing the finished product, in contrast to the idea of the lone scientist or entrepreneur or divine inspiration producing useful ideas (Cushing & Gates, 2002).

A number of companies have employed creativity training techniques (Brown & Hyer, 2002; Arild-Johannessen, Olsen, & Olaisen, 1997). These are extensive in number and only a sample is examined here. Many do not look at all like rational management, in that they appear to be counterintuitive and may seem strange, but many companies are using them with great results (Sutton, 2001; Livingstone, Palich & Carini, 2002).

In Japan a widely-used methodology is to group manufacturing, sales, and marketing employees for new product development. The members of the group deliver their ideas

to a creativity circle, where they are analysed by the members. One variation is the "Lotus Blossom “technique, where a moderator writes a central theme in the centre of a lotus blossom diagram and group members are encouraged to think of related ideas or applications of the idea (Tatsuno, 1990). Experience to date suggests that industry training programs can be effective in nurturing creativity (Wang & Horng, 2002; Kuriloff & Hemphill, 1988; McAdam & McClelland, 2002). A number of Fortune 500 firms have implemented creativity training programs centred on the notion that virtually any employee has the ability to think innovatively (Schwartz & Nandhakumar, 2002). Executives in these companies generally appear to be satisfied with the programs (Hills, 2002; Olivero, 1990). Further, training in creativity has been shown to be of value to expatriate managers operating in foreign countries (Harvey & Novicevic, 2002). A number of authorities report that the best-managed firms in the United States are capable of taking advantage of employee creativity and nurturing their ideas. (Mitchell, 1989; Wagner & Hayashi, 1994)

One report on academic endeavour outlines computer-aided modifications for introducing the principles of creative problem-solving skills in an established project for a Master of Business Administration program (Rickards, 1987). Students were able to overcome the complexities of the new technology, and it was possible to offer a large amount of interaction, monitoring, and feedback with each project group. Evidence was uncovered for the enhancement of the principles of creative problem solving associated with innovation in new technology.

2.7 Factors that influence teaching of creativity at the university level

The researcher investigated the following factors but these are not exhaustive and they include aptitude, faculty members, teaching facilities, academic programmes and the teaching methods.

2.7.1 The place of Aptitude in creativity learning at the university level

The empirical study of creativity has long been dominated by an emphasis on the individual different variables that contribute to high levels of creative performance. Implicit in much of this work has been a focus on the internal determinants of creativity, to the exclusion of external factors such as the environmental circumstances conducive to creativity. Researchers interested in the psychology of creativity have typically chosen to decontextualize the creative process. Yet creativity does not come about in a vacuum. A large number of investigations carried out by social psychologists over the past two and one half decades have now established that there is a direct link between the motivational orientation brought by an individual to a task and the likelihood of creativity of performance on that task. And we now understand that the environment plays a large part in determining that motivational orientation.

As described by Renzulli (1986), the standard approach to the study of gifted persons has also generally reflected the notion that giftedness is a condition somehow magically bestowed. Recently, however, some researchers have advanced the argument that it makes more sense to shift the emphasis from being gifted to the question of how to develop gifted behaviors in children in the classroom (e.g., Feldhusen, 1995; Houtz, 2003; Renzulli 1986, 1999, 2002; Sternberg, 1998, 2000; Torrance & Sisk, 1997; Treffinger, 1988; Treffinger, Isaksen, & Dorval, 1996; Treffinger, Young, Nassab, & Wittig, 2003). Social psychologists working to specify the environmental conditions

most conducive to creativity have much in common with investigators whose goal it is to help foster gifted behaviors in children. The two fields have much to offer one another and it is high time that a systematic exchange of theories, models, research findings, and practical applications take place.

(i) Renzulli's three-Ring Model

Historically, definitions and assessments of giftedness have been directly linked to tests of intelligence, most especially the Intelligence Quotient scores (Renzulli, 1986). There is growing concern that the prevailing conceptions of giftedness (and, as a result, our measurement techniques) are far too narrow. Renzulli (1986), for example, proposes that, at the very least, we must recognize two distinct categories of giftedness: schoolhouse giftedness and creative-productive giftedness (Renzulli, Smith, & Reis, 1982). Both types, he argues, are important and the two categories often interact. But it is not unusual for children (and persons of all ages) to demonstrate unevenness" in their giftedness profile—with their strengths in one of the two areas far outweighing their abilities in the other.

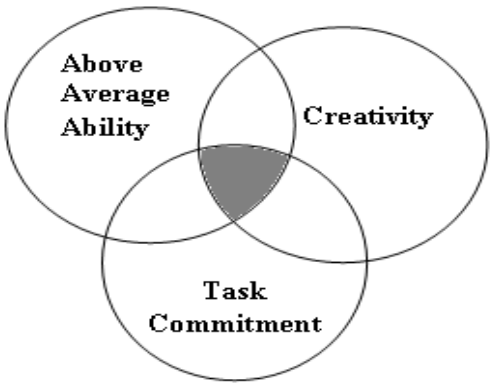
What Renzulli terms "schoolhouse giftedness" might also be thought of as test-taking or lesson-learning giftedness. This form of giftedness is fairly well served by standard Intelligence Quotient (IQ) and other indices of cognitive ability. And because schoolhouse giftedness is relatively easy to recognize and test, it is high scores in this realm that is most often lead to students being identified as gifted and invited to participate in special programs. The hallmarks of what Renzulli terms creative-productive giftedness are often more difficult to recognize in students. Creative-productive giftedness results in the production of original material and tangible products that are intended to be shared with and to impact others (Renzulli, 2002).

Research shows that this second type of giftedness is not all that closely tied to intelligence and traditional tests of Intelligence Quotient. While it is true that persons with relatively low levels of intelligence exhibit almost uniformly low levels of creativity, there is great variability in the creativity of individuals earning average to well-above-average intelligence scores. Simply stated, the IQ-creativity correlation is quite low (Stein, 1968; Wallach, 1971) and creative-productive giftedness is far too complex, far too multi-faceted, to be captured by a numerical score on a test of intelligence, aptitude, or achievement.

This recognition that creative-productive giftedness cannot always be quantified with a test score calls for a shift of emphasis among educators toward an exploration of "potential giftedness" and the concomitant question of how such potential might best be fostered. In psychological terms, the focus of attention must move away from an emphasis on giftedness as a stable *trait* toward an understanding that creative-productive giftedness may, in many respects, be better conceptualized as a situation-specific state. Creative-productive giftedness can be nurtured if conditions are right for an appropriate interaction to take place between the gifted student and the environment (Renzulli, 1986). But what are the conditions under which giftedness is most likely to blossom?

While no single criterion has been found to determine creative-productive giftedness, individuals who have achieved recognition because of their outstanding accomplishments and creative breakthroughs tend to possess a fairly well-defined set of three traits (Renzulli, 1986):

Figure 2.1: Renzulli's three ring Model



Source: (Renzulli, 1986)

Above average, although not necessarily superior, ability; task commitment, and creativity. Importantly, no one component of this three-part model can, on its own, make for high levels of accomplishment. Rather, it is the interaction between the three clusters that leads to creative-productive giftedness.

In the process of developing this model, Renzulli and colleagues conducted a large number of research studies that focused on various aspects of this three-part conceptualization and these findings have been summarized in a variety of venues (Renzulli, 1998, Renzulli & Reis, 1994). Work done by Winner (2000) and Gallagher (1990) reveals the intense drive and unusually high levels of intrinsic motivation often demonstrated by gifted children and there are a number of important parallels between Renzulli's theory and the biographical and autobiographical accounts of the lives and creative breakthroughs of eminent individuals representing a variety of fields (e.g., Bloom, 1985; Csikszentmihalyi, 1997; Gardner, 1993; Gruber, 1981; Renzulli, 2002). Across history, high levels of intelligence or especially developed skills in one or more areas have often not, in and of themselves, been sufficient for product-based creativity to flourish (Winner, 2000). The capacity for creative thinking coupled with a single-

minded determination to persevere until a solution is reached is also necessary ingredients (Amabile, 1996).

Renzulli presents compelling evidence to support this three-part model, yet absent from his writing is any mention of the empirical research spearheaded by social psychologist Teresa Amabile. While other researchers and theorists interested in gifted populations (e.g., Treffinger, Isaksen, and Feldhusen) have occasionally referenced studies carried out by Amabile and colleagues, very few attempts have been made to directly integrate this work that comes from the mainstream social psychological literature with research that specifically targets gifted students. By the same token, Amabile and her collaborators, have for 25 years or more been publishing findings that speak directly to models of creative production among gifted children, yet they too have failed to make the connection. It would appear that these two longstanding programs of research have evolved completely separately of one another. A melding of the two perspectives is long overdue.

(ii) Amabile's Creative Intersection

Like Renzulli, Amabile too offers a three-part model—this time focused specifically on the antecedents of creative performance. Amabile and colleagues (Amabile, 1996; Hennessey, 2003; Hennessey & Amabile, 1988) have long argued that it is a mistake to stop at the individual level of analysis: the person doing the creating. This work emphasizes the fact that the confluence of a variety of environmental and person variables are necessary for creativity. More formally, this research is built on a three-part conceptualization of creative performance. For a creative solution to be found or a creative idea or product generated, an individual must approach a problem with the appropriate domain skills (background knowledge), creativity skills (willingness to

take risks, experiment, etc.) and task motivation. Under ideal circumstances, the coming together of these three factors forms what Amabile (1997) terms the "creative intersection."

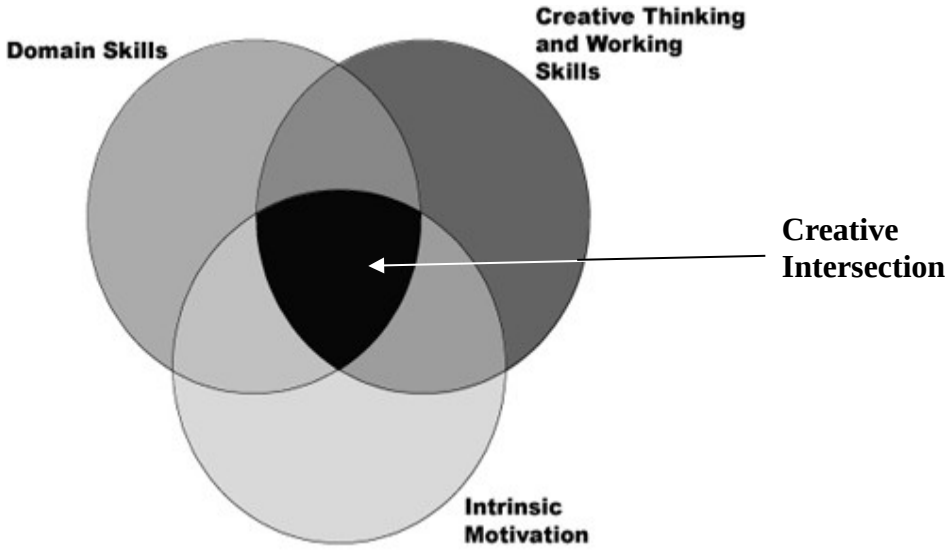


Figure 2.2: Amabile's creative intersection

Source: (Amabile, 1997)

While it is certainly possible to teach (and learn) domain skills and perhaps even creativity skills, motivational orientation is much more ephemeral. Motivational state is highly variable and largely situation-dependent. It is on this question of how the environment helps to shape motivational orientation that Amabile and colleagues have focused their attention. In this research and theorizing, the distinction is made between two types of motivation. Intrinsic motivation is the motivation to do something for its own sake, for the sheer pleasure and enjoyment of the task itself. Extrinsic motivation, on the other hand, is the motivation to do something for some external goal.

Given their obvious talents and intellectual superiority early in life, surprisingly few gifted children grow up to be creative adults (Winner, 1996). The issue here is the fact

that while much of the research and theorizing that has been done on creativity and the gifted has concentrated on the role played by these children's academic superiority in the creative process, a high level of intelligence is but one of the necessary ingredients for creative performance.

Researchers have tended to investigate only the largely innate, or at least largely immutable, differences between creative and uncreative or gifted and less academically talented students. The Creative Intersection Model presented here (Amabile, 1997), on the other hand, focuses on "creative situations"—the particular social and environmental conditions that can positively or negatively impact the creativity of most individuals.

How might the gifted child be characterized according to the intersection model? Hunsaker and Callahan (1995) report that the majority of schools have adopted definitions of and criteria for giftedness that include creativity; and it might seem reasonable to expect that where creative behaviour is concerned, gifted children can be expected to fare particularly well. Yet the overwhelming majority of students identified as gifted have earned that designation because of above average general ability and knowledge (what Amabile terms domain-relevant skills). Importantly, over 25 years of empirical research tells us that no amount of domain-relevant (or even creativity-relevant skills) can compensate for a lack of intrinsic motivation to perform an activity. Task motivation makes the difference between what an individual can and will do (Amabile, 1983). It is task motivation that determines whether domain skills and creativity skills will be adequately and efficiently tapped in the service of creative performance.

While some research has revealed that intellectually gifted children can display strong levels of intrinsic motivation (Gallagher, 1990; Winner, 2000), educators must be careful not to take this tendency for granted. As reported earlier, studies show that gifted children often struggle with motivation in the classroom (Reis & McCoach, 2000). Teachers of the gifted must remember that their students' advanced intellectual capacities and problem solving skills will often not be enough to ensure that creativity will flourish within the classroom. It is essential to also consider students' motivation and to conceptualize their motivational orientation as both a relatively enduring trait and as a temporary situation-specific state. Intrinsic motivation is almost delicate and often fleeting entity. Even especially gifted students, who may be generally more highly intrinsically motivated toward what they do, can quickly fall prey to outside influences. Intrinsic motivation cannot be taught. It cannot be coerced, but it is easily squelched. Intrinsic interest must come from within the individual and some classroom environments are much more conducive to this happening than are others(Reis & McCoach, 2000).

In their present form, the majority of American classrooms, from pre-schools through high schools and colleges, are fraught with killers of intrinsic interest and creativity. Nowhere is this situation direr than in the gifted and talented classroom or "pull-out" program where the promotion of students' intrinsic motivation and creativity of performance must be top priority. Modifications of curriculum or materials, modules aimed at creativity enhancement or lessons in techniques for brainstorming or "thinking outside the box" are not enough. Administrators, teachers, parents, and students must work together to change both individual classroom environments and the overall climate of their educational institutions. If gifted students are to be helped

to find their creative intersection, significant and fundamental changes must be made to the way that educators think about teaching and learning (Winner, 2000).

Towards this end, a few researchers in the area of gifted and talented education have, in recent years, turned their attention to programs that can be individualized to meet a particular child's interests and needs. Rather than singling out only a few students who might demonstrate exceptional ability in one or more narrowly-defined, traditional subject areas, this alternative approach recognizes student strengths and talents along a wide variety of dimensions. Treffinger's (1986) individualized model or Feldhusen's (1992, 1995) program for talent identification and development are two primary examples of programs that strive to help students to reach higher levels of accomplishment and productivity, at their own pace and in their own way.

The actions suggested are based on 30 years of empirical data gathered by social psychologists interested in promoting intrinsic motivation and creativity in the classroom (for extensive reviews of the literature, Hennessey, 2003; Hennessey & Amabile, 1988). While many of the earlier investigations in this genre tended to target White, middle-class, suburban school students, there is a growing body of evidence to indicate that all children, both gifted and more typically developing, can benefit from these changes. And, in fact, the intrinsic motivation and creativity of economically disadvantaged children and culturally different students have been shown to be particularly vulnerable to classroom environmental factors (Lopez, 2003; Lopez, Esquivel, & Houtz, 1993). None of these suggested reforms necessitate large budgets or a major reallocation of funds. Instead, what is needed is a deep commitment to change and a willingness on the part of the entire educational community to band

together to make the school environment conducive to the development of intrinsic motivation and creativity.

Dearborn (1921) avers that educators should recognize, appreciate, and encourage different styles of creativity. Gerard Puccio (1995) describes the advantages and disadvantages of two styles of creative people (functioning primarily as adaptors who focus on improving an existing situation, and innovators who develop and advocate new solutions): "Instead of valuing one style, an organization should respect and value the adaptive and innovative styles of creativity. Individuals within an organization can work more effectively together by capitalizing on each other's' strengths, rather than punishing each other because of individual differences. If an atmosphere of openness and trust prevails in the organization, then the adaptors and innovators will be able to join their creative talents to propel the organization to success. Individuals will manifest their creativity in different ways, and both styles of creativity are valuable."

(iii) Overall pedagogic criteria approaches.

Traditionally, giftedness has been equated with a high Intelligent Quotient (IQ) score, simple quantitative index or cut-off point. In the late 1960s, concern about artistic excellence, creativity and specific academic aptitude emerged. By the 1980s, increased interest in the affective domain, multiple intelligences and talent development further broadened the conception. Society's view of human talents and abilities has broadened considerably in the last three decades (Treffinger & Sortore, 1992).

Gagné (1995) identifies four aptitude domains representing giftedness: intellectual, creative, socio-affective and sensorimotor; and as many fields of talent as there are fields of human activity; e.g., academics, trades and craft, technology, arts, social action, business, athletics and sports. Catalysts (positive or negative impact) for talent

development include: motivation, temperament/personality and environmental factors (surroundings, persons, understanding, events).

Chinese people rely on metaphor and descriptive characterisation to understand aptitude. Ancient Chinese scholars accepted intelligence as an attribute with which we are born and an original gift from heaven and the concept of “heaven is often included in terms for intelligence: *tiancai* (..), *tianzi* (..), and *tianfu* (..), translated as ‘ability emanating from heaven’, ‘resource coming from heaven’, and ‘endowment bestowed upon us by heaven’” (Chan, 1996). Chan’s description is similar to the meaning of words “gifted” and “innate” because they are given by heaven. However, traditional Chinese learning success doesn’t seems to support this.

Negative responses towards “aptitude” are obvious in the Chinese context, dating back to Wang Anshi’s work of “*Shang Zhong Yong*” in the Song Dynasty. The story tells of an intelligent child named *Shang Zhong Yong*, who when he was young showed much aptitude for reading and memorization abilities, but years later he was found to be no different from other people. Recently, negative responses from the mass media also reinforce the idea that children with “aptitude” should use the same road as the common people so as to build up their own character on the way to learning success. The aforesaid media has traced many “young and intelligent” university students for the past decade in China and found that these young “aptitudes” haven’t had much or any success at all. The failures of both “*Shang Zhong Yong”* and the “young and intelligent” university students suggest that “aptitude” is not emphasized in a Chinese educational context. Consequently, intelligent tests are rarely encouraged in schools (Chan, 1996).

There always will be individuals who have greater aptitude, experience greater environmental supports, and employ more effective strategies thereby leading to longer lasting and more influential creative contributions. However, just because someone's creative contribution is not revolutionary doesn't mean it is not creative. Indeed, the novel and useful efforts of normal, everyday people are still, by definition, creative. This level of creativity, called "pedestrian or everyday creativity" (Plucker and Beghetto 2004), is important and representative of what often is hoped for in school settings. Students are expected to be able and willing to solve problems, create products, and contribute ideas that are novel and useful in any given situation.

Unfortunately, few teachers reward creativity in their classrooms (Fasko 2001). This is somewhat understandable, because students' creative expression can be challenging for teachers and may even be perceived as disruptive (Nickerson, 1999). The pressure to cover curriculum, meet standards, and administer assessments may, inadvertently, result in teachers short-circuiting students' creative expression. Even within the constraints of standardized curricula and tests, teachers should make room for creativity. In fact, the most valuable form of creative expression often occurs within the constraints of real-life structures, rules, and standards.

Nickerson (1999) argued that a balanced environment, both demanding and supportive, is necessary for creativity to flourish. Students can be taught how and when to express novel ideas so that they are appropriate and useful within a given context. By recognizing novelty and helping students calibrate that novelty so that it is appropriate and useful, teachers can go a long way in supporting and promoting student creativity.

Assessment feedback provides an ideal opportunity for teachers to encourage students in their risk-taking and the novel expressions of ideas, as well as to share information on how students can improve their ideas or adapt them for a different context.

Student creativity is fostered when teachers minimize the use of assessments in making social comparisons. When students focus on self-improvement, they are more likely to take risks, seek out challenges, and persevere in the face of difficulty (Nickerson 1999; Pintrich and Schunk 2002; Stipek 1998). Conversely, when assessments are used to pit students against one another, there is a greater chance that some students will attribute their performance to factors over which they have little control, e.g., natural ability or luck (Stipek 1998). As a result, students are more likely to give up or, worse yet, not even see the point in trying because they feel they can never be as talented or lucky as those to whom they are being compared.

Taking risks, accepting challenges, believing in one's ability to be successful, and sustaining effort in the face of difficulties are important skills. These will help ensure that students strive to generate novel ideas and to complete and communicate the results of their creative endeavours. When assessments are viewed as sources of self-improvement information, students can focus on "competing against themselves"

(Nickerson 1999) rather than concentrating on the performance of others. The result students will be more likely to develop and contribute ideas that are both novel and useful. Teachers' classroom assessment practices are laden with goal-related messages that influence the motivational beliefs and subsequent achievement behaviour of their students (Ames 1992; Midgley 2002; Pintrich and Schunk 2002; Stipek 1998).

Teachers may try to motivate students by displaying only the best work or by charting student progress on a highly visible chart. By displaying only the best work or by

using charts to make social comparisons, teachers communicate to students that outperforming others, rather than self-improvement, is the reason for engaging in achievement-directed behaviour. This goal message is quite different from the message sent by assessment practices that stress understanding and self-improvement.

Motivational researchers (Midgley 2002) have categorized environments created by teachers' goal-related messages into types: performance goal structures and mastery goal structures. A performance goal structure is represented by goal-related messages that stress the importance of avoiding mistakes, besting others, getting the highest grades, and demonstrating one's ability in relation to others. Assessments in classrooms with a performance goal structure primarily make comparisons among students (e.g., rank students by ability and emphasize who's best, smartest, or most Capable). Empirical evidence suggests that students within such classrooms have an increased likelihood of adopting maladaptive motivational beliefs and engaging in performance avoidant behaviors. These students are more likely to view errors as an indication of a lack of ability, experience high levels of anxiety, exert less effort, place less value on tasks, give up in the face of difficulty, and engage in self-sabotaging behaviors, such as cheating or not seeking help when needed (see Kumar, Gheen, and Kaplan 2002; Pintrich and Schunk 2002; Urdan et al. 2002).

Creative thinking in a way which produces innovative solutions is a capability important for planners at all levels in a variety of contexts. This ability is particularly helpful in dealing with and managing change, which is crucial for the profession, given the constant state of flux in the external environment and within organisations. In an increasingly competitive society, creativity and innovation improve employability and the capability to achieve planning goals. While creativity and

innovation cannot be overtly taught, they can be fostered and encouraged. Creativity is inherently a quality possessed by an individual, but environment and context are key influences in developing or inhibiting it. Initial professional education has a key role in developing thinking habits leading to imaginative solutions. Equally, planners in practice have a role in developing these qualities in themselves and others; managers are in strong positions to lead the way.

Colleges and universities need to take a stronger look at the pedagogical or educational positioning they are currently taking and work to strengthen the student's abilities in communications and problem solving and to make their curriculum more rigorous and measurable. The college graduates of today enter into a world constantly presenting them with problems that do not have simple or unique solutions. Students must be able to work independently and with other people to survive. Individual thinking is a vital part of all creative problem-solving processes and is necessary when solving the complex issues of today. The process of requiring students to engage in creative problem solving, either individually or in groups, can be frustrating as students are not schooled to think innovatively. When students are assigned open-ended problems (problems with more than one solution) requiring creative thinking, they often become frustrated and struggle because they have not had formal training. The foregoing calls for creativity among our graduates from our public universities which the graduates are expected to foster.

2.7.4 Influence of Faculty members (Lecturers) on creativity learning at the university

Nagel (2001) looked at tenure as an important framework condition in encouraging creativity. Without tenure, faculty members might tend to be much cautious and

conservative. That does not mean being conservative ideologically. Universities tend a bit towards the left, especially in social sciences and humanities.

The people who teach at universities, though, tend to be on a lifeline ego trip. They were fawned over as children, as students and now by the students they teach. The 95% who are not heavy book products may consciously or subconsciously resent the 5% who are. As a result, in times of scarce resources, they might seek to lessen the resources that go to the more creative faculty. The justification might be an equalitarian one. It could be based on subjective criteria that relate to teaching or the quality in what is published. The important thing is that creative non-tenured faculty may not get tenure under such circumstances and tenured faculty may find themselves pushed out by unpleasantness (Nagel, 2001).

Bartel (2006) says that teachers are quite often blamed for the diminished inclination to be creative as students become socialised and more intelligent. He says that teachers in every discipline/area need to reflect on what they are doing that tends to foster or hinder the creative critical thinking that is so essential as a survival and success skill in today's world. Creative teachers, whatever they teach, will recognise their own lessons and projects. In the development of cognition, the ability to imagine is among the most advanced of all human traits and therefore, no teacher would want to ignore or squelch the imagination.

Nagel (2001) suggests ways of enhancing academic creativity in the institutions of higher learning through new incentive systems. He said that in order to raise the creativity and productivity of the academic research community, the colleges and universities in developed countries may consider the following suggestions: require all faculty members to submit an annual report indicating articles written or book chapters

written, consulting activities for governments, corporations or other entities that use academic knowledge; papers presented or speeches made at academic conferences; have good facilities on campus in terms of libraries, ICT Workshops, laboratories and secretarial support and make them available without charge; encourage good graduate students to work with faculty members on joining projects, requiring the seminar papers to be publishable either jointly or separately; encourage faculty members to present their creative ideas in classroom when appropriate and encourage obtaining feedback from the students; creative teaching should also be encouraged, reports should ask about new courses and new ways of teaching old courses; ensure that merit bears some correlation to data that is included the annual reports, each departmental head should be required to show a kind of regression, correlation or simple graphic analysis showing the relations; hold regular meetings on how to make the department more productive and more creative, since creativity refers to innovative usefulness or useful innovations; submit articles on creative achievements to the departmental newsletters, the faculty newspapers and professional newsletters; and grant money for business and for hiring research assistants.

Torrance (1987) gives the results of 308 studies of trying to teach children and students creativity. In 70% of these cases the attempts were successful. The education in fact increased the creativity. The success of the teaching depended on a number of factors; the methods used in teaching, what approaches were used etc. The success percent varied from 42 to 92% depending on the approach. Best results were achieved with Creative Problem Solving (CPS) and related methods, but also other approaches gave good results. This study does not only show that it is possible to increase the creativity by education but also shows that not all attempts give the wanted results. If we reverse

the numbers, we find that the chance of not getting an increase vary from 8 to 58%, depending on the approach.

Probably, there exist no "best way" to teach creativity. There are a lot of good ways and some not so good. Good ways to teach creativity depend on the actual culture of the country it is taught in. When teaching creativity in school, we must also take into account the actual school system of that country e.g. what subject are taught at what levels, what methods of education are used etc.

The ways creativity is taught in schools in other countries can give valuable information, and much of the methods and material can also be used successfully in all countries. And this is the problem, what can be used and what cannot be used. And in what way should creativity be taught for this particular country or this particular school (Torrance, 1987).

Bernard Tarn (2006) says that while project work and independent learning programmes can be effective in developing these desirable qualities (i.e. the inherent characteristics in an individual that enables one to learn things easily), the personal role of the university teacher is in the long run the most vital factor. These qualities and abilities are human qualities which cannot really be taught out of a text book. The best project work and independent learning schemes will come to naught if the university teachers involved negate such schemes through their own personal attitudes and mindsets. Whether we like it or not, our students will regard us, by default, as role models by whom they verify the importance of these qualities and abilities.

For example, students are not expected to become independent learners and thinkers if their teachers are always waiting for top-down instructions before they act. Students

become creative and innovative when it is obvious that their own teachers do exhibit any creativity or originality in their teaching or research work.

Conversely, university teachers who are themselves independent and self-reliant workers and thinkers, who are creative and original teachers and researchers, and who can work amicably with all their colleagues for the common good of their students, make superb role models who transmit these values effectively through their personal example. One cannot expect every university teacher to be a perfect role model; however, it is useful for all of us to be aware that the transmission of such qualities can be strengthened or weakened, as the case may be, through our own personal behaviour. Our attitudes and actions are continually on display and speak far more loudly and strongly to our students about these qualities than any formal teaching can ever do.

Linda Jackson and Michael Murray (1997, 1980) looked at a teacher as performer, observing that students applaud instructor enthusiasm as a motivator of learning, and chide professors whose lectures lack humour. Drawing from their own training and experiences and that of the many teachers with whom they have worked on various campuses, they hope to offer fresh insights into the art and science of effective instruction, as well as new designs for more engaging learning experiences.

In education in the United Kingdom, for example, Beetlestone (1999) focused on creativity in the early years' classroom, Woods (1995) and Woods & Jeffrey (1996) explored teacher creativity, and Craft (1996) looked at how to nourish the creative teacher. Beetlestone (1999) documents practical strategies for fostering creativity within the early year's curriculum, using examples from a large variety of early year's contexts. Woods & Jeffrey work through in-depth case studies to document ways in which a small group of teachers operate creatively in the face of a wider context which

arguably suppresses the creativity of the teaching profession. Craft explores in depth the perspectives of eighteen educators involved in a holistic postgraduate course specifically designed to nurture their own creativity. There are, of course, some overlaps in these periods. For example, from the applied education context, Fryer (1996) undertook a large-scale survey of teachers' attitudes towards creativity in their daily professional work.

It should be realized that student's perceptions are important in assessing and evaluating the quality of teaching as they formed the end part of the process whereby a high quality of teaching is expected to transform into a better performance in students. The quality of teaching may be improved, among others, by encouraging the academician to use as many teaching methods in the classroom and by providing training and support to them from time to time. By realizing the factors that affect the level of their teaching quality, the lecturers are expected to make continuous improvement from time to time in order to be a quality educator.

2.7.5 Facilities' role in enhancing creativity teaching at university level

Allwright (1990) argues that materials should teach students to learn and that there should be resource books for ideas and activities for instruction/learning, and that they should give teachers rationales for what they do. From Allwright's point of view, textbooks are too inflexible to be used directly as instructional material. O'Neill (1990), in contrast, argues that materials may be suitable for students' needs, even if they are not designed specifically for them, that textbooks make it possible for students to review and prepare their lessons and that textbooks are efficient in terms of time and money, and that textbooks can and should allow for adaptation and improvisations.

Allwright (1990) emphasizes that materials control learning and teaching. O'Neill (1990) emphasizes those they help learning and teaching. It is true that in many cases teachers and students rely heavily control the content, methods, and procedures of learning. Students learn what is presented in the textbook, and the way the textbook presents material is the way students learn it. The educational philosophy of the textbook will influence the class and the learning process. Therefore, in many cases, materials are the centre of instruction and one of the most important influences on what goes on in the classroom.

Theoretically, experienced teachers can teach without a textbook. However, it is not easy to do it all the time, though they may do it sometimes. Many teachers do not have enough time to make supplementary materials, so they just follow the textbook. Textbooks therefore take on a very important role in language classes, and it is important to select a good textbook.

(i) The Role of Materials in Relation to Other Elements

Since the end of 1970s, there has been a movement to make learners rather than teachers the centre of language learning. According to this approach to teaching, learners are more important than teachers, materials, curriculum, methods, or evaluation. As a matter of fact, curriculum, materials, teaching methods, and evaluation should all be designed for learners and their needs. It is the teacher's responsibility to check to see whether all of the elements of the learning process are working well for learners and to adapt them if they are not.

In other words, learners should be the centre of instruction and learning. The curriculum is a statement of the goals of learning, the methods of learning, etc. The role of teachers is to help learners to learn. Teachers have to follow the curriculum and

provide, make, or choose materials. They may adapt, supplement, and elaborate on those materials and also monitor the progress and needs of the students and finally evaluate students. Materials include textbooks, video and audio tapes, computer software, and visual aids. They influence the content and the procedures of learning. The choice of deductive vs. inductive learning, the role of memorization, the use of creativity and problem solving, production vs. reception, and the order in which materials are presented are all influenced by the materials. Technology, such as Overhead Head Projector (OHP), slides, video and audio tape recorders, video cameras, and computers, supports instruction/learning.

Evaluations (tests, etc.) can be used to assign grades, check learning, give feedback to students, and improve instruction by giving feedback to the teacher. Though students should be the centre of instruction, in many cases, teachers and students rely on materials, and the materials become the centre of instruction. Since many teachers are busy and do not have the time or inclination to prepare extra materials, textbooks and other commercially produced materials are very important in language instruction. Therefore, it is important for teachers to know how to choose the best material for instruction, how to make supplementary materials for the class, and how to adapt materials.

Littlejohn and Windeatt (1989) argue that materials have a hidden curriculum that includes attitudes toward knowledge, attitudes toward teaching and learning, attitudes toward the role and relationship of the teacher and student, and values and attitudes related to gender, society, etc. Materials have an underlying instructional philosophy, approach, method, and content, including both linguistic and cultural information. That is, choices made in writing textbooks are based on beliefs that the writers have about

what language is and how it should be taught. Writers may use a certain approach, for example, the aural-oral approach, and they choose certain activities and select the linguistic and cultural information to be included.

Content of textbooks should be useful, meaningful and interesting for students. While no single subject will be of interest to all students, materials should be chosen based, in part, on what students, in general, are likely to find interesting and motivating.

As a general rule, materials should be slightly higher in their level of difficulty than the students' current level of English proficiency. (Exceptions are usually made for extensive reading and extensive listening materials, which should be easy enough for students to process without much difficulty). Materials at a slightly higher level of difficulty than the students' current level of English proficiency allow them to learn new grammatical structures and vocabulary.

Textbooks should have clear instructional procedure and methods, that is, the teacher and students should be able to understand what is expected in each lesson and for each activity. Textbooks should have support for learning. This can take the form of vocabulary lists, exercises which cover or expand on the content, visual aids, etc. Traditionally, language teaching materials in Japan are made up mostly of text, with few, if any, visual aids. However, with the development of technology, photos, visual materials and audio materials have become very important components of language teaching materials, and they are becoming easier to obtain. Teachers need to learn how to find them, and how to best exploit these characteristics.

Materials are getting more complicated and instructional philosophy, approach, methods, and techniques are getting more important. Teachers need to be able to evaluate materials involving photos, videos, and computers now.

(ii) Ways of learning about materials used in teaching

There are various ways to get information about textbooks and other teaching materials. Many materials are published by publishers and developed and distributed by commercial companies. Thus, publishers are useful (if not entirely unbiased) sources of information and advice about what materials are available and what materials are appropriate for various purposes. Many publishers provide sample copies on request. Bookstores that carry textbooks are another possible source of information. Clerks at such bookstores may help you find the materials you want. In addition, publishers' displays at conferences are useful. They usually have the most recent materials, exhibitors are willing to help you and answer your questions, and in some cases, you will have opportunities to meet and talk with the authors. Colleagues and friends who are teachers are also good sources of recommendations of textbooks and advice about how to best use them. Finally, there is information from computer mailing lists and web pages on the Internet. Lists on language teaching often have discussions on materials, and you can ask questions and may get good feedback. Many publishers have www pages and e-mail addresses, so you can check with them and also ask questions about the materials.

(iii) How to source for materials

In addition to publishers, there are many possible sources of materials. There is a lot of material available on the Internet. You can search for materials when you have free time, and store them for your future classes. Many teachers go abroad during vacations these days, and they can collect materials in English-speaking countries. TV and radio are good sources. They provide a variety of materials. The information is

current and the language is natural, but the content has to be chosen carefully. Newspapers, magazines, advertisements, and other types of printed material are very useful. Teachers can take photos; make video tapes or record audio tapes. If they make plans before they go overseas, they may be able to make good video or audio programs.

Even in your home country, you can browse the World Wide Web (www) and search for useful materials for classes. There are lots of sources of materials and photos on internet. Students are normally taught by dedicated lecturers and Teaching Engineers/assistants with vast experience in teaching to ensure they get the content of the subject matter. Apart from structured formal teaching and learning, students can also use the best suited facilities provided only for students of the School which includes; Mini Library, Discussion rooms, Tutorial rooms and Seminar room and use them for learning purposes. Such facilities will enhance their understanding of the issue at hand being discussed.

2.7.4 Programmes role in enhancing creativity learning at University level

It has been argued that by fostering pupils' creativity in the classroom, they will be helped to identify and establish a framework for their lives (Annarella, 1999). The development of creative skills and attitudes across the curriculum may enable them to 'route-find' in a range of contexts in their lives (Craft, 2000). Weaver (1999) describes the social consequences of this as developing 'an entrepreneurial culture', which he argues is essential if society is to contend with the various dimensions of change. It is also currently being argued (Jeffrey & Craft, 2001) that fostering the climate of creative purpose and challenge appears to act to disperse a culture of 'whingeing' and blame. Encouraging creativity in organisations may well not only enhance market

share but also serve to ensure higher levels of commitment from employees. The role of creativity in business and innovative organisations has been acknowledged and described by many (Fatt, 1997, 1998) although it is also acknowledged by some that culture shift in small companies is a significant challenge in fostering innovation and creativity in the economy (Vaux, 1999).

It has been suggested that organisations now have good reason to develop democratic cultures that encourage creativity (Lucas, 2001). Education is seen by many to have a role in this policy area as well as in the economic one (Heeboll, 1997). It is argued by some that the promotion of collaborative practices and 'team work' prepares pupils and students for work in organisations that need to be creative and single-minded if they are to be effective in their highly competitive markets (Ball, 1994, Hargreaves, 1994). It could be argued, however, that the continual innovation and constant change characteristic of the culture of today's western world is not necessarily desirable. A consequence of such a view would be that the role played by democratic creativity in continuing to develop these cultural norms should be carefully debated. There is also quite a range of literature exploring the relationships between research in higher education and creativity in business, for example, Tegart (1996) describes a specific Australian programme set up to link researchers to the users of their research; Walshok(1996)```, discusses the expanding role for US universities in economic development; Woolhouse & Cramphorn, 1999, discuss the collaboration between education and business organisations which contributed to economic regeneration in two large areas of England and Jones &Jenkins, 1999, describe a similar project in Wales involving Cardiff University).

There is very little recent research, it seems, investigating the development of creativity in education, although some commentators suggest that creativity can be developed. Seltzer & Bentley (1999), for example, suggest in their recommendations on knowledge and skills for the new economy, that 'creativity can be learned' and that the school curriculum should be restructured 'to reflect forms of learning which develop creative ability'. There is, it seems, a dearth of conclusive research evidence suggesting that creativity can be developed or that progression can be identified in creativity. An overview of findings from such studies as exist is given below, using five categories.

(i) Comprehensive approaches

Stein (1974, 1975) has summarised studies up until the mid-1970s, in which researchers evaluated attempts to stimulate adult creativity at the individual and group level, using a range of techniques, including role play brainstorming, psychotherapy and hypnosis. His review of the literature up to that point suggests that attempts to train people to become more creative are not particularly effective, although some studies did indicate short-term effects (Mansfield et al, 1978).

(ii) Educational approaches

Various kinds of training programmes have been advocated to develop creative thought processes. Creative thinking is often equated with originality, the generation of ideas, and with a range of problem-solving strategies (sometimes referred to as 'creative production'). Although there have been attempts to do this within a school context, Vernon (1989) concludes that the results of such studies suggest they are much less successful than is sometimes maintained. For although specific skills, such

as problem solving, can generally be trained and improved upon, there is rarely a transfer to more complex activities such as creative production.

However, certain approaches to education may possibly foster greater creativity than others. For example, some have claimed that Montessori education (Dantus, 1999, Cane, 1999) is particularly effective in fostering life-long creative skills. These writers suggest that self-expression, encouraged in Montessori education, holds the key to enabling individual agency and on a larger scale recovering human authenticity and a new approach to creativity which seeks a less technologically dominated world.

Others (Edwards & Springate, 1995, Leach, 2001) have suggested that the Reggio Emilia approach to pre-school education in Italy is particularly successful at fostering children's creativity. This is achieved, they suggest, by: involving children in higher-level thinking skills (analysis, synthesis, evaluation) encouraging the expression of ideas and messages through a wide variety of expressive and symbolic media encouraging the integration of subject areas through topics holding meaning and relevance to the children's lives offering adequate time for the in-depth exploration of specific topics which may arise from spontaneous interest.

There is, however, a lack of external evaluation of such approaches which mix together, and possibly confuse, curriculum, learning and pedagogical theories and practices.

(iii) Psychodynamic approaches

Both psychodynamic approaches and humanist approaches emphasise the development of personality traits. Underpinning psychodynamic approaches is the belief that

thinking can be explained through the way that various motives, conflicts, emotions, processes and structures in the psychic system interact. Openness to the so-called preconscious processes is considered to be important for creativity. The methodological approach to research in the psychodynamic tradition is through case study and there are those which appear to demonstrate increased creativity following psychodynamic input/training. However, it is clearly problematic to generalise from such investigations. In addition it is not possible to compare the creativity of equivalent individuals who did not have the input.

(iv) Humanistic approaches

These approaches concentrate on growth within the individual agent. Creativity is understood as self-creation, i.e. the generation of personal identity and agency. Humanistic studies have also been undertaken using the case study approach and again suggest that humanistic training can influence the individual's effectiveness in creating their own life plan. However, the method of investigation is subject to the same problems as described under psychodynamic approaches above.Most importantly, neither the psychodynamic nor the humanistic interventions have conclusively improved creative production (Stein, 1974, 1975).

(v) Behaviourist approaches

Behaviourism as a branch of psychology has not taken creativity to be a major focus of work. However, Rhyammer & Brolin (1999) suggest that some educational programmes contain within them behaviourist assumptions. Broadly speaking, behaviourists place emphasis on the significance of the environment in influencing the behaviour of the individual. Implicit within behaviourist programmes is the assumption that creativity is learned and that it can be fostered through stimulus,

reinforcement and response and that individuals learn to be creative at different rates, although all can be taught, through this method, to become more creative. Some approaches to fostering creativity in education are described in the section on ‘Practical advice’ below.

It is not known to what extent an individual's ability to create can be enhanced. The popular press produces a steady stream of books that advocate particular techniques and training programs; most have not been evaluated, so it is not known whether they work. The small numbers of training techniques that have been evaluated systematically produce modest effects. It is possible that more effective training techniques exist but have yet to be invented. Most training programs implicitly assume that creativity is a general ability or process.

Although it is unclear whether the ability to create can be enhanced, there is consensus that the disposition to create can be suppressed. Creativity and discipline are not antithetical–creative individuals practice much and work hard–but extensive reliance on overly structured activities can thwart the impulse to create, with negative effects on students' well-being. Students with high ability will perform better than others in activities that require design, imagination, or invention, but participation in such activities encourages the disposition to create in students at any level of ability.

Creative individuals often elicit negative reactions from others by violating social norms and expectations. In a school setting, care should be taken to distinguish creative students from students who cause disturbances due to emotional or social problems. Creative students who find ways to engage others in their projects are likely to become outgoing and adopt leadership roles. Creative students who experience difficulties in this regard are likely to engage in individual projects. In short, high

creativity is compatible with both social and individualistic life styles; either outcome is healthy. There is widespread concern among educators in Western countries that the trend to define the goals of schooling in terms of standardized tests forces teachers to prioritize fact learning and analytical ability over creativity. Participation in creative activities is emphasized in schools that implement particular pedagogical theories, for example, the Montessori and Waldorf schools (Sternberg, 1999).

(vi) Programme process in schools

Motivation is the driving force behind any human action. Without motivation we would not do our jobs, would not invest time in hobbies and would not learn anything exceeding simple facts. Educators know about the importance of motivation. Intelligence, aptitude and social background are factors that can influence learning, but they are out of reach of the teacher as they are either inborn or environmentally influenced.

Around 20 percent of a student's achievement can be attributed to motivation (Asmus, 1994). This possibility to raise a student's achievement may be used as a powerful tool by the teacher. Since the results of many introductory programming courses are not satisfying, a number of studies have been conducted to investigate factors causing the unpleasant situation. The findings regarding motivation include: High-intrinsically motivated students performed better (Bergin, 2005), Many students do not have a general interest in programming per se (Curzon, 1998,Mamone, 1992), Motivation is raised by using meaningful tasks and exercises (Rich et al., 2004,Tharp, 1981, Feldgen, 2003), Motivation can be improved by assigning personally challenging tasks, e.g. competitions (Lawrence, 2004).

The “optimal way” for introducing programming has not been found yet; a part of the key to it may be creativity. While programming in the classroom often is not perceived as motivating and creative, outside of the classroom some interesting observations can be made that may reflect the real nature of programming: The development of software has a fascinating impact on many programmers and students in Computer Science. They invest an enormous amount of time for writing programs, students learn, even self-educated, how to program and some Open Source programmers spend more then 20 hours of their weekly free time unpaid with the development of software. These people seem to be driven by a strong intrinsic motivation similar to artists who are dedicating themselves intensively to their work (Moravcsik, 1974).

Education in business has come under appreciable attack in recent periods (Karr, 2002; Brown & Gobeli, 1993). One of the leading charges is that undergraduate programs and MBA Programs stress analytical and classification skills and neglect focus on creativity (Ramocki, 1994). Numerous business spokespersons have reported that graduates are capable of performing break even, return on investment, and other analyses but lack capability in more subjective areas, such as creativity (Gilbert, Prenshaw, & Ivy, 1996). Marketing educators have expended some efforts at creativity training.

Moreover, such courses would mean higher investment in equipment, especially at the initial stages. It is clear that information technology studies were perfectly in line with the nature of a virtual university.

As a comprehensive university, University offers and develops quality liberal arts, science, technology and professional programs. University undergraduate students follow a general education program that emphasizes intellectual skills and the breadth

of intercultural understanding necessary for personal growth and achievement and responsible Universities will grasp the opportunity to address lifelong learning centrally in their mission and strategy as part of a wider definition of excellence. The complexity of lifelong learning concepts has to be acknowledged and explored as a key aspect of developing the contribution of universities to a culture of lifelong learning for the citizenship. All University degree programs meet national standards of excellence.

Flexible and transparent learning paths need to be in place for all learners to access and succeed in higher education in all its different forms. It is an essential responsibility of universities to ensure that this educational offer is always of high quality. Kenyan universities acknowledge the diversity of individual learner needs and therefore their responsibility to adapt programmes and ensure the development of appropriate learning outcomes in a learner-centred perspective. They also pledge to play their part in promoting widening participation and continuing education.

2.7.6 Teaching Methods as a factor influencing the teaching of creativity

The overall aim of the teaching within the University is the development of the skills of independent learning, critical thinking, and developing a relationship of theory to practice so as to provide a firm foundation for lifetime learning and development. Teaching builds upon the fact that students are generally well qualified for the courses they take, but there is some concern about declining motivation and commitment within the student body. There is need to seek to reconcile an emphasis on deep learning, understanding and creativity with the increasing pressure for the specification of learning outcomes. This will call for careful thinking by course organisers, but will potentially provide a mechanism for matching assessment to the professed goals of

teaching. Staff will need assistance in developing appropriate specifications for course and programme outcomes, and we may need a greater variety of modes of assessment. In some areas the variety of teaching methods and styles is not accompanied by sufficient evaluation of their effectiveness, and there may be too slow a response to the changing interests, aptitudes and commitment of students.

The teaching of the University aims to maximise benefit from the research skills and scholarship of its teaching staff. It may be valuable to develop the concept that there is a continuum from research and scholarship through to student learning and that staff and students are engaged in the same kind of activity. The other important factor in determining the teaching method is that the students are predominantly full time and on site, providing an opportunity for face to face teaching and for contact between students and staff. As student: staff ratios have risen over the years, small group teaching is less frequent, but the benefits of the tutorial, laboratory, clinical, workshop and field work are valued highly. Whereas the quantity of contact between students and staff may have to diminish, we will strive to ensure the quality of that contact. In many disciplines it is important to ensure linkage to current professional, commercial and industrial practice.

Innovation in teaching is constrained by a number of factors, including problems of assessment and the difficulty of staff finding time to develop and apply their ideas to courses that they wish to revise. Much might be achieved if further ways could be found to permit staff to stand aside from their existing commitments and, perhaps working with experts, to prepare new material. A one-off funding scheme from the Development Trust showed that there was interest that might expand should it be possible to sustain such a scheme (Teaching Support Grants, 2000).

It is a matter of importance that teaching should provide intellectual challenge to all students. Where there is heterogeneity of the knowledge base of students at the point of entry to courses, then supplementary learning opportunities, sometimes perhaps based on Computing and Information Technology (CIT), can be used to bring all students nearer to an appropriate starting level, but heterogeneity of ability, as distinct from knowledge, is more difficult to deal with if courses are truly challenging, as they should remain.

Teaching is one of the most important instruments employed to realize the objectives of a university. For a university committed to a liberal education orientation, the most widely accepted objectives include: expansion of the boundary of knowledge, preservation and enrichment of a country's cultural heritage, development of personal and social adjustment, cultivation of intelligent citizenship, acquisition of self-discovery and self-understanding, development of an oral and written competency, maximization of the capacity for critical and imaginative thinking, and understanding of international relations and affairs.' This awareness of the commonly held objectives of a general education provides broad bases for the instructor's use of various teaching activities and methods. To achieve the broad objectives of a general education, learning should provide opportunities beyond the knowledge of the subject matter of a particular course. For example, a course in elementary economics should not be restricted to the instruction of abstract economic theories, but should afford opportunities for students to develop skills of effective oral and written expression, to improve their ability to relate to- others, to learn to think critically and scientifically, and to feel the need for continuous growth even outside the college campus. The importance of such intellectual and social stimulation beyond the mere knowledge parameters of the course content is emphasized

Teaching and performing are live public performances in which delivery, engagement, and feedback matter. Both require prior preparation. Indeed, effective teaching can be measured by some of the same basic criteria used to evaluate performers: Whether the teacher could be heard or seen or whether the material was well organized; whether the teacher's timing increased student engagement or not; whether the teacher made good use of the classroom space and other available resources or not; Seymour Sarason (1999) observes that we make certain assumptions about the performer: That "the artist wants to perform, that the performer "has rehearsed for the occasion and that the artist will give his or her 'all' to the performance and will not leave us with the impression that he or she has gone through the motions, relatively devoid of personal feeling or involvement.

Runco et al (1993) suggested that some investigations of teachers' views of creativity had limitations in terms of validity. They argued that some of these studies (e.g. Treffinger, Ripple and Dacey, 1968; Torrance, 1963) appeared to be based on explicit theories developed by professional social scientists who formulated tests to question the degree to which educators would agree or disagree with their hypotheses.

In order to prevent this limitation, the intention in the present enquiry was not to ask participants directly about constructs of theoretical creativity outlined in academic writing.

Instead, participants were interviewed presenting in front of them extracts of their own videotaped classroom music lessons and asked to comment upon them. This enabled an explanation of the participants' views in their own words instead of using the technical academic concepts from the literature. The intention was, moreover, to explore further the 'why' of their ideas about creativity.

Because the aim of this study was to cover a range of teachers' views, it was decided to adopt what Lincoln and Guba (1985) call a 'purposive' approach to selecting the participants. Lincoln and Guba note that purposive sampling increases the scope or range of data exposed.

Taylor and Bogdan (1984) suggest that in sampling within a qualitative approach, what is important is the potential of each participant to help the researcher to develop theoretical insights into the area of knowledge studied. Having focused the study on school music teachers, the intention was to involve participants with different backgrounds, teaching in a variety of contexts from several secondary schools. Initially it was considered that six teachers would probably provide a broad range of potential views, even though it was recognized that it might be necessary to involve more teachers at a later stage.

To facilitate the observation of a wide range of teaching views in each participant, each teacher was video taped over several lessons. A single researcher could not follow all participants' activities within the music curriculum during the whole academic year. It was necessary to focus on a specific range of activities. It was assumed activities involving music composition and/or improvisation would best facilitate the emergence of teachers' views on creativity. It would seem likely that teachers associate creativity with 'composing' (e.g. Kratus, 1990; Reimer and Wright, 1992; Webster, 1996; Pitts, 1998). While the focus was on this type of activities, the intention was to observe and videotape the whole lesson because of the importance of being aware of and understanding the context. It was agreed with participants to observe Years 7, 8 and 9 groups only (Key Stage 3, age 11-14) because, unlike older groups, these were not

under the pressure of the GCSE examinations. Moreover, music at Key Stage 3 is compulsory, and this allowed the researcher to observe mixed ability groups.

Some practicalities regarding the dates and times for the interviews and the visits for classroom observation were personally discussed and agreed with each teacher during a preliminary school visit. The intention was to make clear to participants that the aim of the inquiry was completely non-judgemental. The researcher's position was not that of an inspector aiming to judge the rights and wrongs of music teacher methods, nor did the observer have the knowledge to evaluate them. Instead, it was expected the researcher would play a learning role, trying to collect the views of the participants and building a relationship of trust with them. To this end participants were provided with information about the author's background and experience, the background of the study and the research techniques. It was always explained to prospective participants that classroom observations would be videotaped with the sole purpose of selecting extracts for a later interview where they, then, would comment on their own lessons. It was also noted that names of schools and teachers participating in the study would be changed for confidentiality purposes. As noted in the literature (e.g. Brown and Dowling, 1998) school descriptions are not to be disclosed in detail because it could lead to identifying the participants. Therefore the names of the teachers quoted in the last section have been changed.

Teachers arranged their classrooms as they wished (i.e. activities, settings, etc.). The intention was to record the whole lesson each time, because of the importance of understanding the activities within the context. The aim was to videotape what was taking place in terms of: what pupils did that the teacher regarded as creative; their characteristics and attitudes; the appropriateness of the environment for developing

creativity considered by the teacher, including classroom settings, teaching methods, music programme and school culture; the teacher's consideration of the creative process of their students; how the assessment of creativity in the students' products was carried out and the criteria used in such evaluation,(Wang,2001).

The classroom observations, nevertheless, should not be seen as ends in themselves but as a starting point. It is necessary to remember that the focus of the enquiry was on the teachers' own views of creativity; not on the lessons *per se* but on how participants talked about their lessons. The classroom observation was intended to identify attitudes and behaviours which appeared to frame teachers' views, in order to focus the interview themes and questions.

Extracts from the lessons concentrated on areas observed upon which participants might be able to comment, and were selected following the four themes of the theoretical framework previously explained. The effectiveness of the interviews, thereafter, partially depended on the potential of the extracts to get participants talking about their views of creativity. In addition, teachers had the opportunity to validate the choice and to raise issues that may had been overlooked (ibid).

Learners differ considerably in how much they depend on their teachers, collaborate with their fellow students, and engage with their learning. Most learners feel more comfortable with dominant styles of learning (Vaugh, 2001). Similarly, most teachers have specific teaching styles which they feel comfortable with and which they often resort to under stressful conditions.

Each of these learning and teaching styles has its own advantages and drawbacks. A teaching method may "match" a specific teaching style with a learning style. For

example, didactic lectures match teachers who wish to maintain control with learners who are dependent and competitive (Grasha, 1996).

There are other reasons for using a broad range of teaching methods. Firstly, when a group of learners has mixed learning styles, using a variety of teaching methods minimises the risk of privileging one group of learners over another. Second, it has been found that learning is optimal if learners are exposed to a mixture of familiar and unfamiliar teaching methods (Vaugh et al, 2001).

Appreciable changes in the philosophy, curriculum, and assessment methods in medical education, such as a move towards student centred approaches, project work, and wider use of educational technology, may change the learners' expectations. The organisational philosophy underpinning the curriculum often determines the teaching methods that are used. For example, facilitators for a problem based undergraduate medical curriculum use a very different approach to that used by tutors on a traditional curriculum (Maudsley, 1999).

Sometimes the learning environment does not allow the usage of methods lectures are comfortable with. For example, in spite of the advantages of student centred teaching methods, they might not be as effective as lectures if you have to impart factual information to a large group of learners within a short space of time. Likewise, technologically minded teachers might have to rely on other methods if there are no information technology (IT) facilities available.

Some subject matters lend themselves more to particular teaching methods. For example, compared with statistics, ethics might be better taught in small group discussions and debates rather than in a lecture format (ibid).

It is clearly impossible for anyone to be expert in all teaching methods. So there is need to choose a balanced range of these to get experience in all the available methods. Teachers can gain experience in a few widely used methods (such as seminars and clinical supervision) wherever we work. Opportunities to gain experience in other methods, however, are limited to settings with appropriate curriculum and practical training (for example, problem based learning) or facilities (for example, virtual learning environment).

If you are working in a rotation, you should explore the opportunities available at each setting you work in. For example, you should gain experience in roles ranging from the teacher as expert to the teacher as delegator. You should also acquire skills in individual, small group, and large group teaching and should be able to supervise learner led investigative projects and design and deliver teaching courses. The order in which you gain these skills does not usually matter.

(i) Teaching approaches to developing creativity

There is some evidence from some university researches (Angeloska-Galevska, 1996) that certain characteristics of the teacher are correlated with the extent to which creativity is effectively fostered with pupils. These include the teacher's attitude toward creativity, social relations between teacher and pupils (students), the provision of optimal materials and perhaps most significantly, the educational level of the teacher (university-educated teachers were found, in this study, most likely to foster creativity).

Clearly this evidence begs questions about the possible relationships between values and attitudes, educational level, intelligence and pedagogic repertoires. It has also been suggested (Sternberg & Lubart, 1991) that the ideal learner is often characterised as

one who conforms, a model which does not appear to embrace pupil creativity. As they say, ‘to engender creativity, first we must value it. The role of the mentor in fostering creativity has been documented by many in the literature (Beetlestone, 1998, Craft, 2000, Fryer, 1996, Shagoury-Hubbard, 1996, Torrance, 1984).

Essentially, the research suggests that the provision of a role model, who can provide a learner with an apprenticeship approach to developing creativity, is a powerful aid to fostering their creativity. The mentor may be an adult (for example, a teacher or someone from beyond the school itself), or indeed another pupil.

What is clear from the literature is that practical strategies depend on the theory of creativity which underpins pedagogy. The most common examples in the international community at present may be grouped into five areas: those emphasising the creative cycle, single-strategy approaches, multistrategy approaches, system approaches and those emphasising overall pedagogic criteria. Some dominant approaches within these categories are described below. It will be seen that the strategies draw upon specific parts of the fields which study creativity, as mapped out earlier in this review.

(a) ‘Creative cycle’ approaches

‘Creative cycle’ approaches are those based on the processes of creativity originally proposed by Storr but then developed by others such as Guildford (1973), and much more recently by Kessler (2000), who describes the stages as preparation, incubation, inspiration or illumination and verification. Preparation, she suggests, involves the gathering of skills, principles and data, a time of discipline and focus. Incubation by contrast involves the doing of nothing, ‘letting go’. This is an essential fallow period, of receptivity and openness, sometimes even chaos or muddle (and thus offers a potential challenge in the classroom). Inspiration, or illumination, comes directly out

of the incubation space. Finally verification involves the refining of the outcome. Craft (2000) adds on the start of the next cycle at the end of the last one. Such process approaches when developed in the classroom may involve offering pupils specific kinds of experience.

Both writers suggest the need to foster in pupils and teachers the ability to: be open to possibility, the unknown and the unexpected bridge differences – make connections between apparently unconnected ideas and integrate different ways of knowing (for example, physical, feeling, imagining) hold the paradox of form and freedom hold the tension between safety and risk be willing to give and receive criticism be aware of the individual.

Balke (1997) suggests that, in early childhood and primary education, play is essential in the development of creativity. The association of play with creative development can be misleading although some play may be creative. Play is necessary to creativity, but not all play is necessarily creative (Craft 2000). For example, snakes and ladders are not creative whereas hide and seek or other dramatic play may be. Hence the early years early learning goal ‘creative development’ which incorporates play, may be slightly misleading in that not all play is creative.

(b) Single-strategy approaches

One well-known single-strategy approach is De Bono’s ‘six hats’ method. Some schools already use this and it is used in other organisational contexts. Based on his view that creative thinking is essentially ‘lateral thinking’, this is a method developed to encourage the viewing of any issue from a number of different perspectives. The idea is that, when ‘wearing’ any one of six possible fictional coloured hats imbued with certain qualities, the thinker emphasises certain approaches to thinking.

Another is Craft's 'possibility thinking' (2000). Here the idea is essentially that pupils are encouraged to approach learning across the curriculum with a 'what if?' attitude. In other words, with a questioning approach which wonders about possibilities and is both prepared to follow, and be supported in, seeing the questions through to an outcome.

(c) Multi-strategy approaches

Shallcross (1981) identified a range of strategies important in pedagogical approaches to creativity. These include allowing adequate space and time for developing a creative response to any given situation. She suggests that teachers often intervene too early in a child's thinking process, preventing pupils from working out ideas for themselves. In addition, she suggests that it is essential to provide an overt 'mental climate' in the classroom which includes fostering self-esteem and self-worth and the valuing of achievability i.e. setting tasks for children which are achievable, in order to build their confidence. The emotional climate of the classroom should enable each child to grow in security and personal confidence without constant scrutiny. As Shallcross puts it, 'The ground rules are personal guarantees that allow [pupils] to grow at their own rate, retain the privacy of their work until they are ready to share it, and prize their possible differences' (Shallcross,1981).

(d) System approaches

(e) Edwards & Springate (1995), writing of the Reggio Emilia approach to fostering creativity in the Italian pre-school, suggest a range of teaching system strategies

which enable the modification of classrooms to support children's creativity. It is important to realise, however, that they are discussing mainly artistic creativity. The pedagogical strategies they name are listed below:

(i) Time – giving children adequate time to finish their work, so they are not artificially rotated or asked to move on before they are ready Space – offering children the physical space to leave work from one day to the next without it being destroyed; also providing a bright working space with harmonious colours, furnished with child-sized areas and examples of their own and others' work including that of known artists, and including appropriate and inviting materials

(ii) Rich resource materials – these are particularly useful when the children themselves have helped to select them. Resource materials may be bought, found or recycled and include, they Suggest, paper goods of many kinds, tools for writing and drawing, construction and collage materials, including buttons, shells, beads, seeds and stones, as well as sculpting materials such as shaving cream, clay and play dough

(iii) Climate – the atmosphere in the classroom, they propose, should encourage risk taking, making mistakes, innovation and uniqueness, alongside mess, noise and freedom, whilst in an overall environment of order. Teachers themselves should be encouraged to experiment alongside the children

(iv) Occasions – teachers should provide a variety of exciting and intense encounters for the children between their outer and inner worlds. The stimulus of field trips, visitors to the classroom, the introduction of

specific artefacts, animals or plants to the learning environment, and so on, can be intensified, they suggest, by representations both before and afterwards.

These pedagogic strategies reflect studies done beyond schools, such as that by Greenberg (1992) investigating the creativity of fashion design students at college in the USA. She discovered that those students who were more creative had more choice in identifying which problems they were going to work on and took more time over completing their task. She also found that such students expressed more positive feelings about their work, an important point for school teachers, for it could be argued that fostering a positive attitude to one's own creativity is an essential starting point.

Sternberg & Lubart (1991) propose what they call an 'investment theory' of creativity which is influential in creativity discourse internationally. They suggest that it is possible to create, or foster, creativity in children and adults and that this involves teaching them to use the following six resources:

(i) Intelligence: By this they mean problem definition and re-definition; and the ability to think insightfully. This means 'seeing things in a stream of inputs that most people would not see', or 'seeing how to combine disparate pieces of information whose connection is usually non-obvious and usually elusive', or 'seeing the non-obvious relevance of old information to a new problem'. Problems requiring insightful solutions are usually not obvious in the first place. Most school situations set up problems as obvious. So encouraging children to identify problems in the first place is an important role of provision in education.

(ii) Knowledge: Knowledge of a field is essential in order to be creative within it. It is essential that the knowledge is usable for the pupil. Pupils also need to know *why* they are learning particular knowledge, if they are to use it.

(iii) Intellectual style: Here they suggest that the creative individual enjoys seeing things in new ways as well as having the ability to do so. They call this having a 'legislative proclivity' in 'mental self-government'.

(iv) Personality: Personality attributes include tolerance for ambiguity, willingness to surmount obstacles and persevere, willingness to grow, willingness to take risks, having the courage of one's convictions and belief in oneself.

(v) Motivation*:* Intrinsic motivation is, they propose, important. Extrinsic motivation can even undermine creativity. The motivation to excel is also important.

(vi) Environmental context: They suggest that the environment (or classroom) needs to spark creative ideas, encourage follow-up of creative ideas, evaluate and reward creative ideas.

(ii) Different methods of teaching

There are different methods usually used in teaching and these include; Lecture or mini-lecture (Teacher as the expert does not require special settings for the teaching to take place); Bedside teaching; Role play (small group discussion), Teacher as facilitator; problem based curriculum, formal training required ;Peer assisted learning ;Teacher as delegator; no special settings required ;Project supervision Teacher as delegator; no special settings required ;Clinical or educational

supervision ;Teacher as support provider; no special settings required ;e learning Teacher as facilitator; virtual learning environment facilities required.

Universities often run short courses on specific teaching methods. For all these methods, it is often valuable to arrange with your colleagues to observe the teaching sessions of each other and provide constructive feedback afterwards. Lectures and teacher centred question and answer sessions are often used. Despite the general move away from lectures, they remain an efficient way of imparting information and explanation to a large group of learners. It is wise to gain experience in giving mini-lectures to small groups before lecturing to a large audience (Brown, 2001).

(a) **Guiding learners or role modelling**

This method is commonly used in bedside teaching when the teacher demonstrates techniques in history taking or physical examination. It is also used in tutor led seminars.

(b) **Facilitators in the traditional curriculum**

Familiar examples include case history discussion, role play, small group discussion, and learner led journal clubs. A relatively unfamiliar example is the "fishbowl seminar," in which participants sit in two concentric circles. Those in the inner circle (inside the fishbowl) engage in discussion while those in the outer circle stay silent, watch the discussion, analyse the content and process of the argument, and subsequently offer feedback.

(c) **Problem based learning tutors**

Although only three medical schools adopted problem based learning in the late 1990s, the number has more than doubled since then. Learning takes place in a small tutorial group governed by ground rules. Learners are given case scenarios to trigger their own learning objectives. For example, they might be given a case history of abnormal bleeding to generate their own objectives in their knowledge of relevant basic sciences, diagnosis, and management, and they are required to find out the answers for themselves as a group. The group is chaired by a student. The tutor uses his or her subject expertise only subtly and sparingly, but facilitates learning by probing, encouraging critical reflection, and challenging students' assumptions and makes suggestions where necessary (Maudsley, 1999).You can gain substantial experience only if your local medical school runs a problem based learning curriculum and you must undergoing formal training in the medical school by being a co -facilitator in a group.

(d) **Peer assisted teaching**

This has been used successfully in the United States, but until recently it has been neglected in the United Kingdom. It entails active help and support in an informal environment from peer group members. For example, a student led peer learning programme exists at Dundee Medical School, where fourth and final year students assist groups of second or third year students in preparing for their examinations (Wadoodi, 2002). Not only do the students benefit, but peer tutors can also improve their teaching skills. You might consider piloting such a scheme for medical students, trainee doctors, or other health professionals. The success of the scheme depends on the following: the scheme being genuinely student led, the sessions having a provisional set structure, appropriate training for the student tutors, rewards for the

student tutors, setting time limits on the sessions, using small rooms, maintaining an informal environment, and ensuring that the scheme has support from the university Wadoodi (2002).

(e) **Project supervision**

This has become more important with increased emphasis on projects for both undergraduates and postgraduates. The supervisor must provide adequate support and yet allow the learner take a lead in the project and to develop his or her intellectual potential.

(f) **Clinical and educational supervision**

Most consultants will be concerned with one to one clinical and educational supervision of trainees. The supervisor needs to provide support and guidance as well as to monitor the trainee. Integrity of the supervisor is particularly important as the balance of power between the supervisor and trainee is clearly asymmetrical. Ideally, all supervisors should attend the training the trainers courses run either locally or by their relevant royal colleges.

(g) **Distance learning and e-learning**

This mode of learning has become more popular with the availability of virtual learning environment software such as WebCT and Blackboard. These can be used to augment other teaching methods and many distance master degree courses are delivered exclusively by this method. The teachers require only basic IT skills. It allows them to deliver course material in a variety of formats, preset dates when documents become accessible by each student, set computer marked assessment questions, and track the performance of each student with ease.

(h) **Projects as a means of teaching creativity**

Lakhani and Wolf (2005) as well as Luthiger Stoll (2006) investigated the motivation of software developers in Open Source projects. They identified enjoyment-based intrinsic motivation, namely how creative a person feels, as the strongest and most pervasive driver. Additionally they found a variety of creativity related factors that were responsible for intrinsic motivation and thus for we refer do software design as it is a central issue of Computer Science. the participation in those projects: Usage, reputation, identification with the group, learning and altruism. Similar factors were found to be responsible for student engagement in programming in Computer science classrooms – some students dedicate a lot of energy to the creation of software and spend a good deal of their free time for doing that. In an interview with one of those students similar motives for intrinsic motivation, especially the chance to be creative in programming, were mentioned (Romeike, 2006). As these motives correspond to the factors that were identified as missing in the aforementioned studies, they may serve as a key for programming motivation. Since for some students these motivators already seem to be obvious enough to raise intrinsic motivation, emphasizing and utilizing those may help to inspire the rest of the class as well. The following implications can be drawn to raise motivation and interest:

Regarding usage: An obvious reason for developing software is the wish to use it later on. If the programmer has a problem that he cannot solve with available software he needs to program himself or herself or to modify existing software so that it fits to his or her needs. Tasks shall be meaningful and offer usage to the students. “Pseudo problem orientation” as the modelling of a flash light on a computer will not meet this motive. Supporting to build up a reputation: One of the maxims of the Open Source

community is that contributions of each developer can be exactly traced. This way every individual can build up a reputation, which may be useful for later job applications or can strengthen the person's prestige in the community. Since learners usually just receive feedback from the teacher, disseminated software can be appreciated outside of the classroom, e.g. on personal homepages and thus raise motivation.

Fostering identification with the group: An individual's close integration into a group can lead to a strong identification with the goals of that group. This motive can be successfully applied in group programming projects.

Promoting purposeful learning: The chance for Open Source programmers to learn is a reason to participate in the projects; they want to extend their experiences and improve their skills in order to become a better software developer. When students become aware of the use of the facts and concepts to be learned and when they find it interesting to build software, the goal to do this better can be motivating.

As seen, motivating students for learning to program can be troublesome. When creativity is regarded in the context of programming, it is the extracurricular observations that suggest it is easier to raise intrinsic motivation and interest; as tasks will become personally challenging and meaningful. Considering the motivators found in Open-Source Programmers when designing lesson may be helpful. The effects of such lessons need to be verified by empirical research.

The DfES strategy (2005) highlighted the importance of ICT in enabling the education system to be transformed to meet the needs of society (and individuals) in the 21st Century. Central to this strategy was the notion of personalisation and the ability for learners to be supported across physical contexts, including across different

educational organisations, the workplace and home. This support was seen as being not only anywhere but also anytime, or indeed ‘just in time’. A major study of the implementation of two of the priorities of the DfES e-Strategy (as it was in 2005) concluded that “the key to successful implementation of the e-strategy involves effective management of educational change, which is primarily about people rather than the technology” (Twining et al 2006).

That same study (Twining et al 2006) found strong support for the view that the curriculum within schools and colleges should change to focus on ‘skills’ such as communication, learning to learn, critical thinking, and problem solving, alongside ICT, Information handling, Literacy and Numeracy. These fit well with the lifelong learning agenda, but also with developments in ‘learning theory’, particularly those associated with social constructivist theorists who are building on the work of Vygotsky and. Bruner’s work in particular highlights the importance of learner agency (e.g. Bruner 1996) which one might expect to link closely with notions of personalization on textbooks, and textbooks determine the components and methods of learning.

Clarke (1989) argues that communicative methodology is important and that communicative methodology is based on authenticity, realism, context, and a focus on the learner. However, he argues that what constitutes these characteristics is not clearly defined, and that there are many aspects to each. He questions the extent to which these are these reflected in textbooks that are intended to be communicative.

The cultural information included in English textbooks should be correct and recent. It should not be biased and should reflect background cultures of English. It should include visual aids etc., to help students understand cultural information.

According to UNESCO paper (2005-2007), as a private university, UNITAR initially focused mainly on academic activities that were viable and less demanding, particularly in terms of financial requirements. In a virtual university, the activities need to be focused on providing the most effective mode of delivery that is both efficient and convenient for students. This is the market niche that needs to be strongly developed so that UNITAR can be truly different from conventional universities. State-of-the-art technology, flexibility of learning and the convenience this provides are some of the other benefits that student can enjoy in a virtual education environment.

Obviously an instructor is the key to effective teaching. An experienced instructor's knowledge and skill regarding methods of instruction may be compared to a maintenance technician's toolbox. The instructor's tools are teaching methods. Just as the technician uses some tools more than others, the instructor will use some methods more often than others. As is the case with the technician, there will be times when a less used tool will be the exact tool needed for a particular situation. The instructor's success is determined to a large degree by the ability to organize material and to select and utilize a teaching method appropriate to a particular lesson.

2.8 Summary

In this study, a number of factors implicated in the development of students' creativity have been briefly reviewed. It has been argued that measurement does, indeed, have a role to play in enhancing creativity and that the investigative process is just the same as when researching equally fuzzy concepts — such as 'work' or 'play', for example.

However, the quality of research is enhanced when investigators are conversant with the vast body of knowledge on creativity and creative education. This makes it easier

to question assumptions — about creative education provision, for example (as discussed in Fryer & Fryer, 2005) — and to identify gaps in knowledge. One such gap is the dearth of information on cross-cultural perspectives on creativity. This is something which we have started to address at the university (for instance Fryer, 2004; Bolingbroke & Fryer, 2009). At the same time there is a need for more cross-cultural studies in this field in order to build up a Kenyan map of the way in which creativity is (or isn't) being enhanced in education and the implications for future policy and practice. It would be really useful to compare educational provision in different European countries and the effect on students' creativity, taking account of the various social, economic and political contexts. This would be no mean task, since it would not simply involve a comparison of like with like. Yet, despite the differences and difficulties, it should be possible to identify useful points of comparison.

In summary, therefore innovation which is an off-shoot of creativity is about gradual or dramatic change, and about intended or real improvement. It involves creation, adoption or adaptation of new ideas and practices at different levels: individual, departmental, institutional or systemic levels. Depending on the level at which the innovation takes place and other factors, an innovation can produce different outcomes. Taking all these elements into account, innovation in higher education might then be defined as the planned implementation or application of new ideas, practices and services, which arise through creativity, interaction and insight, with the aim of improving an existing situation, practice or service, and thereby bringing about change. In addition, innovation can arise from initiatives at the individual, institutional systemic levels, and in response to external factors.

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter presents the procedures that were employed in order to come up with data for analysis which include study area, research design, target population, sample design, data collection and data analysis procedures**.**

3.2 The Study Area

Moi University is the second public university that was started in 1984. Its original mandate was to produce students of high technological competence. Practical oriented

courses were to form the core of the programmes at the institution. This saw the schools of forestry and wildlife management, the school of science, the school of engineering and the school of information sciences started. It was argued after short while that, courses in liberal arts and other, science courses were necessary for the university to be all round in all spheres of knowledge. Thus the schools of education, arts and social sciences, business and economics among others found their legitimacy. Currently the institution has 13 schools spread over in three major zones. Zone 1 is Main campus at Kesses, zone 2 town campus (Health Sciences, Annex and Eldoret West), zone 3 Chepkoilel University College. There are also many satellite campuses and off-campus teaching and research units spread all over the country to take education closer to the people.

3.3 Research Design

Research methodology can be looked at as the methods, approaches and techniques that are employed in a study, in order to come up with new knowledge. Crotty (1998) defines research methodology as the strategy, plan of actions, processes or design lying behind the choice and use of a particular method and linking the choice and use of methods to the desired outcomes.

A research design is a plan, structure and strategy conceived so as to obtain answers to research questions and control variance (Kerlinger, 1973). A research design helps to control the experimental, extraneous and error variance of a particular a research problem being investigated. According to Kerlinger (1973), research designs are invented to enable answering the research questions as validly, objectively, accurately and as economically as possible. A research design sets up a framework for adequate tests of the relations among variables. In social science research, researchers often identify an “effect” then seek to establish what has caused it. Two types of variables

emerge; independent variable, the cause variable that identify forces or conditions, that act on something; the variable that is the effect or the result or outcome of another variable and the dependent variable (Newman, 1999).

This study was conducted through a cross-section survey design. Cross-sectional studies (also known as cross-sectional analyses, transversal studies, and prevalence study) form a class of research methods that involve observation of all of a population, or a representative subset, at one specific point in time. The objective of most cross-sectional surveys is to produce unbiased (or nearly unbiased) estimates of levels such as totals or means at a given time point, and, in the case of repeated surveys, to produce estimates of the net change that occurred in the population between two time points. Data are collected at one point in time from a sample selected to represent a larger population. This study is a cross-section survey that employed explanatory and correlation research methods in describing the phenomena of interest. The study was concerned with investigations of various variables and their contribution to one's creativity learning at the university. Survey researchers study a sample drawn from a population and then infer the characteristic of the defined population or universe (Levesque and Franklin, 2000).

The study of a sample from which inferences about populations can be drawn is needed because of the difficulties of attempting to study whole populations. Kerlinger (1973) adds that, random samples can often furnish the same information as a census. Survey studies focus on people, the vital facts of people and their beliefs, opinion, attitudes, motivations and behaviour (Kerlinger, 1973). Neuman (1999) states that surveys are appropriate for research questions about self-reported beliefs or behaviours and lists behaviour; attitudes & beliefs, opinions; characteristics; expectations; self-

classification and knowledge, among the areas that questions can be asked in a survey. According to Neuman (1999) survey researchers sample many respondents who answer the same questions, measure many variables, test multiple hypothesis and infer temporal order from questions about the past behaviour, experiences, or characteristics. In addition, survey researchers think of alternative explanations when planning a survey, measure variables that represent alternative explanations (i.e. control variables), and then statistically examine their effects to rule out alternative explanations. Neuman (1999) points out that survey research is often called correlation and uses control variables to approximate the rigorous test for causality that physical experimenters achieve with their physical control over temporal order and alternative explanation.

While a major strength of the survey approaches is the ability of a sample to represent a population with data collected at a shorter period and at a lower cost, a major weakness is that, it tends to emphasize scope of information at the expense of depth (Kerlinger, 1973). It is therefore more adapted to extensive rather than intensive research. In order to gain a better insight into the factors influencing the implementation of teaching creativity at the university level, this study conducted in-depth interviews with students from selected schools and identified five variables for investigation.

3.4 Target population

The population in this study consisted of final year Technology Education, business and economics and engineering students of Moi University. The finalist population in the schools of engineering, business and economics and department of technology education in the school of education were 240, 260 and 71 respectively, 35% of

respondents was allocated to each school/ department. This constituted 571 targeted respondents.

3.5 Sample Design

The researcher wanted to know the sample size determination and the sampling procedure that was used to pick the schools and the respondents.

3.5.1 Sample size determination

The researcher strived to ensure that a representative data was obtained from the selected departments/ schools by ensuring that at least one third of the student population in the respective schools under study was covered. Mugenda and Mugenda, (2003) asserts that sampling is that part of the statistical practice concerned with the selection of individual or observations intended to yield some knowledge about a population of concern, especially for the purposes of statistical inferences. They advise that a researcher would have to use 30% of the total target population as a sample size for it to be accepted as a good representative sample.

3.5.2 Sampling procedure

The schools were picked following the random sampling procedure where the researcher requested his student colleagues to pick the three schools from the thirteen schools pooled together. This was done as it should be noted that all schools do undertake special projects for the students in the final year. Quota sampling procedure was also used to pick respondents from schools of education, engineering and the school of business and economics. The respondents that were identified were those students engaged in special projects. A sample of 180 students was chosen using quota sampling. and purposive stratified sampling in the respective schools (departments) as this process involved the selection of a particular sample on purpose that is those

students who were undertaking special projects in an effort to determine their creativity. Each school had its quota and random sampling was used pick respondents from each school.

3.6 Data Collection

This is the process by which data that was used in the study was generated. It involved the use of data collection instrument which in this case was questionnaire.

3.6.1 Data collection instrument

To collect data, a structured questionnaire student was used. The questionnaire that was used covered all aspects being studied. Questionnaire was administered to the 180 students which was the targeted population. One hundred and thirty two (132) returned the questionnaires from which the study then generated data for the analysis

The questionnaire had stated item on each of the six key variables (Creativity, Students aptitude, teaching, faculty/lecturers, teaching facilities, academic programmes and teaching methods) of the study was piloted to test its reliability. The reliability constituted co- efficient established by Kuder Richardson KR20 method of 0.75 deemed adequate to allow the instruments to be used (Cortina, 1993).

3.6.2 Validity and reliability of instrument

To ensure reliability and validity, research instruments were ascertained by the researcher before going out to collect data. A pilot study was carried out on 10 students to test the reliability of the questionnaires. The shortcomings, errors and omissions detected in the questionnaire while testing the research instruments were rectified and modified before the final data collection. There were two basic goals in questionnaire design; to obtain information relevant to the purposes of the research and to collect this

information with maximal reliability and validity. Items were randomly chosen for the content that accurately represented the information in all areas.

In addition efforts were made to ensure both validity and reliability of the research instruments. The content validity of the data collection instruments is the extent to which the data provides accurate and adequate coverage of the objectives of the study (Cohen *et al*, 2000). The instrument was interrogated by my supervisors peers they gave a verdict of adequacy. Secondly, by examining earlier creativity literature, the variables and parameters used in capturing and measuring achievability of the study objectives and construct validly were established as used by other scholars. Pre-testing the instruments enabled the evaluation of the content validity which is subjective, as it were, so as to focus the assessment of the instrument as to whether the research framework and questions in the instruments cover the study objectives adequately.

By definition, in quantitative research reliability is a synonym for consistency and replicability over time, over instruments and over groups of respondents (Cohen et al, 2000). Any random influence that tends to make the measurement different from occasions to occasions is a source of error unless the differences are such that they maximize systematic variance. Reliability is concerned with precision and accuracy. For research to be reliable it must demonstrate that if it were to be carried out on a similar group of respondents in a similar context (however defined), then similar results would be found.

There has been a debate as to whether the cannons of reliability of quantitative research apply to qualitative research. Cohen et al (2000) seek to differentiate the two by stating that qualitative research reliability can be regarded as a fit between what researcher’s record and what actually occurs in the natural setting that is being

researched, that is, the degree of accuracy and comprehensiveness of coverage. Replicability may be achieved in the status positions of the researcher's choice of informant/respondents, social situation and conditions under investigation, analytical constructs and premises that are used and the methods of data collection and analysis. To give an indication of reliability, the test retest method was used. Retest Method which was used was one of the easiest ways to determine the reliability of empirical measurements in which the same test was given to the same people after a period of time. The reliability of the test (instrument) can be estimated by examining the consistency of the responses between the two tests.

The reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. Although unreliability is always present to a certain extent, there will generally be a good deal of consistency in the results of a quality instrument gathered at different times. The tendency toward consistency found in repeated measurements is referred to as reliability (Carmines & Zeller, 1979).

3.6.3 Administration of the instruments

The researcher collected the data using a structured questionnaire from the students from the schools that were under study.

3.7 Data Analysis procedure

When the questionnaires were received, they were checked to see whether they were duly filled. Those, which were complete, were labelled and coded. Of those returned only 132 were adequately filled as the rest had either partial answers or were completely blank in most pages and could therefore not be used in the analysis The data so generated was analysed using descriptive statistics (frequencies) and inferential statistics. Regression analysis and Correlation analysis were done in trying to establish

the significance of independent variables and the dependent variable. The analysed data was presented by using frequency tables and graphs

3.8 Ethical Considerations

Ethical considerations in research focuses on ethical issues regarding the researcher, issues concerning research subjects and issues concerning the research process (Mugenda & Mugenda, 2003). In this study, the teaching of creativity is an emotive one and the respondents are skeptical of the nature and purpose of the inquiry. On the one hand, data collection was carried out at a time when the respondents were undertaking special project assignments. This could lead to loss of concentration on the work and therefore could interfere with the quality of the projects done.

The other ethical issue encountered was that of either raising expectations where respondents thought that by giving the information, their enterprises would receive intervention that would ease the pressure they were facing during the learning process and since this was not the case university set up the researcher and the enumerators had to be very careful not to make promises they could not keep while at the same time not to discourage the respondents from participating. There was need for consistency in what is said, since this could trigger speculations that would go ahead of the data collection team.

Confidentiality was another issue in data collection since a student respondent's assessment of the faculty members is treated personal the researcher had to assure the respondent that their identity would not be reported anywhere and that they were not supposed to fill in their names or that of their enterprises. This assured them of anonymity. Anonymity was also enhanced by use of codes and pseudo names to camouflage the identity of the student respondents. Finally, throughout the data

collection and analysis, the researcher was committed to conform to the principle of voluntary consent where respondents willingly agreed to participate in the study.

CHAPTER FOUR

4.0 ANALYSIS AND PRESENTATION OF DATA

4.1 Introduction

The chapter gives the presentation of data and analysis of various variables under study which include creativity as an output (Dependent variable) and Aptitude, programmes, faculty members, teaching facilities and teaching methods as independent variables and their relationships. The data is analysed both descriptively and inferentially.

4.2 Students' socio- Personal characteristics

The researcher was interested in knowing the socio-personal characteristics of the respondents which included the age, gender, degree pursued by the respondents, and Area of specialization.

4.3 Age of Student Respondents

Respondents were asked to state their ages as the researcher was interested in knowing the ages of the student respondents. The study established that most of the students' (93.8%) are aged between 20 and 30 years. The rest of the respondents were students who are above 30 years of age. The results were as tabulated in table 4.1 below.

Table 4.1: Age of Student Respondents

Age in years	Frequency	Percent	Valid Percent	Cumulative Percent
20—25	93	70.4	74.9	74.9
26—30	29	23.4	23.3	98.2
31—40	1	0.8	0.8	99.0
Above 40	1	0.8	0.8	99.8
Total	124	93.9	100.0	

Source: Researcher (2010)

This depicts a youthful group of people who if nurtured well will be the future entrepreneurs who are creative and innovative enough to come up with new ideas to make their contributions in the economy.

4.3.1 Sex/Gender

The respondents were asked to state their gender. The results show that majority of the students in the schools under study who undertook special project are males (68.2%) while the female students who are the minority constituted the remaining proportion(31.8%). The findings are as shown the Table 4.2 below.

Table 4.2: Gender of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	90	68.2	68.2	72.7
Female	42	31.8	31.8	100
Total	132	100	100	100

Source: Researcher (2010)

Majority of female students do not engage in undertaking special projects as they are associated with sciences hence the notion that female students do not like taking science courses. The results indicated as missing system are those that indicate their gender. Again the female students who were admitted for the courses had to undertake special projects.

4.3.2 Degree being pursued

The respondents were asked to indicate the Degree courses they were pursuing as students of Moi University. The respondents were picked as follows; Bachelor of Education (Technology) was 40, Bachelor of Business Management was 50, Bachelor of Science in Technology was 90.However the results were as tabulated below. Most of the respondents who undertook special projects were those who were enrolled in the Bachelor of Science (Technology) with a proportion of 55.3%.These were as tabulated in the Table 4.3 below.

Table 4.3: Degree Pursued by Respondents

Course	Frequency	Percent	Valid Percent	Cumulative Percent
Bachelor of Education technology	33	25	25	37.9
Bachelor of Business Management	26	19.7	19.7	44.7
Bachelor of Science technology	73	55.3	55.3	100.0
Total	132	100.0	100.0	

Source: Researcher (2010)

It can be seen that most students who undertook the special projects were those who were enrolled in the Bachelor of Science Technology (55.3%),followed by Bachelor of Education -Technology with 25%.

4.3.4 Area of specialization

The respondents were asked to state their area of specialisation within their courses. The distribution was as shown in the table 4.4 below.

Table 4.4: Area of Specialization

Specialization area	Frequency	Percent	Valid Percent	Cumulative Percent
Marketing	9	6.8	6.8	15.9
Mechanical engineering technology	14	10.6	10.6	26.5
Production technology	11	8.3	8.3	34.8
Power/plant engineering technology	4	3.0	3.0	37.9
Electrical/electronic engineering technology	28	21.2	21.2	59.1
Civil engineering/building construction technology	18	13.6	13.6	72.7
Chemical engineering	25	18.9	18.9	91.7
Textile engineering	5	3.8	3.8	95.5
Finance and banking	5	3.8	3.8	99.2
Accounts	1	.8	.8	100.0
Total	132	100.0	100.0	

Source: Researcher (2010)

The majority of the respondents who undertook special projects were those specializing in the electrical/electronic engineering technology (21.2%), followed by chemical engineering (18.9%) which was then followed by civil engineering/building construction technology (13.6%). This was a fair distribution given that these are areas which are technologically oriented.

4.4 Determination of the individual learners aptitude, ability and inherent creative traits (creativity Process)

The respondents were given a series of questions in an effort to gauge their understanding of creativity. Creativity starts with knowledge accumulation, reading, conversation, experience and learning. This is the creative process which is very crucial in the whole creativity learning.

Creativity process in an individual

(a) Knowledge accumulation

The respondents were asked to indicate if they agree with the fact that Creativity starts with knowledge accumulation, reading, conversation, experience and learning. It was found out that 65.2% of the respondents were of the opinion that creativity in individual starts with knowledge accumulation. The responses are as shown in the table 4.5 below.

Table 4.5: Knowledge Accumulation

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	11	8.3	8.7	8.7
strong Disagree	5	3.8	3.9	12.6
Disagree	8	6.1	6.3	18.9
undecided/ don't know	17	12.9	13.4	32.3
Agree (A)	28	21.2	22.0	54.3
Strongly Agree (SA)	22	16.7	17.3	71.7
Very strongly Agree(VSA)	36	27.3	28.3	96.3
Total	127	96.2	96.3	96.3
Missing System	5	3.8		3.7
Total	132	100.0		100.0

Source: Researcher (2010)

The above results imply that there is need to generate ideas by first accumulating knowledge through learning process. However, if one lacks the propensity to take risks, then knowledge accumulation cannot make him creative.

(b) Incubation Stage

The respondents were asked whether they agree with the fact that knowledge accumulation is followed by incubation, during which period, one subconsciously mulls over information so far gathered. It was established that 59.8% of the respondents do agree that there is always need to have time to mull over an idea for which information had been gathered. The results are as shown in the table 4.6 below.

Table 4.6: Incubation Stage

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	5	3.8	3.9	3.9
strong Disagree	12	9.1	9.4	13.3
Disagree	11	8.3	8.6	21.9
undecided/ don't know	21	15.9	16.4	38.3
Agree (A)	37	28.0	28.9	67.2
Strongly Agree (SA)	23	17.4	18.0	85.2
Very strongly Agree(VSA)	19	14.4	14.8	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

The responses from the table above shows the respondents were aware that one needs to accumulate knowledge so as to sort out a problem that presents itself. Incubation is followed by idea experience, where innovative or novel ideas emerge or is discovered.

(c) **Verification Stage**

The respondents were asked to indicate whether they are aware that the new idea is evaluated, decision put to hold, till more information is obtained and idea crystallized. It was established that to some extent as **61.4%** of the respondents corroborating the same as shown in table 4.7 below.

Table 4.7: Verification Stage

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	4	3.0	3.1	3.1
strong Disagree	11	8.3	8.6	11.7
Disagree	14	10.6	10.9	22.7
undecided/ don't know	18	13.6	14.1	36.7
Agree (A)	36	27.3	28.1	64.8
Strongly Agree (SA)	18	13.6	14.1	78.9
Very strongly Agree(VSA)	27	20.5	21.1	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

In verification, the second last stage of the creative process, one carries out activities to demonstrate whether or not what emerged in illumination satisfies the need and the criteria defined in the preparation stage.

(d) Implementation Stage

The respondents were asked to indicate whether after verification, finally the idea is implemented after deep understanding and insight, idea fleshed out and business plan or working drawings developed. From study it was established that, 63.7% of the respondents agree that after getting the details of an idea, they were able to move ahead and select the projects which were going to address various community needs. The results are as shown in table 4.8 below.

Table 4.8: Implementation Stage

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	7	5.3	5.6	5.6
strong Disagree	5	3.8	4.0	9.5
Disagree	10	7.6	7.9	17.5
undecided/ don't know	20	15.2	15.9	33.3
Agree (A)	40	30.3	31.7	65.1
Strongly Agree (SA)	22	16.7	17.5	82.5
Very strongly Agree(VSA)	22	16.7	17.5	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

This is normally the last stage of the creative process where now one actualizes what he has learnt in theory.

(f) Special project costs.

The respondents were asked to give the approximate cost of the special projects they were undertaking. Approximate total costs of the special project from idea identification, design; through all stages to presentation for the respondents were as given below the responses were as presented in Table 4.9

Table 4.9: Special Projects costs

KShs	Frequency	Percent	Valid Percent	Cumulative Percent
800—10000	48	36.6	51.3	51.3
10001—20000	15	11.4	16.0	67.3
20001—40000	8	6.2	8.6	75.9
Above 40000	23	17.8	24.7	100.0
Total	94	71.2	100.0	

Source: Researcher (2010)

From the responses of the student respondents, the special projects had specific problem to address. The problems the projects intended to address were actually trying

to prepare the respondents for the world of work as they are the future entrepreneurs. The costs of undertaking a specific project could be hindering factor in coming up with a project that addresses a specific problem. However, the respondents are encouraged to select those projects that address a specific problem in the society and also that which is cost effective and affordable.

(g) Problems Addressed by the Special Projects

Generally the special projects had a community needs that they sought to satisfy. The responses from the student were as outlined in the table in appendix II

(h) Community Needs Addressed by the Special Project

A higher percentage of the projects were intended to address issues related to community development and especially in the rural areas. This can be attributed to the higher percentage of 27.3%. However, a small percentage of 0.8% of the projects was dedicated to mobile technology/communication, business community, and manufacturing commodities. The findings are as shown in appendix III.

4.4.1 Determination of creativity index (Student's creative ability, C)

This is obtained from the student's self-assessment on various issues as follows;

Creative ability was assessed from perception of the respondents on four sub-variables namely; Knowledge on creativity and generation of new ideas with a total possible score of 35; Project undertaken at the university and its usefulness, total score 10; Project identification process total score 6 and benefits that accrue from ability to be creative total score 112. The grand total possible score on creativity is 163.

(a) Knowledge on creativity

Respondents were asked to indicate the process of developing new ideas. Statements on the lickert scale whose objective was to test whether the respondents recognized the correct procedure of coming up with a creative idea to solve problems in real life as accumulation of knowledge, incubation, experience of new idea, evaluation of the idea and implementation of idea. It was observed that, the mean score was 24.63 while the expected maximum score was 35.

(b) Project Identification method

The students were asked to indicate the methods of identifying project ideas in statements by just saying yes or no. Since all are correct methods of identifying project ideas a respondent scored 1 for each item ticked yes.

It was found out that, the students' respondents in general have a low understanding of the method of generating new creative ideas with a mean of 2.95 out of expected 6

Descriptively, more than 50% of the students either combined two or more existing project ideas to form a new project (synthesis) or came up with a new (novel) project idea completely or used old technology in a new way (reapplication), or shifted attention from the expected normal and routine in order to look at the problem from a different angle (changing direction) or discussions with other students, lecturers technical staff (brainstorming).

(c) Benefits that accrue from being creative

A lickert scale with 16 items was used to determine the benefits derived from being creative in life. They were expressed in such a way that ticking very strongly agrees (7) one scores a 7 since all items were put positively and were all benefits. A student

who couldn’t recognize them as benefits simply implies that he/she has learnt little in creativity.

The results indicate that, the students are above average on conceptualizing benefits accruing from learning creativity with a mean score of 78.5 out of 112.

A measure of creativity was then aggregated from the individual respondent scores on the sub-variables Knowledge, projects, identification and benefits. The overall creativity measure was high with a mean of 111.9 out of a maximum possible score of 163

A creativity index, a unit less measure of each students learnt creative ability was established by dividing the individual respondents score on creativity by the maximum possible score 163 to get an index that ranges from 0 to 1.

The creativity index had a mean of 0.69 which is significantly high than the half mark of 0.5 as shown by the one sample t- test table 4.10 below.

Table 4.10: A One Sample T -Test With a Test Statistic of 0.5 Confirms this.

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Creativity index	11.965	130	.000	.1867	.1558	.2176

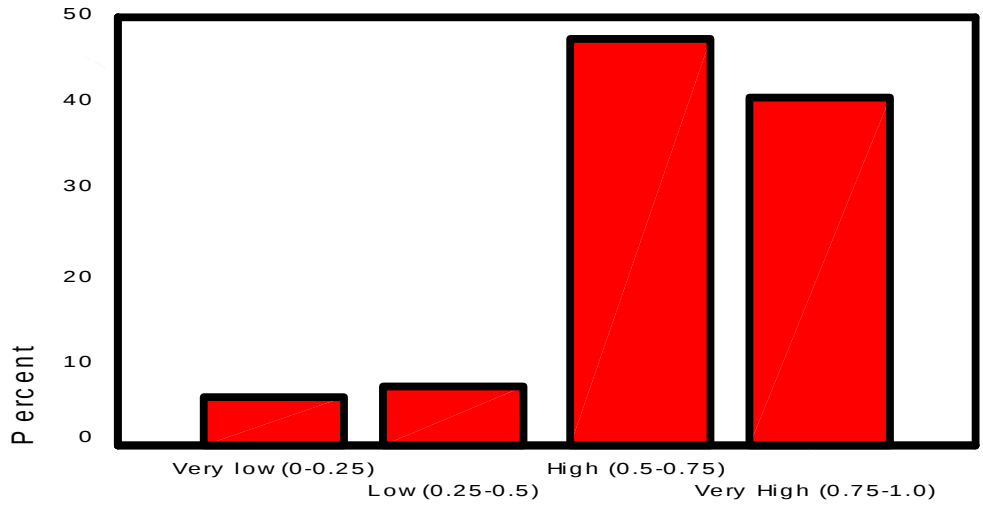
Source: Researcher (2010)

Since the p=0.000 is less than 0.05, the alpha value, reject the null hypothesis that the mean is 0.5 and conclude that it is significantly high than 0.5. This suggests that the

majority of the respondents have acquired significant levels of creativity in their respective training programs.

To examine this finding further, the respondents are classified according to the score on creativity such that Very low (0-0.25); Low (0.25-0.5); High (0.5-0.75) and Very high (0.75-1.00) creative ability classes. The distributions of the respondent's self-assessed creative abilities were as in figure 4.1 and 4.2.

Figure 4.1: Classes of respondents self



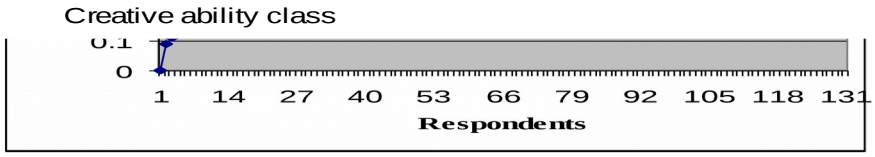


Figure 4.2: Creativity index arranged in ascending order

This chart shows that only about 20 (15.3%) students out of the sampled 132 have creative abilities less than 0.5 categorized as low to very low.

This shows that the most frequent class is that of High level of creativity followed by very high and indicates that the graduates going out of the University have a high self-confidence of being able to solve problems encountered in life and work environment by engaging creative abilities in seeking solutions. In principle therefore, from a learning creativity point of you, it can be concluded that the students do achieve their objective.

4.5 Aptitude's contribution in creativity learning

4.5.1 Aptitude inherent in Individuals

(a) Individual aptitude

The researcher was interested in gauging the individual aptitude of the respondents and to find out if ones aptitude is natural talent. It can be seen from the table that 46.2% of the respondents did agree that the individual aptitude is a natural talent that is inherited from the parents as shown in table 4.11 below.

Table 4.11: Individual aptitude

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	12	9.1	9.4	9.4
strong Disagree	12	9.1	9.4	18.8
Disagree	24	18.2	18.8	37.5
undecided/ don't know	19	14.4	14.8	52.3
Agree (A)	31	23.5	24.2	76.6
Strongly Agree (SA)	16	12.1	12.5	89.1
Very strongly Agree(VSA)	14	10.6	10.9	100.0
Total	128	97.0	100.0	
System	4	3.0		
	132	100.0		

Source: Researcher (2010)

Some of the creative acts one performs are out of the in-born trait that comes as a natural talent. This is confirmed from the responses received from the respondents.

(b) Learning creativity through training and exposure

The researcher was interested in finding out if creativity can be learnt through training and exposure. From the table 4.12 below it can be seen that creativity can be learnt through training and exposure as evidenced by the **63.5%** confirming in their responses.

Table 4.12: Learning creativity through training and exposure

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	3	2.3	2.4	2.4
strong Disagree	4	3.0	3.2	5.6
Disagree	11	8.3	8.7	14.3
undecided/ don't know	11	8.3	8.7	23.0
Agree (A)	37	28.0	29.4	52.4
Strongly Agree (SA)	27	20.5	21.4	73.8
Very strongly Agree(VSA)	33	25.0	26.2	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

Through training and exposure one is bound to make something even better than it was from the initial stage.

(c) Natural curiosity

The respondents were asked to state whether they agree with the fact it is normal to be naturally very curious, want to know things and have a wide range of knowledge. The respondents confirmed that there is always a normal and natural curiosity in a human being to want to know things and have wide range of knowledge as evidenced by **76.5%** agreeing to that fact.

Table 4.13: Natural curiosity of the respondents

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	3	2.3	2.4	2.4
strong Disagree	3	2.3	2.4	4.9
Disagree	7	5.3	5.7	10.6
undecided/ don't know	9	6.8	7.3	17.9
Agree (A)	27	20.5	22.0	39.8
Strongly Agree (SA)	37	28.0	30.1	69.9
Very strongly Agree(VSA)	37	28.0	30.1	100.0
Total	123	93.2	100.0	
Missing System	9	6.8		
Total	132	100.0		

Source: Researcher (2010)

The natural curiosity in a human being is normally there as they always want to learn more and get to know more than they know at the moment.

d**) Identification and assumptions behind ideas, proposals and problems**

The respondents were asked whether they always try to identify and challenge assumptions behind ideas, proposals, problems, believes and statement, questioning everything before accepting them. One will always identify and challenge the assumptions behind ideas, proposals, problems beliefs and statements, questioning everything before accepting them as evidenced from the responses where **75.7%** of the respondents confirmed the same.

Table 4.14: Ideas, proposals and problems

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	3	2.3	2.4	2.4
strong Disagree	3	2.3	2.4	4.7
Disagree	11	8.3	8.7	13.4
undecided/ don't know	10	7.6	7.9	21.3
Agree (A)	44	33.3	34.6	55.9
Strongly Agree (SA)	26	19.7	20.5	76.4
Very strongly Agree(VSA)	30	22.7	23.6	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

The majority of the respondents do agree that there is need for trying to identify the assumptions behind some ideas as this the basis of the implantation of the same.

Constructive Discontent. The respondents were also asked to state whether they agree with the fact that they always have a constructive discontent and always see need for improvement, propose new method for improvement. Respondents confirm that they have a constructive discontent and normally see the need for improvement and then propose new ideas or methods for improvement as 72.7% of the respondents do agree to such.

Table 4.15: Constructive Discontent

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	1	.8	.8	.8
strong Disagree	10	7.6	7.9	8.7
Disagree	5	3.8	3.9	12.6
undecided/ don't know	15	11.4	11.8	24.4
Agree (A)	40	30.3	31.5	55.9
Strongly Agree (SA)	33	25.0	26.0	81.9
Very strongly Agree(VSA)	23	17.4	18.1	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

The findings show that majority of the respondents were of the opinion that there is always need for improvement and when an entrepreneur is discontented then he will strive to improve on the idea he has and hence an improvement in the performance of the enterprise.

4.5.2 Problem Solving

The respondents were asked if they believe most problems can be solved, by faith, instinct or experience, or if they believe something can be done to eliminate or alleviate almost every problem.

From the table below it can be said that **78.3%** of the respondents believe that most problems can be solved; and something can be done to eliminate or alleviate almost every problem.

Table 4.16(a): Problem Solving

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	4	3.0	3.2	3.2
strong Disagree	6	4.5	4.8	7.9
Disagree	8	6.1	6.3	14.3
undecided/ don't know	7	5.3	5.6	19.8
Agree (A)	21	15.9	16.7	36.5
Strongly Agree (SA)	30	22.7	23.8	60.3
Very strongly Agree(VSA)	50	37.9	39.7	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

It is clear from the table that almost all problems are solvable if there is a will.

It was found out that **68.2%** of the respondents have the ability to suspend judgment and criticism until they understand the other person's points of view.

Table 4.16(b): Problem Solving

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	9	6.8	7.1	7.1
strong Disagree	8	6.1	6.3	13.5
Disagree	6	4.5	4.8	18.3
undecided/ don't know	13	9.8	10.3	28.6
Agree (A)	34	25.8	27.0	55.6
Strongly Agree (SA)	33	25.0	26.2	81.7
Very strongly Agree(VSA)	23	17.4	18.3	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

The respondents confirmed that they have optimistic attitude towards ideas in general and they do not dismiss new ideas off-hand even when they seem strange, odd, bizarre or even repulsive as evidenced 68.1% of the respondents

Table 4.16(c): Problem Solving

Key	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	5.3	5.5	5.5
strong Disagree	1.5	1.6	7.1
Disagree	8.3	8.7	15.7
undecided/ don't know	12.9	13.4	29.1
Agree (A)	24.2	25.2	54.3
Strongly Agree (SA)	22.7	23.6	78.0
Very strongly Agree(VSA)	21.2	22.0	100.0
Total	96.2	100.0	
System	3.8		
Total	100.0		

Source: Researcher (2010)

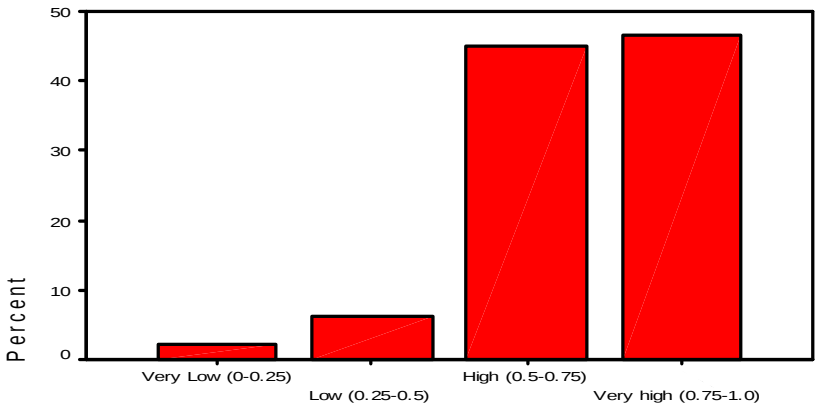
4.5.3 Determination of aptitude Index

Students were asked to assess themselves on items set out in appendix 1 on a lickert scale ranging from 1 to 7. The items are known qualities and characteristics of creative individuals. The closer the score is to seven, the better the aptitude to learn creativity.

The mean score on each item is significantly higher than 4. This shows a self-assessment that there is high aptitude in learning creativity. A score around 4 would indicate indecisiveness while scores significantly below 4 shows absence or lack of ability to learn creativity. To develop an individual total score on all items, the individual's responses were aggregated. The results show that the students mean aptitude 92.26 is significantly higher than the half mark of 163 indicating above average capability.

An aptitude index is obtained by dividing the total scores by 126 the maximum possible score so as to reduce it to a continuum ranging between 0 and 1. The mean aptitude index is 0.73 which is significantly higher than the midpoint 0.5 as shown by the one sample t test. The distribution of the index into four classes very low, low, high

and very high shows that only 11 (8.4%) of the respondents have an aptitude that is classified as low to very low, figures 4.3 and 4.4.



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Classess of the respondents according to their aptitude index

The implication of these findings is that the students have intellectual competence and capacity to learn and be creative.

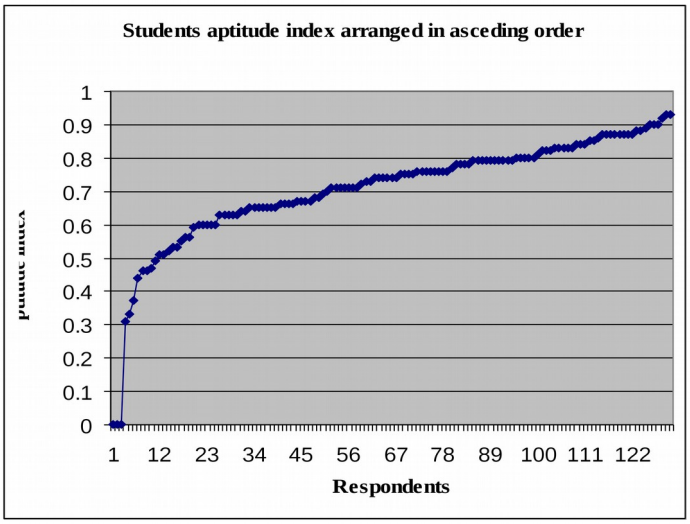


Figure 4.4: Students creative aptitude index in ascending order

Source: Researcher (2010)

A cross-tabulation of Aptitude as the independent variable against creativity as the dependent variable was obtained as in table 4.17 below.

Table 4.17: Classes of Respondents According their Aptitude Index

		Creative ability class				Total
		Very low (0-0.25)	Low (0.25-0.5)	High (0.5-0.75)	Very High (0.75-1.0)	
Classes of the respondents according to their aptitude index	Very Low (0-0.25)	3				3
	Low (0.25-0.5)	1	3	3	1	8
	High (0.5-0.75)	1	5	36	17	59
	Very high (0.75-1.0)	2	1	23	35	61
Total		7	9	62	53	131

Source: Researcher (2010)

Since some cells in the contingency table had less counts than desirable for a chi-square test, a correlation analysis was run to check whether the variables had an association which was significant at the 99% confidence level as shown in table 4.18

Table 4.18: Bivariate correlation between creativity index and Aptitude index

		Creativity index	Students Aptitude index
Creativity index	Pearson Correlation	1.000	.597
	Sig. (2-tailed)	.	.000
	N	132	132
Students Aptitude index	Pearson Correlation	.597	1.000
	Sig. (2-tailed)	.000	.
	N	132	132

** Correlation is significant at the 0.01 level (2-tailed).

Source: Researcher (2010)

This indicates a strong association between the variables.

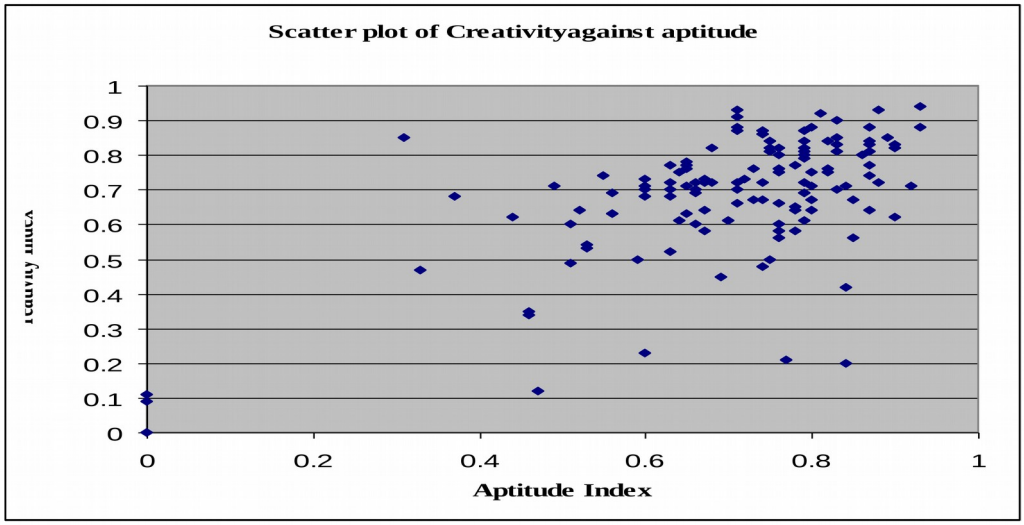


Figure 4.5: Scatter plot of Aptitude against creativity Index

Source: Researcher (2010)

After establishing that an association exists, it was necessary to check whether there is a significant linear relationship between creativity and aptitude. A scatter plot diagram figure 4.5 was obtained.

The scatter plot suggests a strong linear relationship between aptitude and creativity. This indicates that student's aptitude to learn creativity positively influences learnt abilities to be creative as expected.

Thus, since Creativity (c) = f (aptitude (A))

Is the relationship linear? Can it be modelled as?

$C = \alpha + \beta A$

A regression analysis of creativity index against aptitude index was run and presented in table 4.19 below.

Table 4.19: Linear regression of creativity against aptitude

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.597	.356	.351	.1439

Predictors: (Constant), Aptitude-students ability to learn creativity

Source: Researcher (2010)

The r(Karl Pearson's coefficient of correlation) value of 0.597 indicates that there is a relationship that can be described as strong. The r square value of 0.351 suggests that 35.1% of the change in the level of creativity can be explained by a unit change of the aptitude level. This is as expected. The model constants and coefficients were tested and presented in table 4.20 below.

Table 4.20: Linear regression model constants and coefficients

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	.234	.051		4.259	.000
	Aptitude-students ability to learn creativity	5.096E-03	.001	.597	8.442	.000

A Dependent Variable: Creativity index

The beta value of 0.051 is significantly greater than 0 at the 95% confidence level hence the model $C= \alpha + \beta A$ holds. $\alpha = 0.234$ and $\beta=0.597$

Hence $C=0.234 + 0.597A$ is the linear model that relates creativity to Aptitude.

4.6 Faculty members/lecturers ability to teach creativity

The respondents were asked to indicate whether most faculty members in their departments are highly qualified and experienced to teach creativity.

Table 4.21: Qualifications and experience of the faculty members

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	6	4.5	4.7	4.7
strong Disagree	8	6.1	6.3	10.9
Disagree	23	17.4	18.0	28.9
undecided/ don't know	17	12.9	13.3	42.2
Agree (A)	33	25.0	25.8	68.0
Strongly Agree (SA)	21	15.9	16.4	84.4
Very strongly Agree(VSA)	20	15.2	15.6	100.0
Total	128	97.0	100.0	
System	4	3.0		
	132	100.0		

Source: Researcher (2010)

Most faculties (faculties' members in the selected department are highly qualified and experienced as can be confirmed by 56.1% confirming the same. This by implication means that creativity can easily be taught by these faculty members as this was what the students' respondents said to be the case.

4.6.1 Relationship between merit and the position of the faculty members

The respondents were asked to indicate if the Faculty members merit (qualification, experience) bear a strong correlation to position held and productivity (i.e. Merit dictates appointment and promotion) .This is what the researcher was interested in.

Faculty merit (qualification and experience) bears a strong correlation to position held and productivity merit dictates appointments as can be confirmed by 57% of the respondents confirming the same.

Table 4.22: Merit and position of the faculty members

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	7	5.3	5.6	5.6
strong Disagree	14	10.6	11.1	16.7
Disagree	18	3.6	14.3	31.0
undecided/ don't know	25	18.9	19.8	50.8

Agree (A)	20	15.2	15.9	66.7
Strongly Agree (SA)	32	24.2	25.4	92.1
Very strongly Agree(VSA)	10	17.6	7.9	100.0
Total	126	95.5	100.0	

Source: Researcher (2010)

This indicates a close association between merit and productivity of the lecturers themselves and their ability to produce graduates with creative abilities who able adapt to the fast changing technological environment

4.6.2 Faculty's productivity in relation to titles

The respondents were asked to indicate if they agree with the fact that Faculty with high titles and position are equally more productive and contribute more to learning of creativity. It was established that to some extent they do as 34.1% of the respondents are of the idea that titles do have bearing on the creativity learning at their various (selected) schools.

Table 4.23: Productivity in relation to titles

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	14	10.6	11.1	11.1
strong Disagree	17	12.9	13.5	24.6
Disagree	29	22.0	23.0	47.6
undecided/ don't know	21	15.9	16.7	64.3
Agree (A)	23	17.4	18.3	82.5
Strongly Agree (SA)	17	12.9	13.5	96.0
Very strongly Agree(VSA)	5	3.8	4.0	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

4.6.4 Faculties and the publications of articles in referred journals

The respondents were asked to indicate whether they agree with the fact that most of the faculties in the department have written articles (academic papers published in journals) have written books and chapters in Books. The researcher was interested in knowing if the respondents were aware that some of their faculty members were involved in research work. It was established that most faculties have not written articles in referred journals as can be confirmed by 31% of the respondents in the affirmative as indicated in table 4.24 below.

The above low percentage can be attributed to the fact the seemingly most faculties in the schools involved in the study do not involve their students in their research work implying that when it comes to research there is little collaboration between the two groups when it comes to research.

Table 4.24: Publications of Articles in Referred Journals

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	16	12.1	12.5	12.5
strong Disagree	21	15.9	16.4	28.9
Disagree	18	13.6	14.1	43.0
undecided/ don't know	32	24.2	25.0	68.0
Agree (A)	25	18.9	19.5	87.5
Strongly Agree (SA)	10	7.6	7.8	95.3
Very strongly Agree(VSA)	6	4.5	4.7	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

This may be said to mean that either they are literally not involved in the research work leading to publication or the respondents may not be aware.

4.6.5 Faculties' participation in consultancies

The respondents were asked to indicate whether most faculties in the department are engaged in consultancy activities that use academic knowledge and it was established that 40.6% of the faculties' are engaged in consultancy services to the general public. This clearly indicate that whatever is learnt is also able to be passed to the public for their consumption and the faculty members also gain a lot in terms of whatever they gather which they use in the process of teaching to ensure they impart knowledge that enables the students to come out creative people.

Table 4.25: Participation in consultancies

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	15	11.4	11.9	11.9
strong Disagree	11	8.3	8.7	20.6
Disagree	20	15.2	15.9	36.5
undecided/ don't know	27	20.5	21.4	57.9
Agree (A)	34	25.8	27.0	84.9
Strongly Agree (SA)	14	10.6	11.1	96.0
Very strongly Agree(VSA)	5	3.8	4.0	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

4.6.6 Faculties' participation in the academic seminars, conferences and workshops

The respondents were asked to indicate whether most faculty in the department attend and present papers in seminars, conferences and workshops .It was established that 44%of the responses received indicated that their faculty members do participate in the academic conferences.

Table 4.26: Participation in the academic seminars, conferences and workshops

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	14	10.6	11.0	11.0
strong Disagree	9	6.8	7.1	18.1
Disagree	17	12.9	13.4	31.5
undecided/ don't know	29	22.0	22.8	54.3
Agree (A)	27	20.5	21.3	75.6
Strongly Agree (SA)	17	12.9	13.4	89.0
Very strongly Agree(VSA)	14	10.6	11.0	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

This therefore means that if the faculty members participate in these meeting they are bound gather a lot of information in the process of information sharing.

4.6.7 Determination of the faculty competence index

The students/respondents were asked to assess the attributes deemed essential for teaching creativity by lecturers. The items were all listed positively so that on the lickert scale the closer to 7 the better and indicates the respondent's perception of the lecturer's competence. The general response on all items is shown in appendix 1A.

On the whole the student/respondents assess the competence/ability of the lecturer to teach creativity as below average with the mean score on main items below 4 indicating disagreement on the availability or possession of the attribute thought to aid teaching of creativity among lecturers. The few items whose mean is around 4 indicates indecisiveness or simply don't know.

A faculty competence index was created by aggregating the individual respondent's scores on all the 17 items and then divided by 119 the total possible maximum score.

The mean score of 63.24 is just about half of the total maximum score. This suggests that students see their lecturers to have average ability to teach creativity.

An index of the faculty member's ability was developed by dividing each total score for the respondents by 119 to get an index lying between 0 and 1.

The mean index 0.531 is just above half mark. A one sample t test table 4.27 shows that it is not significantly higher than 0.5.

Table 4.27: One-Sample t Test on the faculty members' ability index

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Faculty competence index	.833	130	.406	1.160E-02	-1.5947E-02	3.915E-02

Source: Researcher (2010)

Since p=0.406 is higher than 0.05 the test statistic, it is concluded that there is no sufficient evidence to show that the mean is not the same as 0.5. This indicates that the students assess their lecturer's ability to teach creativity as average, neither good nor poor. When the index is classified as very low, low, high and very high, it is observed that most of the students classify the lecturers in the 3rd quartile (high) with almost an equal number in the 2nd quartile (Low). And again almost equal numbers in the very low and very high classes as shown in the table 4.28.below.

Table 4.28: Frequency distribution of respondent's perception of faculty member's ability in classes

	Frequency	Percent	Valid Percent	Cumulative Percent
Very low (0-0.25)	5	3.8	3.8	3.8
Low (0.25-0.5)	58	44.3	44.3	48.1
High (0.5-0.75)	61	46.6	46.6	94.7
Very high (0.75-1.0)	7	5.3	5.3	100.0
Total	131	100.0	100.0	

Source: Researcher (2010)

The above can be presented in a bar graph display as shown in figure 4.6.

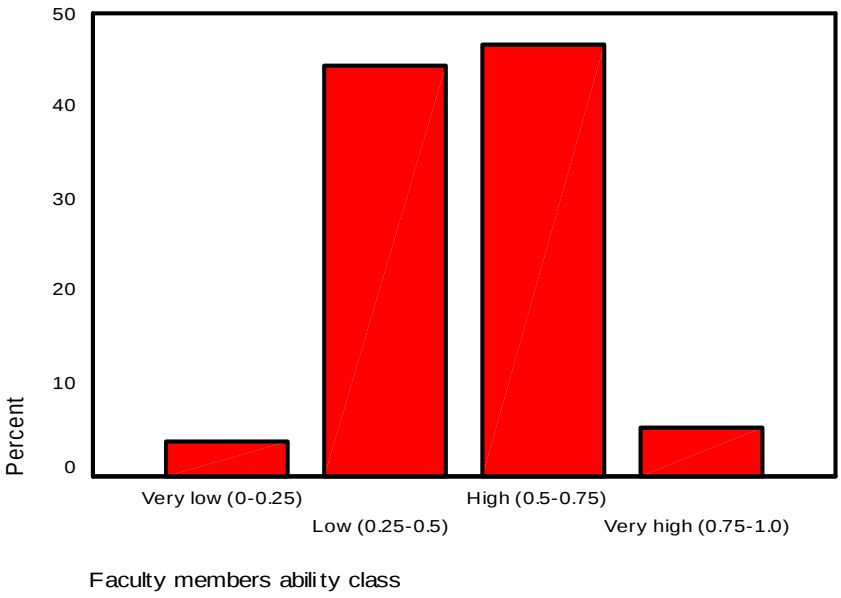


Figure 4.6: Classes of respondent's perception

Source: Researcher (2010)

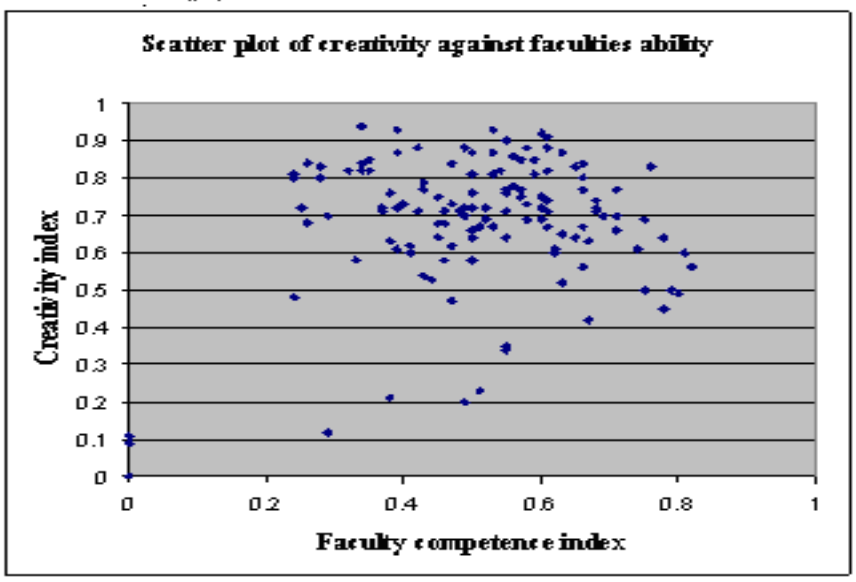
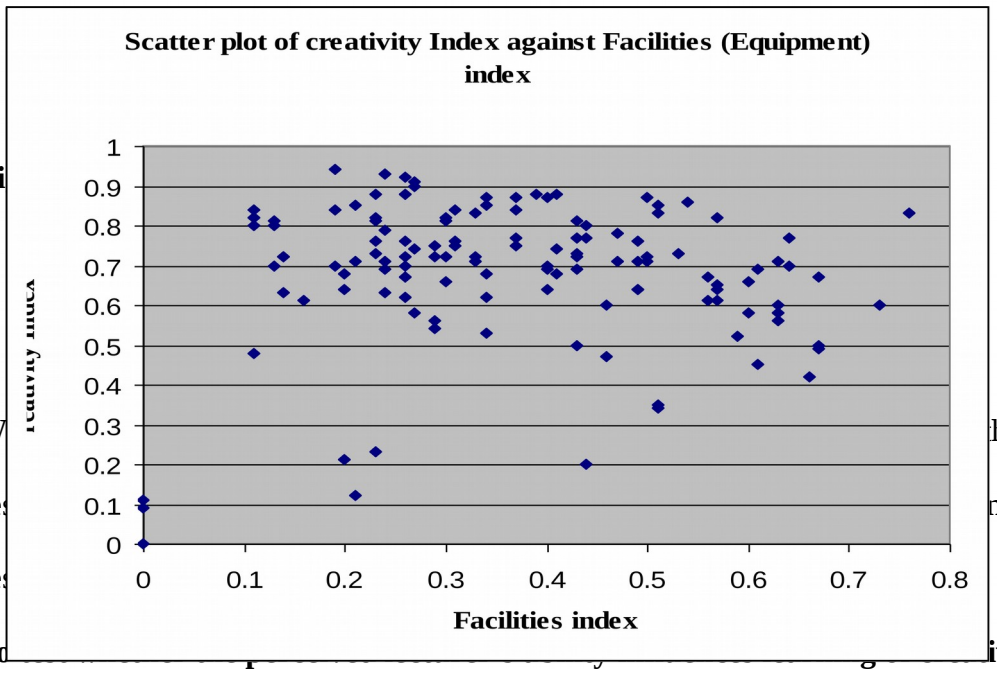


Figure 4.7: Scatter Plot of Faculty Index against Learnt Creative Ability



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Cross tabulation of the creativity index and faculty member index is shown in table 4.29. The table has some empty cells making the contingency table dismiss the use of

Chi square test to investigate association of student's creativity index and faculty member's ability index. A correlation analysis, table 4.30, shows a relationship exists.

Table 4.29: Faculty members ability class * Creative ability class Cross tabulation

		Creative ability class				Total
		Very low (0-0.25)	Low (0.25-0.5)	High (0.5-.75)	Very High (0.75-1.0)	
Faculty members ability class	Very low (0-0.25)	3	1		1	5
	Low (0.25-0.5)	3	1	28	26	58
	High (0.5-0.75)	1	4	31	25	61
	Very high (0.75-1.0)		3	3	1	7
Total		7	9	62	53	132

Source: Researcher (2010)

Table 4.30: Bivariate correlation of creativity index against the faculty ability index

		Creativity index	Faculty competence index
Creativity index	Pearson Correlation	1.000	.197
	Sig. (2-tailed)	.	.024
	N	132	132
Faculty competence index	Pearson Correlation	.197	1.000
	Sig. (2-tailed)	.024	.
	N	132	132

* Correlation is significant at the 0.05 level (2-tailed).

Source: Researcher (2010)

This establishes that an association between creativity and faculty member's competence exists. To investigate the nature of the relationship, a scatter diagram, figure 4.8, was plotted which does not seem to develop a discernable pattern.

The scatter plot does not show a clearly discernable relationship between faculty index and creativity index. To test whether the relationship between creativity and faculty is linear, a regression analysis was run whose results suggest a weak relationship as shown in tables 4.31 and 4.32.

Table 4.31: Linear regression of creativity index and faculty index Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.197	.039	.031	.1758

Predictors: (Constant), Faculty competence index

Source: Researcher (2010)

Table 4.32: Coefficients of the linear regression model of creativity and faculty indices

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	.574	.052		11.071	.000
	Faculty competence index	.221	.097	.197	2.285	.024

A Dependent Variable: Creativity index

Source: Researcher (2010)

The Karl Pearson's product moment coefficient of correlation r = 0.197 is low and suggests a weak relationship. The r squares = 0.031 indicates that only 3.1 % of the change in level of creativity can be explained by a unit change in the level of faculty competence.

The beta β=0.221 value is however significantly higher than 0 and hence the linear relationship holds with a model

C= 0.574 + 0.221L

This indicates that although the relationship is **weak**, the faculty factor cannot be ignored and should be actually strengthened to have greater influence on the student's creative ability.

4.7 Influence of teaching facilities on creativity learning

The various teaching facilities were investigated and various responses were received

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4.7.1 Laboratories and workshop

The respondent were asked whether their departments have enough / adequate laboratory and workshops facilities(computer, engineering laboratories, workshops and

other work spaces) necessary for practical sessions that enhance creative abilities. It was established that not enough labs, workshops facilities for practical sessions are available for use by the students as only 23.1% of the respondents do agree that these facilities are available as shown in the table 4.33 below.

Table 4.33: Availability of laboratories and Workshops

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	37	28.0	28.9	28.9
strong Disagree	25	18.9	19.5	48.4
Disagree	30	22.7	23.4	71.9
undecided/ don't know	5	3.8	3.9	75.8
Agree (A)	18	13.6	14.1	89.8
Strongly Agree (SA)	5	3.8	3.9	93.8
Very strongly Agree(VSA)	8	6.1	6.3	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

Availability of these facilities enhance creative learning at the university level as this forms part of the practical aspects of what is learnt and hence the implementation of those new ideas generated.

4.7.2 Supply of Workshop and laboratory facilities

The respondents were asked to indicate whether they agree with the fact that there are an adequate supply of tools, equipment and materials needed in teaching/ learning creativity in the department. However, only 21.2%of the respondents confirmed that there was adequate supply of tools, equipment and materials needed for teaching/learning creativity in their respective departments as shown in table 4.34 below.

Table 4.34: Supply of Workshop and laboratory facilities

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	31	23.5	24.4	24.4
strong Disagree	30	22.7	23.6	48.0
Disagree	28	21.2	22.0	70.1
undecided/ don't know	10	7.6	7.9	78.0
Agree (A)	21	15.9	16.5	94.5
Strongly Agree (SA)	4	3.0	3.1	97.6
Very strongly Agree(VSA)	3	2.3	2.4	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

4.7.3 Availability of space and the student enrolment

The researcher was interested in knowing the availability of space for learning purposes. It was established that spaces (classrooms, lecture halls laboratories and workshops) are not adequate for the students occupying them at a time as only 28% of the respondents do agree that they available as shown in table 4.35.

Table 4.35: Spaces –student ratio

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	29	22.0	22.8	22.8
strong Disagree	22	16.7	17.3	40.2
Disagree	23	17.4	18.1	58.3
undecided/ don't know	16	12.1	12.6	70.9
Agree (A)	21	15.9	16.5	87.4
Strongly Agree (SA)	10	7.6	7.9	95.3
Very strongly Agree(VSA)	6	4.5	4.7	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

By getting to know those emerging issues, it is possible that the students will be able to have a certain mind-set so that they research on some things which can assist them in sorting out those emerging issues or to design their special projects to suit those problems so that they become solvable.

4.7.4 Use of internet facilities in the library

The respondents were asked to indicate whether they easily access the internet as source of current information and creative ideas. Quite a good number of Students easily access internet as a source of current information and creative ideas as confirmed by 42.4% of the respondents who do agree that they make use of the internet facilities in the library as shown in table 4.36 below.

Table 4.36: Use of internet facilities

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	23	17.4	18.4	18.4
strong Disagree	22	16.7	17.6	36.0
Disagree	15	11.4	12.0	48.0
undecided/ don't know	12	9.1	9.6	57.6
Agree (A)	30	22.7	24.0	81.6
Strongly Agree (SA)	15	11.4	12.0	93.6
Very strongly Agree(VSA)	8	6.1	6.4	100.0
Total	125	94.7	100.0	
System	7	5.3		
Total	132	100.0		

Source: Researcher (2010)

Through the use of internet the respondents are able to get learn about the current information that still is quite useful in the make correct information about a special project one want to undertake.

4.7.5 Availability of Recreational facilities

The respondents were asked to indicate whether they do agree with the fact that Recreation facilities are good and adequate to facilitate relaxed stress free mind ready for creative thinking. It was established from the study that only 39.4% of the respondents do agree that this happens.

Table 4.37: Recreational facilities

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	24	18.2	18.8	18.8
strong Disagree	19	14.4	14.8	33.6
Disagree	17	12.9	13.3	46.9
undecided/ don't know	16	12.1	12.5	59.4
Agree (A)	24	18.2	18.8	78.1
Strongly Agree (SA)	14	10.6	10.9	89.1
Very strongly Agree(VSA)	14	10.6	10.9	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

This implies that relaxation of the mind sometimes is a source of inspiration and one can think creatively and come up with an improvement to the idea he had initially as one will take time to sleep over the matter.

4.7.6 Acquisition of new facilities for use by departments

The respondents were asked to indicate whether their respective departments continuously acquire new facilities to accommodate changes in technology. It was established from the study that only 28 % of the Students respondents their departments continuously acquire new facilities to accommodate changes in technology which do change every time in this fast changing technological environment.

Table 4.38: Purchase of new facilities

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	40	30.3	31.3	31.3
strong Disagree	20	15.2	15.6	46.9
Disagree	23	17.4	18.0	64.8
undecided/ don't know	8	6.1	6.3	71.1
Agree (A)	16	12.1	12.5	83.6
Strongly Agree (SA)	9	6.8	7.0	90.6
Very strongly Agree(VSA)	12	9.1	9.4	100.0
Total	128	97.0	100.0	
System	4	3.0		
	132	100.0		

Source: Researcher (2010)

Acquisition of new facilities would enable the respondents to cope with the technology which is fast changing and also enable the department s to produce the graduates with creative abilities.

4.7.7 Determination of facility index

The respondents were asked to assess the learning/teaching facilities available to them on a scale of 1 to 7. The responses on the various items indicating level of satisfaction on availability and access are as shown in appendix 1A.

The facilities were assessed to be inadequate in all spheres. It is noteworthy that the facility judged to be the poorest is the labs, materials and the library with a mean score of 2.8,2.9 and 3.000 0n a scale of 1 to 7 respectively yet they are the academics heart of creativity and existence.

On all items pooled together the student's score on facilities are a mean of 25.5 out of a possible total of 70 which is on the lower side. The total score on all items by a respondent were divided by 70 to get an index of facilities that range between 0 and 1. A one sample t test on calculated index of facilities shows that the mean, 0.364 is significantly less than half, 0.5 as shown in table 4.39.

Table 4.39: One-Sample Test of the mean facility index

	Test Value = 0.5					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Index for teaching facilities adequacy	-9.240	130	.000	-.1362	-.1653	-.1070

Source: Researcher (2010)

The p=0.000 value is less than 0.05 showing that the mean =0.3638 is not equal to 0.5 hence the difference is significant. This confirms that the students are of the opinion that the teaching facilities are not adequate to facilitate learning creativity. When the indices is classified into very low, low, high and very high classes, most of the respondents indicate that the facilities are in the low adequacy class, table 4.40.

Table 4.40: Class of facilities according to respondents

	Frequency	Percent	Valid	Cumulative

			Percent	Percent
Very low (0-0.25)	34	26.0	26.0	26.0
Low (0.25-0.5)	68	51.9	51.9	77.9
High (o.5-0.75)	28	21.4	21.4	99.2
Very high (0.75-1.0)	1	.8	.8	100.0
Total	131	100.0	100.0	

Source: Researcher (2010)

4.7.8 To check whether an association exists between creativity and facilities

Cross tabulation of the independent variable teaching facilities against the dependent variable creativity shown in table 4.41, shows that the contingency table has several cells with counts less than five which is not admissible for chi square test for checking whether an association exists.

Table 4.41: Creative ability class * Class of facilities according to respondents Cross tabulation

		Class of facilities according to respondents				Total
		Very low (0-0.25)	Low (0.25-0.5)	High (0.5-0.75)	Very high (0.75-1.0)	
Creative ability class	Very low (0-0.25)	5	1	1		7
	Low (0.25-0.5)	1	2	6		9
	High (0.5-0.75)	12	34	16		62
	Very High (0.75-.0)	16	31	5	1	53
Total		34	68	28	1	131

Source: Researcher (2010)

A correlation analysis, table 4.42, shows that the relationship is not significant.

Table 4.42: Bivariate correlation analysis of creativity index and facility index

		Creativity index	Index for teaching facilities adequacy
Creativity index	Pearson Correlation	1.000	.009
	Sig. (2-tailed)	.	.918
	N	131	131
Index for teaching facilities adequacy	Pearson Correlation	.009	1.000

	Sig. (2-tailed)	.918	.
	N	131	131

Source: Researcher (2010)

The p=0.918 is higher than the test statistic 0.05 and hence, there is no sufficient evidence to show that the correlation is significant. Similarly, a visual examination of the scatter diagram figure 12 does not reveal existence of a clear relationship.

A linear regression analysis of the facility index and the creativity index indicates that the linear relationship between the variables is very weak r=0.039 with an r squared = -0.002, table 4.45, indicating that the way things are, a change in teaching facilities explains a reduction of 0.2% of creative abilities for every unit of change. Table 4.44 shows that the coefficients of the linear model are α=0.697 and β=-0.0384.

Table 4.43: Linear regression of facility index against creativity index model

Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.039	.001	-.002	.1685

A Predictors: (Constant), Index for teaching facilities adequacy.

Source: Researcher (2010)

Table 4.44: Linear regression coefficients of the facility index and creativity index

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	.697	.028		25.004	.000
	Index for teaching facilities adequacy	-3.840E-02	.062	-.039	-.617	.538

A Dependent Variable: Creativity index

Source: Researcher (2010)

A test on the model C= α + βE shows that α=0.697 and that β=-0.0384 is not significantly less than zero, with P=0.538 which makes the model collapse to a straight horizontal line implying that facilities at the university do not influence the students learning of creative abilities.

C= α + Bf =0.697 -0.0384F

This suggests that a lot needs to be done to improve the facilities at the university if they have to contribute to the desired goal of learning creative abilities.

4.8 Contribution of the academic programs in creativity learning

The academic programmes implemented by the various academic institutions have an integral role to play to play in the process of developing students with creative abilities.

4.8.1 Suitability of academic programmes and courses

The respondents were asked to indicate whether they agree with the fact that the programmes and all courses in the program are very good and well suited in developing creative graduates. It was established that of the entire student respondents, only 31.1% do agree that programmes and all courses in the program are very good and well suited in developing creative graduates who are off-loaded to the job market.

Table 4.45: Programmes and courses

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree (VSD)	19	14.4	14.8	14.8
Strong Disagree (SD)	15	11.4	11.7	26.6
Disagree (D)	35	26.5	27.3	53.9
undecided/ don’t know (U)	18	13.6	14.1	68.0

Agree (A)	26	19.7	20.3	88.3
Strongly Agree (SA)	8	6.1	6.3	94.5
Very strongly Agree(VSA)	7	5.3	5.5	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

The only way a university can produce graduates who would adequately fit the fast changing world of work is through designing programmes which are geared towards fulfilling this onerous task.

4.8.2 Programmes role

The respondents were asked to indicate whether the program facilitates theory and practical learning of skills that meet the needs and challenge of the current world. It was established that according to the survey, 36.3% of the respondents do agree that Programmes facilitate theory and practical learning of skills that meets the needs and challenges of the current world

Table 4.46: Programmes role

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	14	10.6	10.9	10.9
strong Disagree	15	11.4	11.7	22.7
Disagree	27	20.5	21.1	43.8
undecided/ don't know	24	18.2	18.8	62.5
Agree (A)	30	22.7	23.4	85.9
Strongly Agree (SA)	13	9.8	10.2	96.1
Very strongly Agree(VSA)	5	3.8	3.9	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

It should be noted that the academic programmes should be able to enable one do what he has learnt theoretically and apply it practically .This is basically the aim of learning in the institutions of higher learning.

4.8.3 Programmes review

The researcher was in interested in knowing if in any case the respondents whether they are aware that the programmes are regularly reviewed (at least once in three years) to reflect the changes in technology and the community needs. From the study it was established that from the table below, that programmes are not regularly reviewed to reflect the changes in technology and the community needs as can be confirmed by only 21.1% who do agree in the affirmative.

Table 4.47: Review of programmes

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	34	25.8	26.6	26.6
strong Disagree	18	13.6	14.1	40.6
Disagree	29	22.0	22.7	63.3
undecided/ don't know	19	14.4	14.8	78.1
Agree (A)	18	13.6	14.1	92.2
Strongly Agree (SA)	6	4.5	4.7	96.9
Very strongly Agree(VSA)	4	3.0	3.1	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

Review of academic programmes is usually necessary because there are normally changes in technology as well as the continuous change in the needs of the community. These changes must be addressed only by reviewing the programmes which the students undergo so as to make the graduates competitive as they play their rightful role in the society.

4.8.4 University /Industry link

The researcher was interested in knowing whether there exists a relationship between the university and the industry. It was established that the university Programmes to

some extent support and encourage a strong university/ industry link. This can be confirmed by the 40.1% of the respondents giving a positive response.

Table 4.48: University/industry link

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	15	11.4	11.7	11.7
strong Disagree	18	13.6	14.1	25.8
Disagree	25	18.9	19.5	45.3
undecided/ don't know	17	12.9	13.3	58.6
Agree (A)	30	22.7	23.4	82.0
Strongly Agree (SA)	11	8.3	8.6	90.6
Very strongly Agree(VSA)	12	9.1	9.4	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

The university being a production unit is encouraged to have a strong link with the industry as the product (graduates with creative abilities) is meant for the job market. These graduates should be able adapt to the fast changing technological environment.

4.8.5 The design of programmes

The respondents were asked to indicate whether the programmes are designed to encourage and support learners centred approach to teaching and learning. It was established that the university programmes are designed to encourage and support learners centered approach to teaching and learning to some extent as evidenced by 35.6% of the respondents responding in the affirmative as shown in table 4.49 below.

Table 4.49: Programmes Designs

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	15	11.4	11.8	11.8
strong Disagree	16	12.1	12.6	24.4
Disagree	30	22.7	23.6	48.0
undecided/ don't know	19	14.4	15.0	63.0
Agree (A)	28	21.2	22.0	85.0
Strongly Agree (SA)	11	8.3	8.7	93.7
Very strongly Agree(VSA)	8	6.1	6.3	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

4.8.6 Practical projects

The respondents were asked to indicate whether the programmes are adequate and require students to undertake, practical, projects and industrial attachment to enhance learning by doing. The study found out that to some extent this true as 62.1% of the respondents do agree to this as shown in table 4.50 below.

Table 4.50: Projects undertaken

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	8	6.1	6.3	6.3
strong Disagree	9	6.8	7.1	13.4
Disagree	11	8.3	8.7	22.0
undecided/ don't know	17	12.9	13.4	35.4
Agree (A)	37	28.0	29.1	64.6
Strongly Agree (SA)	27	20.5	21.3	85.8
Very strongly Agree(VSA)	18	13.6	14.2	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

Industrial attachments to some extent normally promote learning by doing. During the attachment the students get an opportunity to implement what they learn in theory also get to know the work environment.

4.8.7 Programmes Development

The respondents were also asked to indicate if the programmes are developed by the faculty members with the collaboration of industry players and other stakeholders to reflect the needs of the society. It was found out from the study that 37.9% of the respondents do confirm that the same is developed by the faculty members with the collaboration of industry players and other stakeholders to reflect the needs of the society.

Table 4.51: Programme development

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	19	14.4	14.8	14.8
strong Disagree	13	9.8	10.2	25.0
Disagree	18	13.6	14.1	39.1
undecided/ don't know	28	21.2	21.9	60.9
Agree (A)	27	20.5	21.1	82.0
Strongly Agree (SA)	14	10.6	10.9	93.0
Very strongly Agree(VSA)	9	6.8	7.0	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

The collaboration is necessary as it is through this process that the stakeholders get to learn much more what the university stands for and the university also would in a way recognize the role played by the stakeholders. This process can lead to the production of university graduates who are well suited to work in the environment which is fast changing.

4.8.8 The design of courses in programmes

The respondents were asked to indicate whether they agree with the fact that the design of all courses in the programs in their departments are market driven emphasizing learning of creativity through problem solving as opposed to traditional courses that emphasizes skills development. It was established from the survey that 32.6%espondents do agree that design of all courses in the program are market driven emphasizing learning of creativity through problem solving as opposed to traditional course that emphasizes skills development.

Table 4.52: Design of courses

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	18	13.6	14.3	14.3
strong Disagree	20	15.2	15.9	30.2
Disagree	26	19.7	20.6	50.8
undecided/ don't know	19	14.4	15.1	65.9
Agree (A)	27	20.5	21.4	87.3
Strongly Agree (SA)	9	6.8	7.1	94.4
Very strongly Agree(VSA)	7	5.3	5.6	100.0
Total	126	95.5	100.0	
System	6	4.5		
Total	132	100.0		

Source: Researcher (2010)

The above implies that the courses are practically oriented and meet the needs of the society.

4.8.9 Teamwork in the programme

The respondents were asked to indicate whether group projects that were inherent in the programme enhance students' creative and innovative ability through problem solving and team work. It was established that 41.7% of the respondents agreeing to the fact that teamwork is a better way of problem solving.

Table 4.53: Teamwork in project work

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	12	9.1	9.4	9.4
strong Disagree	18	13.6	14.2	23.6
Disagree	18	13.6	14.2	37.8
undecided/ don't know	24	18.2	18.9	56.7
Agree (A)	29	22.0	22.8	79.5
Strongly Agree (SA)	15	11.4	11.8	91.3
Very strongly Agree(VSA)	11	8.3	8.7	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

Teamwork is very crucial in problem solving process as ideas are shared and the solution to the problem is easily found.

4.8.10 Exhibition of ideas through programmes

The respondents were asked if the programs facilitate, provide avenues and opportunities for exhibiting creative works and creativity and reward the best and links potential inventers to organizations and bodies that assist in the commercialization of viable ideas. It was established that Some of the respondents(28.8%)do agree that the programmes facilitates, provide avenues and opportunities for exhibiting creative works and creativity and reward the best and links potential inventers to organizations and bodies that assist in the commercialization of viable ideas. This is the innovation where the ideas that have been commercialized.

Table 4.54: Programme exhibition

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	22	16.7	17.3	17.3

strong Disagree	26	19.7	20.5	37.8
Disagree	21	15.9	16.5	54.3
undecided/ don’t know	19	14.4	15.0	69.3
Agree (A)	24	18.2	18.9	88.2
Strongly Agree (SA)	8	6.1	6.3	94.5
Very strongly Agree(VSA)	6	4.5	4.7	99.2
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

4.8.11 Programme and Professional competencies

The respondents were asked to indicate whether the programs lead to the development of professional competencies, confident and creative graduates who are able to fit in any work environment exploiting creative abilities and face current and emerging challenges. It was found out that 43.2% of the respondents do agree to that.

Table 4.55: Programmes and professional competencies

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	12	9.1	9.4	9.4
strong Disagree	15	11.4	11.7	21.1
Disagree	22	16.7	17.2	38.3
undecided/ don't know	22	16.7	17.2	55.5
Agree (A)	30	22.7	23.4	78.9
Strongly Agree (SA)	15	11.4	11.7	90.6
Very strongly Agree(VSA)	12	9.1	9.4	100.0
Total	128	97.0	100.0	
System	4	3.0		
Total	132	100.0		

Source: Researcher (2010)

The professional competencies in an individual usually have its roots in the programmes one undergoes during the studies. The responses simply show that even the respondents had some competencies in them.

4.8.12 Determination of the programme index

Students were asked to assess the academic programs on a 7 point lickert scale with 13 items. All items, appendix 1, were stated positively indicating desirability and that the higher the rating on the scale shows the respondents satisfaction on the program with regard to that item. All the respondents rating was aggregated to give the total score on the programs by each respondents and an index calculated by dividing the total score by 91 the maximum possible score on all items so that the index range from 0-1. The index was denoted by Program index progind for SPSS coding purposes.

Except the items on practical requirements, projects and competence outcome where respondents are indecisive, all other items are rated lowly with a mean index of 0.549 which is significantly higher than 0.5, the mid -point as shown in table 4.58 below.

Table 4.56: One-Sample Test of the difference between the mean programs index and 0.5

	Test Value = 0.5					
Academic programs adequacy for creativity index	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
	4.520	257	.000	4.880E-02	2.754 E-02	7.006E-02

Source: Researcher (2010)

This indicates that the students rate the programs highly for capability to facilitate learning creativity.

The program index is divided into four classes; very low, low, high and very high. The distribution of the rating shows that most of the students place the programs in the high class as seen in figure 4.9.

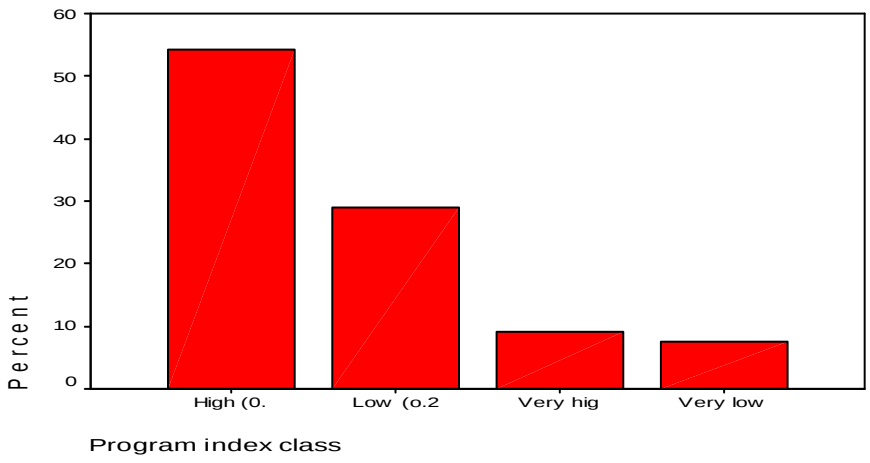


Figure 4.9: Frequency distribution of the respondents rating of academic programs

Source: Researcher (2010)

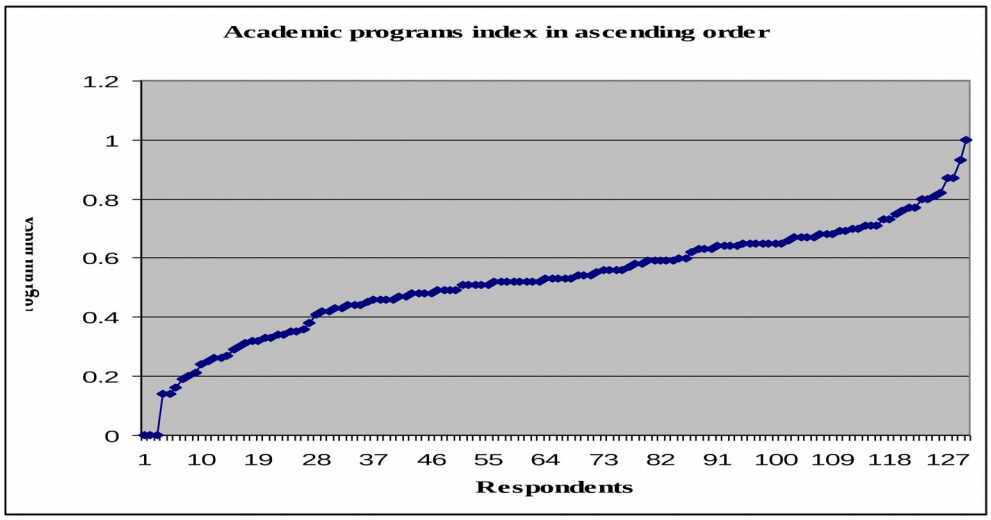
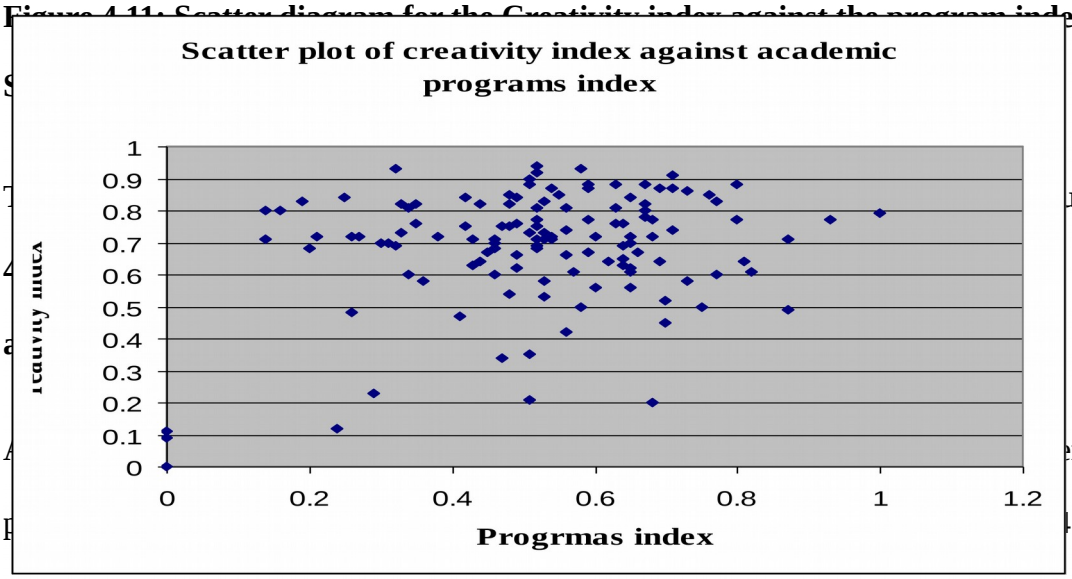


Figure 4.10: Academic programs index arranged in ascending order

Source: Researcher (2010)

When the program index is plotted in ascending order, figure 4.10, it is seen that The diagram shows that most of the respondents rate the academic programs as lying in the high and low classes.

Figure 4.11: Scatter diagram for the Creativity index against the program index



however, does not clearly show the nature of the relationship.

Table 4.57: Bivariate correlation of creativity index and academic programs index

		Creativity index	Program index
Creativity index	Pearson Correlation	1.000	.273
	Sig. (2-tailed)	.	.002
	N	132	132
Program index	Pearson Correlation	.273	1.000
	Sig. (2-tailed)	.002	.
	N	132	132

** Correlation is significant at the 0.01 level (2-tailed).

Source: Researcher (2010)

Visual examination of the scatter plot figure 4.12 does not appear to be an appreciable relationship although correlation analysis says there is. Regression analysis is necessary to investigate whether such relationship is linear. Table 4.58(a) and 4.58(b) shows that the Karl Pearson's correlation coefficients r = 0.273 is low the r square = 0.075 shows that only 7.5% of the change in creative abilities can be explained by a unit change in programs.

Table 4.58(a): Linear regression analysis model summary of creativity against program index

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.273	.075	.067	.1725

a Predictors: (Constant), Program index

Source: Researcher (2010)

Testing the model C= α + βP where α=0.548 and β=0.264 shows that the beta value is significantly higher than 0 and so the model holds.

Table 4.58(b): Linear regression of creativity against programs model coefficients

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		

1	(Constant)	.548	.045		12.060	.000
	Program index	.264	.082	.273	3.223	.002

a Dependent Variable: Creativity index

Source: Researcher (2010)

C= 0.548 + 0.264P

These findings indicate that although the programs are liked by the students, various parameters that improve their attractiveness should be looked into and efforts made to make them better so that the correlation coefficient improves.

4.9 The teaching methods that enhances creativity learning at university level

4.9.1 Instructional Methods

a) Field and Industrial visits

The respondents were asked to indicate whether field and industrial visits were used in the department as a teaching (learning approach). Descriptively, the study established that 62.1% of the respondents attest to the fact that field and industrial visits in the various departments are used as a learning approach (teaching approach).

Table 4.59: Field and Industrial visits

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	9	6.8	7.1	7.1
strong Disagree	11	8.3	8.7	15.7
Disagree	16	12.1	12.6	28.3
undecided/ don't know	9	6.8	7.1	35.4
Agree (A)	29	22.0	22.8	58.3
Strongly Agree (SA)	23	17.4	18.1	76.4
Very strongly Agree(VSA)	30	22.7	23.6	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total				

Source: Researcher (2010)

The field and industrial visits is one way to put to use the knowledge the respondents gain in theory and put them to use. The respondents do confirm that this better way of learning by doing.

b) Innovation through teaching

The respondents were asked indicate whether reverse engineering is encouraged in their various departments. From the information given by the respondents, it was established that 20.3% of teaching do involve reverse engineering where students are encouraged to dismantle a functioning novel project, study its principles and develop their own improved projects as shown in the table 4.59 below.

Table 4.60: Reverse engineering

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	37	28.0	29.1	29.1
strong Disagree	21	15.9	16.5	45.7
Disagree	27	20.5	21.3	66.9
undecided/ don't know	15	11.4	11.8	78.7
Agree (A)	12	9.1	9.4	88.2
Strongly Agree (SA)	11	8.3	8.7	96.9
Very strongly Agree(VSA)	4	3.0	3.1	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

The involvement of the use of reverse engineering means that the knowledge gained by the students is put to use they apply the same in the process of dismantling the projects and re-assembling them again. This process will to some extent encourage creativity.

c) Instructional media use

The respondents were asked to indicate if the faculty members often/frequently use instructional media in developing and teaching new concepts. It was found out that

28.1% of the respondents do agree that the lecturers make use of the instructional media in developing and teaching creativity as shown table 4.61 below.

Table 4.61: Use instructional media

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	19	14.4	15.4	15.4
strong Disagree	16	12.1	13.0	28.5
Disagree	39	29.5	31.7	60.2
undecided/ don't know	12	9.1	9.8	69.9
Agree (A)	26	19.7	21.1	91.1
Strongly Agree (SA)	8	6.1	6.5	97.6
Very strongly Agree(VSA)	3	2.3	2.4	100.0
Total	123	93.2	100.0	
System	9	6.8		
Total	132	100.0		

Source: Researcher (2010)

The use of instructional media is way of passing the required information so that the faculty members able to communicate with the students.

d) Use of laboratories

The researcher was interested in knowing the extent to which the Laboratory experiments which were commonly undertaken are used to develop new concepts.

It was established that 33.3% of the respondents do agree that the experiments conducted at the various laboratories are used by the faculty members to develop new concepts as shown in the table 4.62 below.

Table 4.62: Laboratory experiments

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	19	14.4	15.4	15.4
strong Disagree	19	14.4	15.4	30.9
Disagree	22	16.7	17.9	48.8
undecided/ don't know	19	14.4	15.4	64.2
Agree (A)	28	21.2	22.8	87.0
Strongly Agree (SA)	11	8.3	8.9	95.9
Very strongly Agree(VSA)	5	3.8	4.1	100.0
Total	123	93.2	100.0	
System	9	6.8		
Total	132	100.0		

Source: Researcher (2010)

The above indicates that the use of laboratories in the use university is of significance because the faculty members and their students can come up with new concepts which can be used to improve a project.

e) Academic -industry Partnership

The researcher wanted to know whether there exist a any close association between the academic world and the industry. It was established that 33.4% of the respondents do agree that there exists a partnership between the academic and industry as can be seen in the table 4.63 below.

Table 4.63: Academic industry partnership

Key	Frequency	Percent	Valid Percent	Cumulative Percent
Very strongly Disagree	30	22.7	23.6	23.6
strong Disagree	16	12.1	12.6	36.2
Disagree	20	15.2	15.7	52.0
undecided/ don't know	17	12.9	13.4	65.4
Agree (A)	27	20.5	21.3	86.6
Strongly Agree (SA)	9	6.8	7.1	93.7
Very strongly Agree(VSA)	8	6.1	6.3	100.0
Total	127	96.2	100.0	
System	5	3.8		
Total	132	100.0		

Source: Researcher (2010)

To some extent there is an academic-industry partnership in teaching in the department where part time faculty members are resourced from the industry or come in as guest speakers. Such a partnership is very crucial in that it facilitates a gain on both sides of the divide.

4.9.2 Determination of teaching methods index

The student respondents were asked to assess the teaching methods used with a view to gauging the extent to which they enhance creative abilities in students. A lickert scale was used with 18 items to be scored on a scale of 1 to 7.

The mean score on each item is shown in appendix 1 and indicates that except field and industrial visits, and practical and projects which have a score of more than 4 the mid mark, all other methods are rated poorly. When all items are pooled together, the total score for each item by the respondents is divided by 126 the maximum possible total score for all items to get a methodology index. The mean methodology index is 0.42 which is significantly lower than the midpoint 0.5 as shown by the one sample t test, table 4.63 p=0.000 value is less than 0.05.

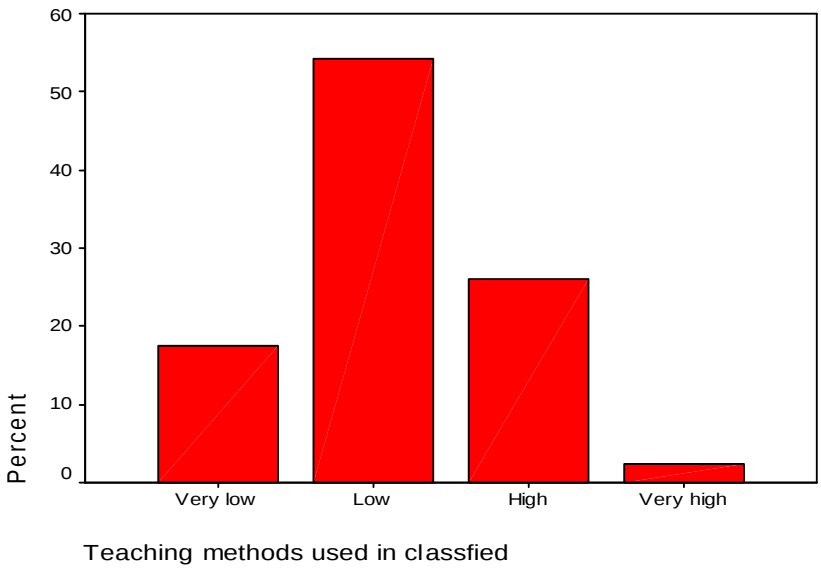


Figure 4.12: Distribution of the respondents rating of teaching methods in classes

Source: Researcher (2010)

Table 4.64: One-Sample t Test of the difference between the means of teaching methods index and 0.5 the test statistic

Test Value = 0.5						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Teaching	-5.197	130	.000	-7.9924E-02	-.1103	-4.9498E-

methods index						02

Source: Researcher (2010)

This implies that, on the whole students are dissatisfied with the teaching methodology employed. Or the teaching methods used are rated lowly in as far as facilitating learning of creativity is concerned.

When the responses were classified ranging from very low, low, high and very high, the highest frequency is in the low class as shown in figure 4.12.

This shows that most of the student respondents rank the teaching methods as low in ability to facilitate learning creativity. The teaching methods index put in ascending order is in figure 4.14, demonstrates that most 91(69.5%) of the respondents assess adequacy of teaching methods used as low below 0.5.

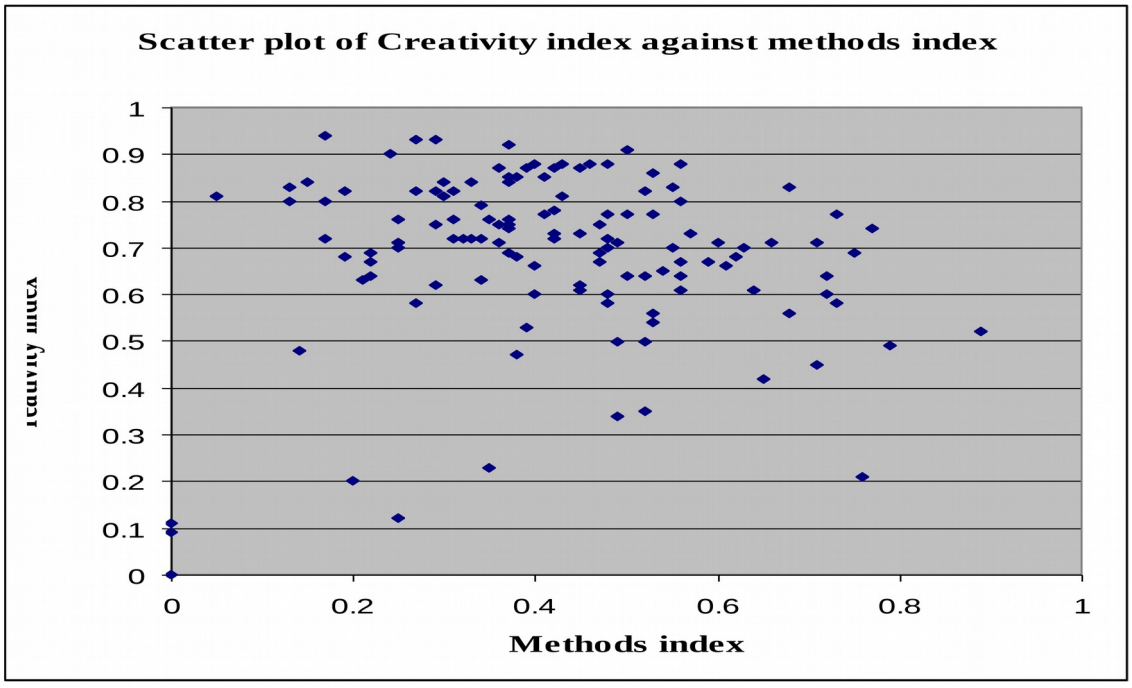


Figure 4.13: Scatter plot of creativity\ index against methods index

Source: Researcher (2010)

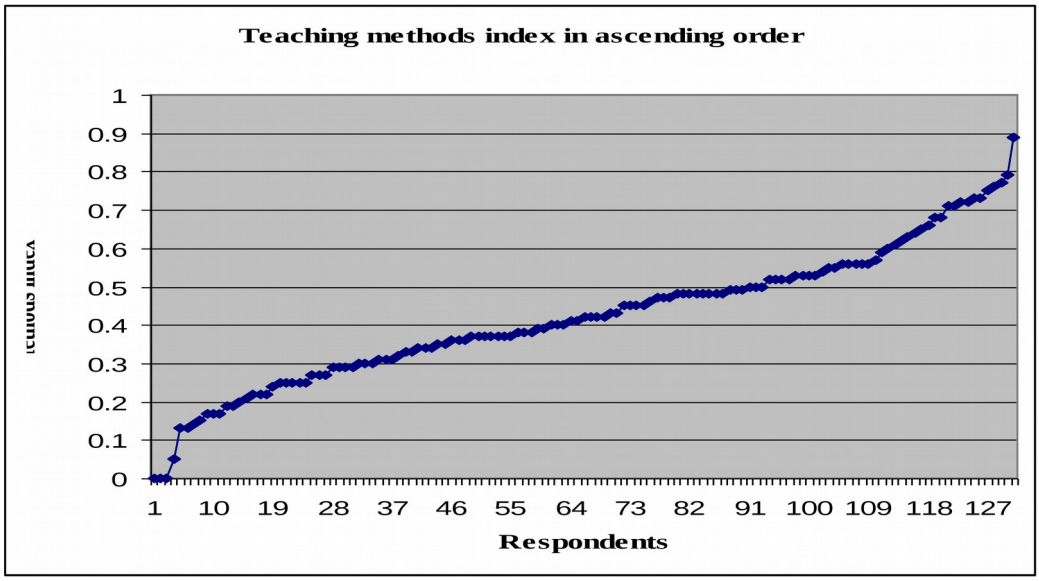


Figure 4.14: Teaching methods index arranged in ascending order

Source: Researcher (2010)

4.8.3 To test whether the teaching methods affect creativity

A correlation analysis shows that r=0.008 which is not significant at the 95% confidence level, p=0.923 as shown in table 4.64 below.

Table 4.65: Correlation analysis of creativity against methods index

		Creativity index	Teaching methods

			index
Creativity index	Pearson Correlation	1.000	.008
	Sig. (2-tailed)	.	.923
	N	131	131
Teaching methods index	Pearson Correlation	.008	1.000
	Sig. (2-tailed)	.923	.
	N	131	131

Source: Researcher (2010)

A scatter plot, figure 4.13 above, shows that there is no discernable pattern that emerges relating creativity index and methods index.

A linear regression analysis table 4.66(a) and 4.66(b), shows, that the relationship is very weak with Karl Pearson's product moment coefficient of linear correlation r =0.148. The r squared = 0.018 indicates that only 1.8% of the change in creativity can be explained by a unit change in methodology index.

Table 4.66(a): Linear regression analysis of creativity against methods index model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.148	.022	.018	.1622

a Predictors: (Constant), Teaching methods index

Source: Researcher (2010)

Table 4.66(b): Correlation coefficient models of the linear regression model

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	.752	.029		26.293	.000
	Teaching	-.142	.057	-.148	-	.014

	methods index				2.486	

A Dependent Variable: Creativity index

Source: Researcher (2010)

A test on the beta value -0.142 shows that it is significantly lower than zero and hence cannot be ignored but it is negative.

The linear regression model $C= \alpha + \beta M$, with $\alpha=0.752$ and $\beta = -0.142$, hence

$$C=0.752 -0.142M$$

This send a rather strong message that a lot need to be done on the teaching methodology because the model is simply suggesting that the student respondents see the methods used to kind of distract them and takes away their creative abilities.

4.9.4 To investigate how all the independent variables affect the dependent variable collectively

Multivariate regression analysis was used in an attempt to answer the questions;

(i)To what extent does the model $C=\alpha + \beta_1 A + \beta_2 L + \beta_3 F + \beta_4 P + \beta_5 M$

represent what is actually happening on the ground?

(ii)How do the independent variables influence the dependent variable collectively?

(iii)To what extent does each independent variable affect the dependent variable in such a collective set up?

(iv)Which are the more significant factors?

A summary of the descriptive Statistics and the correlation analysis for the variables is shown in table 4.67 and 4.68.

Table 4.67: Summary of the descriptive statistics for the variables indices

	Mean	Std. Deviation	N
Creativity index	.6867	.1786	132
Students Aptitude index	.7045	.1659	132
Faculty competence index	.5116	.1594	132
Index for teaching facilities adequacy	.3638	.1687	132
Program index	.5245	.1849	132
Teaching methods index	.4201	.1760	132

Source: Researcher (2010)

Table 4.68: Summary of the correlation analysis of the Bivariate relationships of creativity against the independent variables.

	N=132	Creativity index	Students Aptitude index	Faculty competence index	Index for teaching facilities adequacy	Program index	Teaching methods index
Pearson Correlation	Creativity index	1.000	.597	.197	.009	.273	.008
Sig. (1-tailed)	Creativity index	.	.000	.012	.459	.001	.462

Source: Researcher (2010)

Note the table shows the zero order coefficients for the dependent variable against each independent variable.

A multivariate linear regression analysis shows that the relationship between the dependent variable and all independent variables pooled together is significant with a value of R, the model collective correlation coefficient =0.639 which is higher than any zero order value, table 4.69. This indicates that the model improved when more

variables are incorporated when trying to analyse the factors that affect student's ability to acquire/learn creativity at the university.

Table 4.69: Multiple linear regression analysis model Summary

	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
Model					R Square Change	F Change	df1	df2	Sig. Change
	.639	.408	.385	.1401	.408	17.255	5	125	.000

Source: Researcher (2010)

a Predictors: (Constant), Teaching methods index, Students Aptitude index, Program index, Index for teaching facilities adequacy, Faculty competence index.

To answer the question which of the independent variable is more important when it comes to influencing learning/acquisition of creative abilities, the beta value is used. Table 4.70 indicate that the most important factor is the student's aptitude, followed by programs and faculty in that order. The beta values for those variables 0.553, 0.245 and 0.069 respectively indicate that the dependent variable, creativity index, would change by a corresponding number of standard deviations when the respective independent variables change by one standard deviation. The order of the important factors is similarly to the one suggested by the bivariate regression analysis using the zero order correlation coefficients as shown in table 4.70.

Table 4.70: Creative ability factor inputs according to the order of importance

Factor inputs	**Multiple regression beta values**	**Zero order correlation coefficients**
Students aptitude	0.553	0.597
Academic programs	0.245	0.273

Faculty competence	0.069	0.197
Teaching facilities availability, access and adequacy	-0.027	0.009
Teaching methods use	-0.289	0.008

Source: Researcher (2010)

The resulting production function model is therefore;

Creativity ©= 0.237 + 0.596Aptitude (A) + 0.0773Faculty (L) – 0.02899Facility (F) + 0.237 Program (P) – 0.293Methods (M).

Simply put,

C = 0.237 + 0.596A + 0.077L – 0.029F + 0.237P – 0.293M

Teaching facilities and teaching methods are seen to be affecting ability to learn/acquire creativity negatively. Teaching methods comes out the worse.

CHAPTER FIVE

5.0 DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section of the research forms a platform for the overall consideration and discussion of the results of the research that were obtained from the various factors that contribute in developing creative abilities in the graduates from the universities . It will therefore examine some of the main issues yielded from the research. In addition recommendations and suggestions for further research in this field will be discussed.

5.2 Discussion of findings

In this section the finding in the previous chapter were discussed by giving their implications on the teaching of creativity at the university level.

5.2.1 Background of respondents

The researcher was interested in knowing the ages of the student respondents. The study established that most of the students' (93.8%) are aged between 20 and 30 years. This depicts a youthful group of people who if nurtured well will be the future entrepreneurs who are creative and innovative enough to come up with new ideas to make their contributions in the economy.

Usually young people are quite creative: however, creativity diminishes as one grows older. Abuodha et al (1992) observed that better educated people are currently entering the informal sector and that higher levels of education imply higher level of enterprise performance. Harris (1998) also observed that everyone has substantial creative ability such that young children are quite creative observing what they are able to do in the process of playing. Usually young people are quite creative: however, creativity

diminishes as one grows older. In adults, creativity has too often been suppressed through formal education but it is still there and is often reawakened.

The results shows that majority of the students in the schools under study who undertake special project are males (68.2%) while the female students who are the minority constituted the remaining proportion. This confirms that majority of female students do not engage in undertaking special projects. From the results it can also be said that the male students prefer the courses that entails undertaking special projects during their studies as compared to female students. Most of the respondents who undertook special projects were those who were enrolled in the Bachelor of Science (Technology) with a proportion of 55.3%.It can be said that they are technologically enabled to carry out such projects.

The findings show that only about 20 (15.3%) students out of the sampled 132 have creative abilities less than 0.5 categorized as low to very low. This shows that the most frequent class is that of High level of creativity followed by very high and indicates that the graduates going out of the University have a high self-confidence of being able to solve problems encountered in life and work environment by engaging creative abilities in seeking solutions.

5.2.2 Aptitude's contribution student's creative ability

It can be seen from the findings that 46.2% of the respondents did agree that the individual aptitude is a natural talent that is inherited from the parents. An aptitude is an innate, acquired or learned or developed component of a competency(the others being knowledge, understanding and attitude) to do a certain kind of work at a certain level. Aptitudes may be physical or mental. The innate nature of aptitude is in contrast to achievement, which represents knowledge or ability that is gained

From the results it can be said that creativity can be learnt through training and exposure as evidenced by the **63.5%** confirming in their responses. Our creativity training and innovation programme works by asking people to deliberately break the normal rules of planning, behaviour, decision-making, just to mess up current patterns. By overturning the predictable, new possibilities will emerge, including the absurd, the inappropriate, even the dangerous.

However, out of a bit of irreverence and rule-breaking comes original and innovative thinking, even for those who absolutely are convinced they aren't creative. An organization may need to have various individuals or teams sharpen their creative capabilities to keep pace with its aspirations. Like so many organizations right now, one may be undergoing big changes and your people have to rise to the creative challenge to stay on top.

It may be that one simply needs to have some additional innovative tools to spark creative thinking and get people outside those proscribed 'boxes' even if those boxes have proved excellent in the past.

The respondents confirmed that there is always a normal and natural curiosity in a human being to want to know things and have wide range of knowledge as evidenced by **76.5%** agreeing to that fact.

Creativity and curiosity are intrinsically linked. One leads to the other, and vice versa. They are both important elements of problem solving. We begin by trying something new (creativity) then testing it to see what happens (curiosity). But also, the opposite can occur, where we begin by looking to discover all the possibilities (curiosity) then using this information in a new way (creativity) to solve our problem. It is this give and take between the two that can lead to many exciting and new revelations and

possibilities. They are the keys for an inventor, engineer, or philosopher in making new discoveries, inventions and solutions. Children who are given the freedom to stretch these abilities and explore their capabilities within them to the fullest will find their play to have a richer, deeper meaning and a higher sense of accomplishment. Ginger Carlson, author of Child of Wonder ties together curiosity and learning in this way: “Exploration is the foundation for developing a creative thinker” (Fernandez, 2008).

Respondents confirm that they have a constructive discontent and normally see the need for improvement and then propose new ideas or methods for improvement as **72.7%** of the respondents do agree to such.

Inventive ideas often arise because existing technology or design proves to be unsatisfactory in some way – perhaps too costly, too inefficient or too dangerous. Using a product or process for a while can reveal inadequacies in its performance and is often vital preparation for producing ideas for improvements. One may have become dissatisfied either with an existing product or process or with the fact that something doesn't exist to meet a need one has identified. But creative individuals go further than this unfocused dissatisfaction and actually try to do something about it.

From study it can be said that **78.3%** of the respondents believe that most problems can be solved; and something can be done to eliminate or alleviate almost every problem It was found out that **68.2%** of the respondents have the ability to suspend judgment and criticism until they understand the other person’s points of view.

To qualify as creative problem solving the solution must either have value, clearly solve the stated problem, or be appreciated by someone for whom the situation improves (Forbes, 1993).The situation prior to the solution does not need to be labeled

as a problem. Alternate labels include a challenge, an opportunity, or a situation in which there is room for improvement (Forbes, 1993).

It was found out that;

C=**0.237** + **0.596A**; where C stands for Creativity

0.237 stands for the constant value of creativity in an individual whether there is any factor influencing it or not. It means that even if one is taught or not there is some level of creativity in him or her.

0.596 is the co-efficient of aptitude, this means any change in aptitude by **0.596** in the variable aptitude will lead to change in creativity by the same quantity.

A is the linear model that relates creativity to Aptitude. This therefore implies that there exists some relationship between the two variables.

Knowledge mainly plays the roles of bringing a creative idea into reality and of helping the individual overcome limitations of prior knowledge. To make innovation a success, both formal and informal knowledge are required to help the individual adapt to the environment. Gardner (1993) contends that the broader and deeper one's knowledge is the more creative he will be. In particular, scientific knowledge should be incorporated in technological invention.

5.2.3 The role played by the University faculty members in teaching creativity.

Most faculties (faculties' members in the selected department are highly qualified and experienced as can be confirmed by 56.1% confirming the same. The experience of the lecturers has a positive contribution to make in shaping the students even to come up with projects which are to some extent are creative in nature. Faculty merit

(qualification and experience) bears a strong correlation to position held and productivity merit dictates appointments as can be confirmed by 57% of the respondents confirming the same.

Faculty with high titles and position are not equally productive and do not contribute more to learning creativity as can be confirmed by the 34.1% who are of the idea that titles do have bearing on the creativity learning at their various (selected) schools. Most faculties have not written articles in referred journals as can be confirmed by 31% of the respondents in the affirmative. The academic world places strong emphasis in research and subsequent publications of their findings in referred journals. This may not have been known by the student respondents. However, this is necessary so that the lecturers could be seen to have taken their research work seriously.

Most faculties are engaged in consultancy activities that uses academic knowledge as can be seen from the responses where 40.6% of the faculties' are engaged in consultancy services to the general public. Engagement to consultancies services ensures that the lecturers understand the outside world for which they are preparing the students for .This plays major role because the students are prepared for the field of work and the first person who should understand the work organizations is the lecturer himself. With the understanding of the work organizations, one will be tempted to try and prepare a student who is all round and can easily fit in the various work places they could be engaged in.

Most faculty members attend and present papers in seminars, conferences and workshops as can be attested to by 44% of the responses received. The attendance and participation of faculty members in various academic conferences is very crucial in

creativity learning because it involves knowledge and information sharing among the participants.

Teaching creativity and higher order thinking skills transcends any specific formula. The faculty members often advocates integrating creativity objectives into the curriculum which offers a subject oriented basis for reflective activities. Teachers will find that it is wise to devote time investigating creativity models which play a vital role in helping students acquire reflective skills. Van Tassel-Baska (2006) observes that "…a few selected models used over time enhance learning more strongly than eclecticism". The various scholars recommend viewing creativity models by using a framework involving four categories which include the domain (area of expertise Subject area), Content (types of objective, types of product including knowledge products), Process (steps/phases in a sequence or cycle complexity level in a hierarchy, type of thinking or learning ,quality of thought/action),and the Psychological aspects which include stage of development ,structural features of cognition,, nature and strength of dispositions ,internalization of learning ,orchestration and control of thinking, degree of learner autonomy and level of consciousness (Mosley et al, 2005).

It has been noted that teachers are quite often blamed for the diminished inclination to be creative as students become socialised and more intelligent (Bartel, 2006). Teachers in every discipline/area need to reflect on what they are doing that tends to foster or hinder the creative critical thinking that is so essential as a survival and success skill in today's world. Creative teachers, whatever they teach, will recognise their own lessons and projects. In the development of cognition, the ability to imagine is among the most advanced of all human traits and therefore, no teacher would want to ignore or squelch the imagination.

It was established that an association between creativity and faculty member's competence exists as indicated by the equation below;

C= 0.574 + 0.077L

This indicates that although the relationship is weak but positive, the faculty factor cannot be ignored and should be actually strengthened to have greater influence on the student's creative ability. This is because these are the people responsible for the nurturing the student respondents in to graduates with creative abilities.

In universities and elsewhere, teachers' pedagogical beliefs vary greatly in sophistication, depth and complexity. Even with an education-related degree, teacher expertise and experience vary. However, fundamentally, student-centred and learning-oriented beliefs and practices are generally accepted as underpinning the kinds of technology practices that lead to deeper and more active learning that enriches the student learning experience (Becker, 2000).

With the exponential expansion of higher education, faculty are expected to teach larger classes and students from non-traditional backgrounds with a wide range of motivations and abilities. Governments, employers and students expect faculty to be more accountable for quality in teaching and learning and seek improvements in completion rates and grades. In some institutions, teaching portfolios are required for appointment and promotion. In some countries, universities are also being audited and then ranked, in part in according to their teaching quality. Universities are expected to provide different kinds of degree pathways to provide lifelong learning for adult learners. New understandings of human cognition and social-constructivist approaches to adult learning (Vygotsky,1978; Slavin, 1996) are leading to a greater emphasis on learners assuming greater responsibility for their own learning and case-based, collaborative learning in which learners engage in problem solving and open dialogue

(Hausfather,1996). In such learning contexts, faculty are expected to change from being 'instructors' to providing guidance for the learners, acting as ‘resource specialists’ and ‘response specialists’. Faculty are also expected to embrace new forms of educational delivery such as open, distance, blended, and work-based learning and master the latest tools and methodologies of information and communications technology. And all of this is expected to occur without commensurate increases in funding and in most cases, adequate training provision.

5.2.4 The contribution of teaching (learning) facilities to creativity learning at university level

Not enough labs, workshops facilities for practical sessions are available for use by the students as only 23.1% of the respondents do agree that these facilities are available. Evidence on the ground need to be documented to ascertain whether this is actually so and this is possible even by conducting a survey. In other words, there is need to find out how adequate and satisfactory the facilities are in terms of the number and quality of staff, quality and size of buildings including class-rooms, laboratories and workshops; library facilities, instructional support services such as photocopy and secretarial centres, staff/student ratio, and so on. Furthermore, there are concerns expressed by some educators the quality of teaching as well as that of students admitted into the distance learning programmes are poor.

Spaces (classrooms, lecture halls laboratories and workshops) are not adequate for the students occupying them at a time as only 28% of the respondents do agree that they available. The availability of adequate space especially for creativity learning is necessary because the students can only learn from and with as well as within what available for them.

Only 21.2% of the respondents confirmed that there was adequate supply of tools, equipments and materials needed for teaching/learning creativity in their respective departments. This clearly shows that the availability of teaching facilities which is very crucial for creativity teaching was wanting. It should be noted that learning materials are the basic items necessary for the teaching of creativity at an institution of higher learning.

The findings also indicate that, only 34.1% of the Students respondents' access current books, journal magazines in the library in acceptable time, to gather a wide variety of emerging issues. Again to some extent students continuously have adequate information from both electronic and print media in the library or students hall on current challenges affecting society which appeals to their creative abilities as confirmed by 34.1% of the student respondents in the affirmative.

Quite a good number of Students easily access internet as a source of current information and creative ideas as confirmed by 40.2% of the respondents who do agree that they make use of the internet facilities in the library. Through the use of internet the students can learn some new things which could be beneficial to them in their studies.

Recreation facilities are good and adequate to facilitate stress free mind ready for creative thinking .However only 39.4% of the respondents do agree that this happens. Whether or not participants in organized sports achieve higher grades is controversial. Nonetheless, it is widely believed that athletes develop certain skills and habits that help them to function better in an academic environment. Other scholars also do claim that through participation in recreational sports, students are encouraged to develop critical thinking skills, create new problem-solving strategies, honest decision-making

skills, enhance creativity, and more effectively synthesize and integrate this information into all aspects of their lives. In this way, students both perform more effectively in an academic environment and flourish throughout all phases of the co-curricular experience.

A test on the model $C= \alpha + \beta E$ shows that $\alpha=0.697$ and that $\beta=-0.0384$ is not significantly less than zero, with $P=0.538$ which makes the model collapse to a straight horizontal line implying that facilities at the university do not influence the students learning of creative abilities.

$C= \alpha + \beta F$

$=0.697 -0.0384F$

This suggests that a lot needs to be done to improve the facilities at the university if they have to contribute to the desired goal of learning creative abilities

5.2.5 The role of programmes in creativity learning at the university

Of all the student respondents, only 31.1% do agree that programmes and all courses in the program are very good and well suited in developing creative graduates who are off-loaded to the job market

Creative graduates in art, design, and craft and media subjects are well equipped to deal with the challenges of creative working, which they keep firmly in their sights as they navigate their way through the complexities of work, underpinned by their desire to continue with their creative practice. As a result, they experience considerable personal and work satisfaction. Creative graduates are at the forefront in initiating

changes in the creative sector, and their tolerance of uncertainty and ability to adapt and to continue to learn fits them for contemporary life and work.

According to the survey 36.3% of the respondents do agree that Programmes facilitate theory and practical learning of skills that meets the needs and challenges of the current world. This implies that the students/respondents who are nurtured with the creative traits tend to be constructivists because they generate knowledge and meaning from their experiences and will therefore easily fit in the job market to some extent.

It was also established that programmes are not regularly reviewed to reflect the changes in technology and the community needs as can be confirmed by only 21.1% who do agree in the affirmative. The low percentage can be attributed to the fact that in most cases the students in a university do not play an important role in the design of academic programmes but usually the people who are consulted in most cases are the stakeholders in the job market either directly or indirectly.

There is to some degree the participation of other players in coming up with the programmes. From the survey it was confirmed that 37.9% of the respondents do confirm that the same is developed by the faculty members with the collaboration of industry players and other stakeholders to reflect the needs of the society. It was also established that 32.6% respondents do agree that design of all courses in the programmes are market driven emphasizing learning of creativity through problem solving as opposed to traditional course that emphasizes skills development and this is why the students are expected to undertake special project which addresses a problem in a society.

The university Programmes to some extent (40.1%) support and encourage a strong university/ industry link .This is evident by the fact that usually most of the students in

their last year of study normally are asked to be attached to some institutions as a way ensuring that whatever they have learnt during their studies are put to test through practice. The knowledge that has been gained by the student is their utilized as a way of improving even the performance of the institution where they are attached to.

The changing role of knowledge in society also means that the research agendas of universities are increasingly defined through interaction and negotiation with non-academic parties, in particular government and industry. As a consequence, the line between academic and non-academic realms is becoming blurred. Programmes are to some extent adequate and require students to undertake practical projects and industrial attachment to enhance learning by doing. This is corroborated by 62.1% of the respondents.

Group projects are inherent in the programme to enhance student creative and innovative ability through problem solving and teamwork as evidenced by 41.7% of the respondents agreeing to the fact that teamwork is a better of problem solving. The use of groups is encouraged there is the element of the sharing of ideas.

Some of the respondents(28.8%)do agree that the programmes facilitates, provide avenues and opportunities for exhibiting creative works and creativity and reward the best and links potential inventers to organizations and bodies that assist in the commercialization of viable ideas which in itself is innovation.

It was also established that 43.2% of the respondents do agree that programmes lead to the development of professional competencies, confident and creative graduates who are able to fit in any work environment exploiting creative abilities and face current and emerging challenges.

The exhibit of creative work (Portfolio) should demonstrate a strong visual literacy and an ability to communicate your ideas in a visual format. The portfolio should include your best. These may be works one has completed as assignments in school but one is also strongly encouraged to include projects one has done on his own. Technical skills are an advantage to designers; however, they are not the primary purpose of the portfolio exhibition.

Fostering creative thinking among business students is no small task. Creating new business electives, developing corporate partnerships and exchange programs, consulting with entrepreneurs and executives are some of the means business schools are currently employing to enhance creativity and innovation in their curriculum (Business Week, 2005). These methods are primarily based on the premise that some form of traditional face-to-face or social interaction will be employed. However, in today's business schools, a growing number of programs are focusing on technology-mediated learning modes as supplements and/or alternatives to the traditional learning pedagogy. Indeed, technology-mediated learning via online delivery is quite common in most universities and colleges across the United States (Hollenbeck et al., 2005). As a result, significant advances have been made in the area of online learning.

5.2.6 How teaching methods employed by faculty members influence the teaching of creativity

Descriptively, the study established that 62.1% of the respondents attest to the fact that field and industrial visits in the various departments are used as a learning approach (teaching approach). From the information given by the respondents, it was established that 20.3% of teaching do involve reverse engineering where students are encouraged

to dismantle a functioning novel project, study in its principles and develop own improved project.

Teachers should note in their lectures and class discussions that creativity can arise from people with a diversity of backgrounds and personality characteristics. Researchers have used correlational studies involving both well-known people and everyday individuals and they identified seven traits of creative people which include independence of judgment, self-confidence, and attraction to complexity, aesthetic orientation, and openness to experience, risk taking and self-actualization (Sternberg et al, 2005. p. 358).

The use of modern educational interactive learning tools and web-based technologies are indeed powerful resources that enhance and support quality learning and enrich the students' learning experience. The traditional Teaching and Learning model is not relevant to real student needs due to today rapidly changing environment. Lectures should focus not only on the material content, in-class activities, or discussion but how to actively engage the students with the material in ways that promote student learning. This will involve a lecturer total commitment in teaching that take full responsibility by actively doing everything to cause the student to learn. The lecture content must be valuable, relevant, and interesting and related to real world problems that enable students to make the necessary connections between theory and real life applications.

The challenges for lecturers are to influence students in positive ways and simultaneously be able to flexibly adapt a wide range of learning situations and educational technologies evolved from time to time. To be effective, one must consciously attempt to be flexible, changing plans, actions or goals in response to the changing interests and needs of today students and/or from the many unplanned and

unforeseen events that happen during the course of the lecture. There are various applicable approaches for teachers in teaching science. In general, the selection of the approaches depends on the objectives of teaching. Influencing factors caused by students are the preparation of students, students' capability, class capacity and students' background like their behavior and expectation to the lesson as well as the teachers' factors besides the limitation of time table and facilities available for the process of teaching and learning (Dawson, 2000).

Not all teaching methods are equally appropriate for helping all students attain all instructional objectives. This general principle is often overlooked when students and teachers talk about teaching methods. The question-what method of teaching is best?- really has no answer unless one specifies the characteristics of the students and the objectives of the teaching (Gage and Berliner, 1984).

This study has established that graduates of Moi university acquire creative abilities with most (89.3%) of the graduates going out of the University have a high self-confidence of being able to solve problems encountered in life and work environment by engaging creative abilities in seeking solutions. This indicates that the students are satisfied that the achieving their objectives of learning creativity. They however rate their own aptitude as the best predictor of the creative learning abilities, the academic programs second, then faculty competence but criticize teaching facilities and teaching methods which they accuse of contributing negatively to the learning of creative abilities as demonstrated by the emergent linear model;

C = 0.237 + 0.596A + 0.077L – 0.029F + 0.237P – 0.293M.

While the respondents have a significant level of confidence with the competence of the faculty members/lecturers who teach them, they take serious exception on the

facilities used and the teaching methods employed. In essence this is a challenge to university administrators and managers. As noted earlier, to replicate the success story of the contribution of universities in the conversion of the Silicon valley to an industrial powerhouse you do not only need to have the drive to play with technological innovativeness and good degree programs, which is the preserve of the faculty members and have been rated well, but also astute management. Management decides on priorities in the allocation of resources in an organisation. The allocative efficiency in the transformation process of developing creative graduates have been put to question with the teaching facilities and teaching methods all dependent on the management decisions requiring most urgent attention. Efforts need also to be directed towards those factors, aptitude, faculty competence and academic programs with a view to improving them and the efficiency to optimize the utilization of resources.

It should also be noted that in order for the university to play a significant role in economic development and the industrialisation process, the major challenge is not on the number of inventions, novel technologies, but the extent to which the innovations are commercialised. The critical success factors for radical technological innovation were less technological than might be presumed (Nagel, 2001). Nagel (2001) notes that there are a range of factors requiring expertise which exists in differing organisational functions (marketing, technical, strategic, financial and organisational). In addition, due to limited financing, universities in developing countries would contribute more if they emphasized more on incremental development of technological innovations through projects that is seen through to commercialisation (Fan, 1999). This implies that the success of a department in technological innovation could be assessed from the number of functional projects adopted by the industry every year.

5.3 Conclusion

By looking at the factors influencing the teaching of creativity at the university level that were investigated, the researcher came up with linear production function;

C = 0.237 + 0.596A + 0.077L – 0.029F + 0.237P – 0.293M;

Where C stands for Creativity,

A stands for Aptitude

L stands for Lecturers or the faculty members

F stands for Facilities

P stands for Programmes

M stands for Teaching Methods.

The coefficients against each of the variables shows the extent to which each of the variable contributes either positively or negatively to creativity learning at the university.

The researcher wanted to investigate the following objectives;

(i) To determine whether the individual learner's aptitude, ability and inherent creative traits influence the creativity of a student.

(ii) To examine whether University faculty members influence the teaching of creativity at University.

(iii) To determine the extent to which teaching (learning) facilities contribute to the teaching of creativity at University level.

(iv) To establish the extent of contribution of University programmes in creativity learning at the University level.

(v) To examine whether teaching methods employed by faculty members influence the teaching of creativity at University level.

Creativity is a very important tool that is learnt by students during their studies unknowingly. The concepts of creativity and innovation power were examined by analysing the relationship between the construct of the learning organisation (university), and how it results to a graduate with creative abilities.

The study was aimed at determining whether the individual learner's aptitude, ability and inherent creative traits influence the creativity of a student. And to answer the question how this happens the researcher found out that the inherent characteristic trait has great influence on what one does as what is learnt is what is implemented or what is implemented is that which is in the mind and this could be that creative idea one has in mind. This can be attributed to the fact that there is strong correlation co-efficient between the dependent variable creativity and the independent variable aptitude.

The researcher also had aimed at finding out whether the faculty members influence the teaching of creativity at the university where they teach and to answer the question of finding out the extent to which they influence the product of their effort, that is a graduate with creative abilities. The faculty members have been rated well because being the major contributor to learning at the university it is necessary to encourage them so that the products of their effort (graduates with creative abilities) could suit well the ever changing technological environment.

The teaching facilities were also examined in order to know the extent to which such contribute too creativity learning at the university level. The facilities used at the

university, according to the study reveal that they have a negative contribution to creativity learning.

The study was also aimed at examining the extent of contribution of academic programmes to creativity learning at the university level. The programmes contribute to creativity learning as evidenced in the findings where they contribute positively (as there is a positive correlation of 0.237.

It was realised from the study that the teaching methods have a negative contribution to make in creativity learning. The methods used by the faculty members may be do not measure to the expectations and therefore the need to improve the methods being employed by the faculty members.

As indicated earlier the researcher came up with a linear production function model;

C = 0.237 + 0.596A + 0.077L – 0.029F + 0.237P – 0.293M

The constant 0.237 here means that in as much people are taught there is the creativity element in an individual whether one is taught or not and this is what this constant stands for.

This model consists of three processes: knowledge creation, innovation and learning to learn. Introducing this model at the university level calls teachers to use more open ended questions and provide conditions for the students to become familiar with divergent points of view in relation to the areas being studied. It necessitates also further involvement and inclusion of students in implementation of new ideas by fostering creativity in order to address the issues raised. This provides a culture of playing field for all involved in an attitude focused on learning through actions and that all inputs are valued. To improve creativity, students are encouraged to be

committed to creativity, by taking a trial and error approach. Key issues to restructuring university studies are: openness to experience, tolerance of ambiguity, an internal locus of evaluation and an atmosphere of freedom and safety. Education can, and should, learn more from the methods employed in industry for the fostering of creativity and innovation. The first step to achieve this goal is to include planned study of creative thinking in the curriculum.

5.4 Recommendations

From the foregoing it is recommended that;

(i) The university management take immediate steps to assess and review the current state of affairs with the regard to the teaching facilities and teaching media available to both the faculty members and students to facilitate learning creative abilities.

(ii) The University faculty members to have a critical look at the teaching methodology they employ in teaching creativity with a view to improving on them to the students/ clients expectation. The quality of a product is simply in its fitness for purpose.

(iii) All the stakeholders to jointly work on all the input factors of production with a view to improving the alocative efficiency with which they are employed.

(iv) The identified weak areas in the teaching of creativity at the university level like the teaching methods needs to be addressed so as to improve on the creativity learning at the university level. This therefore implies that the faculty members need to device other ways or methods that will enhance creativity learning at the

university. This is an area which is therefore recommended for further research so as to find out the reason why there exists a weaker link between creativity and the teaching methods.

(v) Further research employing the production function to analyse the performance in utilization of resource inputs in the education sector and incorporating more variables seen to influence outputs from the university should be carried out in order to test its application in investment in education.

(vi) There should be plans for the development of academic programs that prepare the university graduates for the job market and this speciality should be encouraged and brought to fruition.

(vii) There is need for the university to try and improve on the teaching facilities which are used by the students during the learning sessions.

5.5 Recommendations for further Research

Further research is recommended on creativity learning in other departments which were not dealt with in this particular research as well as generally in other institutions of higher learning in the Republic of Kenya. It is also recommended that further research be done where other factors that may have influence over creativity learning at any institution of higher learning be investigated.

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APPENDICES

Appendix 1A: Mean Analysis of the variables

Indicators of creative ability					
Knowledge on creativity	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**
creativity starts with knowledge accumulation, reading, conversation, experience and learning	127	1	7	5.02	1.86
knowledge accumulation is followed by incubation, during which period , one subconsciously mulls over information	128	1	7	4.70	1.64
incubation is followed by idea experience, where an innovative or novel idea emerge or is discovered	128	1	7	4.82	1.68
the new idea is then evaluated, decision put to hold, till more information is obtained and idea crystallized	126	1	7	4.87	1.61
finally the idea is implemented after deep understanding and insight, idea fleshed out and business plan or working drawings developed	126	1	7	5.22	1.69
Project identification method					
incremental improvement of past student special project(evaluation)	116	1	2	1.60	.49
combined two or more existing projects ideas to form a new project (Synthesis)	114	1	3	1.52	.52
used old technology in a new way	115	1.00	2.00	1.4348	.4979
I shifted attention from the expected, normal and routine to look at the problem from a different angle	118	1.00	2.00	1.4237	.4963
discussions with other students, lecturers, technical staff	116	1.00	2.00	1.2759	.4489
Project identification method	129	.00	6.00	2.9535	1.3799
Benefits accruing from learning creativity					
satisfied requirement forward of degree	121	1.00	7.00	5.7521	1.4100
developed creative abilities that can always be applied in the place of work	122	2.00	7.00	5.6967	1.3167
came up with physical project that will develop further and commercialize	119	1.00	7.00	4.7143	1.6982
I am able to solve a specific community problem and satisfy a need in the market	123	1.00	7.00	5.3008	1.5037
I develop a strong sense of and ability to work in teams	122	1.00	7.00	5.1066	1.6852
acquired an expanded sense of time i feel i have enough time to pursue creative work	122	1.00	7.00	4.9426	1.5228
Acquired or developed a sense of freedom. i	119	1.0	7.0	5.210	1.6564

feel free and charged to seek to know and develop new		0	0	1	
project have made me value relationships and feel better about others	124	1.00	7.00	5.2581	1.5611
project work and creativity ability will prevent impulse and idle time	120	1.00	7.00	4.8000	1.7277
learning creativity and ability to complete functional projects	124	1.00	7.00	5.1855	1.4106
I feel a strong sense of connection to others who have succeeded	122	2.00	7.00	5.3443	1.3408
I have learnt to have faith and confidence	124	1.00	7.00	4.9597	1.5845
I have learnt to appreciate, respect and honor the gift of creative inspiration	122	1.00	7.00	5.4344	1.4826
I've learnt to acknowledge my creative ability	122	2.00	7.00	5.6230	1.3132
I feel adequately prepared for a creative role in the world of work	119	1.00	7.00	70.7899	712.4153
hive solutions and technologies to develop innovative solutions and technologies	123	2.00	7.00	5.6504	1.3670
Benefits accruing from learning creativity	131	.00	110.00	78.5191	23.4204
Students creative ability	131	.00	153.00	111.9237	29.0147
Valid N (listwise)	87				

Creative aptitude indicators

Attributes indicative of ability to learn creativity						
1	to be creative, i have inherited natural talents	128	1	7	4.1641	1.7693
2	I can learn creativity through training and exposure	126	1	7	5.2857	1.5171
3	normally and naturally curious	123	1	7	5.5447	1.4613
4	I always try to identify and challenge assumptions behind ideas, proposals problems before accepting them	127	1	7	5.2598	1.4541
5	always have a constructive discontent, see need for improvement and propose new methods for improvement	127	1	7	5.1575	1.4443
6	I enjoy challenges and willing to test my abilities to the limit	127	1	7	5.5197	1.5058
7	I believe most problems can be solved, something can be done to eliminate or alleviate almost everything	126	1	7	5.5794	1.6606
8	I have commitment time and energy to address and try to solve every problem	128	1	7	4.9688	1.5417
9	I have ability to suspend judgment and	126	1	7	4.9524	1.7383

	critism until I understand the other persons point					
10	I have optimistic attitude towards idea in general	127	1	7	5.1024	1.6224
11	I always try to see good in the bad.	126	1	7	4.9127	1.7019
12	I do not mind problems or difficulties, they lead to improvement	121	1	7	5.3306	1.6196
13	unexpected and unwanted problems are not necessarily bad they permit solutions	127	1	7	5.1969	1.6136
14	preconceived based on experiences prevents me from seeing beyond the known	125	1	7	4.208	2.0052
15	I always try to see things for what they can do not what they are	124	1	7	5.0565	1.5993
16	I always try to avoid feelings that i do notknow what they are	127	1	7	5.126	1.6714
17	I avoid thinking small and limiting myself	126	1	7	5.4206	1.6265
18	I avoid psychological blocks-refusing to do something	128	1	7	5.4766	1.6069
	Total				92.2624	

The maximum possible score on these items is 126

Indicators of faculty members competence in teaching creativity	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**
most faculty in my department are highly qualified and experienced	128	1.00	7.00	4.6094	1.6801
faculty merit bear a strong correlation to position	126	1.00	7.00	4.3730	1.6911
faculty with high titles and position are equally productive and contribute more to learning	126	1.00	7.00	3.7381	1.6742
most faculties have written articles	128	1.00	7.00	3.6484	1.6581
most faculties are engaged in consultancy activities that uses academic knowledge	126	1.00	7.00	3.9206	1.6327
most faculties attend and present papers in seminars, conferences and workshops	127	1.00	7.00	4.2047	1.7698
faculty access good facilities to enhance their academic abilities	127	1.00	7.00	3.7480	1.8643
faculties have secretarial support provided to facilitate processing	127	1.00	7.00	3.5591	1.6166

academic documents hence spending more time on research and creative work					
faculty access grant money for business, research and hiring research assistant	123	1.00	7.00	3.3252	1.7718
are involved in hiring of their colleagues so as to get teams that work together and stimulate each other	124	1.00	7.00	3.5887	1.6479
most have security of tenure hence can express themselves freely	125	1.00	7.00	3.6880	1.6820
encourages graduate students to work with them in joint projects and publish papers jointly	125	1.00	7.00	3.1520	1.7600
uses creative teaching methods, employing new methods to teach old course	123	1.00	7.00	3.3171	1.7894
presents new creative ideas in class and encourage obtaining feedbacks from undergraduates and graduate students	126	1.00	7.00	3.3730	1.7239
members are there and hold position on merit and have contributed greatly in my learning throughout my stay	127	1.00	7.00	3.9055	1.7658
members are not overloaded hence have enough time for research	127	1.00	7.00	3.8740	1.9107
students ratio is good allowing direct contact and learning	127	1.00	7.00	3.2205	1.9062
Valid N (listwise)	108			63.2453	

Indicators of availability, adequacy and access of facilities for teaching/learning creativity	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**
enough lab, workshops facilities for practical sessions	128	1.00	7.00	2.9141	1.8230
students access the facilities as frequently as	123	1.00	7.00	3.1626	1.8659

need rise					
adequate supply of tools, equipments and materials need in teaching	127	1.00	7.00	2.8740	1.6183
spaces are adequate for the students occupying them at a time. ration is good	127	1.00	7.00	3.2520	1.8169
the library is adequate and well resourced	123	1.00	7.00	3.0000	1.8062
students access current books, journal magazines in the library in acceptable time, to gather a wide variety of emerging issues	128	1.00	7.00	3.3203	1.9070
continuously have adequate information from both electronic and print media in the library or students hall on current challenges affecting society which appeals to their creative abilities	128	1.00	7.00	3.3750	1.8949
students easily access internet as a source of current information and creative ideas	125	1.00	7.00	3.6480	1.9187
recreation facilities are good and adequate to facilitate stress free mind	128	1.00	7.00	3.7422	1.9970
department continuously acquires new facilities to accommodate changes in technology	128	1.00	7.00	3.1172	2.0298
Valid N (listwise)	116				

Indicators of respondents level of satisfaction with academic programs	N	Min	Max	Mean	Std. Deviation
programmes an all courses in the program are very good and well suited in developing creative graduates	128	1.00	7.00	3.5391	1.6832
program facilitates theory and practical learning of skills that meets the needs and challenges of the current world	128	1.00	7.00	3.7812	1.6214
programmes are regularly reviewed to reflect the changes in technology and the	128	1.00	7.00	3.0234	1.6905

community needs					
programmes support and encourage a strong university/ industry link	128	1.00	7.00	3.8594	1.8000
designed to encourage and support learners centered approach to teaching and learning	127	1.00	7.00	3.7402	1.7007
have adequate and require students to undertake practical, projects and industrial attachment to enhance learning by doing	127	1.00	7.00	4.7244	1.6888
developed by the faculty members with the collaboration of industry players and other stakeholders to reflect the needs of the society	128	1.00	7.00	3.8516	1.7795
design of all courses i the program are market driven emphasizing learning of creativity through problem solving as opposed to traditional course that emphasizes skills development	126	1.00	7.00	3.5714	1.7225
research and creative assignments are integral components of all courses in the programmes in the department	128	1.00	7.00	3.4766	1.6118
group projects are inherent in the programme to enhance student creative and innovative ability through problem solving and team work	127	1.00	7.00	4.0157	1.7502
the programmes encourages invention and innovation by emphasizing techniques for generating creative ideas	128	1.00	7.00	3.6250	1.7614
the programs facilities provide avenues and opportunities for exhibiting creative works and creativity and rewards the best and links potential inventers to organizations and bodies that assisting the commercialization of	127	1.00	55.00	3.7638	4.9013

viable ideas					
leads to the development of professional competencies, confident and creative graduates who are able to fit in any work environment exploiting creative abilities and face current and emerging challenges	128	1.00	7.00	4.0625	1.7468
Valid N (listwise)	123				

Indicators of acceptability of teaching methods used to enhance teaching/learning creativity	**N**	**Min**	**Max**	**Mean**	**Std. Deviation**
most common used method in my department adequately enhances learning creativity	123	1.00	7.00	3.4228	1.6297
teaching methods used allow adequate teacher /student contact	124	1.00	7.00	3.4839	1.5900
student centered teaching approaches are used when and where approximate to exploit individual learning capabilities	125	1.00	7.00	3.6320	1.6091
because of the teaching methods used, students easily learn, hence understand the activity and the process	123	1.00	7.00	3.2439	1.5276
members often use instructional media in developing and teaching new concepts	123	1.00	7.00	3.3740	1.5961
the overhead projector is a commonly used instructional media	123	1.00	7.00	2.9106	1.8861
PowerPoint projector is a commonly used instructional media in the department	124	1.00	7.00	3.3629	2.0888
demonstrations are common in lesson development	121	1.00	7.00	3.1818	1.8886
laboratory experiments are commonly undertaken to develop new concepts	123	1.00	7.00	3.5772	1.7274

students practical and projects are carried out in most courses frequently	123	1.00	7.00	4.3496	4.1231
map wall charts graphs and 3 dimensional objects are used to clarify issues when teaching	127	1.00	7.00	2.9921	1.8279
computer simulation are used to demonstrate relationships observed in real life	123	1.00	7.00	3.1138	1.7704
videos, TV programmers and other electronic media is used in class or lecture halls	127	1.00	7.00	2.6142	1.8216
modern technology is adequately embodied in the teaching methods	123	1.00	7.00	2.9512	1.7266
an academic industry partnership in teaching the department where part time faculty members are resourced from the industry or come in as guest speakers	127	1.00	7.00	3.4252	1.8836
imitation of success cases and novel projects is used in to department to enhance learning	126	1.00	7.00	3.2937	1.6689
reverse engineering is encouraged and used in the department	127	1.00	7.00	2.9449	1.7697
field and industrial visits are used in the department as a teaching approach	127	1.00	7.00	4.7874	1.8967
Valid N (listwise)	99				

APPENDIX II: Various Needs of the society addressed by the Special projects

Community Need	Frequency	Percent	Valid Percent	Cumulative Percent
	28	21.2	21.2	21.2
telecommunication in Africa	8	6.1	6.1	27.3
Colour-shades match during dyeing and printing	1	.8	.8	28.0
unavailability of building materials	6	4.5	4.5	32.6
Security	2	1.5	1.5	34.1
Transport	1	.8	.8	34.8
efficient production	4	3.0	3.0	37.9
ozone pollution	2	1.5	1.5	39.4
malaria scourge	3	2.3	2.3	41.7
productivity and reduce cumbersome in fetching water	4	3.0	3.0	44.7
water quality	4	3.0	3.0	47.7
machine introduction	1	.8	.8	48.5
lack of fibre length measurement equipment in the lab	3	2.3	2.3	50.8
traffic congestion	2	1.5	1.5	52.3
Tse- tse fly menace	2	1.5	1.5	53.8
dissatisfaction in workplace	1	.8	.8	54.5
economic heating process of fluids	1	.8	.8	55.3
production of anhydride useful in manufacturing of drugs	4	3.0	3.0	58.3
overcoming granular flow problems in hoppers	2	1.5	1.5	59.8
banking problems	4	3.0	3.0	62.9
disposal problems	3	2.3	2.3	65.2
hygiene at large especially women	3	2.3	2.3	67.4
to improve material handling in mass production industries	2	1.5	1.5	68.9

provision of low cost energy	2	1.5	1.5	70.5
ways and means of controlling floods	5	3.8	3.8	74.2
digital sensitivity	1	.8	.8	75.0
efficiency in water provision	1	.8	.8	75.8
problems faced in transport industry and pollution	1	.8	.8	76.5
water scarcity	1	.8	.8	77.3
improvement of railway track stability o control derailment	1	.8	.8	78.0
enabling of long distance broadcasting	1	.8	.8	78.8
costing problem	1	.8	.8	79.5
lack of knowledge of products in market and competition	9	6.8	6.8	86.4
workplace problems	1	.8	.8	87.1
reduction of use of staple food	2	1.5	1.5	88.6
street light vandalism	1	.8	.8	89.4
sorting of flower	1	.8	.8	90.2
value addition to high value products	2	1.5	1.5	91.7
energy consumption	7	5.3	5.3	97.0
channel ban usage	2	1.5	1.5	98.5
aerobic fermentation of glucose	1	.8	.8	99.2
ensure clean production in Manufacturing Industries and limited waste	1	.8	.8	100.0
Total	132	100.0	100.0	

APPENDIX III:

	Frequency	Percent	Valid Percent	Cumulative Percent
	36	27.3	27.3	27.3
rural community	5	3.8	3.8	31.1
shelter	4	3.0	3.0	34.1
safety	1	.8	.8	34.8
transport sector	4	3.0	3.0	37.9
efficiency in factories	5	3.8	3.8	41.7
general public	12	9.1	9.1	50.8

resistance to drugs by the malaria parasite	1	.8	.8	51.5
personal hygiene at affordable costs	3	2.3	2.3	53.8
reduction in water borne diseases	4	3.0	3.0	56.8
water for both major and small scale usage	6	4.5	4.5	61.4
banking needs	4	3.0	3.0	64.4
production quality fibres in building and construction	3	2.3	2.3	66.7
proper disposal of materials/ recycling of wastes	3	2.3	2.3	68.9
to substitute human labour in hazardous jobs	4	3.0	3.0	72.0
helps in saving life and property	3	2.3	2.3	74.2
mobile technology/communication	1	.8	.8	75.0
reduction of cost of construction	1	.8	.8	75.8
mostly urban people	2	1.5	1.5	77.3
faster and safer transportation	1	.8	.8	78.0
radio communication	1	.8	.8	78.8
employers/managers	4	3.0	3.0	81.8
economic	1	.8	.8	82.6
good conducive living environment for learning an communicate	2	1.5	1.5	84.1
business community	1	.8	.8	84.8
quality flower production	1	.8	.8	85.6
food shortage	2	1.5	1.5	87.1
addition of earning to farmers]	2	1.5	1.5	88.6
energy	7	5.3	5.3	93.9
ICT	5	3.8	3.8	97.7
less or no pollution	2	1.5	1.5	99.2
manufacturing commodities	1	.8	.8	100.0
Total	132	100.0	100.0	

APPENDIX III: QUESTIONNAIRE FOR STUDENTS

Kindly assist in completing this questionnaire on the student's special projects for purely academic purpose. The researcher is an M. Phil. student in entrepreneurship who seeks to assess the efficiency of the student's special projects in the teaching of creativity and innovation at the University and its essential contribution to technology and National development. Do not put your name on the questionnaire to enhance confidentiality.

Please tick or fill in the blanks as appropriate.

SECTION A: PERSONAL DETAILS

1. Age in years ___
2. Sex? Male [ ] Female [ ]
3. Degree being pursued: BED technology [ ] BBM [ ] BSC Technology [ ]
4. Area of specialization? Marketing [ ] Mechanical Engineering Technology [ ] Production Technology [ ] Power/Plant Engineering Technology [ ] Electrical/Electronics Engineering Technology [ ] Civil Engineering/building Construction Technology [ ] Chemical Engineering [ ]

Any other (specify)……..

SECTION B: PERCEPTION OF AND SELF ASSESSMENT ON LEARNT CREATIVITY ABILITIES.

On a scale of 1- 7, please tick as appropriate to show the extent to which you agree with the statements that amounts to self- assessment on creativity.

Key

Very Strongly Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**.

VSA

		VSD					VSA
STATEMENT	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. Creativity starts with knowledge accumulation, reading, conversation, experience and learning							
6. Knowledge accumulation is followed by incubation, during which period, one subconsciously mulls over information							
7. Incubation is followed by idea experience, where an innovative or novel idea emerge or is discovered							
8. The new idea is then evaluated, decision put to hold, till more information is obtained and idea crystallized							
9. Finally the idea is implemented after deep understanding and insight, idea fleshed out and business plan or working drawings developed							

10. What was the title of your special project?.....
……

11. What was the approximate total cost of your project from idea identification, design, through all stages to presentation? Ksh_____

12. What problem does it address? .....
…….....

13. What community need does it seek to satisfy.....
.....

In developing, the project idea, I used; (tick as appropriate)

Project identification method used	Yes	No
14. Incremental improvement of past student special project (Evaluation)		
15. Combined two or more existing project ideas to form a new project (synthesis)		
16. Came up with a new (Novel) Project idea completely different form existing ones		
17. Used old technology in a new way (re-application).		
18. I shifted attention from the expected, normal and routine in order to look at the problem from a different angle (changing direction)		
19. Discussions with other students, lecturers, technical staff (Brainstorming)		

The following are the benefits I have achieved after completion of the special project work. Please tick to indicate the extent to which you agree or disagree.

Key

Very Strong Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**.

VSD **VSA**

Benefit		1	2	3	4	5	6	7
20.	Satisfied requirement for award of degree							
21.	Developed creative abilities that can always be applied in the world of work							
22.	Came up with physical project that I will develop further and commercialize							
23.	I am able to solve a specific community problem and satisfy a need in the market							
24.	I developed a strong sense of and ability to work in teams.							
25.	Acquired an expanded sense of time I feel I have enough time to pursue creative work							
26.	Acquired or developed a sense of freedom. I feel free and charged to seek to know and develop new							
27.	The projects have made me value relationships and feel better about others. I can recognize abilities of others and appreciate others.							
28.	The project work and creativity ability will prevent impulse spending and idle time (save money)							
29.	Learning creativity and ability to complete functional projects makes me feel energetic, able and good about life and has drive for other responsibilities.							
30.	Since I have learnt to be creative through projects, I feel a strong sense of connection t others who have succeeded in the same field							

	before me							
31.	I have learnt to have faith and confidence on impulses and trust instincts when expressing creative work							
32.	I have learnt to appreciate, respect and honor the gift of creative inspiration and connect to a deeper wisdom							
33.	I have learnt to acknowledge my creative ability, see choices in life, have a new way of looking at things and be open to possibilities							
34.	I feel adequately prepared for a creative role in the world of work							
35.	Projects have greatly enhanced my ability to develop innovative solutions and technologies to solve community problems and enhance quality of life							

SECTION C: INDIVIDUAL APTITUDE AND CREATIVE ABILITIES

On a scale of 1to 7, please tick as appropriate to show the extent to which you have aptitude and creative abilities. Give your true, sincere opinions on each statement

Key: Very strongly Disagree (VSD)- 1; Strongly Disagree (SD)-2; Disagree (D)-3; Undecided/Don't know (U)-4;Agree(A)-5; Strongly Agree (SA)-6 and Very Strongly Agree (VSA)-7.

	STATEMENT	**VSD**						**VSA**
		1	2	3	4	5	6	7
	To be, creative, I have inherited natural talents							
	I can learn creativity through training and exposure							
	I am normally and naturally very curious, want to know things and have a wide range of knowledge							

	I always try to identify and challenge assumptions behind ideas, proposals, problems, believes and statement, questioning everything before accepting them.							
	I always have a constructive discontent. Always see need for improvement, propose new method for improvement.							
	I enjoy challenges. Work very hard, persevere, never give up and I am always willing to test my abilities to the limit.							
	I belief most problems can be solved. By faith, instinct or experience, I belief something can be done to eliminate or alleviate almost every problem.							
	I have commitment, time and energy to address and try to solve every problem I encounter in my day to day work							
	I have ability to suspend judgment and criticism until I understand the other persons point of view							
	I have optimistic attitude towards ideas in general. I do not dismiss new ideas off hand even when they seem strange, odd, bizarre or even repulsive							
	I always try to see the good in the bad. Faced with a poor proposed solution, I try to see what is good about it							
47.	I do not mind problems or difficulties, they lead to improvement							
48.	Unexpected and unwanted problems are not necessarily bad, they permit solutions that lead to better world							
	Preconceived ideas, based on my experiences prevent me from seeing beyond the known.(prejudice)							
	I always try to see things for what they							

	can do not what they are (Avoid fractional fixation).							
	I always try to avoid the feeling that I do not have tools, knowledge materials or ability to do anything							
	I avoid thinking small and limiting myself							
	I avoid psychological blocks-refusing to do something because it does not sound good or it is not done in my culture. I do it, if I think it will lead to good outcome							

SECTION D: FACULTY MEMBERS ABILITY TO TEACH CREATIVITY

Please tick as appropriate your personal assessment of the faculties (All members of staff who participate in teaching and facilitating learning) in your department, creativity, productivity and ability to teach creativity. Give an honest, sincere opinion on a scale of 1 to 7.

Key

Very Strong Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**.

	STATEMENT	**VSD**				**VSA**		
		1	**2**	**3**	**4**	**5**	**6**	**7**
	Most faculty in my department are highly qualified and experienced							
	Faculty merit (qualification, experience) bear a strong correlation to position held and productivity (i.e. Merit dictates appointment and promotion)							
56.	Faculty with high titles and position are equally more productive and contribute more to learning of creativity							
	Most of the faculties in the department have written articles (academic papers published in journals) have written books and chapters in Books.							
	Most faculties in the department are engaged in consultancy activities that use academic knowledge.							
	Most faculty in the department attend and present papers in seminars, conferences and workshops							

60.	Faculty in the department access good facilities to enhance their academic abilities; library, computer rooms, workshops and laboratories							
	Faculty in the department have secretarial support provided to facility processing academic documents hence spend more time on research and creative work/activities							
	Faculty access grants money for business, research and hiring research assistant							
	Faculties are involved in the hiring of their colleagues so as to get teams that work together and stimulate each other.							
	Most faculty have security of tenure hence can express themselves freely							
	Faculty encourage graduate students to work with them in joint projects and publish papers jointly							
	Faculty use creative teaching methods, employing new methods to teach old courses							
	Faculty present new creative ideas in class and encourage obtaining feedbacks from undergraduate and graduate students							
	On the whole, faculty member in the department are there and hold position on merit and have contributed greatly in my learning creativity throughout my stay in the department							
	Faculty members are not over loaded /overworked hence have enough time for research and creative work							
	The faculty/student ratio is good allowing direct contact and learning that facilitates creativity.							

SECTION E: TEACHING FACILITIES FOR CREATIVITY.

Please tick as appropriate your personal assessment of the teaching facilities available and accessible to you that facilitates learning creativity.

Key: Very Strong Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**.

		VSD					**VSA**
Benefit	**1**	**2**	**3**	**4**	**5**	**6**	**7**

72.	The department has enough / adequate laboratory and workshops facilities(computer, engineering laboratories, workshops and other work spaces) necessary for practical sessions that enhance creative abilities							
73.	Students access the facilities as frequently as need arises							
74.	There are an adequate supply of tools, equipments and materials needed in teaching/ learning creativity in the department.							
75.	The spaces (classrooms, lecture halls, laboratories and workshops) are adequate for the students occupying them at a time. Facilities/ students ratio good.							
76.	The library is adequate and well resourced							
77.	Students access current books, journals, magazines and newspapers in the library in acceptable time, student's ratios and diversity to gather a wide variety of emerging issues.							
78.	Students continuously have adequate information from both electronic and print media in the library or student halls, on current challenges, problems and issues affecting society which appeals to their creative abilities							
79.	Students easily access the internet as source of current information and creative ideas							
80.	Recreation facilities are good and adequate to facilitate relaxed stress free mind ready for creative thinking							
81.	The department continuously acquires new facilities to accommodate changes in technology.							

SECTION F. ACADEMIC PROGRAMMES FOR CREATIVITY.

Please tick as appropriate to reflect your personal assessment of the teaching programme in your department and their adequacy for learning creativity.

Key: Very Strong Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**. **VSD** **VSA**

	1	**2**	**3**	**4**	**5**	**6**	**7**
82. The programmes and all courses in the program are very good and well suited in developing creative graduates.							
83. The program facilitates theory and practical learning of skills that meet the needs and challenge of the current world.							
84. The programmes are regularly reviewed (at least once in three years) to reflect the changes in technology and the community needs.							
85. The programmes support and encourage a strong university/ industry link.							
86. The programmes are designed to encourage and support learners centered approach to teaching and learning.							
87. The programmes have adequate and require students to undertake, practical, projects and industrial attachment to enhance learning by doing.							
88. The programmes are developed by the faculty members with the collaboration of industry players and other stakeholders to reflect the needs of the society.							
89. The design of all courses in the programs in the							

	department are market driven emphasizing learning of creativity through problem solving as opposed to traditional courses that emphasizes skills development.							
90.	Research and creative assignments are integral components of all courses in the programmes in the department.							
91.	Group projects are inherent in the programme to enhance student creative and innovative ability through problem solving and team work							
92.	The program encourages invention and innovation by emphasizing techniques for generating creative ideas							
93.	The programs facilitate, provide avenues and opportunities for exhibiting creative works and creativity and rewards the best and links potential inventers to organizations and bodies that assist in the commercialization of viable ideas							
94.	The programs lead to the development of professional competencies, confident and creative graduates who are able to fit in any work environment exploiting creative abilities and face current and emerging challenges							

SECTION G : TEACHING METHODS THAT ENHANCE LEARNING CREATIVITY

Please tick as appropriate the extent to which you agree with the statements showing the teaching methods used in your department that enhances learning of creativity.

Key: Very Strong Disagree (VSD)-**1**, Strongly Disagree (SD)-**2**, Disagree (D)-**3**, Undecided/don't Know (U)-**4**, Agree (A)-**5** strongly Agree (SA)-**6** and Very Strongly Agree (VSA)-**7**.

		VSD					VSA	
NO		**1**	**2**	**3**	**4**	**5**	**6**	**7**
95. 9	The most common used method in my department adequately enhances							

	learning creativity							
96.	Teaching methods used allow adequate teacher/student contact							
97.	Students centred teaching approaches are used when and where approximate to exploit individual learning capabilities							
98.	Because of the teaching methods used, students easily learn, hence understand the activity and the process.							
99.	Faculty members often/frequently use instructional media in developing and teaching new concepts.							
100.	The overhead projector is a commonly used instructional media in the department							
101.	The power point projector is a commonly used instructional media in the department							
102.	Demonstrations are common in lesson development in the department							
103.	Laboratory experiments are commonly undertaken to develop new concepts.							
104.	Students practicals and projects are carried out in most courses frequently							
105.	Maps, wall charts, graphs and 3-dimensional objects are used to clarify issues/principles when teaching							
106.	Computer simulation are used to demonstrate relationships observed in real life							
107.	Videos, TV programmes and other electronic media is used in class or lecture halls for teaching.							
108.	Modern technology is adequately embodied in the teaching methods in the department							
109.	There is an academic-industry partnership in teaching in the department where part							

		time faculty members are resourced from the industry or come in as guest speakers.							
110.		Imitation of success cases and novel projects is used in to department to enhance learning creativity							
111.		Reverse engineering (Where students are encouraged to dismantle a functioning novel project, study its principles and develop own improved projects) is encouraged and used in the department.							
112.		Field and industrial visits are used in the department as a teaching(learning approach)							

THE END

Thanks for your cooperation.