BUSINESS SCHOOL CREATIVITY AMONGST MBA STUDENTS AT NELSON MANDELA METROPOLITAN UNIVERSITY

WOUDI VON SOLMS

2015

BUSINESS SCHOOL CREATIVITY AMONGST MBA STUDENTS AT NELSON MANDELA METROPOLITAN UNIVERSITY

By

Woudi von Solms (20225856)

Submitted in partial fulfilment of the requirements for the degree of Masters in Business Administration to be awarded at the Nelson Mandela Metropolitan University Business School

JULY 2014

Supervisor: Prof. Margaret Cullen

DECLARATION

I, Woudi von Solms (20225856), hereby declare that the treatise for Masters in Business Administration Is my own work and that it has not previously been submitted for assessment or completion of any postgraduate qualification to another University or for another qualification.

Woudi von Solms

June 2014

ACKNOWLEDGEMENTS

I would like to thank the following people:

- In God who I believe for making me feel that there is twenty five hours in a day and giving me strength to do a lot of work in limited time.

- Prof. Margaret Cullen who believed in me and helped me to do my work to the best of my ability.

- Kayode Ayankoya for assistance with my statistics.

- All other business school staff that assisted me with my studies.

- My family who hardly saw me during the hours of hard work, but still believed in me.

- My fellow students who saw me more than my family and allowed me to believe in myself.

ABSTRACT

Innovation allows for competitive advantage. Competitive advantage and innovation lead to economic growth. For innovation to occur, creativity is necessary. All individuals are creative, but continuous practice is necessary to be creative. The process from creativity to innovation and competitive advantage and economic growth involves three stages.

The first stage involves educating primary and secondary school children to be creative across different domains. Current school systems focus on mathematical and linguistic skills. Examples of domains are linguistic, performance, mechanical-scientific and artistic. These creative domains can be taught through encouraging children to use their imagination and different methods. In primary and secondary education little-c creativity and mini-c creativity are developed. Little-c creativity involves developing problem solving skills. Mini-c creativity involves the ability to recognise personal creative events, not necessarily recognised by others. Tertiary education involves students gaining knowledge in a specific domain. While studying to gain knowledge and conduct research on a specific domain, practicing creativity is still important. Upon completion of tertiary education the second stage in creating economic growth through creativity and innovation commences.

This second stage involves organisations hiring creative employees that have knowledge within a domain similar to the organisation's industry. Creative employees develop creative ideas. The creative ideas allow for innovative products to be developed. Innovative products satisfy customer needs and lead to competitive advantage. Managers should encourage employees to be innovative. Employees that are motivated and encouraged to take risks develop a talent within the domain that they are employed in. The ability to be creative and innovative leads to pro-c creativity and big-c creativity. Pro-c creativity refers to a talent being developed over approximately ten years. Big-c creativity involves creating products that benefits society positively. Upon creating products that benefit society, competitive advantage is created that allows for the third stage of creating economic growth to commence.

This third stage involves economic growth that stems from innovation and creative individuals. Countries currently focus on stage two where they aim to encourage innovation amongst organisations. There is a realisation that to be innovative,

creativity is necessarily and that creativity must be taught by means of education. This research study will use a questionnaire by Kaufman (2009, 2012, 2013) to determine how creative students perceive they are and whether they are capable of recognising different levels of creativity. A similar study was conducted in Germany and Mexico. Professor Alexander Brem was asked for the questionnaire. The questionnaire was translated from German to English.

The objective is to determine whether students perceive themselves to be creative, thus being innovative within their organisations and indirectly allowing for competitive advantage and economic growth. Kaufmans' questionnaire was distributed to Nelson Mandela Metropolitan University Masters in Business Administration students. Ethics clearance was granted and answering the questionnaire was optional.

To draw conclusions an Exploratory Factor Analysis was done on creative domains and the levels of creativity students are able to recognise. The first Exploratory Factor Analysis revealed performance creativity as the first factor, mechanical-scientific creativity as the second factor, scholarly creativity as the third factor and artistic creativity as the fourth factor. The second Exploratory Factor Analysis grouped pro-c creativity, big-c creativity and little-c creativity as the first factor, not being able to recognise creativity as the second factor and mini-c creativity as the third factor. The individual results from each factor were discussed. Each factor was further analysed by comparing gender, age, year's work experience and type of students to the type and level of creativity.

The results show three trends. Firstly, results indicated that respondents perceived themselves to be predominantly scholarly and mathematical-scientific creative. This result is synonymous with secondary research that states that educational institutions focus on enhancing linguistic and mathematical skills amongst students and that developing skills in other domains are seen as less important. Secondly, the ability of students to recognise different levels of creativity decreases from big-c creativity to pro-c creativity; pro-c creativity to little-c creativity and little-c creativity to mini-c creativity. Students are therefore better able to recognise large inventions than smaller inventions. Thirdly, results indicated that creativity levels do not differ when gender, age, year's work experience and type of students are compared. In this research study the above statements will be discussed in detail.

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LIST OF ABBREVIATIONS

APT model:	Amusement Park Theoretical Model
BCG:	Boston Consulting Group
CAQ:	Creativity Achievement Questionnaire
CDQ:	Creativity Domain Questionnaire
CSDD:	Creativity Scale for Diverse Domains
CTI:	Commission of Technology and Innovation
EFA:	Exploratory Factor Analysis
FDI:	Foreign Direct Investment
FET:	Further Education and Training
GDP:	Gross Domestic Product
ITIF:	Information Technology and Innovation Foundation
K-DOCS:	Kaufman Domains of Creativity Scale
MBA:	Masters in Business Administration
NGO:	Non-Governmental Organisations
NMMU:	Nelson Mandela Metropolitan University
R&D:	Research and Design
SNSF:	Swiss National Science Foundation
USA:	United Stated of America

CHAPTER 1

INTRODUCTION AND PROBLEM STATEMENT

1.1 INTRODUCTION

Innovation and education assist countries to obtain competitive advantage (Slack, 2013). The three concepts in this statement that are necessary for competitive advantage are the foundation for this research study. The first is education. The second is innovation that stems from creativity. The third is how countries exercise innovation and education.

Education involves teaching skills. The skills involve taking risks, adapting to changing environments and thinking of new solutions to problems. Teachers should encourage creativity and teach creatively so that creativity levels do not decrease and innovation can be applied when students enter the working environment (Kwong, Thompson, Cheung & Manzoor, 2012:45-49).

All individuals have a certain level of creativity. Creativity refers to a novel idea that occurs before innovation. Innovation is the implementation of the creative idea. Innovation and creativity can be taught (Clegg, 2013). Levels of creativity have been measured in various ways. Gibson (2010:608) stated when measuring children's' creativity levels that the average creativity level is ninety eight percent but decreases to two percent when the child reach adulthood. Kaufman and Beghetto (2009:94-101; 2013:333-334) use four levels to measure creativity. The first is big-c creativity that involves continuous learning (education) and novel products that are remembered by future generations. The second is pro-c creativity that involves people that are experts in their field and have approximately ten years' experience working in their field. The third is little-c creativity that involves solving problems. The fourth is mini-c creativity that involves teachers encouraging learning and individuals recognising themselves as being creative. Together with the four levels of measuring creativity, Kaufman and Beghetto (2009) also confirmed that certain people are not able to recognise creativity. The ability to recognise creativity plays an important part in innovation (Kaufman and Beghetto 2009:94-101).

Innovation involves two steps. The first is to recognise creativity. The second is to design products that benefit society. These two steps allow for competitive

advantage (Mann & Chann, 2011:15-16; Liao, Chang & Wu, 2010:1121). Various countries spend different amounts of resources on recognising and implementing innovation to increase competitiveness. Bloomberg (2013) ranks countries' innovation levels. Seven criteria were identified that included research and design (R&D), productivity, high technological density, researcher concentration, manufacturing capability, tertiary efficiency and patent activity (Bloomberg, 2013).

Figure 1.1: Layout of Chapter 1

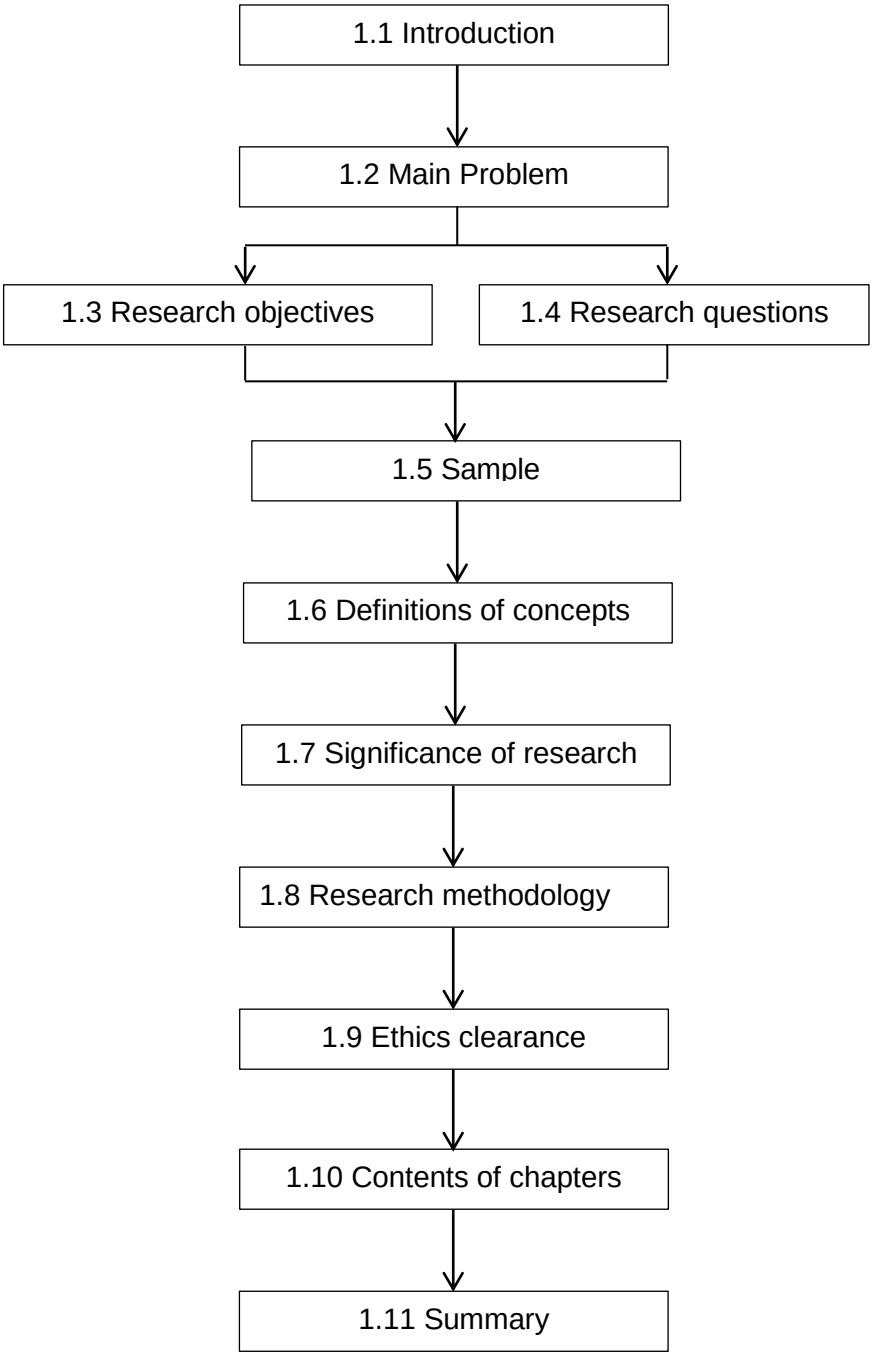


Figure 1.1 gives an outline of chapter 1. An introduction is given above and is followed by the main research problem. Research questions and research objectives will be mentioned. The sample, definitions of concepts and the significance of the research will also be discussed together with the research methodology. Ethics and a brief overview of the other chapters will be discussed before the chapter conclude with a summary.

1.2 MAIN PROBLEM

Creativity is a natural phenomenon that individuals have since birth. Education systems decrease the level of creativity (Gibson, 2010:68). Kovalik (2010) mentions that teachers increase intelligence of students. The longer an individual is exposed to education, the more intelligent an individual becomes due to increased practice on that which was learnt (Kovalik, 2010:12.2-12.3). Based on Kovalik (2010) and Gibson (2010) the education system decreases creativity that leads to innovation and increases intelligence (Kovalik, 2010:12.2-12.3; Gibson, 2010:68). A balance between creativity and intelligence in education play a role in countries' competitiveness and economic growth (Wesner, 2011). Kaufman (2009; 2013) conducted research that showed individuals have the ability to recognise creativity. This leads to the main research problem of this study:

***Creativity is not recognised amongst Masters in Business Administration (MBA) students at the Nelson Mandela Metropolitan University (NMMU) Business School*.**

1.3 RESEARCH OBJECTIVES

The main research objective is:

To determine the perception of tertiary students own creativity as it is important in entrepreneurship.

The research objectives include:

- RO_1: To investigate the significance education plays in enhancing creativity;
- RO_2: To investigate the extent to which countries realise the importance of innovation;
- RO_3: To determine the importance innovation plays in organisations;

- RO_4: Evaluate own domain-specific perspective of everyday creativity;
- RO_5: Using K-DOCS, to determine the ability to identify different levels of creativity; and
- RO_6: To determine whether demographics influence perceptions of creativity.

1.4 RESEARCH QUESTIONS

To solve the main research problem secondary research questions have been identified:

- RQ_1: What significance does education play in enhancing creativity?
- RQ_2: How important is innovation to countries?
- RQ_3: What role does innovation play in organisations?
- RQ_4: How creative do students perceive they are, using the Kaufman Domains of Creativity Scale (K-DOCS) and creative domains?
- RQ_5: Are students able to recognise different levels of creativity?
- RQ_6: Do demographics influence the perceptions of creativity?

Table 1.1 is a consistency matrix that shows the relationships between the research questions and research objectives, the chapter in which the research questions and research objectives is discussed and the deliverable.

Table 1.1: Consistency matrix

Title: Business School creativity amongst MBA students at Nelson Mandela Metropolitan University				
Main Research Problem: Creativity is not recognised amongst students at tertiary institutions.				
Research objective: To determine the perception of tertiary students own creativity as it is important in Entrepreneurship.				
Main Research Question (RQ_M): Do students perceive themselves as creative?				
Secondary research questions		**Research objective**	**Chapter**	**Deliverable**
RQ_1	What significance does education play in enhancing creativity?	Investigating the significance education play in enhancing creativity.	Chapter 2: Creativity and Innovation (Literature study)	Teaching increases the level of creativity of students.

RQ_2	How important is innovation to countries?	Investigating the extent to which countries realise the importance of innovation.	Chapter 2: Creativity and Innovation (Literature study)	Innovation is necessary for country competitiveness.
RQ_3	What significance does innovation play in organisations?	Determining the importance innovation plays in organisations.	Chapter 2: Creativity and Innovation (Literature study)	Innovation helps organisations to be sustainable.
RQ_4	How creative do students perceive they are using sing Kaufman Domains of Creativity Scale (K-DOCS)?	Using Kaufman Domains of Creativity Scale (K-DOCS) to determine how creative students believe they are.	Chapter 3: Creativity Methodology chapter and Chapter 4: Results and Analysis of Creativity Levels of Students	Validation of findings from the creativity test and the impact it can have on management innovation in a business.
RQ_5	Are students able to recognise level? domain-specific perspectives of everyday creativity?	Evaluating domain-specific perspective of everyday creativity that.	Chapter 4: Results and Analysis of Creativity Levels of Students	Employees and managers excel in different areas.
RQ_6	Do demographics influence the perceptions of creativity?	Demographics influence perceptions of creativity.	Chapter 4: Results and Analysis of Creativity Levels of Students	Employees' demographics influence creativity perception and innovation levels.
RQ_7	Do students perceive themselves as creative?	To determine the perception of tertiary students own creativity as it is important in Entrepreneurship.	Chapter 5: Summary, conclusions and recommendations on creativity Levels of Students	The perception of tertiary students own creativity as it is important in Entrepreneurship.

1.5 SAMPLE OF STUDY

The sample is MBA students at Nelson Mandela Metropolitan University in Port Elizabeth. Students are from Port Elizabeth, Cape Town, Johannesburg, East London and George.

1.6 DEFINING CONCEPTS

The definitions of the key concepts of the research study are provided below.

1.6.1 Competitive advantage

A competitive advantage involves having better profitability and market share than competitors as well as values and skills that are not owned by competitors which benefit consumers (Markamn & Phan, 2011:186; Higgins & Izushi, 2011:81).

1.6.2 Creativity

According to O'Sullivan (2008:5), creativity is a mental process that involves useful and actionable concepts that stem from novel ideas.

1.6.3 Education

The ability to understand various disciplines and methods of gaining knowledge and understand concepts to develop, learn and engage in different perspectives (Matheson, 2014:13).

1.6.4 Innovation

Christensen (2012) describes innovation to involve, firstly, creating employment by turning expensive products into affordable products, secondly encouraging sustainability by creating new product models and lastly, simplifying processes (Hall, 2014).

1.7 SIGNIFICANCE OF THE RESEARCH

Entrepreneurship education helps students to become creative and increasingly take risks. The 'risk' aspect is apparent in the definition of an entrepreneur that states that an entrepreneur organises and takes into consideration the risk associated with running a profitable organisation. Entrepreneurs create something new, increase revenues and are both creative and innovative (Subroto, 2012:188-190). Entrepreneurship also plays an important role in economic growth and innovation assist in achieving entrepreneurial success. Innovation can refer to new ideas, products and processes. The concepts of 'new' are therefore apparent in both the definitions of an entrepreneur and innovation (Global Business School Network, 2013:4-6; Farzaneh, Gholamreza, Parviz & Alireza, 2010:5372). Educating students about entrepreneurship should include creativity and novelty. These two aspects are not necessarily apparent when considering education (Farzaneh, et al., 2010:5372).

In South Africa low enrolment levels at university and low entrepreneurship hinder economic growth. Entrepreneurship is a necessity of economic development and competitiveness (Alessandrini, Klose & Pepper, 2013:204-205). Entrepreneurs need to be creative and be able to solve problems. Poor education hinders entrepreneurial

skills, creativity as well as other skills needed when employed. The quality of education is therefore important (Global Business School Network, 2013:1-5).

The link between entrepreneurship, innovation and education is significant in this research as the majority of students interviewed are employed by entrepreneurs or, entrepreneurs themselves or have aspirations of becoming entrepreneurs. The ability to recognise a creative idea or innovative product within the work place simultaneously leads to economic growth and is due to a good educational background.

The K-DOCS that test the ability of students to recognise creativity and the level of creativity can assist in the students to be innovative in the workplace. Innovation occurs in different areas of businesses and the K-DOCS will show the ability of students to recognise creativity in different domains and therefore assist in economic growth.

1.8 RESEARCH METHODOLOGY

A literature review is conducted. The aim of the literature review is three-fold. The first is to gain existing knowledge on creativity and innovation. The second is to determine the existing importance and application of creativity and innovation in education. The third is to determine the existing importance and application of creativity and innovation in different countries. To obtain data for the literature review journals, books, newspapers and videos is utilised.

The literature review is followed by a questionnaire initially designed by Kaufman (2009). Recently Professor Brem from Germany (2013) used the questionnaire to test the perception of creativity on German students. The same questionnaire is translated into English and is used to test the perception of creativity on South African students. The questionnaire allowed for quantitative data to be collected. The questionnaire consists of five sections. Section one refers to the ability to recognise creativity in different domains. Section two tests the ability to recognise different levels of creativity. Section three aims to create a link between feelings and creativity. Section four involves six new aspects that could probably be linked to creativity. Section five related to demographic variables.

Quantitative research instruments, such as questionnaires, are used to numerically measure non-quantitative concepts such creativity and beliefs and attitudes in education. The aim, through data analysis, is to find explanations for concepts being researched (Muis, 2012:2). Upon completion of the questionnaire the data is captured on Excel and transferred to Statistica to obtain statistical results on the concept of creativity.

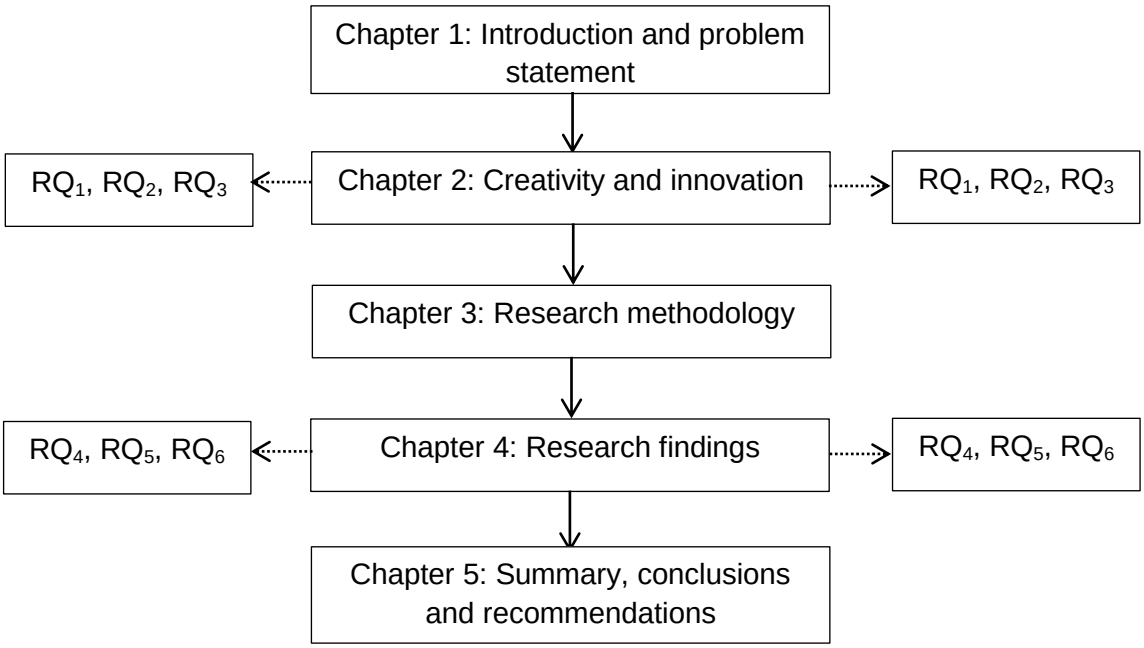
1.9 ETHICS CLEARANCE

Ethics clearance was necessary as students are classified as a vulnerable group. An ethics clearance form was submitted to the NMMU Business School and ethics clearance was received. The ethics number is: H14-BES-MBA-053 and is attached as appendix A.

1.10 CONTENTS OF CHAPTERS

The layout of all the chapters is depicted below and is followed by a brief explanation.

Table 1.2: Layout of all chapters



Chapter 1 gives a brief description of the research problem, research questions and research objectives. The significance of the research, sample and research methodology is explained. Definitions of the main concepts are also given.

Chapter 2 provides a literature review on creativity and innovation. The importance of creativity and innovation is highlighted in different countries, organisations and education systems. Research questions and objectives one to three are addressed.

Chapter 3 constitutes a detailed description of the research methodology. The discussion relates to the sample, data gathering process and research methods used.

Chapter 4 discusses the statistical results obtained from the primary research. Research objectives and questions four to six are addressed.

Chapter 5 includes conclusions, recommendations and a summary.

1.11 SUMMARY

In this chapter an overview was given on all aspects of the research study. An introduction to creativity, innovation and education was given and why these three aspects are important in research. The research method of gaining additional knowledge was briefly given. In chapter 2 secondary sources are consulted to gain information on research questions one to three.

CHAPTER 2

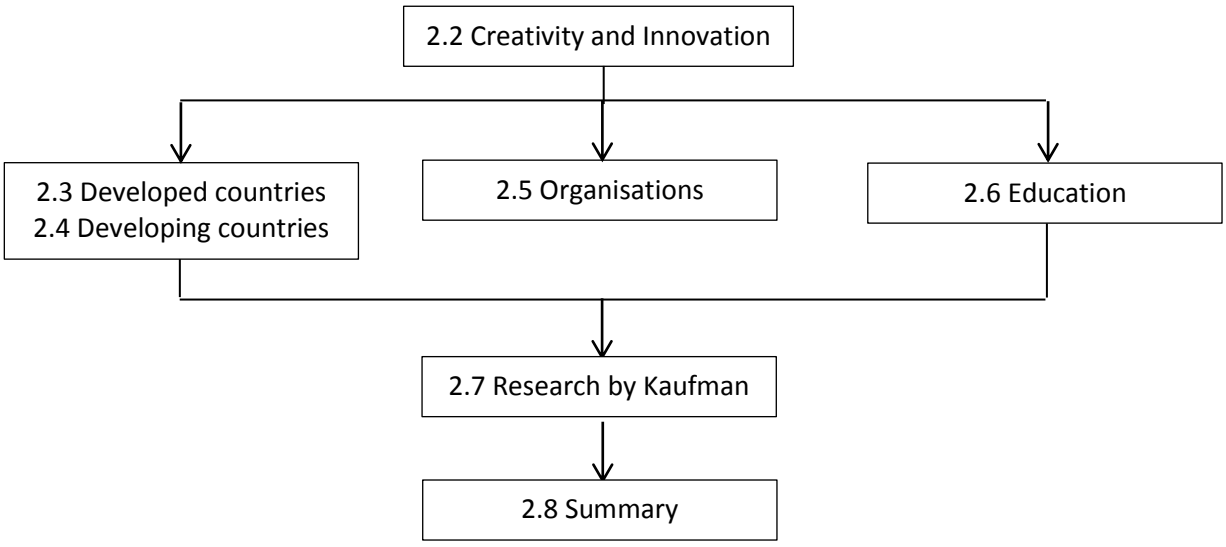
CREATIVITY AND INNOVATION

2.1 INTRODUCTION

According to Slack (2013) education is the main influence on a country's level of competitiveness. Competitiveness can be defined as country's generating income and employment (OECD, 2013:31). Competition involves increasing market share as well as improving and creating new products. Resources must be utilised and facts must be analysed to ensure an environment that allows organisations to receive value and individuals prosperity (United Nations, 2010:90-91; Nallari & Griffith, 2013:37). The level of competitiveness is related to the level of efficiency and innovation. Slack (2013) defines competitiveness as institutions, policies and factors that determine productivity. A productive workforce that is well educated and trained assists in creating innovative individuals (Slack, 2013).

The objectives of this research study are to determine the extent to which Masters in Business Administration (MBA) students at NMMU can recognise their own creativity. To assist in gaining information on these objectives this chapter will provide information on the importance of creativity within countries, organisations and education systems. A layout of the chapter is given below and is followed by a brief explanation.

Figure 2.1: Layout of chapter 2



Firstly, this chapter will begin by defining and discussing creativity and innovation.

Secondly, this chapter will endeavour to give an outline of the perceptions of creativity and innovation by developed and developing countries as well as an overview of their education systems.

Thirdly, there will be an explanation of the role of creativity and innovation within organisations.

The fourth intention is to discuss education and the importance of creativity within education.

The fifth intention is to discuss research done by Kaufman (2003, 2009, 2012) on which the primary data collection of this research is based.

Finally this chapter will include conclusions that state similarities between creativity within education and creativity within organisations.

2.2 DEFINING CREATIVITY AND INNOVATION

Creativity and innovation help organisations to be successful. Innovation includes implementing a creative idea that assists in improving the operation of an organisation. Both concepts involve people creating something novel (Farzaneh, et al., 2010:5372-5373; Clegg, 2013). Creativity happens before innovation and relates to conceptualising and solving problems through ideas (Clegg, 2013).

2.2.1 Creativity

Clarke and Cripps (2012:114) define creativity as a transformation process. The process of knowing, thinking and doing that embodies elements such as risk taking, envisaging, engaging, persisting, observing, experimenting, attending to relationships, taking a benign attitude to error and critically reflecting. Other explanations of creativity mention four aspects in the description. The four aspects involve an idea being novel, useful, appropriate and actionable. When an idea involves these four aspects and satisfies a need, the idea is creative (Busco, Frigo, Giovannoni & Maraghini, 2012:30; Farzanech et al., 2010:5372). Other descriptions of creativity in psychology involve functionality and adaptability. The motivation behind creativity may include the quality of tasks (Kersting, 2003). Furthermore,

creativity also involves originality, utility and value. Value and originality are also concepts used to describe creativity from an educational perspective and stems from the imagination (Kleiman, 2008:208-210). Kersting (2003) also states that when the environment is favourable creativity requires intelligence, freedom, support and positive challenges.

The numerous concepts that aim to describe and define creativity make it difficult to create a specific definition for creativity. Research has shown that all individuals have a certain level of creativity. A child of five years' potential for creativity is 98%, however when the child is aged ten he or she has a creativity potential of 30%. Furthermore, when the age increases to fifteen the creativity potential drops even further to 12% and the average adult creativity potential is 2% (Gibson, 2010:608). It is consequently apparent that the level of creativity decreases from young childhood to adulthood.

Initially two levels of creativity were identified namely everyday creativity (little-C creativity) and genius level creativity (big-c creativity). When creativity is applied in education, everyday creativity is used (Sandeen, 2010:94). Everyday creativity involves growth and being able to solve problems better (Rinkevich, 2011:221). Everyday creativity is also known as little-c creativity (Bramwell, Reilly, Lilly, Kronish & Chennabathni, 2011:228; Kersting, 2003; Kaufman, 2009:44; Shavinina, 2009:592). Kaufman (2009:44-45) states that all individuals have little-c creativity. An example may include adjusting a recipe, enhancing writing methods or a fourth grade student conducting an experiment. Little-c creativity enables an individual to analyse situations and use their imagination to gain results (Kaumfan, 2009:44). Multiple authors also agree that little-c creativity involves people thinking or identifying different ways to solve problems (Bramwell et al., 2011:228; Kersting, 2003; Kaufman, 2009:44; Shavinina, 2009:592). Individuals that are classified as having little-c creativity are those that have not yet achieved big-c creativity status (Kaufman & Beghetto, 2009:95-97).

Big-c creativity involves developing a product that is meaningful to society (Bramwell et al., 2011:228). The product is classified as genius and is said to be remembered for generations. An example of someone who used big-c creativity is Steve Jobs from Apple who created the iPod (Kaufman, 2009:44-46). In the music industry

Mozart is an example (Brinkman, 2010:48; Shavinina, 2009:592-593). Big-c creativity involves the creativity product to be novel and useful (Kaufman & Beghetto, 2009:96). Individuals that recognise big-c creativity are characterised as being agreeable and open. It is achieved through talent and continuous learning (Kaufman & Beghetto, 2013:333-334). Winning an award is proof that an individual has achieved big-c creativity level. There must be a link between the individual and the domain and field of creativity. The domains will be discussed at the end of the chapter. The domains involve teachers and critics that influence the individuals' ability to be creativity in a specific domain (Kaufman & Beghetto, 2009:95).

In 2009, Kaufman and Beghetto incorporated two additional categories that include mini-c and pro-c. The definition of mini-c creativity involves novelty and experiences, actions and events that are interpreted in a meaningful manner. Mini-c creativity is developed through learning. The learning process involves gaining knowledge and understanding socio-cultural circumstances. Teachers assist in this process. All individuals have the potential to be creative. The teachers and other role players must recognise creative insights of students and assist in interpretation and learning of the subject matter (Kaufman & Beghetto, 2009:97-99). Mini-c creativity involves learning and gaining novel insights that an individual identifies about themselves through their ideas and their interpretations. Mini-c creativity is subjective and necessary for big-c creativity (Kaufman & Beghetto, 2013:333).

Pro-c creativity involves professional creators that have not reached big-c creative status. Pro-c creativity represents progression between little-c and big-c creativity. Professionals in a specific domain attain pro-c status. To achieve pro-c status approximately ten years of performing, learning, experimenting and exploring is necessary. This time frame may be longer in domains that require various styles and ranges (Kaufman & Beghetto, 2009:100-101). Pro-c creativity relates to individuals being experts in their fields, but these people are not famous for their creative ability.

The question arises whether a layperson can identify the four different stages. Research has shown the laypeople are more easily able to see themselves as having little-c creativity than big-c creativity. The creative process starts with mini-c and discovery of creativity. The next stage is little-c that is followed by pro-c that involves a talent (Kaufman & Beghetto, 2013:333).

The four levels of creativity are not necessarily similar to the original concept of the four-C model of Kaufman (2012). The reason is that a layperson has difficulty distinguishing between pro-c and little-c. The levels of creativity identified by individuals include big-c, pro and little-c, mini-c and not being able to recognise creativity. To distinguish between the levels of creativity assists in recognising insights of children and novices that is still learning about certain creative domains (Kaufman & Beghetto, 2013:334).

Other characteristics of creativity will be discussed throughout this chapter. Based on the above information creativity, pertaining to education can so far be described as: 'learning to solving problems through original methods that adds value, satisfies needs of society' (Kaufman & Beghetto, 2009; Kaufman & Beghetto, 2013).

2.2.2 Innovation

Creativity and innovation can be taught, however there are distinct differences (Sandeen, 2010:94; Clegg, 2013). Innovation involves ingenuity, freedom, flexibility, questioning and defying authority (Zakaria, 2011). For innovation to take place a system must be followed that originated with creativity. Innovation also happens when individuals collaborate and use resources. Recognising creativity and innovation when it occurs and the size of the impact it has on social systems determines the level of innovation (Mann & Chann, 2011:15-16).

According to Mann and Chann (2011:15-16) innovation is defined as a process where organisations practice designing products that are new. Merely inventing a new idea does not necessarily lead to innovation. The execution and production of the idea is also important (Mann & Chann, 2011:15-16). Plucker, Beghetto and Dow (2004:90) defined innovation as an interaction among aptitude, process and environment by which an individual or group produces a perceptible product that is novel and useful within a social context (Kaufman & Beghetto, 2009:96). A third definition includes that of O'Sullivan (2008:3). O'Sullivan (2008:3) defines innovation as the process of making changes, large and small, radical and incremental, to products, processes and services that adds value to customers, introduces something new to the organisation and contributes to the knowledge of the organisation (O'Sullivan, 2008:3).

Innovation is encouraged by design-thinking that is a skill that encourages innovation as it involves observing and collaborating. Individuals that apply design-thinking learn fast and can visualise their creative ideas (Sandeen, 2010:97). Innovation and entrepreneurship is a necessary element in developing design-thinking skills. The product that stems from design thinking must be made available to customers through an organisation that sells the product. Creativity and imagination are also necessary to create these products (Denning, 2013:31). Innovation that is successful leads to competitive advantage. The competitive advantage originates from using creative ideas to create offerings of value and quality that satisfy customer's needs (Stokes, Wilson & Machor, 2010:48-74; Liao, Chang, Wu, 2010:1121).

The disruptive products satisfy needs of markets in developing and developed countries. The developing countries' population are poor and products that satisfy needs must be affordable. These products are known as disruptive products that stem from reverse innovation. Affordable materials and simple usage make the product attractive for developing and developed countries. The disruptive products increase competition between countries (Hang, Chen & Subramian, 2010:21-22). Innovation therefore includes the execution or production of valuable ideas that can lead to competitive advantage but originate from creativity.

2.3 GLOBAL IMPORTANCE OF CREATIVITY

The Global Innovation Index (2013) states that multinational organisations, government and family owned organisations can increase innovations by employing talented employees, both locally and internationally. The talented employed can do research that will lead to commercial advancement and new innovations. Thus continuous investment in talent that allows for innovation will lead to additional investment, talent and innovation (Global Innovation Index, 2013).

Innovation also leads to economic growth, increased competitiveness, a future for the next generation, increased national security and finding solutions to global challenges. For a country to be innovative there must be investment in education as well as collaboration on research and product invention amongst Small to Medium Enterprises, universities and government (Wessner, nd). Successful innovation stems from research and design (R&D), productivity, high technological density, researcher concentration, manufacturing capability, tertiary efficiency and patent

activity (Bloomberg, 2013). These seven aspects from Bloomberg were used to rank countries based on innovation in 2012.

To determine the ranking each factor mentioned was given a weighting. Each weighting was 20%, except for manufacturing capability, which was weighted at 10%, tertiary efficiency at 5% and patent activity at 5%. Research intensity relates to the percentage of the Gross Domestic Product (GDP) that is spent on research and development. Productivity is determined by the hours worked per GDP per employee. High-tech density refers to public, high technological companies and researcher concentration to the number of researchers within every one million individuals. Manufacturing capability involved the GDP and the percentage of value manufacturing adds to the GDP. Tertiary efficiency refers the number of students enrolled at universities at all levels, studying science, engineering, manufacturing and construction. Patent activity refers to the number of patents filed per every one million individuals, as well as considering every $1 million spent on research and development (Bloomberg, 2013).

In figure 2.1 the number of researchers and engineers are shown in millions (vertical axes) as well as the percentage of the GDP that is spent on research and design (R&D) (horizontal axes) in various countries. The size of the circle reflects the relative amount of money spent on research and design (Bloomberg, 2013).

The United States of America (USA) spend the largest amount of their GDP annually on R&D. Approximately 2.75% of their GDP is spent on R&D and the country has approximately 5 trillion researchers and engineers. Japan and South Korea have a similar amount of researchers, but spend a higher percentage of their GDP, 3.4% and 3.5% respectively, on their R&D than the USA.

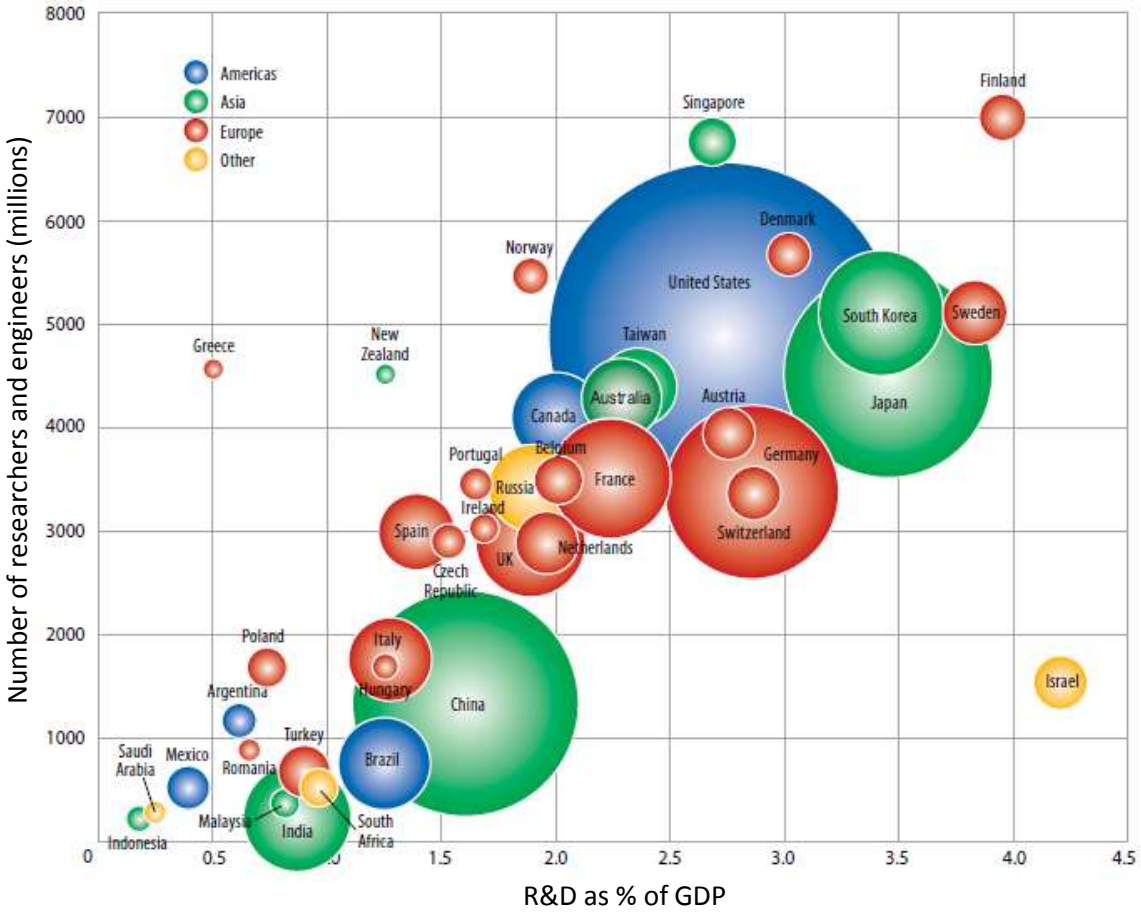
Switzerland spend a similar amount annually on R&D to Japan, but allocate a smaller percentage of their GDP to R&D (2.8%) and have less researchers and engineers (3,2 trillion) than the USA, Japan and South Korea (Bloomberg, 2013).

China spends a larger amount on R&D annually than Japan and South Korea, but less than the USA. The percentage of Chinas GDP allocated to R&D (1.6%) and the number of researchers and engineers (1,5 trillion) is also less than Japan and South Korea (Bloomberg, 2013).

India's annual spending on R&D is closest to the annual spending of South Korea however the percentage of the GDP spent on R&D (0.8%) and the number of researchers and engineers (200 million) is considerably less than the above mentioned countries (Bloomberg, 2013).

Brazil's percentage of GDP spent on R&D is approximately 1.25%, which is more than India, but less than China. Of all the above mentioned countries, South Africa spent the smallest amount on R&D annually. South Africa has more researchers and engineers (700 million) and a bigger percentage of the GDP (0.9%) is spent on R&D than in India (Bloomberg, 2013).

Figure 2.2: Innovation levels of countries



Source: Bouwer, 2013

The countries that spent the largest amount on R&D as well as Brazil, Russia, India, China and South Africa (BRICS countries) will be discussed in the next section.

2.3 DEVELOPED COUNTRIES

The developed countries identified for discussion include the United States of America, Switzerland, South Korea and Japan.

2.3.1 United States of America

The Boston Consulting Group (BCG) ranked the USA as sixth and the Information Technology and Innovation Foundation (ITIF) eighth in terms of money spent on research, new patents and new venture funding. The ITIF also conducted a longitudinal study for ten years (1999 – 2009) to measure the improvement government funding had on research and education. The USA ranked fortieth (Zakaria, 2011). Bloomberg ranked two hundred countries on innovation and the USA ranked number one (Bloomberg, 2013). According to the Bloomberg Global Innovation Index's criteria the USA ranked ninth on R&D intensity, third on productivity, first on technological density, tenth on researcher concentration, fifty second on manufacturing capability, twenty sixth on tertiary efficiency and sixth on patent activity (Bloomberg, 2013). The reason for the difference in ranking is that different criteria was utilised. Bloomberg (2013) used the seven criteria above where the BCG and ITIF used the amount spent on research, patents filed and funding to new ventures as a criteria (Zakaria, 2011).

One reason for the USA ranking high on innovation indices is because they are using their own technologies, refining international products and creating their own innovations while simultaneously increasing jobs that allow economic growth (Global Innovation Index 2013, 2013). The USA have realised that innovation involves original concepts, as well as reattempting initiatives that originally failed. The USA's innovations have increased despite the global economic crisis (Global Innovation Index 2013, 2013). In 2011, the USA government introduced budget cuts in certain areas to ensure that areas that will allow future economic growth receive additional investment. Areas that were seen to allow for future growth include training, education, research and technology. In the long term the aim to increase education and technology is to allow the USA to be more competitive (Sun, 2011). Technology and education will now be discussed.

2.3.1.1 Technology

Technological innovations are dependent on universities and organisations that conduct research and receive funding from government. In the USA technologies that receive government funding include technology used in the military, focussing on stealth, global positioning systems, the Internet and microchips needed by NASA (Zakaria, 2011). Targets for new technologies, such as renewable energy, transport and products used by the Department of Defence should be set by the department. Other public sectors should collaborate with private sector and focus on intellectual property that could lead to increase innovation. Quick approval of technologies, investment incentives and environmentally viable infrastructure should be supported by policies that include social value propositions (Manyika, Pacthod & Park, 2011). An example is Apple, as it is seen as an innovative company that has innovative products and patents. A survey in 2010 ranked Apple as 81st when comparing money spent on research and development. Although Apple spends less money on research and development than their competitors, part of Apple's innovative successes stem from their product design, consumer usage and their marketing. These three aspects are linked to the definition of innovation provided earlier that innovation must satisfy a consumer need and be part of the objective of organisations (Zakaria, 2011).

The USA used to be leaders in industries that included the internet and space exploration. The speed of technological entrepreneurship in America has led to economic growth. However, today the USA is competing with Russia, Japan and other Asian countries on technological innovations (Manyika, Pacthod & Park, 2011; Segal, 2004). Technologies are increasing efficiency and jobs are outsourced to China and India to save costs. Innovation in in the USA, in new industries that allow new products and processes will increase local employment opportunities and lead to economic growth (Zakaria 2011). In order to assist with innovation the USA believe that economic leadership together with satisfying customer needs, talented employees, entrepreneurial spirit and technology is necessary (Manyika, Pacthod & Park, 2011). Globalisation is a threat to the technological innovation the USA is competing for. International rivals are also developing original technologies and for the USA to stay competitive continuous technological entrepreneurship will be important (Segal, 2004).

2.3.1.2 Education

The USA's education system does not place enough emphasis on the purpose of education. The schooling system currently focuses on cognitive skills. However, merely focusing on cognitive skills reduces the level of intrinsic motivation and creativity that students have (Townsend, 2013). Teachers in the USA do not communicate on individual students' academic ability. Teachers that teach students in primary and high school do not understand a student's academic capability and needs (McCallumore & Sparapani, 2010). Students' class performance is estimated to increase as schools receive better funding and teachers take up the role of facilitators in classrooms (Townsend, 2013). The USA also has high drop-out rates in high school, which are due to the social and academic differences between middle and high school. Students going to high schools do not have the reading levels and subject knowledge needed to perform satisfactory in high school. Students also do not understand the importance of academic performance that high schools have on university entrance. Thus students fail to see the advantage of academic success in high school (McCallumore & Sparapani, 2010).

There is an increase in international students that attend American universities, however Visa regulations force international students to leave the USA upon completion of studies. As a consequence there is a reduction in talent developed the USA. The reduction in talent of engineers is a concern in the USA as the engineers that assist in innovation retire at a higher rate than those trained by universities. The education system allows for students and teachers to excel at research; however a skill shortage is still a reality (Manyika, Pacthod & Park, 2011). Thirty eight percent of post-graduate students in science are international students. The foreign students pose another threat: The education system where these students originate from is increasing in quality, which reduces the number of graduates in the USA that can participate in research and innovation, as there is a better education available in their home country (Segal, 2004).

2.3.2 Japan

On the Bloomberg Global Innovation Index Japan ranked sixth. Japan also ranked sixth on researcher concentration, fifteenth on manufacturing capability, twenty

seventh on tertiary efficiency and second on patent activity, fourth on research and development intensity, twenty first on productivity and twentieth on high technological intensity (Bloomberg, 2013). Japan's innovation predominately came from technology. After a boom, the technologic industry's competitive advantage declined. Examples of technological innovation include DRAM chips, DVD players, liquid crystal display panels, car navigation systems as well as energy panels, iPods and lithium ion batteries (Vogel, 2013).

Quality management is difficult in high technological sectors due to radical changes and high levels of uncertainty. The Japanese are good at improving quality, and this has led to competitive advantages in industry and innovation (Cole & Matsumiya, 2007:78). Apart from getting a competitive advantage through quality, the Japanese also copied technology and was able to offer products at lower prices and supply the products in larger quantities. Another means of competitiveness for Japan is enhanced production processes, which led to cost reduction and offers Japan a competitive advantage the USA is finding difficult to compete with. Japanese innovation focus on production processes as opposed to new products (Vogel, 2013).

When an organisation aims to improve processes and reduce variations of products, less innovation takes place. Japan innovated, but did not keep the level of quality in mind. They were slow to adjust compared to their competitors and aimed for standardisation and not adapting their products to different markets. Managers therefore failed to meet market requirements (Cole & Matsumiya, 2007:81). The end result of Japan not satisfying international markets, when producing products and services, led to Japan manufacturing products that only satisfied the Japanese markets' needs as oppose to international customer needs (Vogel, 2013).

The weaknesses of Japanese products included services, software, entertainment and system integration. Due to software being included in patents the Japanese lost competitive ground due to their competitions focusing on innovation in software development (Vogel, 2013). The Japanese government have reacted to the above problems by increasing flexibility while keeping the stable employment conditions in mind. The Japanese have been careful of changing production processes that

involve higher financial returns but increased risks. These changes led to a reduction in Japan's competitive advantage (Wessner, nd).

2.3.2.1 Education

Students in Japan's schools perform academically better than those students of a similar age in different countries. This result is based on the Program for International Student Assessmeny (PISA) examination (Clavel, 2013; Gardner, 2014). A slowing birth-rate is reducing the number of students; however the number of teachers has increased. Japan's students perform well in literacy and numeracy, but perform poorly on problem solving skills. Teachers are a source of the problem, as teachers are not trained and do not have the resources to teach English. An example of a poor resource is out-dated textbooks (Clavel, 2013). English classes are not taught in English, but rather in Japanese. In these classes communication is not a priority. Students learn correct grammar, but are unable to have a conversation. The inability to speak English has a spin-off effect. Adults are not able to communicate efficiently within a work environment where English is spoken internationally (Pamintuan, 2014).

In order to solve these problems foreign English teachers are hired. Financial investment from the ministry of education can help but the financial resources are limited (Clavel, 2013). Another problem is that parents of students see English classes as not being important. The methods of testing English proficiency are not seen as ideal. Students also do not see the importance of being able to speak English (Gardner, 2014). Internationally, English is seen as an important language due to globalisation and communicating with other countries and organisations. The government aims to rectify this by starting English classes two years earlier. Originally children learnt English in grade five. This is now moved to grade three (Clavel, 2013).

Gaining entry into a Japanese university does not involve speaking English. The importance of being able to speak English was outweighed by the importance of gaining university entrance (Clavel, 2013). The importance of being able to speak English is changing. In 2014, an English proficiency test has been implemented at certain universities to determine the extent to which university entrants are able to

write, listen to and speak English (Mainichi, 2014). Apart from solving the English language problem, the Ministry of education also has policies in place to increase research in universities. The Ministry of Education has showed concern with regard to a high drop-out rate from university students. Surveys were conducted and the data indicated that the drop-out rate was due to students being forced to enrol at a university. In an attempt to reduce drop-out rate counselling is provided and within universities remedial assistance is provided to students that is struggling (Mainichi, 2014b).

2.3.3 South Korea

According to Chung (2011) foreign direct investment allows a country to gain knowledge and skills. In South Korea, international investment was restricted by policies that related to exporting and the transfer of technology. The reason for this restriction was that South Koreans felt that sharing technological knowledge reduced independence (Chung, 2011:335). Geographically this is not ideal. The regional political leadership creates uncertainty in terms of developments within regions that have led to duplication of policies and programs (OECD, 2011:15,17).

Certain geographical areas within the country were identified and the regional government is responsible for research and innovation within that geographical area. The South Korean government are implementing strategies to enhance collaboration across a wider geographical area. South Korea's main industries focus on human capital due to limited natural resources and are mainly located in the Seoul metropolitan areas (Ko & Choe, 2011:2). South Korea learns from failures and seeks international practices that work to help the country operate more effectively (OECD, 2011:15). In order to assist with overall innovation the South Korean government are cooperating globally to increase cross-border knowledge. One example is collaborating with the USA on green issues that include climate change and reducing poverty and with Russia and India on science and technology innovations (Ko & Choe, 2011:7-9).

Foreign Direct Investment (FDI) in South Korea is approximately 0,3%. International competition forced South Korea to be innovative and more competitive. South Korea was able to supply the demand for R&D and innovation due to them having the finances and trained human capital available (Chung, 2011:343). On the negative

side, reducing FDI reduces the amount of international knowledge South Korea can utilise to enhance their leadership in technology and them being a fast follower on international practices (OECD, 2011:15-16). Not gaining international knowledge forced South Korea to focus on gaining knowledge domestically through education.

2.3.3.1 Education and human resources

Education leads to increased knowledge and technology. The education system increases knowledge, which leads to an increase in technological know-how. South Korea's advantage stems from them focusing on education when they lagged behind in technological innovation (Chung, 2011:353). The education system has allowed for innovative employees to enter industry. South Korea has made educational investment a priority and since the 1980's university students and researchers have increased (Chung, 2011:346). The outward looking development strategy involves technological advancements and employees that are well educated and disciplined that is due to the education system (Chung, 2011:334).

In the South Korean education system all children are enrolled in pre-schools (Chung, 2011:334). The education system in secondary schools involves international assessments that focus on reading, mathematics and science. Tertiary education is encouraged, but is said to be of a lesser standard than secondary schools (OECD, 2011:15-17). Education therefore is paramount. South Korea's high school education focuses on an university entrance exam, consequently little focus is placed on creative thinking skills (Ko & Choe, 2011:1-2,6-9;). Universities are said to not challenge students efficiently. In addition to South Korea's education system producing talent in sciences, they also excel in sport and arts (OECD, 2009:15-17).

In the 1960's South Korea had limited facilities for technological research, which forced South Korea to source technology internationally (Chung, 2011:334). South Korean students studying at international universities choose to stay in the country's they studied in and they do not return to South Korea. This is true for especially post-doctorate students. This trend is said to be reduced in future, as South Korea's increased investment in research will increase employment opportunities and collaboration amongst researchers within the country. A current problem is that a doctoral student receives limited funding, which forces them to seek funding opportunities elsewhere (OECD, 2011:15-17).

2.3.3.2 Government support

In September 2010, government encouraged collaboration amongst industries, academic institutions and research institutes through an innovation policy (Ko & Choe, 2011:1,14,18). The 2012 budgets set by the South Korean government for R&D include investment in public areas that include space, aviation and construction, green resources and fusion industry (Ko & Choe, 2011:1,14,18; OECD, 2011). Unfortunately there is also a lack of trust and understanding between the research conducted by government and universities. This lack of understanding is in contrast to the collaboration the South Korean government is trying to implement. South Korea conducts little R&D within the country and receives limited international finances and researchers from other countries (OECD, 2011:15-16). The amount of funding provided by government is increasing and is not merely focused on research conducted at universities. In the 1980's South Korea provided tax incentives for research conducted. Since the 1980's, South Korea's investment in research has increased more than sixty times. The private sector conducts more R&D than government (Chung, 2011:338,340).

The government favoured large organisations known as 'chaebols' that are mostly run by families. Decision-making in these chaebols is centralised, which allows for quick responses to opportunities (Chung, 2011:345). Investments in family owned conglomerates do not wish to participate in research done by SMEs, universities and research organisations, as they prefer to conduct their own research. The aim of the Plan for Advancing Cooperation amongst Industry Academia and Research Institutes involved joint research that included organisations working with academics. Organisations doing research with other organisations is discouraged. The aim is to transfer knowledge gained from research to assist in the commercialisation of ideas and strengthening human capital within industries (Ko & Choe, 2011:1,14,18).

The growth of South Korea is due to large organisations that are owned by families. Examples of chaebol include Samsung, Hyundai and LG that are transnational corporations that have leading technologies. Science and technology are the areas South Korea focus on to increase innovation (Ko & Choe, 2011:1,14,18; OECD, 2011).

2.3.3.3 Industries

The government used foreign, long term loans to invest in industries and entrepreneurs that become owners of chaebols and would attract investment. Agriculture was one of South Korea's biggest industries that allowed for seventy five percent of economic production (Chung, 2011:335). The technological industries South Korea focused on include exporting ships, semiconductors and televisions (Chung, 2011:336). Currently South Korea have one of the highest rates of broadband and are implementing exceptional mobile communications networks that have assisted in creating new industries (Ko & Choe, 2011:1; OECD, 2009:15). Using innovation to address climate change, energy, social inequity, diseases and health care is also an aim of government (Ko & Choe, 2011:7-9). Other industries South Korea focuses on include iron, steel and shipbuilding. From the preceding discussion it is apparent that, unlike the USA, South Korea has invested in new industries (Zakaria, 2011).

2.3.4 Switzerland

In the Bloomberg Global Innovation Index, Switzerland overall ranked twenty first. They ranked seventh in R&D, seventeenth in productivity, tenth in high technology density, twenty second in researcher concentration, thirty fourth in tertiary efficiency and forty fifth in patent activity (Bloomberg, 2013). Compared to other industrialised countries, Switzerland had the highest number of patents in 2007 (World Bank, 67-70). International technological investments in developing countries are allowing for growth in economies and innovation that increases competition with the Switzerland (OECD Switzerland, 2013: 46-47).

The ideas stemming from the educational institutes, organisations, good legal systems and incentives for organisations help with the growth of innovation in Switzerland. The reason Switzerland has such a high rate of innovation is because they started funding research in 1943 and, unlike South Korea currently, the public and private sector are working together in funding and conducting research. Universities are also of a high standard (World Bank, 67-70). In 1952 the Swiss National Science Foundation (SNSF) was establish to support research done in universities and other research institutions. Support was given through financial support and legislation. The collaboration between organisations and universities is

done and supported by the Commission for Innovation and Tecnology (CTI). The CTI support research that relates to market needs encourages entrepreneurship and the transfer of knowledge and technology (Research Service, nd).

The market potential of scientific products is important and support depends on whether the product is perceived as innovative or not (Research Service, nd). Market-orientated innovation is supported by government through the provision of grants and coaching for new businesses and existing privately owned organisations that are focussed on innovation (Haour, 2014). Entrepreneurship support involves training on starting a new organisation that includes products needed within the market (Research Service, nd).

2.3.4.1 Education

Education is compulsory and is funded by government, as it is seen as an important factor for economic growth due to the lack of natural resources in Switzerland. (Education in Switzerland, nd). Vocational training is seen as important and, with secondary schools, is the main requirement for university entry (OECD Switzerland, 2013:49-50,53-54). Approximately sixty six percent of students enrol for vocational training, which combines practical experience with theoretical education. The training lasts approximately three to four years during which theory is provided one or two days per week. The remainder of the time is spent in an apprenticeship at an organisation. Upon graduation a diploma is received and after certain vocational training courses, students qualify for university entry (Vocational Training, nd).

Universities are also responsible for graduates and publications. In Switzerland different types of universities exists and entrance into various universities depends on a child's ability, which is measured at fourteen years of age. The number of graduates is low due to access to universities being difficult (OECD Switzerland, 2013:49-50, 53-54). Entrance into university depends on high school education. If a student went to high school they are allowed entrance to a university, an institute of technology or a university of applied sciences and teacher training college. Students that choose vocational training are allowed entrance to a higher vocational college through vocational examinations (Tertiary education: overview, nd).

The international students account for the majority of doctoral students. International students are mostly from within Europe, as legislation makes it difficult for non-European students to enter and work in Switzerland (OECD Switzerland, 2013:49-50, 53-54). One reason for the high amount of international students is the reputation of the universities. Switzerland also offers exchange programs (International comparison, nd). International students are allowed to stay within the country, unlike the USA where international students are forced by regulations to leave the country after completion of studies (OECD Switzerland, 2013:49-50, 53-54).

2.4 DEVELOPING COUNTRIES

Knowledge forms part of the innovation system and, in developing countries, comes from three sources. The first is knowledge obtained from other countries, the second is knowledge obtained from within the country and the third is the creation of new knowledge. The way this knowledge is obtained can include transferring knowledge or using acquisitions (Dahlman, 2008). Developed countries locate foreign businesses in developing countries. Developing countries observe the foreign business within their country and imitate the new products produced by foreign businesses. New products are invented from local technology. If there is limited innovation in developing countries increased imitation and FDI as well as international growth is limited due to low market presence by businesses of developed countries. Developing countries learn from FDI. When imitation takes place it initially allows for competition before reducing the need for FDI, as local organisations produce similar products which are improved (He & Maskus, 2012).

Organisations should not be the only users of knowledge. The government, public institutions, social organisations and the public should have access to the knowledge. The utilisation of this knowledge to enhance innovation can be used to establish technological centres, more efficient organisations, enhance services in industries as well as allow better people networks and better technologies (Dahlman, 2008). Innovation is important for economic growth. The speed at which innovation grows is proportionate to economic growth (Michael & Pearce, 2009; Pisano, 2010; Kwong, et al., 2012:45). Countries that rely on natural resources and basic industries are less innovative than countries with knowledge based industries, like technology (Ailin & Lindgren, 2008:87, 88; Bruton, 2011:323; He & Maskus, 2012).

The countries to be discussed in this section include Brazil, China, India, Russia and South Africa. Brazil is classified as an upper middle income country. Economic growth is currently poor after an increase between 1960 and 1970. China is seen as having a lower middle income that focus on manufacturing. It is experiencing rapid growth and is increasingly making use of global knowledge to increase innovation. India is classified as a low income country. Recent growth is associated with increased knowledge, exports and information technology. Russias' background is in technology and the military (Dahlman, 2008). A comparison between the BRICS countries, in terms of innovation, shows South Africa ranking fiftieth, China twenty ninth and Russia fourteenth when compared to two hundred countries. Brazil and India are not amongst the top 50 countries (Bouwer, 2013:98).

2.4.1 Brazil

Brazil has increased the amount of expenditure on R&D; contrary to South Africa that has decreased expenditure on R&D (Bouwer, 2013:98; Wessner, 2008:8). Brazil is said to only invest one percent of GDP on R&D. The majority of this GDP spent on research is spent at government owned organisations doing research on science (Troyjo, 2013:4).

The main area of technology Brazil is focusing on is social development together with bio and biofuels, nano, health, space and nuclear technology. Financial and technical support for innovative organisations and entrepreneurs is provided (Wessner, nd). Brazil has been successful in innovation that relates to social development. Social development enables society to solve the problems they are facing by meeting needs and improving lives. Social innovation development relates to the capabilities and interactions of people to business and government (Cipolla & Moura, 2012). In Brazil innovations that have allowed for social development include access to water through farm workers in dry regions (Couto Soares, 2014).

Apart from the innovative successes Brazil had, they also face some challenges that hinder innovation. A first challenge is bureaucracy. The increased amount of red tape has led to increased corruption due to the time and resources needed to follow the legal method of dealing with government. A second challenge involves low penetration of technologies. Brazil refrained from allowing technologies to be imported. The aim was to encourage technologies to be developed in Brazil. The

third is poor resource allocation. Public debt is decreasing, but still more money is spent on pensions funds then on education (Lopez-Claros & Mata, 2010:1-4). Government spending lacked transparency and due to the lack of transparency on how government funds were utilised, corruption occurred within government. The corruption and lack of transparency also led to reduced international trade. In an attempt overcome this problem the Controller General encouraged Brazil to make it known on what funds were spent in 1994. This transparency assisted in reducing corruption (Cruz & Lazarow, 2012). A fourth challenge is education in Brazil, which will be discussed next (Lopez-Claros & Mata, 2010:1-4).

2.4.1.1 Education

Brazil increasingly invests more in education. Twenty percent of individuals aged between fifteen and twenty nine have no education and are unemployed. The majority of investments are aimed at primary and secondary education. However, the increased investment is still lower than that of other countries. The enrolment for primary, secondary and tertiary education is increasing (OECD: Brazil, 2012). Brazil focused on enrolment in primary and secondary schools, but not on the quality of education. The students' performance in mathematics, science and reading was proven poor by PISA exams (Lopez-Claros & Mata, 2010:1-4). Students in Brazil are not encouraged to actively participate in lessons. Policies and guidelines indicate plans for alternative interdisciplinary teaching methodologies that develop better thinking skills. However, the lack of application of the policy is leading to reduced critical thinking skills by learners. Applying methods of interdisciplinary teachings involve training teachers and changing the education system as a whole (Barbosa, & Camara, 2012).

Enrolment in tertiary institutions is only thirty percent. This percentage is low compared to other South American countries. Lopez-Claros and Mata, (2010:1-2) mention that government is also neglecting investing in first-class educational facilities. Universities have out-dated libraries, poor curricula and limited availability to computers. The low percentage of engineers (0,8% of the population) is also a cause of concern. Universities also do not collaborate with the industry. One reason is legal bureaucracy that makes intellectual property rights difficult to obtain (Lopez-Claros & Mata,, 2010:1-4). The number of students graduating with a Master's

degree has increased continuously, as well as the amount of scientific articles published. Brazil aims to enhance their innovation strategy through better science and technology institutions, infrastructure and better trained employees (Wessner, nd).

2.4.2 Russia

Russia's expenditure on innovation has not changed in the last decade (Bouwer, 2013:98). Since 2005 foreign direct investment and research and development centres allowed SME's to grow. The growth is not enough to satisfy demand by government. The support programs also led to better national competition, but are limited by government due to limited funds (OECD: Russian Federation, 2011:14). Public laboratories and technological institutes receive and use the bulk of research and development investment. The research and development programs of Russia focus mainly on long term science. However, research and development that focus on short term economic growth and social issues are neglected (Cervantes & Malkin, 2013).

Russia also has other problems relating to innovation. From 2008 onwards intellectual property rights in Russia have improved. The enforcement of property rights are lacking. There is also limited transparency on copyrights (OECD: Russian Federation, 2011:25). Entrepreneurial advice and intellectual property rights are also lacking and the rules for owning intellectual property were reduced due to unclear procedures. Policies limit research and development investment to be utilised by the private sector that in turn limit economic development (Cervantes & Malkin, 2013).

Unfortunately, the Russian innovation system includes low competition levels and low investment, which has reduced knowledge and incentives stemming from innovation and competition. Intellectual property rights are poorly governed. Barriers to high-technology trade and FDI are low except in science and technological industries. Policies aims to favour government innovations and offer limited investment opportunities for private business investments (OECD: Russian Federation, 2012:14). University research is lacking, which reduces knowledge and partnerships for innovation between government and private organisations with universities. The lack of partnerships is due to low incentives given by government for research (Cervantes & Malkin, 2013).

Russia's innovation system has some advantages. Intellectual capital and natural resources exist. The government realised the importance of innovation and have experience in designing and using innovation policy tools. The opportunities for Russia's innovation system are that globally the need for innovation and knowledge is growing. Research universities and entrepreneurs are driving forces that can encourage the growth of innovation. The Russians have a strong engineering background that can be used to increase innovation in industries that include aerospace, software, information and communication technologies (OECD: Russian Federation, 2011:14). Researchers left the country due to financial difficulties, out-dated equipment, unemployment and high wages in non-technological sectors. The researchers mostly emigrated to Germany, Israel, the USA and Canada. The demand for science and technology researchers in Russia was reduced when these industries shrunk. The ratio between research and investment made between government and industry is 2:1. Foreign financial investment has increased after the Soviet Union collapsed. This financial investment has advantages, but simultaneously coincides with global business perceptions and competition (Cervantes & Malkin, 2013).

2.4.2.1 Education

School attendance in Russia is compulsory if a child is between seven and fourteen years old. School involve 5853 hours which is low compared to other countries such as South Korea and China (OECD: Russian Federation, 2012). Traditionally children were sent to school at the age of seven. In 1985 this changed and children were sent to school at the age of six. Primary education takes four years, basic general education five years and secondary general education two or three years (Ministry of Education and Science, 2013). The majority of teachers are women and class sizes in Russia involve less than seventeen students per class room. The main subject include languages, mathematics and science (OECD: Russian Federation, 2012). Studying languages mostly involves Russian. Technology is taught but includes skills such as sewing, cooking and carpentry. Sciences are split into social sciences that include history, economics and law as well as natural science that include biology, physics and chemistry (Ministry of Education and Science, 2013).

Private schools exist and offer more advanced education. In general children go to school for thirty four weeks and between twenty seven and thirty eight hours in a week (Ministry of Education and Science, 2013). Originally the level of primary and secondary school education depended on how wealthy the families were and the teachers' ability. When needing to enrol in a university, students from urban and rich families were able to afford university education. Students from rural areas had to choose to enter a vocational school or not study further. In the 1950's the schooling system changed. Having a degree became popular, as it became more affordable. However, due to difficult entry exams, enrolment was difficult and was associated with corruption. In 2006 a new entry exam was created that tests local and foreign language, mathematics and natural science knowledge. A problem arose where an increase in competition between secondary schools became apparent. When writing the national exam a child's school is made known and unhealthy competition emerged, as schools wanted their students to obtain high marks. Another problem with the examinations was that an increased amount of students qualified to enrol at a university that lead to universities having too little capital and infrastructure to support the increased student numbers (Samedova & Ostaptschuk, 2012).

The aforementioned competition has led to school curriculua changing. The aim of the curriculum is to achieve good grades on the university entrance exam. Upon entering university a knowledge gap is created that lead to graduates not being trained properly. This is one reason why students wish to study abroad (Samedova & Ostaptschuk, 2012; Vorotnikov, 2014). The Russian government is aiming to increase this number to students that wish to study abroad, through incentivising them through funding their studies abroad. The reasoning for the incentive is that current managers are seen as being of low quality as they lack knowledge and responsibility. Upon completion of studies abroad students must return to Russia or pay a high penalty. The penalty includes paying the Russian government back the amount of money they paid for education as well as a fine that equals twice the amount spent on education. The reason for the penalty is that the Russian government is aware that it may be more tempting to not return to Russia after graduating, but stay in the country where their studies were conducted (Snytkova, 2014).

There is a debate with regard to the above policy. The question is asked whether sending students abroad to get an education is the correct method to solve the human resource problem. Another suggestion is to rather improve the tertiary education system so that it allows for students to have the skills to fulfil the role of management that is necessary. The Russian education system is not as modern as that of other international universities. Courses are based on theory and students struggle to apply concepts practically (Snytkova, 2014).

Increasingly more international students are travelling to Russia to enrol at a university. Although the universities are not of the highest quality, they are seen as affordable. The Russian government is aware that Russian universities are not viewed as the best universities in relation to other universities. In an attempt to address this concern the government has subsequently invested one billion dollars to attract foreign lecturers, offer better support to international students and to create international ties (Romendik, 2014). One may assume that, in future, this will reduce Russian students' studying abroad and increase the level of human resources in the country. The Russian government is also increasing the entry requirements that need to be met by foreign students. These requirements include students taking three additional compulsory subjects, only upon passing these subjects are students allowed to enrol in the Russian university. The classes students need to attend in these additional subjects last one academic year. Speaking, reading and understanding Russian is another requirement, which is tested by means of an essay. Lastly, foreign students must be aware of the Russian history. Courses that involve mathematics also require the students to write a mathematical examination where basic maths skills are tested before entrance to university is granted (Vorotnikov, 2014).

2.4.3 India

In the 2012 Global Innovation Index India was last of the BRIC nations – sixty fourth. One reason why India scored so low, compared to other BRIC countries is because India has the poorest human capital, research, infrastructure and business sophistication in relation to the other countries scored. However, in knowledge and technology outputs India came second when compared to the BRIC countries (National Innovation Council: Government of India, 2010a).

Innovation converts knowledge into wealth and value. However, India has been slow to realise the importance of innovation. Science and technology are now seen as important sectors in which India aims to lead innovation. The decade from 2010 to 2020 is seen as the 'decade of innovation'. In this ten year period India wishes to increase innovation through focussing on science and technology, energy, environment, food and nutrition, water and sanitation, affordable healthcare and skills development. These are aims of the Science, Technological and Innovation system (Ministry of Science and Technology, 2013:5-7).

In order to further increase innovation, India is working with other BRICS countries to assist in innovation in terms of climate change, water resources and pollution, renewable energy, astronomy and geospatial technology. It is agreed that science, technology and innovation that assist in enhancing the lives of the public and leads to sustainability is important (Mohanty, 2014). Furthermore, to increase innovation the government must strengthen support for research through incentives and collaborate with universities, industry and research laboratories (National Innovation Council: Government of India, 2010a).

Inclusive growth relates to a model for innovation that aims to solve the needs of the Indian citizens. India has a large talent pool that is capable of being innovative and benefiting from the policy that encourages research and innovation. The policy, therefore, does not aim to mainly benefit governmental research such as the case in Russia (National Innovation Council: Government of India, 2010a). The aim of innovation in government includes delivering goods at affordable costs quickly, providing transparency and India's goal is to develop, implement and measure the quantity and quality of innovation through an action plan (Performance Management Division, 2013:4-6). The policy aims to encourage innovation in government, research and development laboratories and universities. The innovation council collaborates with these domains and offers support in terms of experts, stakeholders and participants. The innovation council aims to encourage innovation within education, businesses, government, Non-Government Organisations (NGOs), as well as urban and rural development engaged in innovation (National Innovation Council: Government of India, 2010a).

2.4.3.1 Education

The number of schools is increasing and certain schools have digital resources that assist in developing the thinking skills of students. Parents are resisting India's aim to integrate learning with education as opposed to merely memorising information (Pandey, 2012). Historically education in India mostly included learning how to read and write and children were mainly schooled if they wanted to work in government. Education was mostly accessible for those in a higher social class. The poor struggled to enrol in schools, which is one reason for India's poor school attendance. At present status quo of mainly the upper class having access to an education remains, which is one cause for the high illiteracy found in the country. A national curriculum is followed; however how this curriculum is presented varies among schools and states (Cheney, Ruzzi & Muralidharan, 2005:1-3, 5). Comparing the level of reading, mathematics and science, India did poorly compare to other countries (Pandy, 2012).

Literacy is also hindered by the number of languages and dialects spoken in the country. India has fifteen official languages and English is not one of them. However, in higher education the emphasis is placed on English as an important language and this has assisted in the economic growth of the country. The amount of English speaking individuals is increasing, however literacy remains extremely poor (Cheney, Ruzzi & Muralidharan, 2005:1-3). India has realised the importance of education in talent creation and innovation. They aim to use scholarship programs to identify talented children that think creatively at school and college level. The government is focusing on training teachers to teach more creativity (National Innovation Council: Government of India, 2010b).

In an attempt to further develop the level of education the government has reduced investment solely in tertiary education. The aim is to rather focus on investing more equally in primary, secondary and tertiary education. The intention is to make primary and secondary education free, which has been proven difficult due to inadequate financial resources (Cheney, Ruzzi & Muralidharan, 2005:4). Only ten percent of India's children finish school and enrol in universities (Teach For India, 2012). India also wants to set up a meta-university that will allow different institutions to share knowledge. The meta-university will include twenty innovation centres to

increase the academic and industry resources and university innovation clusters that will assist innovation within university curriculum (National Innovation Council: Government of India, 2010b). Students will have flexibility in terms of choosing subjects. The internet will be utilised to gain access to teaching material and academic publications. The numerous universities that form part of the meta-university structure will allow students to gain access to academic resources, such as libraries and laboratories, that they will not be able have access to at a singular university (Mishra, 2012).

2.4.4 China

In the Bloomberg Global Innovation Index China ranked twenty ninth. In R&D they rank twenty fifth, in productivity sixty seventh and in high technological density ninth. They ranked fortieth in researcher concentration, sixth in manufacturing capability, sixty sixth in tertiary efficiency and fourth in patent activity (Bloomberg, 2013). China has good intellectual property protocols that are assisting to increasing patents filed and new innovations. Chinese talent and technological innovation are also increasing and the number of innovations that are copied is decreasing. Innovation stems from a need for products that are not found in the markets of developed economies (Fannin, 2013).

China's government is investing in innovation that includes products such as solar panels, wind turbines and rail (Zakaria, 2011). China's aim is to establish an economy that is driven by innovation. In the Chinese government's national strategy, innovation is the core inclusion. To realise this they aim to increase investment in R&D and offer tax incentives to organisations that invest in R&D. In order to assist in creating favourable circumstances for the development of R&D they are willing to invest in facilities and infrastructure to facilitate the growth of R&D and universities to train skilled employees (Wessner, nd).

2.4.4.1 Education

Being imaginative and being willing to take risks are two aspects Chinese students are struggling with. One potential reason is that the focus is on standardised tests that allow entrance into high schools and universities. These tests are hindering the education system in terms of focusing on imagination and risk taking (Pham, 2010).

Internationally, China's students were tested with PISA and they came first (Shen & Johnson, 2011; Patchin, 2014). Although only a limited number of students took the test, it is still an indication of the Chinese education system performing well (Shen & Johnson, 2011). In 2013 the Chinese education system was reformed with the aim of reducing the importance of the tests. Another reason for the reform was to increase student engagement and happiness and to reduce boredom. A number of reforms have taken place that aimed to enhance social responsibilities and creativity, however, quantitative test scores are still the main method of evaluating students (Strauss, 2013).

Students that achieve high academic results also score modestly on aspects relating to entrepreneurship. Research has shown that the reason is poor creativity. Observation, visual thinking and recognising patterns are used to teach children to be creative. Lastly, children are encouraged to participate in the arts. These procedures are increasing the creativity levels of students as well as their curiosity (Patchin, 2014). Due to low creativity, the Chinese looked at the USA to determine the best method to educate their students and become efficient employees (Foroohar, 2013).

The school system in China is competitive. The reason is that at the end of the school career an exam is written that, if passed, allows for university entrance. An alternative to the competitive school environment and the growing economy of China is Chinese families considering international schooling (Li, 2012). The most popular destination the Chinese send their children to receive an education is London. The immigration to Britain for better schooling is allowing economic growth in Britain, but economic loss in China (Pickford & Warrel, 2014).

The problem is that after finishing international schooling the students either continue working in the international country or return to China to enrol in a university. Students that were schooled internationally and then proceed to enrol in a Chinese university do not perform as well as students that were schooled in China. Excellent employment opportunities are offered to Chinese students that were schooled in China and went to a Chinese University, but as employees their characteristics are those of followers that mentally are not flexible in problem solving (Li, 2012). The one-child policy has reduced the amount of scholars, thus increasing the importance

of delivering prospective employees and researchers (Wertime, 2014). By 2020 employment opportunities will be less than the amount of employees that are available. Those that graduated from universities do not have the necessary talent to conduct work efficiently. Technical ability, being able to speak English, working as a team and solving problems are skills that are lacking (Foroohar, 2013).

2.4.5 South Africa

South Africa ranked thirty fifth in terms of R&D, fifth sixth in productivity, thirty fifth in high-tech density, fifty fourth in researcher concentration, fiftieth in terms of manufacturing capability, ninety fifth in tertiary efficiency and sixty eighth in terms of patent activity (Bloomberg, 2013). Productivity in South Africa has decreased. The education system is partially blamed for the low productivity (Motshekga, 2014). South Africa's expenditure on research in design decreased by R86 million between 2008 and 2009. As a result less than one percent of South Africa's GDP has been spend on R&D in the last couple of years. Focus is on the development of human resources to assist in enhancing science and technology and providing incentives to the private sector when increasing R&D (Bouwer, 2013:98-100). According to To increase innovation in South Africa the government is focusing on R&D and technology. Social challenges, that include skills shortage, are also problematic and hinder innovation (Science and Innovation: South Africa, 2012). A skilled workforce is important and is obtained by motivated employees that have the opportunity and skills to be innovative (Stokes, Wilson & Machor, 2010:48-74; Liao, Chang, Wu, 2010:1121).

2.4.5.1 Education

Attending school until grade nine is compulsory (Education USA, nd; Jones, 2014). In 2011, eighty seven percent of children aged sixteen to eighteen attended school. The high enrolment is not equal to high quality education in South Africa (Jones, 2014). South Africa's education system has two tiers. The first tier provides education for children whose parents are wealthy. This tier also provides education of higher quality, has better resources available than the second tier and operate in a competitive environment. The second tier offers education for the poor and is mostly offered to black school children. The second tiers' level of education is of a lower quality (Molefe, 2014). The poor resources and facilities provided as well as the poor

quality of teachers are some of the reasons that the quality of education is seen as poor in South Africa. The poor resources, facilities and teachers are also reasons for low levels of efficiency and effectiveness associated with South Africa (Jones, 2014).

Private education is expensive, but is more efficient. Different examinations are conducted and the number of students that achieve high enough marks to attend university is high. In 2013 this percentage accounted for eighty five percent. In the public school system seventy eight percent passed matric, but only thirty one percent's grades were good enough to allow students to apply at a university. Those not gaining entry into universities have three options. They can apply for employment opportunities that are scarce, try to become an entrepreneur or continue their education at a further education and training college (Molefe, 2014). Upon completion of grade nine students can choose whether they wish to complete school until grade twelve or enrol at an Further Education and Training College (FET Colleges) and receive and national certificate (Education USA, nd; South Africa, nd). FET Colleges focus on specific career areas in which the students show interest. Education should span over thirteen years. Adults are also offered education when they have not completed education up until grade nine (South Africa, nd).

Similarly to innovation in a country, education also has a relationship with the economic growth of a country. Education leads to organisations that are better able to satisfy customer needs. In the past four years the pass rate has increased. An increase in math and science was also experienced (Webb & Bhuckory, 2014). The perception of the skills, knowledge and abilities that are associated with students having a matric certificate is decreasing (Molefe, 2014; Webb & Bhuckory, 2014). Approximately thirty percent of grade six students are illiterate and sixty percent of grade six students are numerate-efficient. Other African countries are performing better in their education system with higher levels of numeracy and literacy. Contrary to low numeracy and literacy levels, the South African government is spending more money per child on education than other African countries (Wilkinson, 2013). South Africa's education system is ranked as 145 out of 148 giving it the third lowest ranking (Webb & Bhuckory, 2014). In 2005, tests were offered that aimed to indicate the difference in skill levels of children leaving school and what is needed for university entrance. These tests, offered at specific test centres, are difficult to take

for poor families due to transport costs associated of getting to the venues and the cost of taking the test (Molefe, 2014).

The amount of expenditure on education per child is not an indication of the level of education. Kenya, which spends less on education per child, show better numeracy levels (Wilkinson, 2013). Regardless of poorer education, organisations that employ young adults do not drop their expectations of the skills employees should have. Complaints stem from low ability and interest necessary to perform duties well. Universities and employers do not want to take responsibility for poor students and workforce. Government believes that an increasing pass rate is a good accomplishment (Molefe, 2014). Multinational organisations are struggling to hire South Africans consequently employees are hired internationally. In an attempt reduce the amount of expatriates hired multinational organisations are investing in the South African education system (Webb & Bhuckory, 2014).

From the above discussion numerous aspects become apparent when wanting to increase innovation. The education system must focus on teaching children to solve problems and use their imagination as well as teaching student's mathematics, science and languages, as being able to speak English is important. Teachers must be trained in creative teaching methods and must be provided with resources to assist in teaching students to be creative. Government support for research and education is advantageous and there must be collaboration between government, industry and universities. Employees are necessary to solve problems in an innovative manner within organisations.

2.5 IMPORTANCE OF CREATIVITY IN ORGANISATIONS

Innovation in businesses allows for problems to be solved that allow for new product creation, countering competitions and exceeding customer demands. If continuous innovation is supplied then the business will be more sustainable (Pisano, 2010). Creativity influences various aspects of business. These include managements' capability, interaction and communication within the business environment, failure and risk, employees, motivation and knowledge. These aspects will now be discussed.

2.5.1 The role of management

Employees allow for innovation within economies. These employees tend to have certain attitudes, are motivated and excel in an autonomous environment where freedom to conduct activities is encouraged (Sandeen, 2010:95). Carleton (2011) disagrees with Sandeen (2010:95) and says that autonomy and a predictive environment are not synonymous with good work performance (Carleton, 2011). Managers should be held accountable for following through with an innovative idea within budget and time perimeters but not for the results of the innovative idea (Mulford, 2012:38).

There is no set business model for businesses that aim to apply organisational and technological innovation. Managing a business professionally is an innovation. The innovation aims to satisfy the need to manage complex businesses (Pisano, 2010). Together with a need to manage there is also a need to satisfy customers. New products are necessary because consumer tastes change and value must be created to satisfy consumer needs. One reason why businesses fail is because of poor planning. Planning is necessary when there is competition in a market. In order to face competition it is necessary to create products and processes that lower costs and save the business money. However, to achieve profit involves a risk if the new product is not planned properly (BBC, 2013). Another reason businesses fail is due to a lack of management capability to be innovative. In terms of management, leaders must be innovative in the discovery of new ideas, executing plans that involve innovative ideas, leading employees to be innovative and assist in executing innovated concepts (Mulford, 2012:38).

Managers should also be sensitive to the political climate within an organisation. Fear of how performance is evaluated and whether their work is valued influences the extent to which employees wish to apply their skills (Sasser & Koslow, 2012:6-8). Poor management leads to the poor performance of knowledgeable workers. Providing a knowledgeable worker with challenging work, limited distractions and reducing obstacles that hinder performance are important for a creative work environment. A negative work environment encourages employees to search for alternative employment opportunities. Instant gratification has the opposite effect. The behaviour of managers can therefore affect the ability of an employee to be

innovative (Carleton, 2011; Diliello, Houghton & Dawley, 2011). Managers who enforce control in an organisation are beneficial, but when the level of control is too much, creativity, innovation and motivation decreases. This is typical in a bureaucratic or robotic environment (Busco et al., 2012:29-30, Sofia & Ivanov, 2013).

2.5.2 Interaction and communication

Organisations that network increase their chances of innovation. Networks are different from forming strategic alliances that involve contracts and possible mistrust (Pisano, 2010). The ability to be interpersonal allows for effective networking, which includes attending conferences, blogging and communicating with customers (Carleton, 2011). Communicating with customers can also be a source for the development of innovative products and processes (Gordon, 2013; Alsever, 2009:75). Product life cycles are shorter which means that consumers desire new products faster. To satisfy this desire innovation is needed to make customers aware of and supply customers with new products (Kwong, et al., 2012:45). Organisations must collaborate and interact with consumers. Big organisations focus on past success as the past success allowed company growth. The focus on current and past success and innovation reduce the organisation's ability to see new opportunities that include innovation (Gordon, 2013).

2.5.3 Failure and risk

Within businesses risk, integration of knowledge and learning are challenges that must be managed well to allow for innovation. Risk is reduced through predictive models that involve knowledge of cause and effect relationships (Pisano, 2010). The prototypes or models must be mindful of the designer and customers' expectations. Prototype testing includes planned failures to test the quality of the probable end product. In software development, for example, this may include probable viruses that the program may encounter (Denning, 2013:30).

Failure will happen, but continuously striving for new findings through experiments and research leads to making good decisions. Learning from failure and communicating ideas lead to future successes and allow for increased knowledge (Pisano, 2010). In an attempt to reduce failures there are certain aspects to keep in mind. Examples include specific requirements and specific goals of products. The

product should work properly continuously and be dependable, reliable and usable (Denning, 2013:30).

Innovation, sometimes, is the response from economic problems that needed solving (Pisano, 2010; He & Maskus, 2012). When new ways are seen to solve a problem an individual is taking a risk not knowing whether the novel path to the solution will be accepted (Sandeen, 2010:93-94; Michael & Pearce, 2009). The amount of risk taken depends on the amount of expected return. Banks are reluctant to offer financial back-up due to the risk of failure. However, successful entrepreneurs that are innovative gain high return on investment through innovation (Michael & Pearce, 2009).

The first-mover advantage is followed by other firms needing to take risks and improving their products through innovation to be able to compete in the market place. This competition leads to a second risk in terms of whether it is fair and legal competition (Michael & Pearce, 2009). Another risk involves determining the level of quality of the product that impact business survival and competitiveness (Brookhart, 2013:28; Ailin & Lindgren, 2008:88; Hamidi, Wennberg & Berglund, 2008:308; Lioa, Chang & Wu, 2010:1121). When innovation is used, the risk can be spread through incremental innovation that is continuous. However radical innovation involves higher risks that coincide with higher rewards and changes in markets (Ailin & Lindgren, 2008:90-91,103).

2.5.4 Motivation

Collaboration, teamwork and trust increase the chance of creativity and innovation within an organisation. Apart from innovation and creativity; motivation also allows organisations to grow (Busco et al., 2012:29-30, Sofia & Ivanov, 2013). Knowledgeable workers must be praised and provided with the correct resources. The sharing of knowledge leads to more innovation. The supportive relationship a knowledge worker has with a superior is important in increasing the performance and commitment of knowledge workers (Carleton, 2011; Diliello, Houghton & Dawley, 2011).

Motivation of knowledge workers comes from allowing workers to do their job and contribute to the business's success. Not rewarding them will lead to alienation,

dissatisfaction and being unmotivated (Carleton, 2011; Diliello, Houghton & Dawley, 2011). Internal motivation should be present prior to being encouraged. Internal motivation leads to a want to be creative and passion. Passion for something that is liked increase the time spent on creativeness (Robinson, 2010). Passion reduces the need where financial gain is the primary motivation. Passion further encourages an individual to achieve self-fulfilment, work harder and solve problems (Sasser & Koslow, 2012:5-7). Being unmotivated to perform a task reduces the chance of thinking of new ideas and being creative (Carleton, 2011).

External motivation is not ideal and involves rewards and evaluation that may reduce creativity. External motivation may encourage an individual to do what is expected and not come up with creative solutions. Support increases creativity and creative people seek support and assurance (Sasser & Koslow, 2012:5-7). Feedback on opportunities involves execution. The execution involves risk that is linked to experimentation (Mulford, 2012:38).

2.5.5 Employees

When employees trust fellow employees teamwork increases. Teamwork reduces the competitiveness between individual employees. Competitiveness may hinder organisational performance when employees believe that working alone to achieve organisational goals is best done individually (Sofia & Ivanov, 2013). Employees can have a competitive advantage if they are innovative and participate in continuous learning that increases knowledge. A business that encourages continuous learning is known as a ‘learning organisation’ (Carleton, 2011).

Learning organisations create the results they desire, encourage expansive thinking and learn together. Factors such as globalisation, technology, diversity and the knowledge of society have led to an increase in importance placed on learning and training that allows for educated workers to increase (Carleton, 2011). The level of education or expertise can influence the level of creativity. Knowledge can be a foundation for creativity. When too much knowledge is present it limits novel creative ideas. High expertise leads to tunnel vision. Employees that are at the beginning of their careers are more likely to have creative ideas (Sasser & Koslow, 2012:7).

The organisations that have shown the highest growth and best financial performance are also those organisations with the highest levels of innovative knowledge. The most knowledgeable workers are those with formal education and a personality that involves good interpersonal capabilities. Having an education increases the value of an employee (Carleton, 2011). In an organisation an idea must be appropriate, useful and actionable. These three characteristics of an idea stem from creativity and have a positive influence on organisational performance. The creative ideas need time and expertise. Individuals need certain thinking skills and motivation (Fillis & McAuley, 2000:11-12). Ideas should satisfy emotional, economic and functional needs whilst being executable (Mulford, 2012:38).

2.5.6 Knowledge

Knowledgeable workers must form relationships and communicate, as this will allow them to increase their knowledge and be more imaginative (Carleton, 2011; Diliello, Houghton & Dawley, 2011). Seeing relationships between concepts and how the concepts influence each other leads to increasing knowledge. Placing value on an idea increases the chance that the idea will lead to change. Knowledge within a business must keep the organisational goal in mind. Current knowledge can be changed and redesigned to improve the knowledge base within an organisation. Knowledge alone is not enough to allow innovation and creativity. Commitment, perseverance and opportunity also play a role (Sandeen, 2010:94-96). Sharing the knowledge gained is increased through good environmental conditions. Knowledgeable workers that assist with innovation must be praised when they come up with innovative ideas and must realise that they have achieved something (Carleton, 2011; Diliello, Houghton & Dawley, 2011).

The question must be asked: How can innovation be increased and how can risks be taken to transform creative ideas into innovative products that encourage entrepreneurship and economic growth? One solution is through education that is discussed in the next section. Education and learning should not occur in a formal set-up, but rather done informally. Continuous learning and education are also important to retain employees. That which is learnt must therefore be transferable to different employment opportunities (Carleton, 2011).

2.6 EDUCATION

The education system was an innovation that developed from industrialisation in the nineteenth century (Robinson, 2009). Currently the education system is based on academic ability and a specific hierarchy. At the top of the education system are mathematics and languages. These are seen as important subjects when entering the workforce. At the bottom are the arts that are associated with being enjoyable. This hierarchy limits talent development. Children are led to believe that they do not have talent since they were not encouraged to participate in arts as much as in mathematics and languages that are more valued (Robinson, 2009; Robinson, 2010).

Education does not just take place within organisations. Both organisations and universities aim to gain profits from research and experimentation that lead to innovation of new products (Pisano, 2010). Education involves keeping the future in mind. In music education a good teacher involves having musical artistry as well as being able to teach. Together with these two aspects creativity is also important. The prospective teacher must be able to inspire, motivate students and keep the various areas of industry in mind. In music an example is being able to perform, listen to music, critique it, compose, direct, conduct, improvise and produce music (Brinkman, 2010:48). This hierarchy encourages teachers to only focus on strengthening the left side of the brain. The right side, where creativity is mostly formed, and the rest of the body is not the focus in curricula (Robinson, 2009).

2.6.1 Goal of education

The future is not known, yet education focuses on training children to work in an uncertain environment. This is why it is critical to teach students to think creatively and critically in new situations. Education should develop useful citizens that can increase the good of the community and economy they live in (Tallent & Crowley, 2012:27). Education does not allow students to have all the experiences needed when they start their working careers (Ailin & Lindgren, 2008:93). It is the role of education to close the gap of the lack of creativity and innovation that is needed by entrepreneurs that needs to think of new products (Kwong, et al., 2012:47-49). Education forms the platform in which creative success can be measured and enhanced (Busco et al., 2012:29-30).

Educational institutions have a role to teach students the skills to be innovative when entering a working environment. The exact skills necessary are debatable. What is certain is that self-confidence, being able to cope under uncertain situations and thinking skills are necessary (Kwong, et al., 2012:45). The education system must focus offering a curriculum that is in line with what is expected in industry. Creative thinking skills taught enable an individual to think instinctively of solutions not available in textbooks used in school. Combatting competition, meeting deadlines and reacting correctly in emergencies are best conducted when an individual can think creatively. Being able to think of a solution quickly involves andragogy, which was first applied by Aristotle. The process involves a subject and an object that are both necessary to reach an end goal (Tallent & Crowley, 2012:24-27).

Creativity encourages a student to learn, achieve goals and develop cognitive skills that overall lead to academic achievement. The level of achievement depends on the teacher's perception of creativity. Students who imagine how they will solve a problem do better than students who are merely given a list of instructions on how to solve a problem. Students tend to dislike science, mathematical and social subjects. The dislike decreases when creative teaching methods are used that allow student exploration that is timeous (Rinkevich, 2011:219).

Being creative takes time, especially when considering the implication and uses of the creative thought. Education should be approached so that it provides opportunities, motivation and rewards for being creative. Teaching people to be creative is impossible. However people can be taught techniques to approach work creatively. The techniques can include ways to generate ideas, keeping personality traits in mind, encouraging the expression of ideas and taking risks (Brinkman, 2010:48). Creativity should not just come from teachers, but from students as well. A teacher that is creative is not automatically going to encourage students to be creative. Teachers thinking creatively when preparing lessons also instil thinking about the differences of students. Creative teaching helps individuals to concentrate on the lesson (Brinkman, 2010:49).

Individuals process information through various thoughts and associations. Abductive reasoning involves guessing and looking for novel solutions and can be used to explain how creative ideas are developed. Deductive ideas and inductive

ideas involve using a rule to make a case that leads to a result. The result, in turn, is used to make a case that leads to a new rule. Abduction involves a result that follows a rule that lead to a case and is similar to forming a theory. Having a hunch, an intuition or making educated guesses are also linked to abduction thinking (Ross, 2010:145). Apart from abductive thinking, creative thinking is also important. Creative thinking is linked to critical thinking. Creative thinking involves the power of the mind to come up with new original concepts where critical thinking involve judicially determining the wisdom to make the right decision. It must be made known to students that failure has a value. Education is a method to convey information and critical thinking skills (Tallent & Crowley, 2012:26-27). The education system does not teach how to develop hunches, intuition and educated guesses, however it can be used when needing to be creative and solve problems. These non-specific skills are called heuristics and involve the experience gained from the working environment (Ross, 2010:145).

2.6.2 Teaching

There is a controversy that states teaching creativity includes various means of finding and solving problems, but that standardised testing is used that may inhibit reaching creative answers (Saracho, 2012:7-9,12-21).

All teachers have some level of creativity, which is crucial to successful teaching. Lessons should be planned according to specific student and curriculum needs interests and abilities (Bramwell, Reilly, Lilly, Kronish & Chennabathni 2011:228). Creative teachers are those who are persistent, confident, have a sense of humour, push boundaries and adapt. Similarly to students learning creativity from teachers, teachers must be taught how to prepare lessons and teach the lessons creatively (Rinkevich, 2008:220). The aim of teachers is to focus on the content that should be covered in the curriculum. Encouraging students to use their imagination, achieving objectives and coming up with an original concept is sometimes suppressed due to the curriculum and time constraints (Turner, 2013:23-24).

The necessity of creativity in education has been realised in the USA who offer classes in creativity. The classes happen in a classroom and via the internet. Blended learning is used to help students to gain knowledge that induces innovation in organisations, entrepreneurship and innovation, innovation management, creative

problem solving and organisational change. The way creativity is utilised in the classes involves working with opposing ideas and, in some instances, failing to reach conclusions (Sandeen, 2010:84-86). Creative ideas come from different sources. Brainstorming and listing ideas are two ways to start the creative thinking process of developing a new idea. New, innovative or creative solutions given by students should be followed by feedback informing the student that creativity was applied and that the risk of the creative process followed paid off (Brookhart, 2013:28).

Graduates being employed must be able to think independently, recognise opportunity and be willing to adapt to changing environments whilst being confident and willing to take risks (Kwong, et al., 2012:47-49). When students are asked to take a risk and come up with their own solutions, it should not happen in an unstructured classroom environment. Support through teamwork and communication is also important. The interpersonal situation created by team work and the communication that happens in a team leads to negotiation and healthy conflict that forms part of comparing novel ideas. Teachers must ensure that structure and discipline are still applied in the class room when students are negotiating (Davies, Jindal-Snape, collier, Digby, Hay & Howe, 2012:85-86).

A creative thinking process involves two steps. The first is to become familiar with creative solutions and secondly choose the solution that is most appropriate (Goodwin 2013:80). Learning should involve creative ways of reaching conclusions on problems and curriculum outcomes that still involve an appropriate answer. Flexibility and motivation should play an important part of creative lesson planning and presentation (Turner, 2013:25). Teachers presenting lessons focus on teaching one solution to a problem. If multiple methods exist, creativity is used to solve problems in different ways. Teaching creatively involves a risk that must be overcome by the belief that teaching creatively assists students in achieving curriculum outcomes. In education the lack of creative teaching methods stem from creativity being difficult to measure. This lowers the validity of research done on how creative problem solving leads to innovative solutions of problems (Goodwin, 2013:80).

To be able to affectively take risks, use imagination and find different ways of conducting activities, time and reflection are necessary. Teaching creativity can lead

to developing new knowledge. For teachers to teach creatively they must create ideas and change their thought processes (Burnard, 2012:167). The aim is to integrate creativity into lesson planning and the instruction of the lesson (Rinkevich, 2011:220). Specific goals and when they must be completed are important. The methods of teaching and writing down creative ideas help creative practices to develop. Teachers value creativity, originality, independence, risk-taking, problem solving, being curious and enjoy open mindedness that is linked to a specific style of thinking. The thinking style includes visualising, imagining, experimenting, reflection, analysing, synthesis and evaluating (Burnard, 2012:167).

In a creative teaching environment the lesson must be customised to include creativity. Surprises within a lesson, using technology and allowing students different ways to solve a problem are examples (Rinkevich, 2011:221). When students are taught in a creative manner the class becomes easier to manage and students are more engaged (Rinkevich, 2011:220). Risk taking for teachers is difficult due to fixed curricula and standards. Trust that creative teaching methods and an environment that encourages creativity will lead to a more meaningful learning environment is necessary. There must be a willingness to take risk from the starting point of being willing to teach creatively. Characteristics of creative teachers include persistence, humour and confidence. Teachers that view themselves as uncreative should consider student-centered learning, linking curriculum with real life situations and asking open-ended questions as methods that help to increase creativity (Rinkevich, 2011:220-221)

Due to the risk of teaching creatively, security must be provided through structures. Characteristics of creative teachers include being hard working, nonconforming, knowledgeable, intuitive, confident, flexible and energetic. More creative teachers are more inclined to be social and being content with themselves. They are less concerned with impressing others (Bramwell, Reilly, Lilly, Kronish & Chennabathni 2011:232). Teachers cannot apply teaching techniques that are similar to those that they experienced when they were taught. Creative teachings happen within structures and frameworks of an existing education system. When teaching creatively, student participation, opportunities for inquiring, project-based learning and collaborative learning are methods that can enhance creativity (Gibson, 2010:609).

Novel teaching methods can include a variety of experiences that include support from teachers and fellow students. The aim is to offer support, resources and experiences that allow multiple opportunities to take a risk by students thinking creatively and making their own choices (Brown, 2014). Teaching students in a creative manner must involve assessments to also incorporate creativity. Those that structure the education system must listen to students and how they wish to be taught. Students must take ownership and have a say in how these structures are run (Gibson, 2010:611).

2.6.3 Teaching environment

Creative people are less time conscious and are less inclined to want to be tied to specific schedules. One reason is that creativity cannot be chosen to appear at a specific time. A creative environment involves one that allows time to think creatively, allows risk-taking, mistakes and imagining (Gibson, 2010:609). In business, the employees are made up of adults that generally fear judgement of peers. This fear limits the willingness to share ideas and is mainly visible in adults. Children do not have the fear to share ideas. Adults, when in a new situation, aim to categorise the situation. Children engage in possibilities of various outcomes. Adults' habits are also harder to break (Brown, 2014). Children are less scared than adults of being wrong and it is important to note that being wrong and failing is part of the creative process. Children growing up loose their capacity of being willing to be wrong when they become adults (Robinson, 2010).

Identifying problems and thinking of multiple broad solutions is also important. Barriers to creativity include competition, limited choices, pressures, evaluation and constant failure. The quality of work from creative individuals is higher when they are internally motivated. Extrinsic reward is less important. Creativity is more evident in an environment that is diverse, involves collaboration and is interdisciplinary (Gibson, 2010:609). The appropriate classroom structure and environment can also increase creativity. Teachers that follow a too structured environment in classes limit creativity of students (Davies et al., 2012: 85).

A flexible environment with a variety of resources is best to encourage students to be creative. The environment does not necessarily have to be the classroom. A students' home and other areas can allow for creative ideas to develop. It is when

there is a balance between structure and freedom to take risks that students are learning to be creative (Davies et al., 2012:85-86). When in preschool children are free to experiment with clay and building blocks and create things through playing. The resources to build and create become less as school children progress through school. When in preschool, resources to build models are more freely available. In a work environment resources to build probable prototypes are limited. In preschool playing involves rules, which instruct how to play. Together with how to play, when to play is also important. In school, it is a teacher's role to allow both – stipulating how and when to play. When to play and not to play creates two scenarios: one of playfulness and one of seriousness (Brown, 2014).

2.6.4 Talent and education

Throughout the education process failure can be an important learning experience. Failure should involve feedback. Students that fear feedback should learn that feedback is positive and not negative (Kwong, et al.23, 2012:47-49). Talent is diverse, which allows different children to have different talents. Due to these different talents, education should be customised to serve children's needs. Standardised education depletes children's talent as they are hindered from growing their talent in school. Talent creates passion and because the talent is enjoyed by the individual more time is spent on the talent. Education should therefore focus on instilling energy and passion in that which a child shows talent (Robinson, 2010).

2.6.5 Barriers to teaching

Teachers can help to increase a child's creativity. Various teaching methods encourage teachers to take risks when using creative teaching methods (Burnard, 2012:167). Creativity enhances student learning. Standardised testing is one reason that teachers and learners' creativity is reduced. Limited equipment for teachers, limited time, standardisation of curriculum and viewing creativity as being supplementary to teaching are other reasons for low creativity (Rinkevich, 2011:219).

The creative children that are taught are expected to succeed in economies that reward creativity and innovation. Tests and targets often limit the ability to teach creatively. Students are not encouraged to take risks, use their imagination and find different solutions to problems (Burnard, 2012:167). Teachers do not encourage

imaginative thought. Creativity in some cases is discouraged as the value of creativity is not fully understood. Teachers value creativity, but not creative behaviours. Reasons for stifling creative behaviours include large sizes of classes and standardisation of the curriculum. Teachers are also not trained in how to use creativity in a classroom. They struggle to incorporate it as part of a standard curriculum, but aim to use creativity as an additional activity that often coincide with time constraints. Creativity should be part of the process of allowing students to achieve academic success (Rinkevich, 2011:219).

2.6.6 TEACHING AT NMMU

To register with the NMMU MBA course a selection test is taken. The test measures potential student's personality, language skills, learning potential and numeric and verbal reasoning (MBA NMMU, 2014). The MBA course includes gaining theoretical knowledge in different business disciplines, taking risks and thinking and acting creatively (MBA, 2014b). Teaching methods include formal lectures, case study analysis, group discussions, teamwork, presentations and research on business problems. Through these teaching methods management and leadership skills are developed. Group work increases problem solving skills and simulate the way management issues are dealt with (MBA, 2014a). Value is placed on empowering students to be innovators that contribute to the economic sustainability and society (MBA NMMU, 2014).

2.7 RESEARCH BY KAUFMAN

Individuals mentioned include employees in organisations, teachers, children and other individuals that don't have detailed knowledge of creativity. These individuals are known as laypeople (Cambridge 2011:483). Kaufman (2012) conducted research on what laypeople's' perception is of creativity, whether they can recognise it and at what level they can recognise creativity. Research has shown that laypeople and experts views on creativity are similar on creativity and how it is constructed (Kaufman, 2012:1). The research relates to three debates. The first is the extent to which creativity is linked to intelligence. The second debate asks whether creativity is domain specific or whether it can be generalised across domains (Kaufman, 2012:1). The third aims to determine the perception individuals have on their own creativity (Kaufman & Beghetto, 2013:229-230).

2.7.1 Creativity and intelligence

The assumptions exist that if intelligence is increased, performance and thinking skills across various domains will increase as well. If domain general teaching is done the content would not matter (Banks, Gregerson, Snyder & Kaufman, 2012:176). Intelligence is increased by experiences that involve solving problems or creating value-adding products. Each intelligence uses different areas of the brain and goes through stages that involve development, growth and peak (Kovalik, 2010:12.2-12.3). Various researchers have identified various domains of intelligence that can be linked to creativity. These intelligences include, amongst others, kinaesthetic or behavioural, social (interpersonal and intrapersonal), linguistic, logical or mathematical, musical, natural and spatial (Kaufman, 2012:1).

Bodily or kinaesthetic intelligence involves using the body to solve problems and create products. Physical experience is used to stimulate learning and when linked to creativity it involves taking risks, experimenting and envisioning concepts (Clarke & Cripps, 2012:116-117). Bodily or kinaesthetic intelligence can also be applied when ideas and feelings is expressed and when objects is transformed. To be kinaesthetic intelligent an individual needs certain skills. These skills include, amongst others being coordinated, having balance, a certain level of strength and speed and being flexible (Armstrong, 2009:7).

Logical and mathematical intelligence also is known as design learning. Mathematical intelligence involves constructing numeric sequences (Clarke & Cripps, 2012:117; Armstrong, 2009:6). Armstrong (2009:6) states that additional uses for mathematical intelligences involves effectively using numbers as is done by accountants, to reason as is done by computer programmers, establishing relationships and propositions that involve cause-affect relationships as well as making calculations and generalisation.

Linguistic intelligence involves written and spoken language (Clarke & Cripps, 2012: 118). Linguistic skill forms the majority of focus within the schooling system. When a student has a high level of intelligence in another domain, poor linguistic intelligence may cause the student to struggle in school. Reading, writing, memorising, telling stories, spelling words and playing puzzles and games are activities that indicate linguistic intelligence (Kovalik, 2010:12.3). Examples of individuals that use spoken

linguistic intelligence include poets and politicians. Linguistic intelligence may be used by poets and journalists. Throughout the written and spoken language the language is manipulated. The manipulation occurs by changing sounds and semantics. Language can also be used to convince others to take action, remember information, explain concept and talk about oneself (Armstrong, 2009:6).

Social intelligence includes inter- and intra-personal skills. Interpersonal intelligence gains insight into what motivates other people, working with other people and manipulating and discriminating people thoughts and actions (Clarke & Cripps, 2012:120). Recognising changes in other individuals' moods, feelings and motivations is necessary. This can be done by recognising and responding to changes in facial expressions, voices and gestures (Armstrong, 2009:7). Intrapersonal intelligence, similarly to interpersonal intelligence, involves the recognition of changes in moods and motivations. The difference is intrapersonal intelligence involves an individual to adapt in situations and to recognise own strengths and limitations. Self-discipline and understanding oneself are further aspects that help to classify intrapersonal intelligence (Armstrong, 2009:7). Intrapersonal intelligence makes one aware of one's own feelings and includes independence, self-confidence and reaction on opinions. It is apparent with individuals who wants to participate in a hobby (Kovalik, 2010:12,10-11).

Musical intelligence involves the perception, discrimination, transformation and expression of music. Occupations may include being a music critic, composer or performer. An understanding of rhythm, pitch, melody and tone are necessary (Armstrong, 2009:7).

Natural intelligence involves recognising different species of plant and animal life as well as other natural phenomena such as clouds and mountains. Having natural intelligence within a city environment may involve different models of cars or products being sold in a shop (Armstrong, 2009:7). Due to the variety of aspects included in natural intelligence it is not processed in one specific area of the brain. Different areas of the brain will be utilised depending on the aspects recognised (Kovalik, 2010:12.11).

Spatial intelligence relates to the perception of an individuals' physical environment. An example may include a hunter or scout knowing the terrain around them.

Transformation of space can be done by an architect or interior decorator that transforms a specific place through design (Armstrong, 2009:7). Participating in art, visualising a mental picture, understanding maps and diagrams, accurate drawings and daydreaming is examples of spatial intelligence (Kovalik, 2010:12.7). Visualising colour, lines, shape and space, amongst others, and the relationship between these concepts needs intelligence (Armstrong, 2009:7). However, not being able to see can still allow an individual to have spatial intelligence. An example is blind individuals that recognise space around them in different ways (Kovalik, 2010:12.7).

The research showed that creativity should be viewed separately from intelligence, but that there are characteristics that overlap. These characteristics that link creativity and intelligence include aspects that are unconventional, include inquisitiveness, involve imagination and involve freedom (Kaufman & Beghetto, 2013:229).

Individuals can excel in one or more than one of the above creative domains. The amount of creative domains an individual possess will classify an individual as being domain general creative or domain specific creative. Characteristics of domain specific and domain general creativity are discussed in the next section.

2.7.2 Domain specific or domain general

A domain involves human accomplishment in academic disciplines. Domains can also include mental activities as well as expertise. Other explanations include domains involving representations that are internal and symbolic. An example of domains in music includes rhythms and melodies. Examples of being domain specific creative involve a scientist that is a talented violinist but unable to paint well (Sawyer, 2012:58-59). Kaufman and Baer (2005) have developed research techniques that measure the two types of proposed creativity: Domain General and Domain Specific (Hong & Milgram, 2011:35-36).

Domain general creativity is synonymous with creative thinking and involves generating original ideas from various domains. Domain specific creativity is a more recent discovery by researchers. Assumptions have been made that domain general creativity involves skills that can be applied in numerous domains. Similar assumptions have been made to domain general intelligence that influences

performance across all domains that has been discussed in the previous section (Banks, Gregerson, Snyder & Kaufman, 2012:176).

Domain specific creativity is tested by an ideational fluency-based test that tests divergent thinking in a specific domain. An example is mathematics. Domain specific creativity within mathematics involves asking questions that relate specifically to mathematics (Hong & Milgram, 2011:36-37). However if creativity is domain specific that which is taught and thought has to include a specific domain (Banks, Gregerson, Snyder & Kaufman, 2012:176-177). Domain specific creativity involves having knowledge and expertise within a specific domain (Sawyer, 2012:60).

Tests have proven that laypersons' perception of creativity include four dimensions. The dimensions include no entrenchment, aesthetic taste or imagination, perspicacity and inquisitiveness (Kaufman, 2012:1). Various domain-based creativity tests have been developed. Other methods of testing domain general creativity have been proven through the Torrance Test of Creative Thinking and other ratings constructed by teachers and other researchers that tested mathematics, art and verbal domains and the relationship between the domains (Hong & Milgram, 2011:36-37). Kaufman (2012) mentions the following domain specific tests.

The first is the Amusement Park Theoretical (APT) model which is based on domain specific outcomes that include intelligence and motivation. Personality traits and thinking patterns are further analysed to determine creativity levels (Kaufman, 2012:1).

The Creativity Achievement Questionnaire (CAQ) is a second test that measures creativity across ten domains and two factors. The two factors include art and science. The domains that relate to art include drama, writing, humour, music, visual arts and dance. The domains that relate to science include invention, science and culinary (Sawyer, 2012:50). Originally architecture was included, but was excluded from the study. The test is seen as reliable and valid and works on a scoring system where points are given to scores that show higher levels of creativity. The CAQ is also used to test creativity that relates to professional creativity (Kaufman, 2012:2).

A third assessment is the Creativity Scale for Diverse Domains (CSDD) that was done on college students. Nine domains were used that included three factors.

Hands-on creativity's domains include art, crafts and physical creativity. Mathematical or science creativity included mathematical or science related knowledge. Empathy or communication creativity include interpersonal relationships, communicating, problem solving and writing. The hands-on factors are more applicable to professional artists, the mathematical and science factor more related to scientists. Differences in cultures can lead to a change in the domains under specific factors (Kaufman, 2012:2). Creativity has also been used to create profiles amongst gifted adolescents, to measure personality and behaviours.

A Creativity Domain Questionnaire (CDQ) is a fourth test. The CDQ involved fifty six domains and seven factors. The seven factors include artistic-verbal, artistic-visual, entrepreneurial, interpersonal, mathematical and science based, performance related and problem solving. The seven factors showed that creativity existed at various levels. Artistic-visual creativity and performance related creativity showed more creativity than creativity related to mathematics and science. The CDQ was shortened to include four factors. The first factor included mathematics and science that include domains that relate to algebra, chemistry, computer science, biology, logic and mechanical. The second factor included drama and the domains included acting, literature, blogging, singing, dancing and writing. The third factor included interaction that included domains of leadership, money, playing with children, selling, problem solving and teaching. The last factors are arts and include domains of crafts, decorating and painting (Kaufman, 2012:2). Research has shown that laypersons can recognise creativity amongst various domains (Kaufman, 2012:2).

A fifth test is the test Kaufman created. The test is called the Kaufman Domains of Creativity Scale (K-DOCS) that tested personality and laypersons' perception on domain-specific creativity (Kaufman, 2012:2). The K-DOCS test is utilised in this research study and is discussed in chapter 3. In another research study (Saunders Wickes and Ward, 2006) students was asked how they view their own creativity. Four factors become apparent: risk-taking, awkwardness, intellect and impulsiveness. When the students rated other individuals' creativity the level of activism, activity, popularity and questioning was used to describe it (Kaufman & Beghetto, 2013:229).

2.8 CONCLUSION

The chapter consisted of five sections. The first gave an explanation on creativity and innovation. Four levels of creativity exist. The four levels of creativity are little-c creativity that involves solving problems, big-c creativity that involves creating novel products for society, mini-c creativity that involves interpreting creative moments and pro-c that involve experience and developing a talent. Innovation is related to designing products that are socially meaningful and allow for competitive advantage.

The second discussion was on four developed countries that spend the most on R&D according to the Global Innovation Index. The USA has a skill shortage and high university drop-out rate. The international students the country attracts leave after completion of studies due to visa requirements. The school system focuses on cognitive skills that reduce creativity. Japan has competitive advantages that include products and production processes. Japanese students excel in numeracy and Japanese literacy, but poor in problem solving skills. The government is assisting with English classes to improve the ability to speak English. South Korea focuses on human capital. Universities focus on research that allow for technological advantages. High schools focus on university entrance exams that involve needing mathematical and language skills. Switzerland also focus on human capital due to a lack in natural resources. The government funds education. Graduation from high school is low due to entry into exams being difficult and the quality of university education is high. The high quality of universities is attracting international students.

The third discussion included the five BRICS countries that were identified as the developing countries to discuss. Brazil's students fare poorly on mathematical, science and language exams. Government support is low and bureaucracy and corruption is high. Russia also has bureaucracy that is hindering economic development. University standards are increasing as well as government funding. Studying at a university is affordable and therefore is attracting international students. Russian students prefer to study overseas, but are encouraged to return after completing their studies. India's schools are mostly accessible to wealthy citizens. Literacy and university enrolment is low. China use standard tests to enter universities. Schools focus on mathematical and literacy to equip students for the university tests. South Africa's level of education is lower than that of other African

countries. The South African government spends more than other African countries on education.

Fourthly organisations management's capability, communication and networking and the willingness to take risk assist with innovation was discussed. Management have an impact the innovation levels of employees and motivation is important. Educated and knowledgeable staff allows for organisations to be more innovative.

The fifth discussion was on education systems that encourages mathematics and languages. These two fields should be combined with students learning to be innovative in an unknown environment considering the different domains of intelligences and thinking creatively. Standard testing is not ideal as it reduces creativity and hinders talent development.

Lastly Kaufmann's research was discussed on which the primary data in this research study is based on. Kaufman identified different domains of creativity that include musical, mathematical, linguistic, artistic and spatial domains. Chapter three and four will elaborate on Kaufmann's findings.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

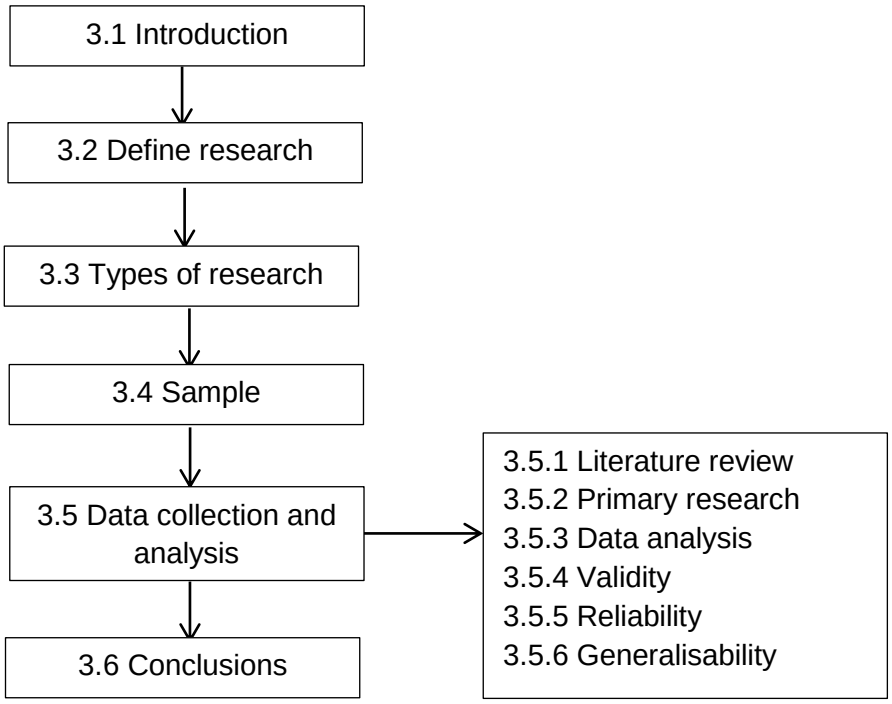
In chapter 2 creativity and innovation were discussed. Information was given on various countries' understanding and how they support innovation. The countries' education systems, the role education plays in increasing creativity and the role creativity amongst individuals' plays in innovative organisations and economic growth was also discussed. Information was also provided on the role of creativity pertaining to education in general. The goals of education, teaching creatively, the teaching environment, barriers to teaching and identifying talent were discussed. Research conducted by Kaufman (2003, 2009; 2012) was also explained. Chapter three has two objectives.

The first objective is to provide a description of the concept research, the types of research applied, the sample and data collection and analysis methods.

The second objective is to discuss the research process of this research study.

The layout of the chapter is depicted below.

Figure 3.1: Layout of chapter 3



3.2 DEFINING RESEARCH

One definition of research is to study an object to better understand or gain information (University of Idaho, 2014). Other definitions describe research as an enquiry, examination, investigation or experimentation that helps discover facts, theories or laws. Research also involves solving problems. The solutions are achieved by collecting and interpreting data (Connaway & Powell, 2010:2). Research further involves searching for information that is gathered from data. Credible, believable and relevant answers involve a systematic way of answering questions. The systematic way involves stages that include gathering, analysing and writing up data (Collins, 2011:10-12). The stages of this research project will be discussed later in the chapter.

For this research study the research will investigate students' perception of creativity. Data will be collected through a questionnaire. The systematic layout of the questionnaire is discussed later in the chapter. The definition of research for this study is to gather data on student's perception of creativity and gain knowledge on the perception by investigating and providing credible, believable and relevant answers to the research questions through a systematic process. The research process will involve quantitative research that will be discussed in the next section.

3.3 TYPES OF RESEARCH

Although quantitative research methods are used, this research study shares certain characteristics with qualitative research. A brief overview of qualitative research will be given that will be followed by a discussion on quantitative research.

Qualitative research is done and processed by the researcher. Observations or interviews are utilised to research unobservable phenomenon (Hatch, 2012:6). Qualitative research aims to gain an understanding on groups and individuals. The understanding assists in the expansion of knowledge. A further characteristic of qualitative research involves studying groups and individuals in their natural setting (Hatch, 2012:6; Sage, nd:34). Qualitative research in education is used to enhance teaching and learning methods. The steps within this process of enhancing education involve identifying and formulating a research question, reviewing literature, designing a research instrument, collecting and analysing data and

reaching conclusions on students' perception of creativity (Atkins & Wallace, 2012:14).

The problem associated with researching creativity is that creativity is seen as intangible and difficult to quantify (Suarez-Villa, 2012:44). Intangible concepts are more suitably researched through qualitative research methods. In education research similar problems are experienced. The reason for quantitative data being problematic is few phenomena in education are seen as naturally quantifiable. Examples include measuring attitudes and beliefs of students that are intangible concepts (Muijs, 2010:2). To overcome the obstacle, different research instruments are used to allow for quantitative answers. One example is surveys or questionnaires (Suarez-Villa, 2012:44). Quantitative techniques convert the non-quantitative phenomena into quantifiable data that are statistical in nature. Thus a phenomenon measured quantitatively does not have to be quantitative in nature (Mujis, 2010:1-3).

The unobservable concept that cannot be observed is called a construct. An example is intelligence. Operational definitions create methods to measure unobservable concepts through numerous variables (Lodico, Spaulding & Voegtle, 2010). This research study aims to quantify the extent to which the variable, creativity, is unobservable or observable. Kaufman (2009:112) stated that being able to observe creativity can increase teaching methods. Conducting a quantitative research study in education aims to generate laws that explain a phenomenon. The laws are universal if a relationship between variables is proven. Experiments, through surveys or questionnaires, help to prove relationships and reduce human bias (Bray, Adamson & Mason, 2007:40-41).

Professor Alexander Brem from the Friedrich-Alexander University in Nürnberg Germany conducted research using a questionnaire on the recognition of creativity in 2013. Professor Brem was contacted to enquire whether a duplicate study in South Africa can be conducted. Professor Brem used the questionnaire to conduct research on creativity and time management and agreed that a study can be conducted in South Africa. The questionnaire, originally compiled by Kaufman (2009), was translated. The researcher has formulated a research question that asks the extent to which students perceive their own level of creativity. Literature was

researched and Kaufmans' questionnaire was utilised to gather and analyse data quantitatively.

Johnson and Christensen (2012:429) state that quantitative research proves theories and explains the reason a phenomenon occurs. Certain phenomena may be neglected if the researcher only focuses on testing hypotheses generated before research is underway and not new hypotheses that are generated from statistical results. In quantitative research results can be generalised and the data collection process is quick. Results are independent of the researcher and useful if the sample size is large (Johnson and Christensen 2012:429). Quantitative results can be experimental and non-experimental. Non-experimental research describes groups of individuals and the relationship between the groups of individuals and other variables. Experimental research refers to cause and effect relationships between the individual and a variable (Lodico, Spaulding & Voegtle, 2010).

The statistics will be studied considering the existing research questions and objectives as well as possible new insights. Experimental research will be obtained indirectly. Secondary sources mentioned in chapter two state that teaching has an effect on creativity levels that influence innovation. The sample size of this quantitative research involves the majority of MBA students at NMMU, but is a small percentage considering all MBA students in other universities in South Africa. However, because the sample is from different geographical areas it increases the generalisability of the sample. The sample is discussed in more detail in the next section.

3.4 SAMPLE

A sample is a percentage of a population. The researcher must choose whether the research will involve studying the population or a sample (Daniel, 2012:5). There is no preferable ratio between the population and the sample. A larger sample size is preferable as it reduces inaccuracy and increases validity of results (Housden, 2012:196-198). A sample can be chosen because they are easy to locate or have specific information the researcher needs (Martella, Nelson, Morgan, Marchand-Marella, 305).

The whole student population from South Africa would be difficult to research. Thus only a sample is chosen. In this research study the sample is Masters in Business Administration (MBA) students enrolled at the Nelson Mandela Metropolitan University (NMMU). The students come from various demographical backgrounds and geographical areas. Thus age, gender and cultural background varied. The MBA students were chosen because the researcher has easy access to them. The students are studying and simultaneously working thus creating a link between an education system, work environment and creativity levels discussed in chapter two.

The convenience sample consisted of 138 students that included ninety males and fourth eight females. South African citizens constituted ninety three percent of the sample. The other seven percent was from other African countries that included Zimbabwe, Kenya, Malawi, Swaziland and Cancun. The average age of participants was thirty four years. The method of obtaining information from this sample is discussed next.

3.5 DATA COLLECTION AND ANALYSIS

This section is divided into six sections. The first section is the literature review that relates to research objectives and research questions one to three. The second is primary research that relates to research objectives and research questions four to six. The data analysis methods, validity, reliability and generalisability will also be discussed

3.5.1 Literature review

The literature review has two purposes. The first is to interpret information that is known on a specific topic. The second, closing knowledge gaps through additional research (Jesson, Matheson & Macey, 2011:8-12). The literature review assisted in interpreting known information from secondary sources on various countries' application of education, creativity and innovation levels. Journal articles from Ebscohost, books, magazines, video clips and newspaper articles were accessed. The knowledge gap that is investigated includes investigating the perceptions of South African MBA students on recognising creativity.

3.5.2 Primary research

Kaufman interviewed 1364 students online of which eighty six percent were female and fourteen percent were male. The average age of the students was twenty four years. Ethnicity included 47.1% Hispanic, 26,6% white, 9.8% African American, 9.1% Asian and 7,3% other (Kaufman & Beghetto, 2013:231). A second study was conducted by Kaufman where 2318 students were interviewed that included 80% women and 20% males. The mean age in the second study was 23,84 years. Ethnicity included 43,7% Hispanic, 28,2% Caucasians, 11,3% African American, 9% Asian American, 3,5% mixed race, 1.1% Middle Eastern and 0.9% Native American. Those that didn't indicate ethnicity totalled 2,3%. In the second study respondents were divided in half and 132 students did the test for a second time to re-test results. One limitation identified in Kaumans' study involved more females than males participating in this study (Kaufman, 2013). In this study more males (88) than females (48) participated.

The questionnaire was divided into five sections that comprise of various questions. Section one include fifty questions that measure creative domains. The domains were obtained from previous creativity domain questionnaires (CDQ). Section two included twenty questions that tested the ability to recognise different levels of creativity. The ability to recognise big-c creativity was tested in questions one to four, pro-c creativity in questions five to eight, little-c creativity in questions nine to twelve, mini-c creativity in questions thirteen to sixteen and not being able to recognise creativity in questions seventeen to twenty. Recognising big-c creativity involves thinking of or developing a product that is needed by society. Pro-c creativity refers to individuals that have ten years' experience in a specific field or areas or expertise. Little-c creativity involves solving problems. Mini-c creativity involves gaining knowledge through teaching. The twenty questions asked questions on products, processes and persons. Section three included twenty questions that measure the respondent's feelings. The first ten items measured self-deceptive enhancements. The second ten items measured impression management levels of individuals. Section four included five questions that measure new concepts identified by Kaufman (Kaufman, 2009). The last section asked questions on the respondents' demographic and geographic background. Question one and two involve a five-point

likert scale. Five represented extremely creative and one represented not at all creative.

The questionnaire was distributed in class for students to complete on six different occasions in five geographic areas. The geographic locations include Cape Town, Johannesburg, George, East-Londen and Port Elizabeth on two occasions. The identity of students during distribution and answering of the questionnaire was kept confidential and answering the questionnaire was voluntary.

The reason and answering procedure for the questionnaire was explained. The researcher was present while students answered the questionnaire, but did not influence answers given. Completed questionnaires were taken by the researcher and data were captured on an Excel spread sheet.

3.5.3 Data analysis

The data were entered into the program Statistica for analysis by the researcher. A statistician assisted with further analysis and interpretation of the data. The overall results will allow for conclusions on the South African MBA students. An Exploratory Factor Analysis (EFA) was conducted on question one and two. To eliminate questions from certain factors 0.4 was used. An EFA reduces variables to identify and explain constructs. The aim is to estimate factors that have an influence on responses to certain variables. The factors identified allow for a common variance (Suhr, nd:2-3).

Section one identified four factors that involved 40.4% of the variance in results based on 34 of the 50 questions in section one. Section one involved ten questions on five personality factors. The five personality factors include extroversion, agreeableness, conscientiousness, emotional stability and openness (Kaufman, 2013:230-232). Section one is also consistent with domains of creative behaviours namely Self/Everyday, Scholarly, Performance (writing and music), Mechanical-Scientific and Artistic (Kaufman, 2012). In this research study the EFA identified four factors that are synonymous with four domains of creativity, namely performance, mechanical-Scientific, scholarly and artistic. The four factors can also be associated with various intelligences, namely musical, logical-mathematical, linguistic and spatial.

Section two identified three factors that allowed for 49.88% of variance in results that included nineteen out of the twenty questions. The three factors are similar to those of Kaufman (2013). Big-c, pro-c and little-c were combined into one factor. The second factor involved not being able to recognise creativity. The third factor was mini-c creativity that is only apparent to the creator.

The levels and domains of creativity were also compared to demographic and geographic variables. The EFA for section one and two, together with other findings will be discussed in chapter four. Throughout the data collection and analysis process validity and reliability was considered. Validity, reliability and generalisability are discussed next.

3.7.4 Validity

Validity involves a truthful relationship between conclusions drawn and evidence obtained by conducting research. The conclusions must be plausible (Salkind, 2010:1171). The aim is to reduce invalidity and increase validity. The lack of validity renders research useless. Validity is synonymous with research being honest, having depth, richness and scope. To achieve depth, richness and scope a good sample, research instrument and statistical analysis is important (Cohen, Manion & Morrison, 2011:179).

The measurement instrument must accurately convey the meaning of concepts investigated. Meanings are made true through social agreements on concepts (Babbie, 2010:153). Full truthfulness cannot be achieved. Quantitative research involves acknowledged errors taking into consideration in the analyses that reduces validity (Cohen, Manion & Morrison, 2011:181).

A questionnaire that has been used in previous similar studies together with a qualified statistician assists in valid conclusions. These variables assist in truthful conclusions being drawn on the creativity levels of students. The researcher trusts that students will complete the questionnaire truthfully. The sample is well represented as they are from different demographic and geographic backgrounds. Errors on the questionnaire will be reduced through previous studies that used the

same questionnaire by other researchers in America, Germany and Mexico. Lastly a knowledgeable statistician will be used.

3.7.5 Reliability

Synonyms to describe reliability include dependability and consistency within a time frame. Precision and accuracy are also important (Cohen, Manion & Morrison, 2011:199). Obtaining similar results does not mean that results are accurate. Reliability refers to the technique used when conducting research. Techniques repeated in multiple studies that yield similar results are reliable (Babbie, 2010:150).

Techniques may be faulty and yield incorrect results that are similar on multiple occasions. Reliability can also be jeopardised while observing and interpreting data. The reasons are subjectivity. Subjectivity is apparent within the researcher interpreting the data as well as respondents that answer questions differently (Babbie, 2010:150-151). In quantitative research, reliability involves stability and consistency. Consistency refers to similar results. Stability refers to the time frame. The time frame in which research is conducted should not be too long or too short. Stability can also refer to the sample where the sample is made up of similar characteristics (Cohen, Manion & Morrison, 2011:201). If consistency in respondents' answers vary, the reason for the variance is important. Consistency can be jeopardised due to time constraints and bias by respondent and researcher (Wilson 2010:117-119).

How a researcher asks a question is also important. Complicated questions make a respondents doubt answers. Vague questions allow for a wider variety of answers than needed. Questions should be clear and retesting could be done to ensure that questions are understood. To ensure reliable data collection methods a test can be conducted multiple times (Babbie, 2010:152). If different researchers are conducting the study then there should be agreement upon the research method chosen (Cohen, Manion & Morrison, 2011:200). Researchers can also use similar methods that have been used for similar studies that have been proven as reliable. Through these methods, reliability is increased as consistent results will be achieved (Babbie, 2010:153,157).

The questionnaire has been utilised before in similar studies with a similar population. The repetitive use of the questionnaire therefore increased the reliability of the study. Although reliability involves similar results being obtained across different studies, the students' background and culture vary. For example, education systems influence creativity levels, thus results from the German study may differ from the results obtained from the South African study. The questions in the questionnaire were translated from German to English by a German-English translator so that it is easily understood.

7.3.6 Generalisability

Quantitative research includes information explained and generalised (Tashakkori & Teddlie, 2010:17-22). Generalisability involves using results to come to conclusions on additional populations in different settings and situations (Cohen, Manion & Morrison, 2011:185; Mitchell & Jolley, 2013:40). Generalisation can be based on a specific population or different populations (Krishnaswamy, SivaKumar & Mathirajan 2009:147-148; Collis & Hussey 2009:65). In education research generalisation is strengthened when the research study is replicated (Bray, Adamson & Mason, 2007:40-41).

The conclusions drawn in this research study will be based on the South African sample. Results will include generalisation on the South African student population and international student population. The repetition of the study further increases the generalisability of the study.

3.8 CONCLUSION

This chapter initially discussed what research entails. The discussion on the quantitative research method was followed by information on the sample. The sample includes MBA students of NMMU. The data analysis method and data collection process was discussed and included a literature review that was followed by the translation of a German questionnaire. The full scale study involved physically distributing a questionnaire during class time, capturing the data on an Excel spread sheet and using Statistica to formulate statistics. In the next chapter the results obtained from the survey will be discussed.

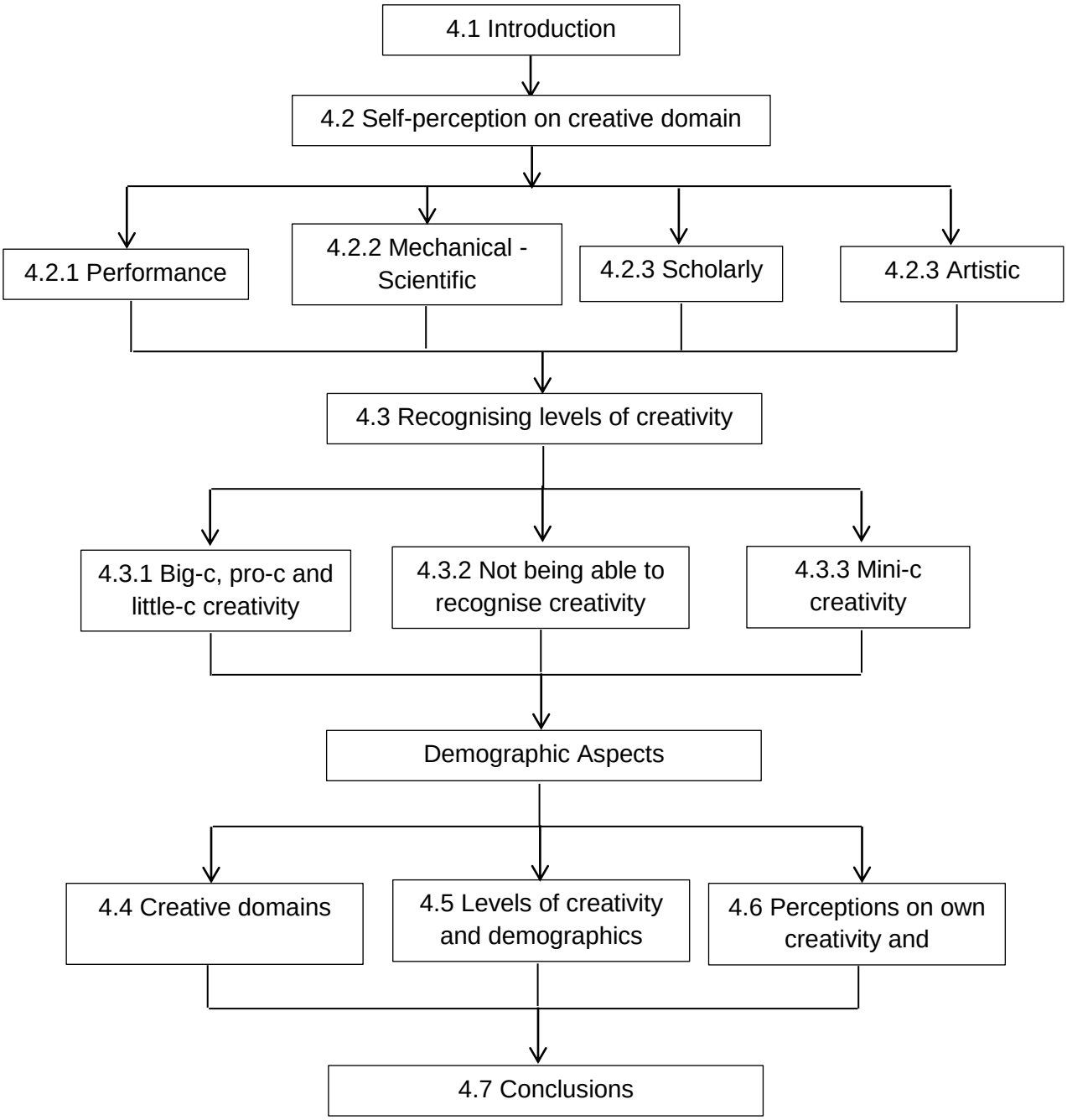
CHAPTER 4

RESEARCH FINDINGS

4.1 INTRODUCTION

In chapter three the methodology and questionnaire layout for this research study was discussed. In this chapter the results obtained from the questionnaire will be analysed. The chapters' aim is to provide information on research objectives four to six. The information is based on the questionnaire that was distributed.

Figure 4.1: Layout of chapter 4



Section 4.2 will provide information on research objective four that was based on Section one of the questionnaire. Section one tests the ability to recognise own creative levels and creative domains.

Section 4.3 will provide information on research objective five that was based on section two. Section two relates to the ability to recognise different levels of creativity and non-creativity.

Section 4.4, 4.5 and 4.6 will provide information on the demographic variables of respondents and the relationship of these demographic variables to creative domains and levels of creativity.

4.2 SELF-PERCEPTION ON CREATIVE DOMAINS

To draw conclusions on respondents' perception on their own creativity level in specific domains an Exploratory Factor Analysis (EFA) was conducted. The EFA showed four factors that allowed for forty percent of the results that are indicated through eigenvalues below. Eigenvalues involves investigating items that have similar characteristics (Chatelin, 2013:1).

Table 4.1: Eigenvalues

	EIGENVALUES: MAXIMUM LIKELIHOOD FACTORS			
	Eigenvalue	**Percentage Total Variance**	**Cumulative Eigenvalue**	**Cumulative Percentage**
Performance	10.22011	20.44021	10.22011	20.44021
Mechanical – Scientific	4.99017	9.80034	15.12027	30.24055
Scholarly	3.18827	6.37254	18.30655	36.61309
Artistic	1.89583	3.79165	2.20237	40.40474

The four factors stem from thirty four of the fifty items in section one of the questionnaire. The four factors show four domains namely performance, mechanical-scientific, scholarly and artistic. The performance factor allowed for 20,44% of the results. The mechanical-scientific factor allowed for 9.8% of results. The scholarly factor allowed for 6.37% of the results. The artistic factor allowed for 3.79% of the results. The EFA for each factor is given followed by a discussion on each of the factors.

4.2.1 Factor 1: Performance

The majority of respondents perceive themselves to be less creative than their peers when performance-related activities are used as an indicator to measure creativity. The table below shows the results obtained from eight items in the questionnaire and the results in the EFA. The code refers to the question number of section one in the questionnaire. The eight questions refer to the questions in the questionnaire on which respondents had to compare their own creativity levels to that of their peers. For performance creativity, questions 22 to 26, 28 and 30 to 31 of section 1 in the questionnaire was identified by respondents.

Table 4.2: EFA for Performance Factor

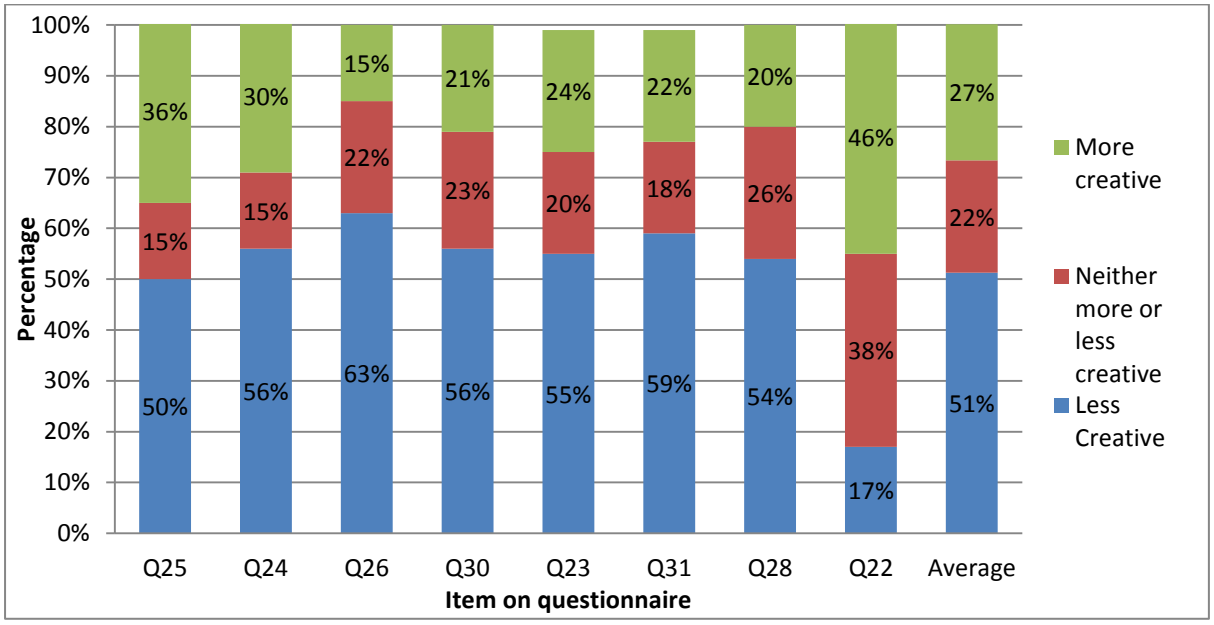
Code	Question	Factor 1	Factor 2	Factor 3	Factor 4
		Performance	Mechanical-scientific	Scholarly	Artistic
Q25	Making up rhymes	**0.910201**	0.036956	0.044055	0.190082
Q24	Making up lyrics to a funny song	**0.843971**	0.037406	0.014827	0.174407
Q26	Composing an original song	**0.793261**	0.039916	0.155145	0.336086
Q30	Spontaneously creating lyrics to a rap song	**0.694371**	0.031837	0.156924	0.243423
Q23	Writing a poem	**0.588287**	-0.046285	0.303829	0.352296
Q31	Playing music in public	**0.564506**	0.062091	0.030440	0.205875
Q28	Shooting a fun video to air on YouTube	**0.430474**	0.035150	0.216568	0.399427
Q22	Coming up with a new way to think about an old debate	**0.396632**	0.081640	0.337694	-0.003800

Question 25 (making up rhymes) had the highest factor loading of 0.91. Question 24 (Making up lyrics to a funny song) had the second highest factor loading of 0.84). The third highest factor loading was from question 26 (composing an original song) with a factor loading of 0.79 followed by question 30 (spontaneously creating lyrics to a rap song) with a factor loading of 0.69; question 23 (writing a poem) with a factor loading of 0.58; question 31 (playing music in public) with a factor loading of 0.56; question 28 (shooting a fun video to air on YouTube) with a factor loading of 0.43 and question 22 (coming up with a new way to think about an old debate) with a factor loading of 0.39. Question 22 had a factor loading of 0.39662. The cut-off for being included in a specific factor loading was 0.4. The reason for inclusion of

question 22 in the performance factor is based on the small variance between 0.39662 and 0.4.

Items were individually assessed to determine the level of performance creativity that respondents had. The average of all respondents' perception on their performance creativity was also calculated. The results are depicted below.

Graph 4.1: Performance domain



Question 22 (coming up with a new way to think about an old debate) is the only variable where respondents perceived themselves to be more creative than other people. In total 17% perceived themselves to be less creative than their peers, 38% neither more nor less creative and 46% perceived themselves to be more creative than their peers.

Question 25 (making up rhymes) showed that 50% of respondents perceived themselves to be less creative than their peers, 15% neither more nor less creative than their friends and 36% more creative than their peers.

Question 24 (making up lyrics to a funny song) showed 56% of respondents perceiving themselves as less creative than their peers, 15% neither more nor less creative than their peers and 30% more creative than their peers.

Question 26 (composing an original song) showed 83% of respondents perceiving them less creative than other people, 22% neither more nor less creative and 15% more creative.

Question 30 (spontaneously creating lyrics to a rap song) showed 56% of respondents perceiving them less creative than their peers, 23% neither more nor less creative and 21% more creative than their peers.

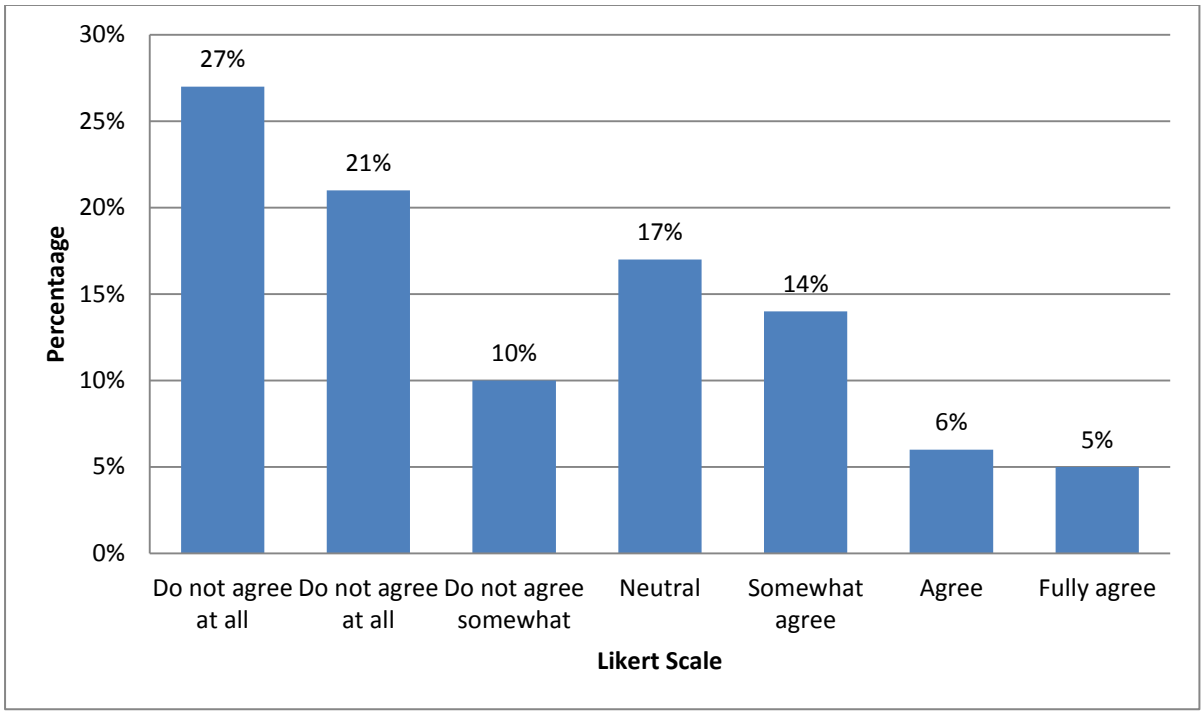
Question 23 (writing a poem) showed 54% of respondents perceiving them less creative than their peers, 20% neither more nor less creative and 24% more creative than their peers.

Question 31 (playing music in public) showed 59% of respondents perceiving them less creative than their peers, 18% neither more nor less creative and 22% more creative than their peers.

Item 28 (shooting a fun video to air on YouTube) showed 54% of respondents perceiving them less creative than their peers, 26% neither more nor less creative and 20% more creative than their peers.

The average of all the above showed 51% of respondents perceiving themselves less creative than their peers, 22% neither more nor less creative and 27% more creative than their peers. The above data shows a similar trend than the new item identified by Kaufman that states ‘I’m a musically gifted person’ that is shown below. In total 138 students answered the question. The mean score was 3.087 and the standard deviation was 1.84.

Graph 4.2: Performance giftedness



The graph indicates that 58% of respondents realise that they are not creative when performance-related aspects are involved, 17% feel neutral and 25% state that they are creative when performance-related is used. The majority therefore are not creative when performance-related aspects are used.

4.2.2 Factor 2: Mechanical-Scientific

The EFA analysis for the second factor is given below. In total eight factors were identified. The questions identified by respondents that relate to mechanical-scientific creativity include questions 34 to 40 of section one in the questionnaire.

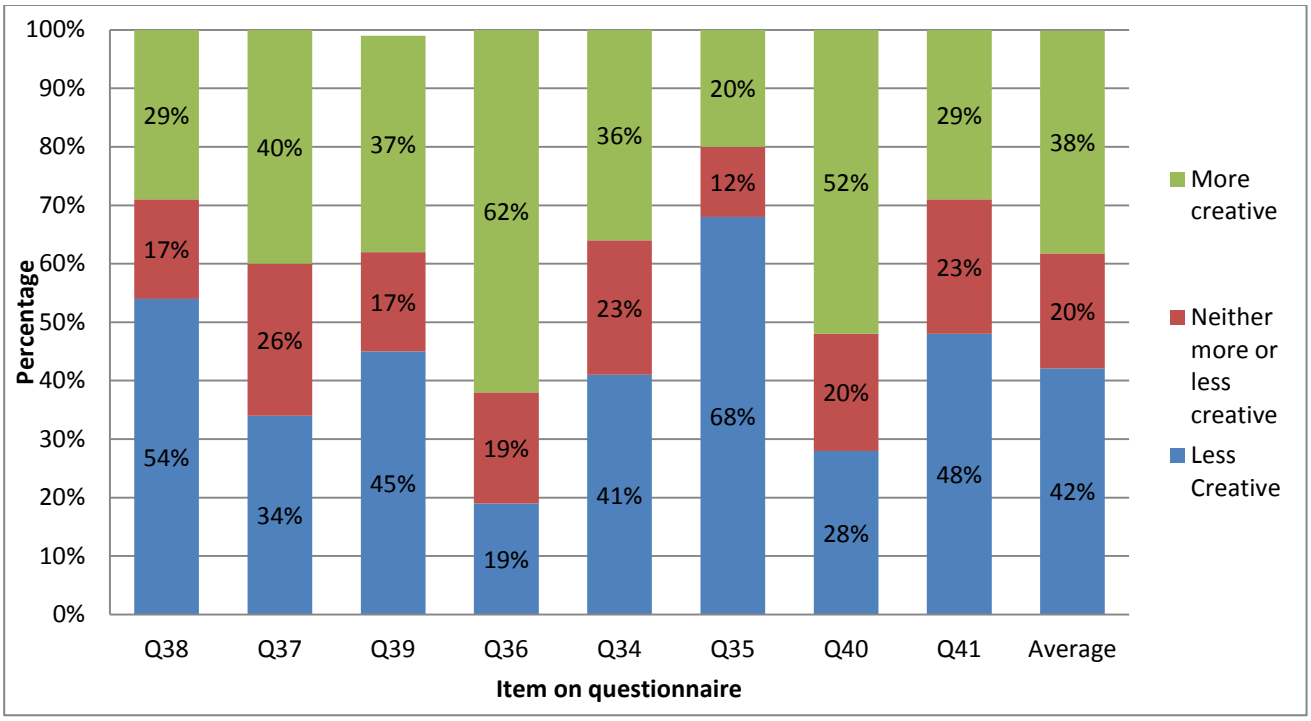
Table 4.3: EFA for Mechanical-scientific domains

Code	Question	Factor 1	Factor 2	Factor 3	Factor 4
		Performance	Mechanical-scientific	Scholarly	Artistic
Q38	Building something mechanical (like a robot)	-0.018170	**0.894139**	0.030591	0.124985
Q37	Taking apart machines and figuring out how they work	-0.063525	**0.886242**	-0.030131	0.082768
Q39	Helping to carry out or design a scientific experiment	0.031280	**0.861039**	0.025393	0.038099
Q36	Solving math puzzles	0.070532	**0.692132**	0.046369	-0.092795
Q34	Figuring out how to fix a frozen or buggy computer	0.093099	**0.688941**	0.184845	0.111536
Q35	Writing a computer program	0.034466	**0.676848**	0.199199	0.043146
Q40	Solving an algebraic or geometric proof	0.046228	**0.654694**	-0.116917	-0.172049
Q41	Constructing something out of metal, stone, or similar material	0.146118	**0.650401**	-0.101179	0.364301

Question 38 (building something mechanical like a robot) had the highest factor loading of 0.89. Question 37 (taking apart machines and figuring out how they work) had the second highest factor loading of 0.88. The third highest factor loading was from question 39 (helping to carry out or design a scientific experiment) with a factor loading of 0.86; question 36 (solving math puzzles) with a factor loading of 0.69; question 34 (figuring out how to fix a frozen or buggy computer) with a factor loading of 0.68; question 35 (writing a computer program) with a factor loading of 0.67; question 40 (solving an algebraic or geometric proof) with a factor loading of 0.65 and question 41 (constructing something out of metal, stone or similar material) with a factor loading of 0.65.

Factor 2 showed that when mechanical-scientific items are used to measure creativity the respondents that perceive themselves to be more and less creative are almost equal and differ by 4%.

Graph 4.3: Mechanical-scientific domain



Question 38 (building something mechanical like a robot) showed 54% of respondents perceiving themselves less creative than their peers, 17% neither more nor less creative and 29% more creative than their peers.

Question 37 (taking apart machines and figuring out the way that they work) showed 34% of respondents perceiving themselves less creative than their peers, 26% neither more nor less creative and 40% more creative than their peers.

Question 39 (Helping to carry out or design a scientific experiment) showed 45% of respondents perceiving themselves less creative than their peers, 17% neither more nor less creative and 37% more creative than their peers.

Question 36 (solving math puzzles) showed 19% of respondents perceiving themselves less creative than their peers, 19% neither more nor less creative and 62% more creative than their peers.

Question 34 (figuring out how to fix a frozen or buggy computer) showed 41% of respondents perceiving themselves less creative than their peers, 23% neither more nor less creative and 36% more creative than their peers.

Question 35 (writing a computer program) showed 68% of respondents perceiving themselves less creative than their peers, 12% neither more nor less creative and 20% more creative than their peers.

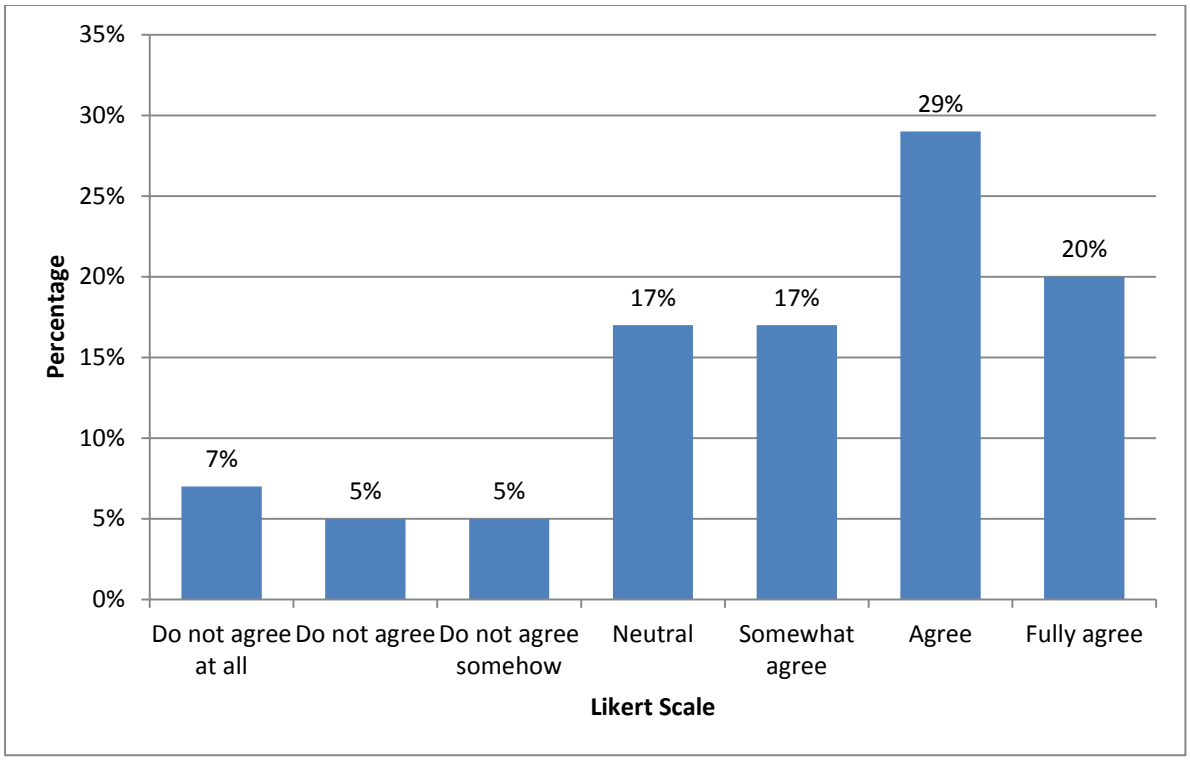
Question 40 (solving an algebraic or geometric proof) showed 28% of respondents perceiving themselves less creative than their peers, 20% neither more nor less creative and 52% more creative than their peers.

Question 41 (constructing something out of metal, stone or similar material) showed 48% of respondents perceiving themselves less creative than their peers, 23% neither more nor less creative and 29% more creative than their peers.

The average for all of the above questions show that 42% of respondents indicated that they perceive themselves to be less creative, 20% that they are neither more nor less creative than their peers and 38% that they are more creative. There are a similar percentage of respondents that perceive them to be more mechanical-scientifically creative and less mechanical-scientifically creative depending on the questions asked.

The above data shows a different trend to the new item identified by Kaufman that states ‘It’s easy for me to solve math problems’. In total 138 students responded to the question. The mean answer was 4.971 and the standard deviation is 1.75. The graph is given below.

Graph 4.4: Mathematical giftedness



The minority of respondents (17%) stated that they don't perceive themselves to be mechanical-scientific gifted. The same percentage of respondents felt neutral and indicated that they neither are more nor less creative in terms of their mechanical-scientific creative ability. In total 66% of respondents perceived themselves to be more creative than their peers. The reason for the difference should be researched further. One reason may be that there are specific aspects identified in the EFA that respondents perceive themselves to be less mechanical-scientific creative than their peers, such as writing a computer program, scientific experiments and building something mechanical.

4.2.3 Factor 3: Scholarly

The EFA analysis for the third factor is given below. In total nine items were identified. The questions identified by respondents that relate to scholarly creativity include questions 10, 12 to 17 and 19 to 20 in section one of the questionnaire.

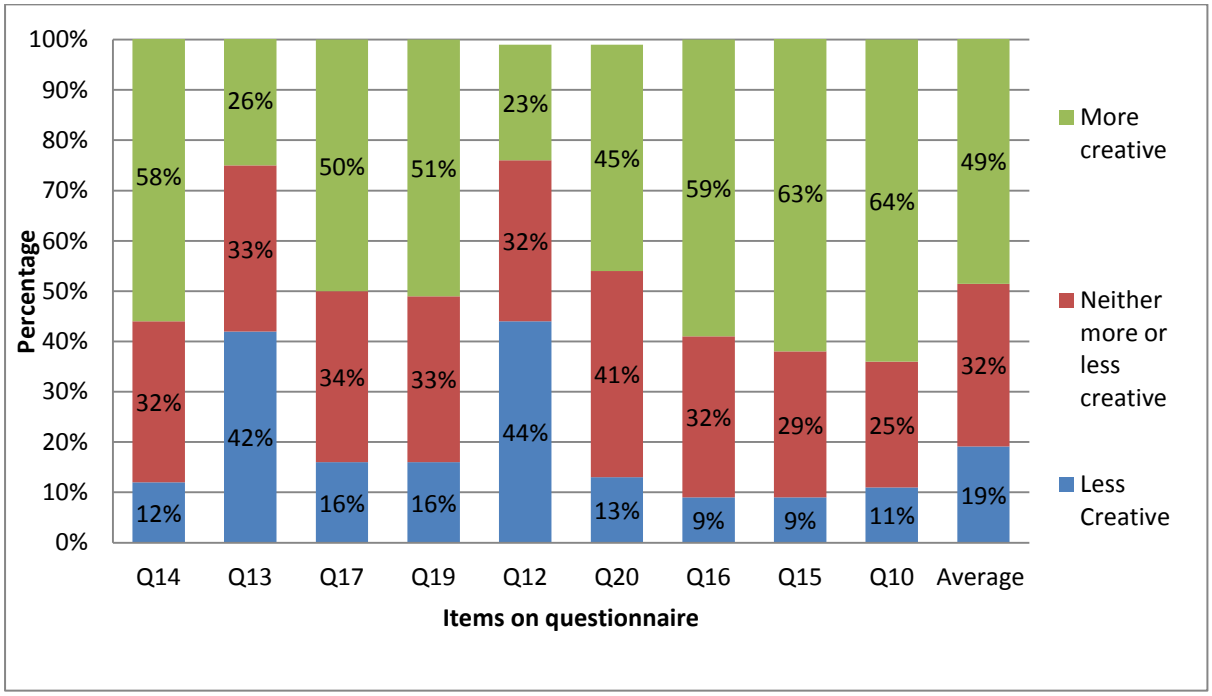
Table 4.4: EFA for Scholarly domains

Code	Question	Factor 1	Factor 2	Factor 3	Factor 4
		Performance	Mechanical-scientific	Scholarly	Artistic
Q14	Researching a topic using many different types of sources that may not be readily apparent	0.048393	0.138499	**0.612660**	0.092421
Q13	Writing a letter to the editor	0.148197	0.123902	**0.608181**	0.219753
Q17	Gathering the best possible assortment of articles or papers to support a specific point of view	-0.001351	0.112756	**0.597388**	0.083854
Q19	Analysing the themes in a good book	0.130491	-0.124307	**0.579027**	0.048110
Q12	Writing a nonfiction article for a newspaper, newsletter, or magazine	0.226095	0.027573	**0.547949**	0.199523
Q20	Figuring out how to integrate critiques and suggestions while revising a work	0.160102	-0.064277	**0.533471**	0.117249
Q16	Responding to an issue in a context-appropriate way	0.230240	0.056714	**0.501875**	-0.044040
Q15	Debating a controversial topic from my own perspective	0.356964	0.040863	**0.454858**	-0.090469
Q10	Mediating a dispute or argument between two friends	0.142559	-0.122650	**0.400167**	0.096039

Question 14 (researching a topic using many different types of sources that may not be readily apparent) had the highest factor loading of 0.6. Question 13 (writing a letter to the editor) had the second highest factor loading of 0.6. The third highest factor loading was from question 17 (gathering the best possible assortment of articles or papers to support a specific point of view) with a factor loading of 0.59; question 19 (analysing the themes in a good book) with a factor loading factor of 0..57; question 12 (writing a nonfiction article for a newspaper, newsletter or magazine) with a factor loading factor of 0.54; question 20 (figuring out how to integrate critiques and suggestions while revising a work) with a factor loading factor of 0.53; question 16 (responding to an issue in a context-appropriate way) with a factor loading of 0.5; question 15 (debating a controversial topic from my own perspective) with a factor loading of 0,45 and question 10 (mediating a dispute or argument between two friends) with a factor loading of 0.4.

Analysing scholarly creativity showed that when items relating to scholarly aspects are used to measure creativity the majority of respondents perceive themselves to be more creative than their peers. Question 12 (writing a nonfiction article for a newspaper, newsletter or magazine) and 13 (writing a letter to the editor) are exceptions that show that students perceive themselves to be less creative when writing a letter or an article. The results of the individual questions are depicted below. Questions not totalling 100% showed certain respondents not answering certain questions.

Graph 4.5: Scholarly domain



Question 14 (researching a topic using many different types of sources that may not be readily apparent) showed 12% of respondents perceiving themselves less creative than their peers, 32% neither more nor less creative and 58% more creative than their peers.

Question 13 (writing a letter to the editor) showed 42% of respondents perceiving them less creative than their peers, 33% neither more nor less creative and 26% more creative than their peers.

Question 17 (gathering the best possible assortment of articles or papers to support a specific point of view) showed 16% of respondents perceiving themselves less

creative than their peers, 34% neither more nor less creative and 50% more creative than their peers.

Question 19 (analysing the themes in a good book) showed 16% of respondents perceiving themselves less creative than their peers, 33% neither more nor less creative and 51% more creative than their peers.

Question 12 (writing a nonfiction article for a newspaper, newsletter or magazine) showed 44% of respondents perceiving themselves less creative than their peers, 32% neither more nor less creative and 23% more creative than their peers.

Question 20 (figuring out how to integrate critiques and suggestions while revising a work) showed 13% of respondents perceiving themselves less creative than their peers, 41% neither more nor less creative and 45% more creative than their peers.

Question 16 (responding to an issue in a context-appropriate way) showed 9% of respondents perceiving themselves less creative than their peers, 32% neither more nor less creative and 59% more creative than their peers.

Question 15 (debating a controversial topic from my own perspective) showed 9% of respondents perceiving themselves less creative than their peers, 29% neither more nor less creative and 64% more creative than their peers.

Question 10 (mediating a dispute or argument between two friends) showed 11% of respondents perceiving themselves less creative than their peers, 25% neither more nor less creative and 64% more creative than their peers.

The average of all questions relating to scholarly creativity showed 19% of respondents perceiving themselves less creative than their peers, 32% neither more nor less creative and 49% more creative than their peers. Considering the four factors identified by the EFA, respondents' highest level of creativity falls within the scholarly domain, but the factor scores are lower for scholarly creativity than it is for performance and mechanical-scientific creativity. Kaufman (2012) did indicate that if scholarly creativity is high it may impact other creative domains negatively. Having creativity across multiple domains is seen as more beneficial than having creativity that spans across one domain. Whether the respondents are creative across multiple or a singular domain is discussed after artistic creativity that is discussed next.

4.2.4 Factor 4: Artistic

The EFA analysis for the fourth factor is given below. In total nine factors were identified. The questions identified by respondents that relate to artistic creativity include questions 33 and 42 to 50 of section one in the questionnaire.

Table 4.5: EFA for Artistic domain

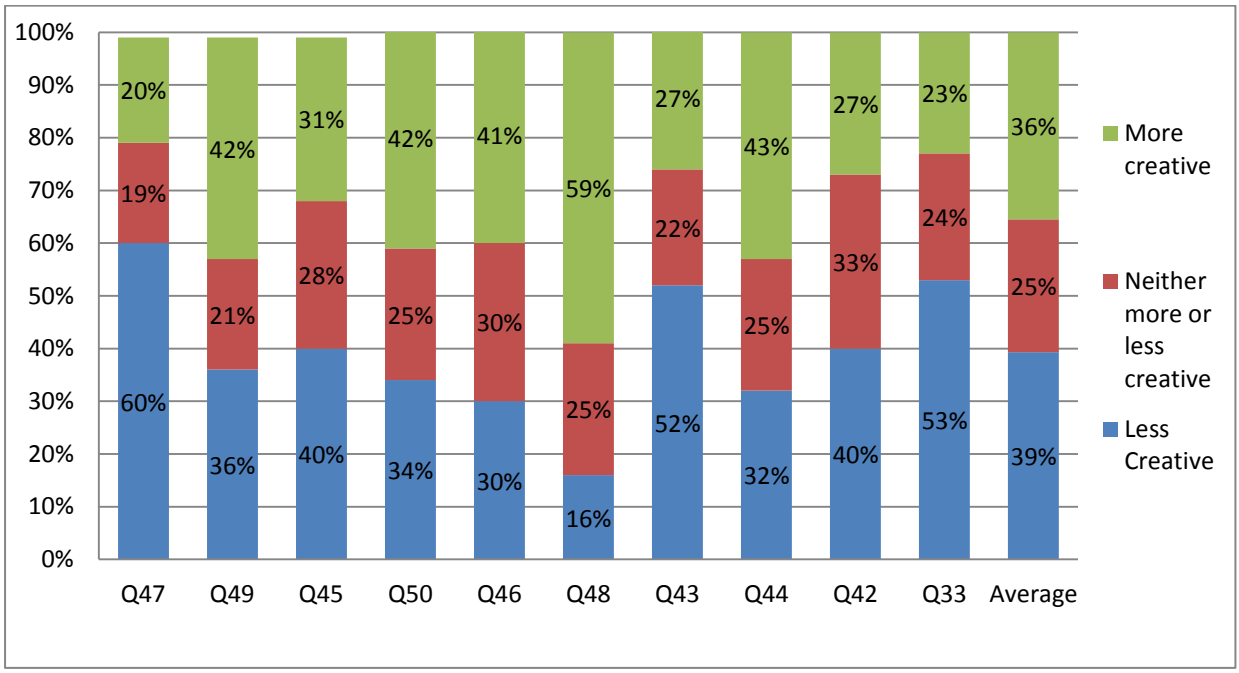
Code	Question	Factor 1	Factor 2	Factor 3	Factor 4
		Performance	Mechanical-scientific	Scholarly	Artistic
Q47	Making a sculpture or piece of pottery	0.357969	0.192295	0.118091	**0.708841**
Q49	Coming up with my own interpretation of a classic work of art	0.326515	0.081971	0.088710	**0.664844**
Q45	Making a scrapbook page out of my photographs	0.200192	-0.047892	0.205318	**0.664533**
Q50	Enjoying an art museum	0.244609	0.023791	0.120901	**0.663309**
Q46	Taking a well-composed photograph using an interesting angle or approach	0.261833	0.048688	0.148921	**0.637238**
Q48	Appreciating a beautiful painting	0.248862	-0.089077	0.038696	**0.591826**
Q43	Sketching a person or object	0.297160	0.321108	-0.103250	**0.578070**
Q44	Doodling/drawing random or geometric designs	0.149021	0.339544	-0.107500	**0.550280**
Q42	Drawing a picture of something I've never actually seen (like an alien)	0.352213	0.361867	-0.064000	**0.529149**
Q33	Carving something out of wood or similar material	0.249758	0.411455	-0.024156	**0.504130**

Question 47 (making a sculpture or piece of pottery) had the highest factor loading of 0.7. Question 49 (coming up with my own interpretation of a classic work of art) had the second highest factor loading of 0.66. Question 45 (making a scrapbook page out of my photographs) had the third highest factor loading of 0.66; followed by question 50 (enjoying an art museum) that had a factor loading of 0.63; question 46 (taking a well-composed photograph using an interesting angle or approach) with a factor loading of 0.63; question 48 (appreciating a beautiful painting) with a factor loading of 0.59; question 43 (sketching a person or object) with a factor loading of 0.55; question 44 (doodling or drawing random or geometric designs) with a factor

loading of 0.52 and question 33 (carving something out of wood or similar material) with a loading of 0.5.

Similarly to the mechanical-scientific factor, artistic factor showed that when items relating to artistic aspects are used to measure creativity the difference between the respondents' perception of being more artistically creative than their peers and less artistically creative varied little.

Graph 4.6: Artistic domain



Question 47 (making a sculpture or piece of pottery) showed 60% of respondents perceiving themselves less creative than their peers, 19% neither more nor less creative and 20% more creative than their peers.

Question 49 (coming up with my own interpretation of a classic work of art) showed 36% of respondents perceiving themselves less creative than their peers, 21% neither more nor less creative and 42% more creative than their peers.

Question 45 (making a scrapbook page out of my photographs) showed 40% of respondents perceiving themselves less creative than their peers, 28% neither more nor less creative and 31% more creative than their peers.

Question 50 (enjoying an art museum) showed 34% of respondents perceiving themselves less creative than their peers, 25% neither more nor less creative and 42% more creative than their peers.

Question 46 (taking a well-composed photograph using an interesting angle or approach) showed 30% of respondents perceiving themselves less creative than their peers, 30% neither more nor less creative and 41% more creative than their peers.

Question 48 (appreciating a beautiful painting) showed 16% of respondents perceiving themselves less creative than their peers, 25% neither more nor less creative and 59% more creative than their peers.

Question 43 (sketching a person or object) showed 52% of respondents perceiving themselves less creative than their peers, 22% neither more nor less creative and 27% more creative than their peers.

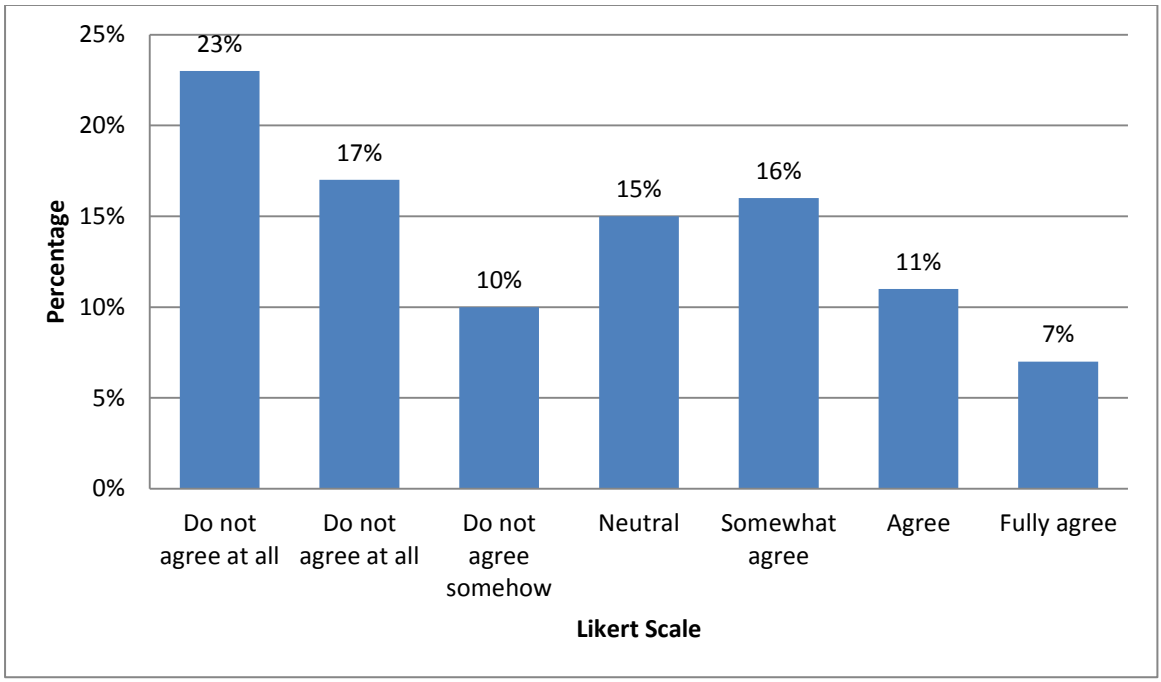
Question 44 (doodling or drawing random or geometric designs) showed 32% of respondents perceiving themselves less creative than their peers, 25% neither more nor less creative and 43% more creative than their peers.

Question 42 (drawing a picture of something I have never actually seen) showed 40% of respondents perceiving themselves less creative than their peers, 33% neither more nor less creative and 27% more creative than their peers.

Question 33 (carving something out of wood or similar material) showed 53% of respondents perceiving themselves less creative than their peers, 24% neither more nor less creative and 36% more creative than their peers.

The average of all of the above showed 39% of respondents perceiving themselves less creative than their peers, 25% neither more nor less creative and 36% more creative than their peers. Overall there is little difference between the number of respondents that perceive themselves to be less, more or equally artistically creative than their peers. The above data shows a different trend to the data obtained from the new item identified by Kaufman that states ‘I’m an artistically gifted person’. The mean answer was 3.45 and the standard deviation was 1.96.

Graph 4.7: Artistic giftedness

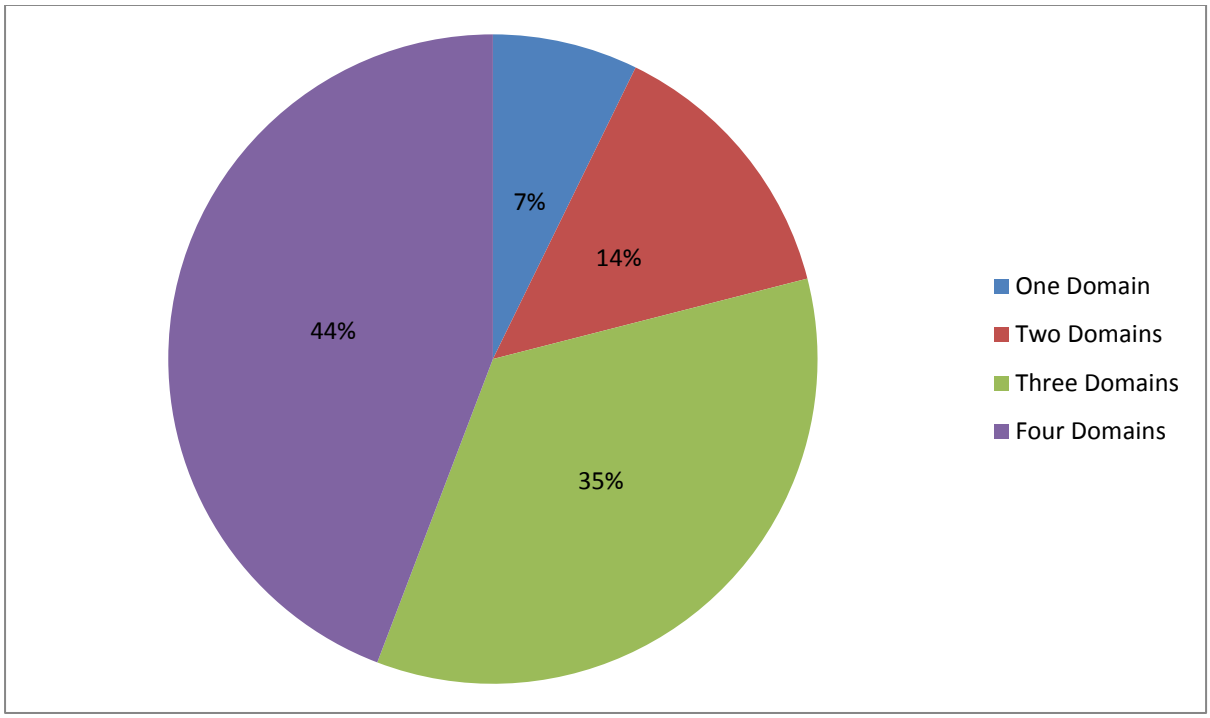


The data indicated that 50% of respondents do not perceive themselves to have artistic giftedness, 15% indicated that they are neither more nor less creative and 34% indicated that they are more artistically creative than their peers. The percentage that perceives them to be more creative is similar. Difference occurs in the respondents that say showed neutral creativity levels and perceive themselves to be less creative.

4.2.5 Domain general or domain specific

Analysing Kaufmans' questionnaire enables conclusions to be drawn on whether respondents' creativity is predominantly domain-specific or domain-general. Out of the four factors identified in the EFA, each respondent was awarded a score out of four for the amount of domains in which they perceived themselves to be creative. The results are depicted below.

Graph 4.8: Number of creative domains



In total 44% of respondents showed domain general creativity across all four domains. The percentage decreases to 35% that show respondents that are creative across three domains. In total 14% of students showed domain general creativity across two domains. Only 7% showed domain specific creativity. Research has shown that all human beings are born with creativity and this is proven in the results. All respondents showed some indication of participants being creative.

4.3 RECOGNISING LEVELS OF CREATIVITY

An EFA was also compiled to draw conclusions on student's ability to recognise different levels of creativity. The EFA showed three factors that allowed for fifty percent of the results. The three factors stem from nineteen of the twenty questions in section two of the questionnaire. The first factors show the ability of students to recognise big-c, pro-c and little c creativity. The second factor not being able to recognise creativity. The third factor the ability to recognise mini-c creativity. These factors will now be discussed.

4.3.1 Recognising big-c, pro-c and little-c

To draw conclusions on respondents' ability to recognise levels of creativity an EFA was conducted. The EFA showed three factors that allowed for 49% percent of the results that are indicated through eigenvalues below. Eigenvalues involve investigating items that have similar characteristics (Chatelin, 2013:1).

Table 4.6: Eigenvalues

	EIGENVALUES: MAXIMUM LIKELIHOOD FACTORS			
	Eigenvalue	**Percentage Total Variance**	**Cumulative Eigenvalue**	**Cumulative Percentage**
Big-c, pro-c and little-c creativity	5.168958	25.84479	5.168958	25.84479
Not being able to recognise creativity	3.534854	17.67427	8.703812	43.51906
Mini-c creativity	1.273649	6.36824	9.977460	49.88730

The three factors stem from nineteen of the twenty questions in section two of the questionnaire. The three factors show five levels of creativity. Big-c, pro-c and little-c creativity allowed for 25.85% of the results. Not being able to recognise creativity allowed for 17.67% of results. Mini-c creativity allowed for 6.36% of the results. The EFA for each factor is given followed by a discussion on each of the factors. Each factor will be discussed individually below.

Table 4.7: EFA for big-c, pro-c and little-creativity

	Code	Question	Factor 1	Factor 2	Factor 3
			Big-c, Pro-c and Little-c	Mini-c	Not recognise creativity
BIG-C, PRO-C AND LITTLE-C CREATIVITY	Q5	A creative product that is sold around the country	**0.829861**	-0.147460	0.156177
	Q6	A creative idea reflecting years of expertise	**0.814383**	0.008703	0.147605
	Q3	Legendary creative work	**0.777352**	-0.252667	-0.008818
	Q2	A creative product that is remembered and appreciated for more than 100 years	**0.721606**	-0.372826	-0.010281
	Q7	A creative person who has been practicing his or her skill for many years	**0.677731**	0.210416	0.086481
	Q4	A creative genius	**0.676567**	-0.234003	0.135801
	Q8	Creative work done by someone with an advanced degree	**0.619631**	0.268458	0.009561
	Q1	A creative action that changes an entire field	**0.601181**	-0.312691	-0.033849
	Q10	Any type of art that is shared with other people	**0.538836**	0.159695	0.029637
	Q11	Creativity that has been revised to incorporate the feedback of others	**0.447239**	0.267882	0.124693
	Q12	A creative hobby encouraged by members of the local community	**0.435779**	0.241369	0.208026
	Q9	A creative product that some people would be willing to buy	**0.427989**	0.203095	0.201290

Big-c creativity was measured by questions one to four. Question 1 (a creative action that changes an entire field) had a factor loading of 0.6. Question 2 (a creative product that is remembered and appreciated for more than 100 years) had a factor loading of 0.72. Question 3 (legendary creative work) had a factor loading of 0.77. Question 4 (a creative genius) had a factor loading of 0. 67.

Pro-c creativity was measure by questions five to eight. Question 5 (a creative product that is sold around the country) had a factor loading of 0.82. Question 6 (a creative idea reflecting years of expertise) had the second highest factor loading of 0.81. Question 7 (a creative person who has been practicing his or her skill for many years) had a factor loading of 0.67. Question 8 (creative work done by someone with an advanced degree) had a factor loading of 0.61.

Little-c creativity was measure by questions nine to twelve. Question 9 (a creative product that some people would be willing to buy) had the lowest factor loading of

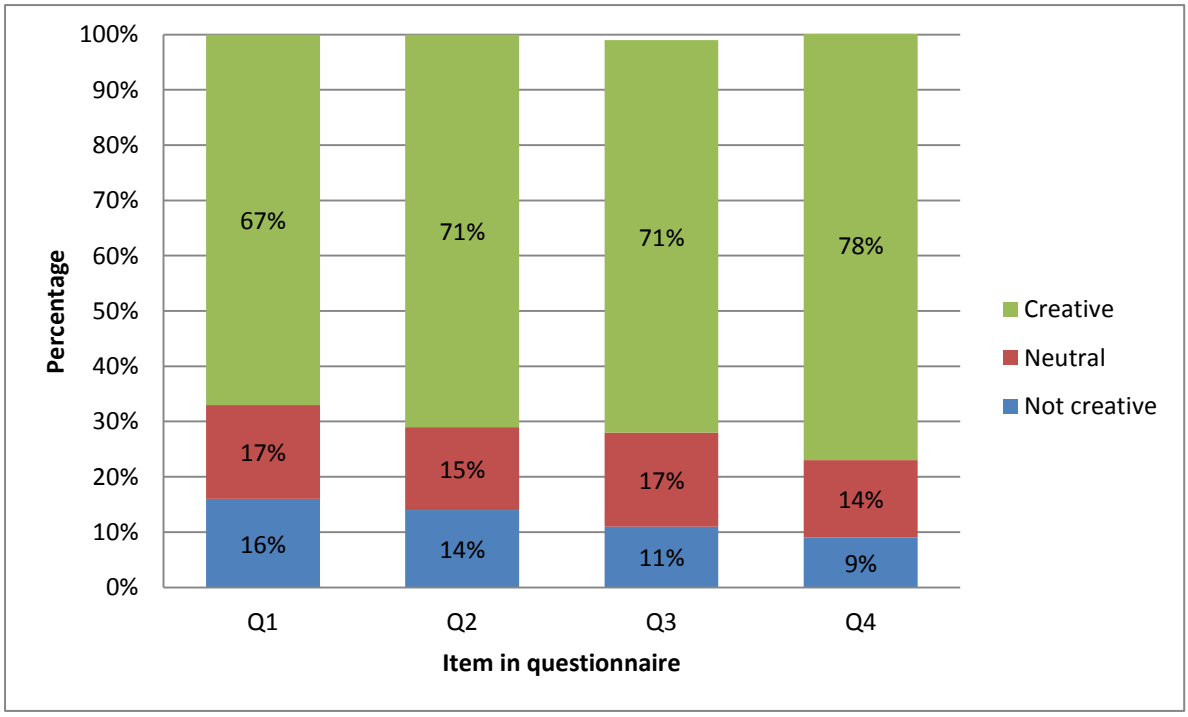
0.42. Question 10 (any type of art that is shared with other people) had a factor loading of 0.53. Question 11 (creativity that has been revised to incorporate the feedback of others) had a factor loading of 0.44. Question 12 (a creative hobby encouraged by members of the local community) had a factor loading of 0.43.

Big-c, pro-c and little-c creativity being combined into one factor shows that respondents perceive these three levels of creativity to be similar. Each level of creativity was also individually analysed. In the section below an outline is given on how different respondents rated each level of creativity.

4.4.1.1 Big-c creativity

The majority of respondents were able to recognise big-c creativity. The graph is given below.

Graph 4.9: Big-c creativity



In question 1 (a creative action that changes an entire field) the respondents indicated that 16% do not recognise aspects that constitute big-c creativity, 17% were neutral and 67% recognised aspects that constitute big-c creativity.

In question 2 (creative product that is remembered and appreciated for more than 100 years) the respondents indicated that 14% of them do not recognise aspects

that constitute big-c creativity, 15% were neutral and 71% recognised aspects that constitute as big-c creativity.

In question 3 (legendary creative work) the respondents indicated that 11% of them do not recognise aspects that constitute big-c creativity, 17% were neutral and 71% recognised aspects that constitute as big-c creativity.

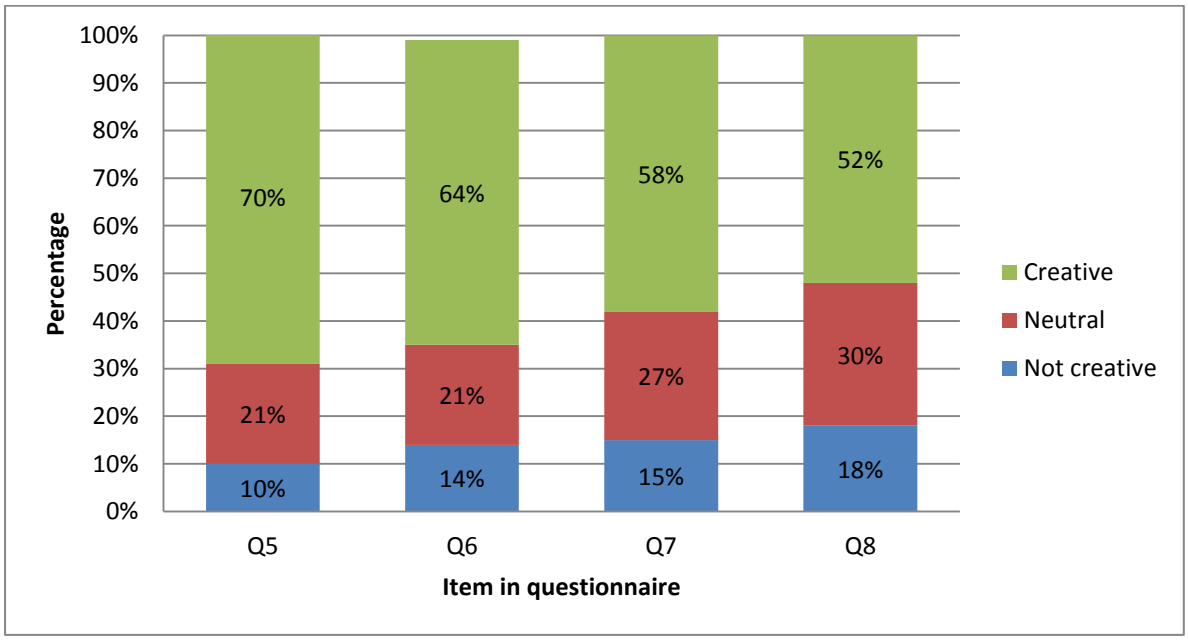
In question 4 (a creative genius) the respondents indicated that 9% of them do not recognise aspects that constitute big-c creativity, 14% were neutral and 78% recognised aspects that constitute as big-c creativity.

The difference between not recognising big-c creativity is 7%. The ability to be neutral on big-c creativity is 3%. The ability to recognise big-c creativity is 11%. The variance in these percentages is less than in the other levels of creativity. Thus respondents are in agreement on big-c creativity amongst the four questions on which big-c creativity is based. The ability to recognise pro-c creativity is discussed next.

4.4.1.2 Pro-c creativity

Similarly to big-c creativity, the majority of students are also able to recognise pro-c creativity. The graph below is followed by a description.

Graph 4.10: Pro-c creativity



In question 5 (a creative product that is sold around the country) the respondents indicated that 10% of them do not recognise aspects that constitute pro-c creativity, 21% were neutral and 70% recognised aspects that constitute as pro-c creativity.

In question 6 (a creative idea reflecting years of expertise) the respondents indicated that 14% of them do not recognise aspects that constitute pro-c creativity, 21% were neutral and 64% recognised aspects that constitute as pro-c creativity.

In question 7 (a creative person who has been practicing his or her skill for many years) the respondents indicated that 15% of them do not recognise aspects that constitute pro-c creativity, 27% were neutral and 58% recognised aspects that constitute as pro-c creativity.

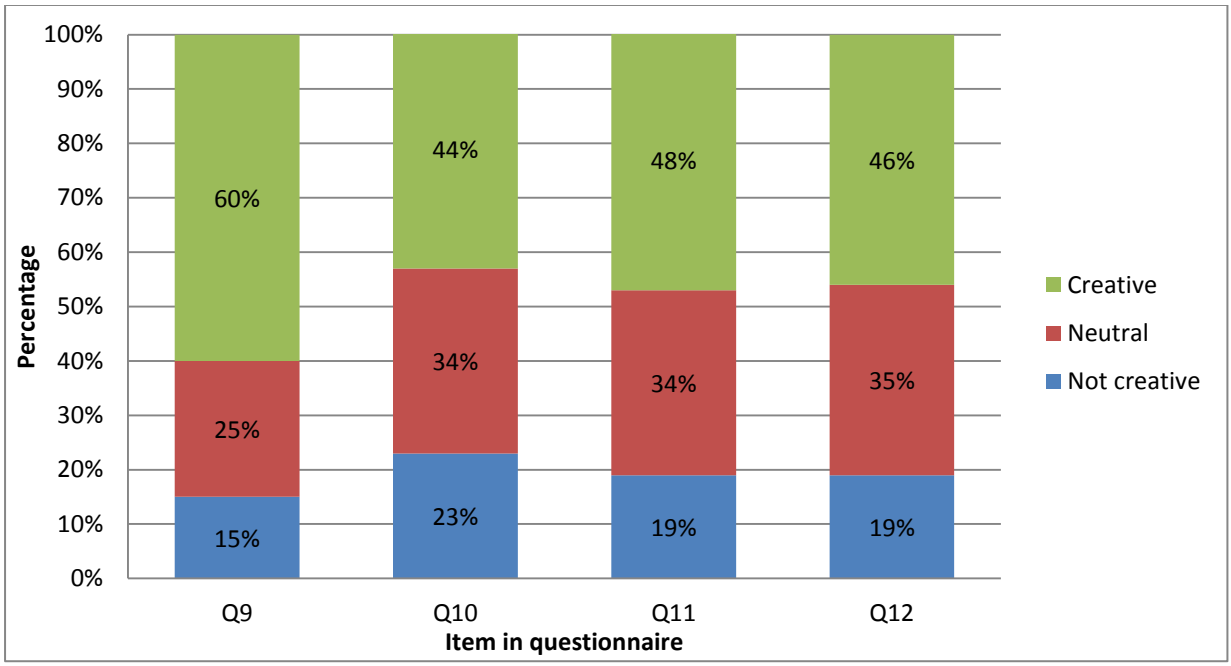
In question 8 (creative work done by someone with an advanced degree) the respondents indicated that 18% of them do not recognise aspects that constitute pro-c creativity, 30% were neutral and 52% recognised aspects that constitute as pro-c creativity.

The difference between the lowest and highest percentage of respondents not recognising pro-c creativity in all four questions is 8%. The difference between respondents' perception on noticing the ability to be neutral on pro-c creativity is 9%. The difference between the lowest and highest percentage of respondents recognising pro-c creativity is 18%. This is similar to the variances experienced in the ability to recognise little-c creativity that is discussed next.

4.4.1.3 Little-c creativity

The ability of students to recognise little-c creativity is slightly less than with big-c and pro-c creativity.

Graph 4.11: Little-c creativity



In question 9 (a creative product that some people would be willing to buy) the respondents indicated that 15% of them do not recognise aspects that constitute little-c creativity, 25% were neutral and 60% recognised aspects that constitute little-c creativity.

In question 10 (any type of art that is shared with other people) the respondents indicated that 23% of them do not recognise aspects that constitute little-c creativity, 34% were neutral and 44% recognised aspects that constitute little-c creativity.

In question 11(creativity that has been revised to incorporate the feedback of others) the respondents indicated that 19% of them do not recognise aspects that constitute little-c creativity, 34% were neutral and 48% recognised aspects that constitute little-c creativity.

In question 12 (a creative hobby encouraged by members of the local community) the respondents indicated that 19% of them do not recognise aspects that constitute little-c creativity, 35% were neutral and 46% recognised aspects that constitute little-c creativity.

The difference in responses in all four questions about not recognising little-c creativity is 8%. The ability to be neutral on little-c creativity varied with 10%. The

ability to recognise little-c creativity varied with 16% between all four questions. When collectively considering the three level of creativity and that they are combined into one factor in the factor analysis it shows that students have a high ability to recognise the three levels of creativity individually, and see them as equally important. The ability to not being able to recognise little-c creativity is discussed next.

4.3.2 Not being able to recognise creativity

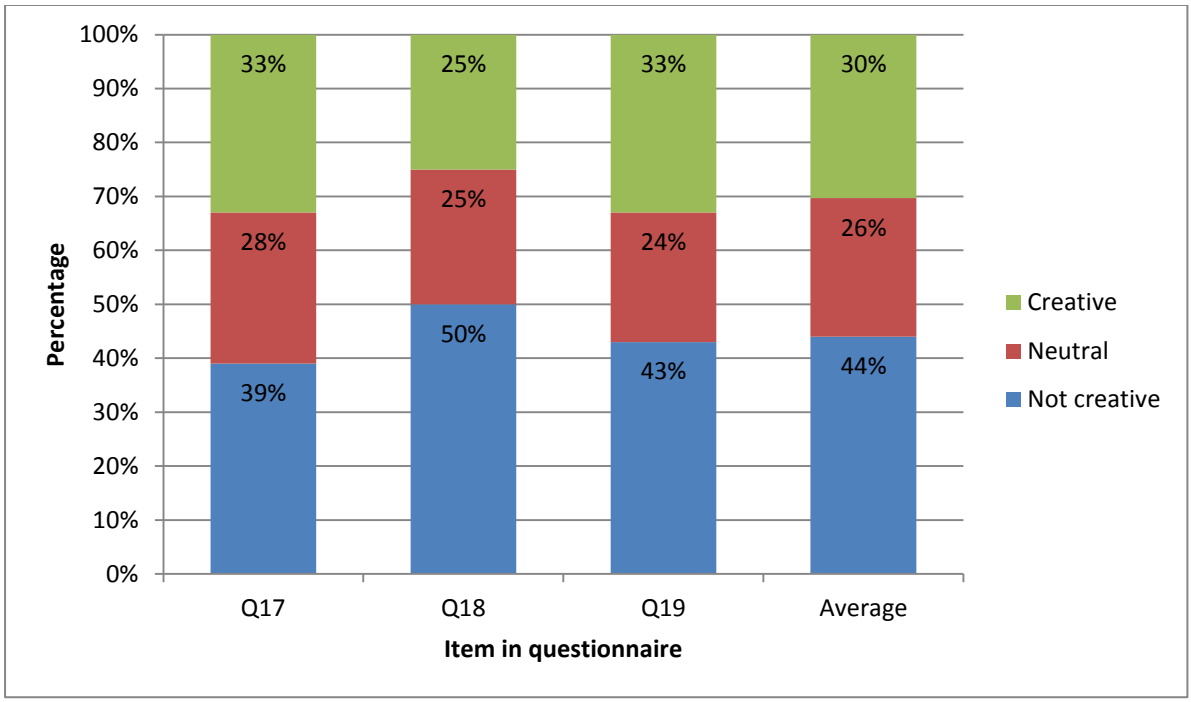
In the original questionnaire four questions of section 2 aimed to determine whether respondents are able to recognise non-creativity. The EFA identified 3 of the four questions. The sub-questions include questions 17 to 19. The EFA is given below.

Table 4.8: EFA for levels of creativity

	Code	Question	Factor 1	Factor 2	Factor 3
			Big-c, Pro-c and Little-c	Not recognise creativity	Mini-c
NOT RECOGNISE CREATIVITY	Q18	Following directions carefully	-0.098966	**0.892264**	0.053942
	Q17	The memory of a past event	-0.155192	**0.812093**	0.184246
	Q19	Solving a problem on the basis of a previously taught method	-0.056550	**0.732687**	0.098107

Question 18 (following directions carefully) had the highest factor loading of 0.89. Question 17 (the memory of a past event) had the second highest factor loading of 0.81. Question 19 (solving a problem on the basis of a previously taught method) had the third highest factor loading of 0.73. The general trend shows that students are able to recognise non-creativity. The results are discussed below.

Graph 4.12: Ability to not recognise creativity



In question 17 the respondents indicated that 39% recognise that the memory of a past event is not creative, 28% thought it neither creative nor non-creative while 33% thought it a creative activity.

In question 18 the respondents indicated that 50% of students recognised that merely following directions is not a creative activity, 25% stated that it was neither a creative nor non-creative activity and 25% thought it a creative activity.

In question 19 the respondents indicated that 43% of students recognised that solving a problem based on previously taught method is not a creative activity, 24% that it is neither creative nor non-creative and 23% thought is a creative activity.

The average of these three questions was combined. The results show that 44% recognise non-creativity, 26% are neutral and 30% thought that non-creative items are creative. There is only 4% difference in the number of respondents that felt neutral and thought that non-creative items are creative are similar. The difference in the ability to recognise non-creative items and perceiving non-creative items as creative is 14%. The difference in being unsure whether a question refers to a non-creative or creative activity is 4%. The small percentage variance shows that

respondents have a similar ability to recognise non-creativity as non-creative, neutral and creative.

4.3.3 Recognising mini-c creativity

The majority of students are able to recognise mini-c creativity. Sub-questions 13 to 16 of question 2 in the questionnaire were included in the analysis and are indicated below.

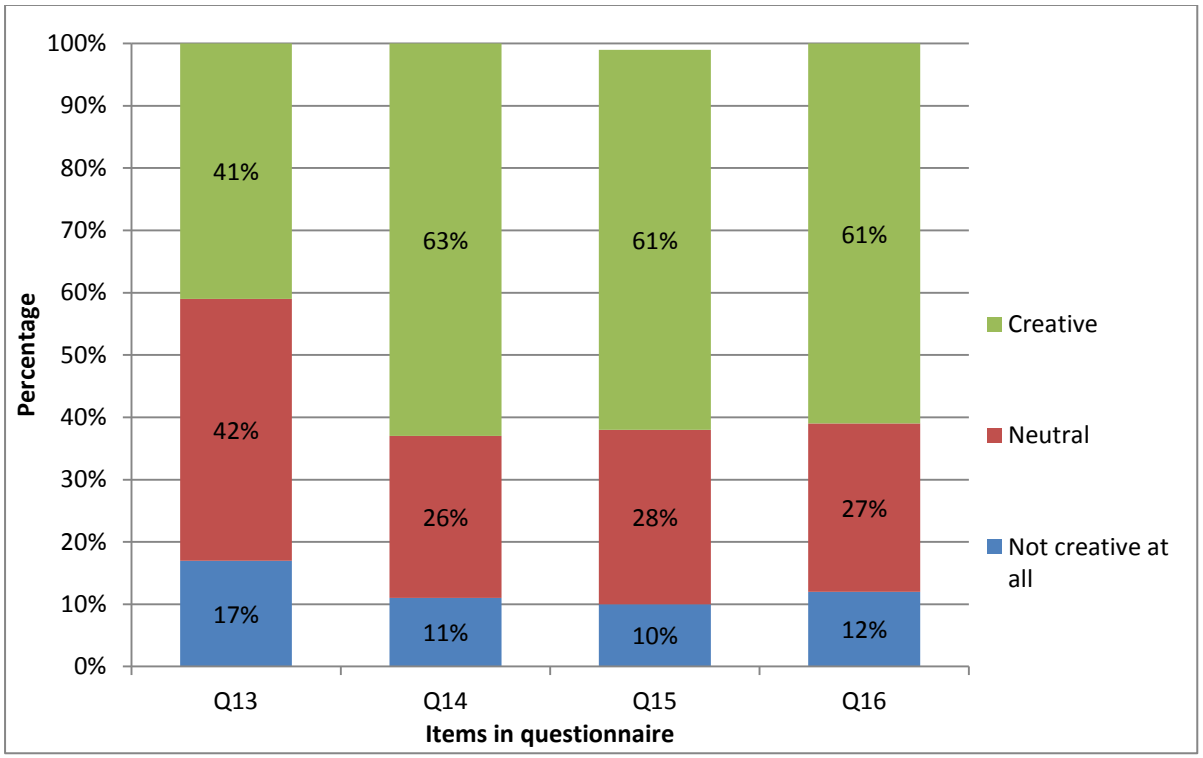
Table 4.8: EFA for levels of creativity

	Code	Question	Factor 1	Factor 2	Factor 3
			Big-c, Pro-c and Little-c	Not recognise creativity	Mini-c
MINI-C CREATIVITY	Q15	Trying to do something creative for the first time	0.154894	0.098804	**0.722240**
	Q16	Actively learning something and making new connections	0.012540	0.273451	**0.714695**
	Q14	A personally meaningful new insight	0.152573	0.052903	**0.669701**
	Q13	An idea that is new to the creator (even if it is not new to anyone else	0.258310	0.035793	**0.398436**

Question 15 (trying to do something creative for the first time) had the highest factor loading of 0.72. Question 16 (actively learning something and making new connections) had the second highest factor loading of 0.71. Question 14 (a personally meaningful new insight) had the third highest factor loading of 0.66. Question 13 (an idea that is new to the creator even if it is not new to anyone else) had the fourth highest factor loading of 0.39.

The questions that scored less than 0.4 was not included in calculating the factors in the EFA. Sub-question 13 scored 0.398436. The close proximity of 0.398436 to 0.4 allowed for the inclusion. The difference in respondent's ability to recognise mini-c creativity in questions 14 to 16 are higher than the respondents ability to recognise mini-c creativity shown by question 13. The results are indicated below.

Graph 4.13: Recognising mini-c creativity



In question 13 (an idea that is new to the creator, even if it is not new to anyone else) 17% of the respondents did not recognise mini-c creativity, 42% was neutral and 41% recognise the activity as mini-c creativity.

In question 14 (a personally meaningful new insight) 11% of the respondents did not recognise mini-c creativity, 26% was neutral and 63% recognise the activity as mini-c creativity.

In question 15 (trying to do something creative for the first time) 10% of the respondents did not recognise mini-c creativity, 28% was neutral and 61% recognise the activity as mini-c creativity.

In question 16 (actively learning something and making new connections) 12% of the respondents did not recognise mini-c creativity, 27% was neutral and 61% recognise the activity as mini-c creativity.

The difference in not being able to recognise mini-c creativity between all four questions is 7%. The difference between all four questions in having neutral feelings towards mini-c creativity or not is 16%. The difference in all four questions in being able to recognise mini-c creativity is 22%. The ability to recognise levels of creativity

and being able to recognise own creative domain will be further analysed by considering demographic and geographic variables.

4.4 DEMOGRAPHIC ASPECTS

The demographic variables that were compared to creativity include age, months' work experience, gender and whether students are classified as first, second and block release students. Block release students are students that do distance learning. The first section of the demographic analysis involves comparing the four levels of creativity with the amount of work experience of each respondent. The second section compares the level of creativity with work experience, age, gender and whether the student is a first year, second year or block release student. The third section compares the ability to perceive own creativity levels with the amount of work experience, gender and age.

4.4.1 Big-c creativity

The scatterplot below show respondent's average answers to the questions that related to big-c creativity. The average response is compared to the amount of months of work experience. Big-c creativity relates to recognising products that are needed by society. A trend line indicates the average response. The majority of respondents have between three and eighteen years work experience. The black rectangle shows these responses.

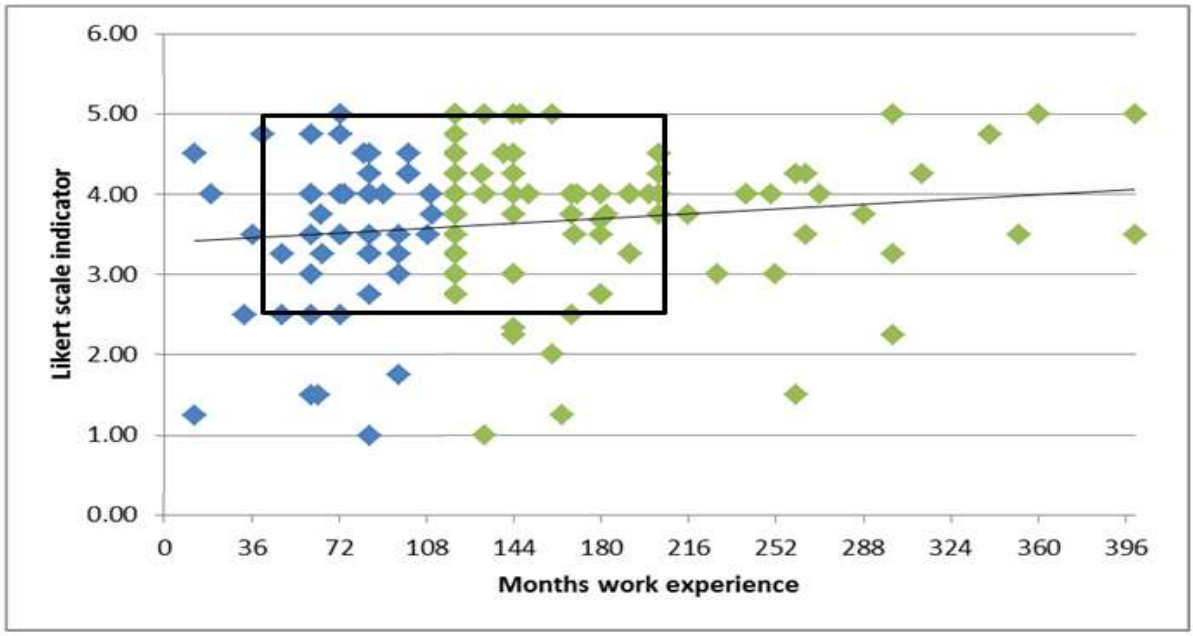
Graph 4.14: Big-c creativity and work experience

The majority of respondents have work experience between 36 and 216 months. They indicated that they are able to recognise products needed by society. The students tend to rank big-c creativity between 3.3 and 5. There are more respondents with work experience between 36 and 216 months that are not able to recognise big-c creativity than there are with those that have more than 216 months' work experience. The average response was four on the Likert Scale. Respondents are able to recognise big-c creativity.

4.4.2 Pro-c creativity

Pro-c creativity is said to be more recognisable to people that have more than ten years' work experience or experience in a certain field. In the graph below the averages of the four responses for the pro-c creativity items was calculated and placed on the scatterplot. The majority of respondents have between three and eighteen years work experience.

Graph 4.15: Pro-c creativity and work experience



The averages to pro-c creativity questions were compared to the amount of months' work experiences of each respondent. The green dots indicate the responses from the respondents that have ten or more years work experience. The blue dots the respondents that have less than ten years work experience. The black rectangle is an indicator of the majority of the respondent's perceptions. Within the black

rectangle are forty respondents that have worked between three years and below ten years and sixty respondents that work between ten and eighteen years. The majority of students ranked pro-c creativity between three and five. There are higher percentages that are not able to recognise pro-c creativity than little-c creativity that is explained below. The average response showed an increase as months' work experience. A trend line shows an average response of 3.63. Thus across all years of work experience the respondents are able to recognise pro-c creativity.

4.4.3 Little-c creativity

Similarly to big-c and pro-c creativity the months' work experience was compared to the ability to recognise little-c creativity. The results are indicated below.

Graph 4.16: Recognising little-c creativity

The respondents indicated that they have neutral feelings towards recognising little-c creativity. The neutral and slightly inability to recognise little-c creativity is more than with pro-c and big-c creativity. The respondents with more than 216 months' work experience show a neutral and high ability to recognise little-c creativity. The average response was 3.39. Thus students have a neutral ability to recognise little-c creativity.

4.4.4 Mini-c creativity

The scatterplot for mini-c creativity is similar to that of the previous three levels of creativity. The majority of students that have work experience between over 36 months' experience and under 180 months' experience are the respondents that feel neutral and are able to recognise mini-c creativity.

Graph 4.17: Recognising mini-c creativity

The respondents indicated that they have slightly higher than neutral feelings towards recognising mini-c creativity. The neutral and slightly inability to recognise little-c creativity is more than with pro-c and big-c creativity. The respondents with more than 216 months' work experience show a neutral and high ability to recognise little-c creativity. The average response was 3.64. Thus students have a neutral and slight ability to recognise little-c creativity.

The ability to recognise mini-c creativity is similar to pro-c creativity, less than big-c creativity and more than little-c creativity. The difference in the ability to recognise the four levels is 0.61.

4.5 Level of creativity and demographics

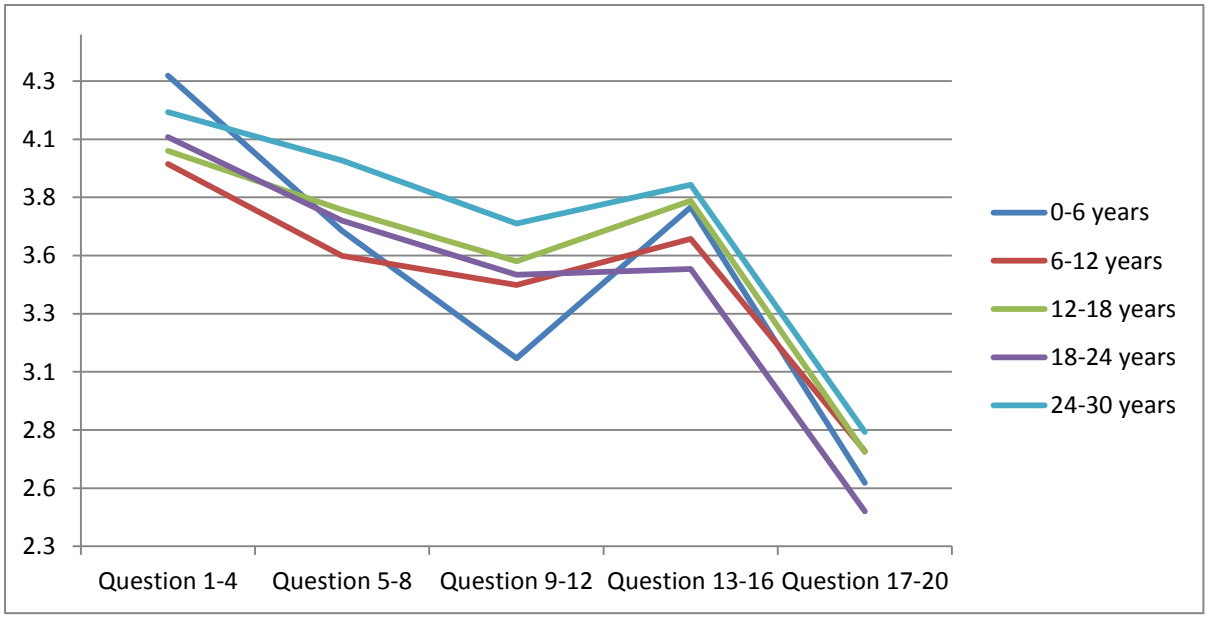
The years of work experience, age, gender and whether students are first, second or block release students is compared below to the levels of creativity. Questions 1 to 4

refer to big-c creativity; questions 5 to 8 refer to pro-c creativity; questions 9 to 12 to little-c creativity, questions 13 to 16 to mini-c creativity and questions 17 to 20 to not being able to recognise creativity.

4.5.1 Years of work experience and level of creativity

The months of work experience were converted into years. Six year intervals were used. The average for each creativity level for respondents in each six year period was calculated and compared to the ability to recognise different levels of creativity. The ability to recognise the levels of creativity is indicated by the rating on the likert scale of five on the y-axis.

Graph 4.18: Work experience and creativity level



The respondents with 0 to 6 years' work experience had an average score for recognising big-c creativity as 4.3, pro-c creativity as 3.7, little-c creativity as 3.1, mini-c creativity as 3.8 and not recognising creativity as 2.6. The difference between recognising the level of creativity is 1.7.

The respondents with 6 to 12 years' work experience had an average score for recognising big-c creativity as 3.9, pro-c creativity as 3.5, little-c creativity as 3.4, mini-c creativity as 3.6 and not recognising creativity as 2.7. The difference between recognising the level of creativity is 1.2.

The respondents with 12 to 18 years' work experience had an average score for recognising big-c creativity as 4.0, pro-c creativity as 3.7, little-c creativity as 3.5, mini-c creativity as 3.8 and not recognising creativity as 2.7. Similarly to respondents aged between6 – 12 years, the difference between recognising the level of creativity is 1.2.

The respondents with 18 to 24 years' work experience had an average score for recognising big-c creativity as 4.1, pro-c creativity as 3.7, little-c creativity as 3.5, mini-c creativity as 3.5 and not recognising creativity as 2.5. The difference between recognising the level of creativity is 1.6.

The respondents with 24 to 30 years' work experience had an average score for recognising big-c creativity as 4.3, pro-c creativity as 3.7, little-c creativity as 3.1, mini-c creativity as 3.8 and not recognising creativity is 2.6. The difference between recognising the level of creativity is 2.1

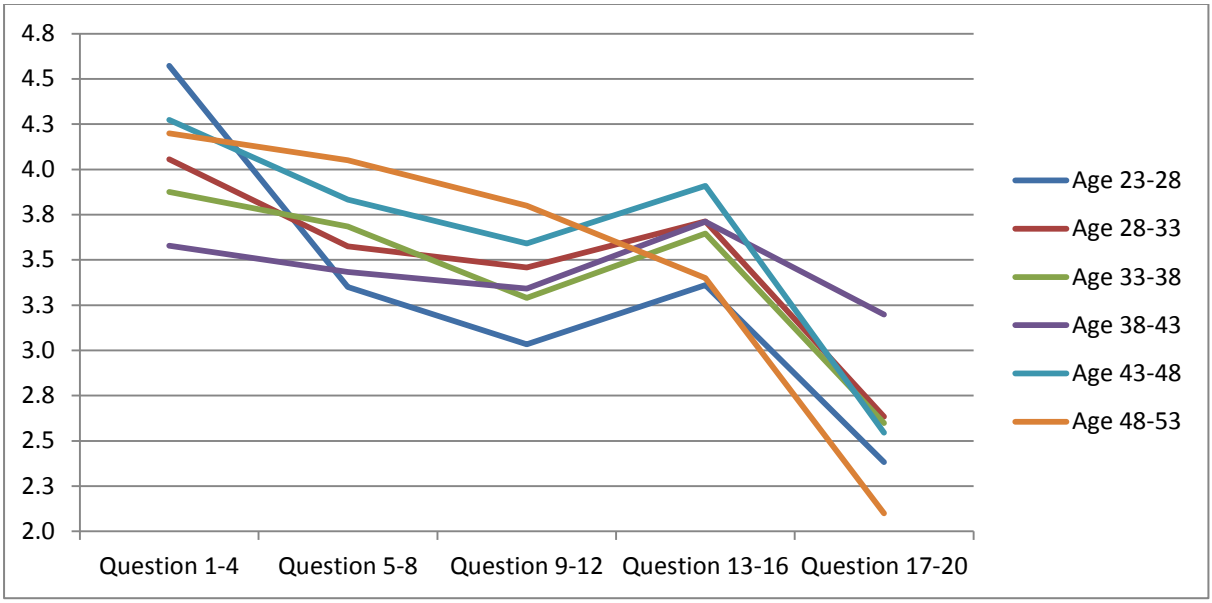
The respondents with 30 to 36 years' work experience had an average score for recognising big-c creativity as 4.2, pro-c creativity as 4.0, little-c creativity as 3.7, mini-c creativity as 3.9 and not recognising creativity as 2.8. The difference between recognising the level of creativity is 1.4.

The biggest difference in recognising levels of creativity is respondents that have between 24 to 30 years of work experience. The smallest difference in recognising levels of creativity is respondents that have between 6 to 12 and 12 to 18 years' work experience. There is an increase in the ability to recognise mini-c creativity over pro-c creativity. Overall the graph shows a downward trend from big-c creativity to not recognising creativity. The difference between the highest and lowest score is 1.7. The results of being able to recognise different levels of creativity in general and different levels of creativity according to years of work experience show a similar trend with no outliers.

4.5.2 Age and level of creativity

The age compared to the ability to recognise creativity show a similar downward trend than when the level of creativity was compared to years of work experience.

Graph 4.19: Age and creativity level



The respondents aged between 23 and 28 ranked big-c creativity at 4.6, pro-c creativity at 3.4, little-c creativity at 3.0, mini-c creativity at 3.4 and not recognising creativity at 2.4. The difference between the ability of students to recognise the highest level of creativity and the lowest level of creativity (not recognising creativity) is 2.4.

The respondents aged between 28 and 33 ranked big-c creativity at 4.1, pro-c creativity at 3.6, little-c creativity at 3.5, mini-c creativity at 3.7 and not recognising creativity at 2.6. The difference between the ability of students to recognise the highest level of creativity and the lowest level of creativity (not recognising creativity) is 1.5.

The respondents aged between 33 and 38 ranked big-c creativity at 3.9, pro-c creativity at 3.7, little-c creativity at 3.3, mini-c creativity at 3.6 and not recognising creativity at 2.6. The difference between the ability of students to recognise the highest level of creativity and the lowest level of creativity (not recognising creativity) is 1.3.

The respondents aged between 38 and 43 ranked big-c creativity at 3.6, pro-c creativity at 3.4, little-c creativity at 3.3, mini-c creativity at 3.7 and not recognising creativity at 3.2. The difference between the ability of students to recognise the

highest level of creativity and the lowest level of creativity (not recognising creativity) is 0.4.

The respondents aged between 43 and 48 ranked big-c creativity at 4.3, pro-c creativity at 3.8, little-c creativity at 3.6, mini-c creativity at 3.9 and not recognising creativity at 2.5. The difference between the ability of students to recognise the highest level of creativity and the lowest level of creativity (not recognising creativity) is 1.8.

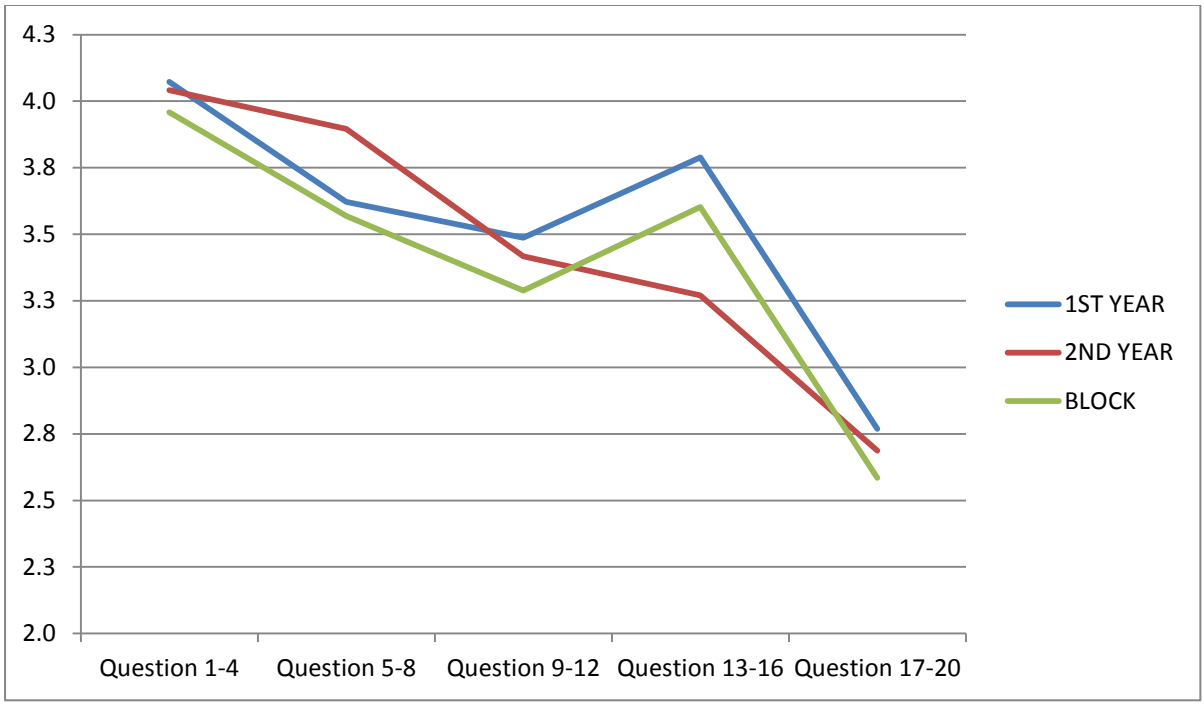
The respondents aged between 48 and 53 ranked big-c creativity at 4.2, pro-c creativity at 4, little-c creativity at 3.8, mini-c creativity at 3.4 and not recognising creativity at 2.1. The difference between the ability of students to recognise the highest level of creativity and the lowest level of creativity (not recognising creativity) is 2.1.

The biggest difference in recognising levels of creativity is apparent with respondents that are between 48 to 53 years of age. The smallest difference in recognising levels of creativity is apparent with respondents that are aged between 38 to 43 years. There is an increase in the ability to recognise mini-c creativity over pro-c creativity, except with respondents aged between 48 to 53 years. The difference between the highest score and the lowest score is 2.5. The general trend is similar to the trend of months' work experience. One difference is that the trend lines for age groups are more varied than that of months' work experience. Thus when dividing respondents according to age groups there is a bigger variance in the answers on the likert scale than when answers was divided according months' work experience.

4.5.3 Type of student and level of creativity

When the type of student was compared to the level of creativity the same downward trend emerged.

Graph 4.20: Type of student and creativity level



First year students ranked the ability to recognise big-c creativity as 4.1, pro-c creativity as 3.6, little-c creativity as 3.5, mini-c creativity as 3.8 and no being able to recognise creativity as 2.8. The difference between the highest score and lowest score is 1.3.

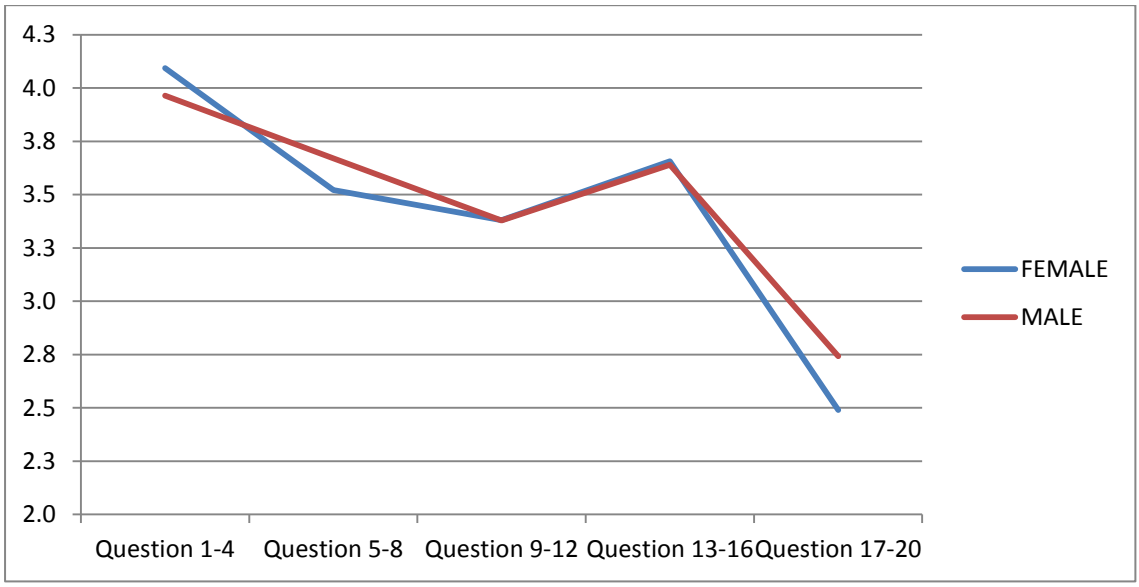
Second year students ranked the ability to recognise big-c creativity as 4, pro-c creativity as 3.9, little-c creativity as 3.4, mini-c creativity as 3.3 and no being able to recognise creativity as 2.7. There is a slight decrease in the ability to recognise the levels of creativity. This may be due to a smaller number of respondents. The difference between the highest score and lowest score is 1.3.

The block release students ranked the ability to recognise big-c creativity as 4, pro-c creativity as 3.6, little-c creativity as 3.3, mini-c creativity as 3.6 and no being able to recognise creativity as 2.6. The difference between the highest score and lowest score is 1.4. In two of the three cases there is an increase in the ability to recognise mini-c creativity over pro-c creativity.

4.5.4 Gender and level of creativity

Similarly to the type of students compared to creativity, the gender compared to creativity shows a downward trend from big-c creativity to not being able to recognise creativity.

Graph 4.21: Gender and creativity level



Female students ranked big-c creativity at 4.1, pro-c creativity at 3.5, little-c creativity at 3.4, mini-c creativity at 3.7 and the lack of creativity at 2.5.

Males showed a similar pattern. Males ranked big-c creativity at 4, pro-c creativity at 3.7, little-c creativity at 3.4, mini-c creativity at 3.6 and the lack of creativity at 2.7.

The biggest difference between how males and females ranked creativity are 0.2 when asked to rank pro-c creativity. The difference between the highest score (4.1) and the lowest score (2.7) are 1.4.

Regardless of whether age, months' work experience, gender or type of students are compared to the ability to recognise the levels of creativity, the general ability to recognise the levels of creativity is similar. Mostly similar trends are also apparent when comparing the demographics to the ability to compare own creativity levels to that of peers. The demographic variables compared to own-creativity levels will be discussed next.

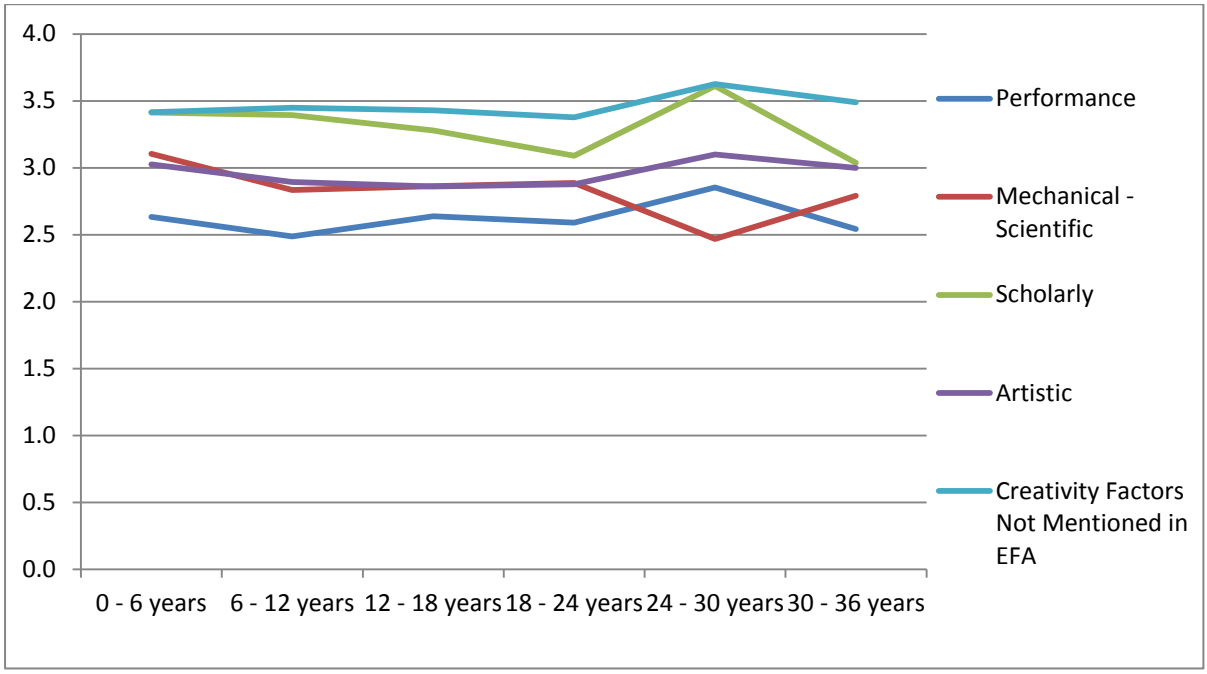
4.6 PERCEPTION ON OWN CREATIVITY AND DEMOGRAPHICS

The demographic variables and the respondent's self-perception of their own creativity levels were compared. The results are discussed below.

4.6.1 Years work experience and self-perception

Years' work experience does not have a major influence on how respondents ranked the various factors. The average of each factor was calculated per every six years of work experiences. The results are depicted below.

Graph 4.22: Work experience and self-perception



The biggest difference in the average responses of performance creativity is 0.1. Respondents with work experience between 0 to 6, 12 to 18 and 18 to 24 years ranked performance creativity as 2.6. Respondents with work experience between 6 to 12 and 30 to 36 years ranked performance creativity as 2.5. Respondents between 24 to 30 years' work experience ranked their ability to perceive performance creativity as 2.9.

The biggest difference in the average responses of mechanical-scientific creativity is 0.6. Respondents with work experience between 0 to 6 years ranked mechanical-scientific creativity as 3.1. Respondents with work experience between 6 to 12 and 30 to 36 years ranked mechanical-scientific creativity as 2.8. Respondents between

12 to 18 and 18 to 24 years' work experience ranked their ability to perceive mechanical-scientific creativity as 2.9. Respondents with 24 – 30 years' work experience ranked mechanical-scientific creativity as 2.5.

The biggest difference in the average responses of scholarly creativity is 0.6. Respondents with work experience between 0 to 6 and 6 to 12 years ranked scholarly creativity as 3.4. Respondents with work experience between 12 to 18 years ranked scholarly creativity as 3.3. Respondents between 18 to 24 years' work experience ranked their ability to perceive scholarly creativity as 3.1. Respondents with 24 to 30 years' work experience ranked scholarly creativity as 3.6. Respondents with 30 to 36 years' work experience ranked scholarly creativity the lowest (3).

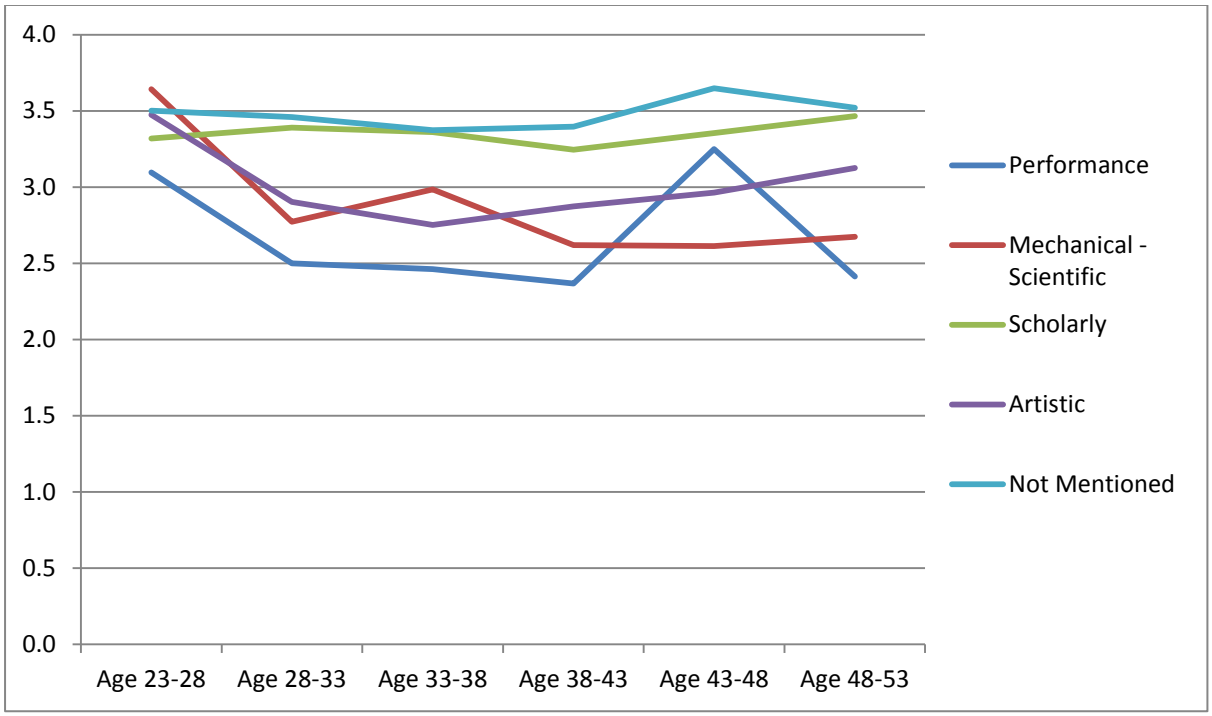
The biggest difference in the average responses of artistic creativity is 0.2. Respondents with work experience between 0 to 6 and 30 to 36 years ranked artistic creativity as 3. Respondents with work experience between 6 to 12, 12 to 18 and 18 to 24 years ranked artistic creativity as 2.9. Respondents with 24 to 30 years' work experience ranked artistic creativity as 3.1.

Overall the lowest score is 2.5. The highest score is 3.6. Overall the average score in show that self-perception is mostly neutral. The median score across all fields was 3. Overall, regardless of the amount of years' work experience respondents in different age groups, perceive themselves to have a similar level of creativity in different domains. What became apparent is that respondents perceived themselves to be slightly more creative in the questions of section one that was not included in the EFA.

4.6.2 Age and creative domains

The average of each factor was calculated in increments of five years. The results are depicted below and show a similar horizontal trend than when years of work experience was compared to the ability to perceive personal creativity levels.

GRAPH 4.23: Age and creative domains



Performance creativity was ranked 3.1 by respondents aged 23 to 28, 2.5 by respondents aged 28 to 38, 2.4 by respondents between 38 to 43 and 48 to 53 and 3.3 by respondents aged 43 to 48.

Mechanical-scientific creativity was ranked 3.6 by respondents aged 23 to 28, 2.8 by respondents aged 28 to 33, 3 by respondents aged 33 to 38, 2.6 by respondents aged 38 to 48 and 2.7 by respondents aged 48 to 53.

Scholarly creativity was ranked 3.3 by respondents aged 23 to 28, 3.4 by respondents aged 28 to 38 and 43 to 48, 3.2 by respondents aged 38 to 43 and 3.5 by respondents aged 48 to 53.

Artistic creativity was ranked 3.5 by respondents aged 23 to 28, 2.9 by respondents aged 28 to 33 and 38 to 43, 2.8 by respondents aged 33 to 38, 3.0 by respondents aged 43 to 48 and 3.1 by respondents aged 48 to 53.

The factors not mentioned by the EFA were ranked 3.5 by respondents aged 23 – 33 and 48 – 53, 3.4 by respondents aged 33 – 43 and 3.6 by respondents aged 43 – 48.

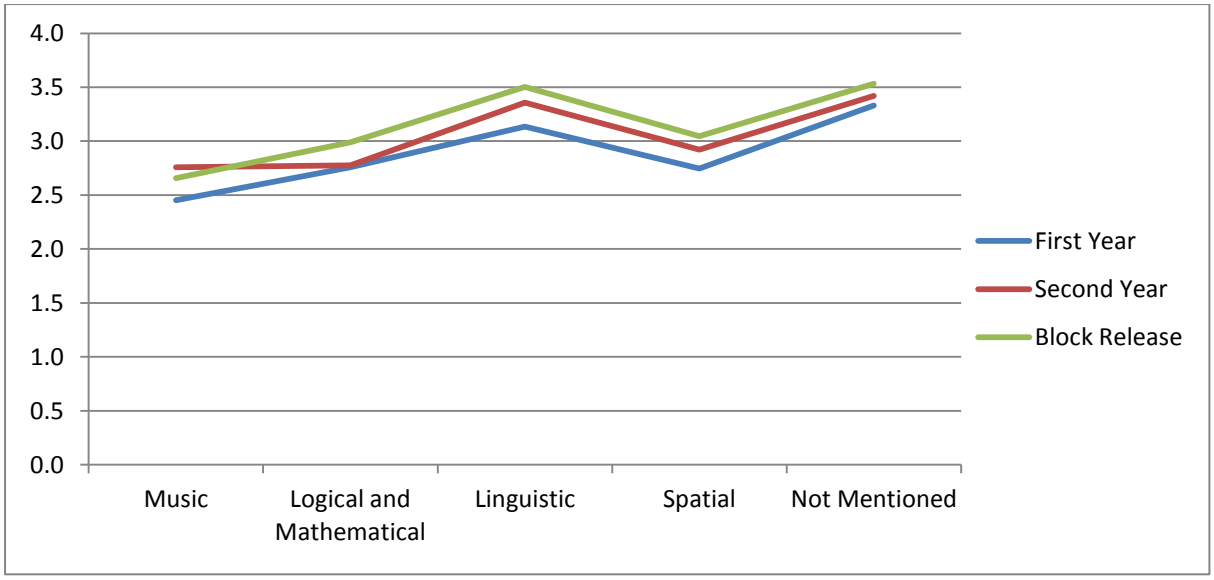
Overall the self-perception of creativity was ranked similar when compared to age than to years of work experience. The lowest score was 2.4 and the highest score

was 3.6. The median score was 3 as well. Overall respondents show a neutral ability on their own creativity level compared to their peers.

4.6.3 Type of student and self-perception

The type of student did not show a significant difference in perceiving their own creativity levels. The results are depicted below.

Graph 4.24: Type of student and self-perception



Performance creativity was ranked 2.5 by first years students, 2.8 by second years students and 2.7 by block release students.

Mechanical-scientific creativity was ranked 2.8 by both first and second year students and 3 by block release students.

Scholarly creativity was ranked 3.1 by first years students, 3.4 by second year students and 3.5 by block release students.

Artistic creativity was ranked 2.7 by first years students, 2.9 by artistic students and 3 by block release students.

The factors not considered by the EFA were ranked 3.3 by first year students, 3.4 by second year students and 3.5 by block release students.

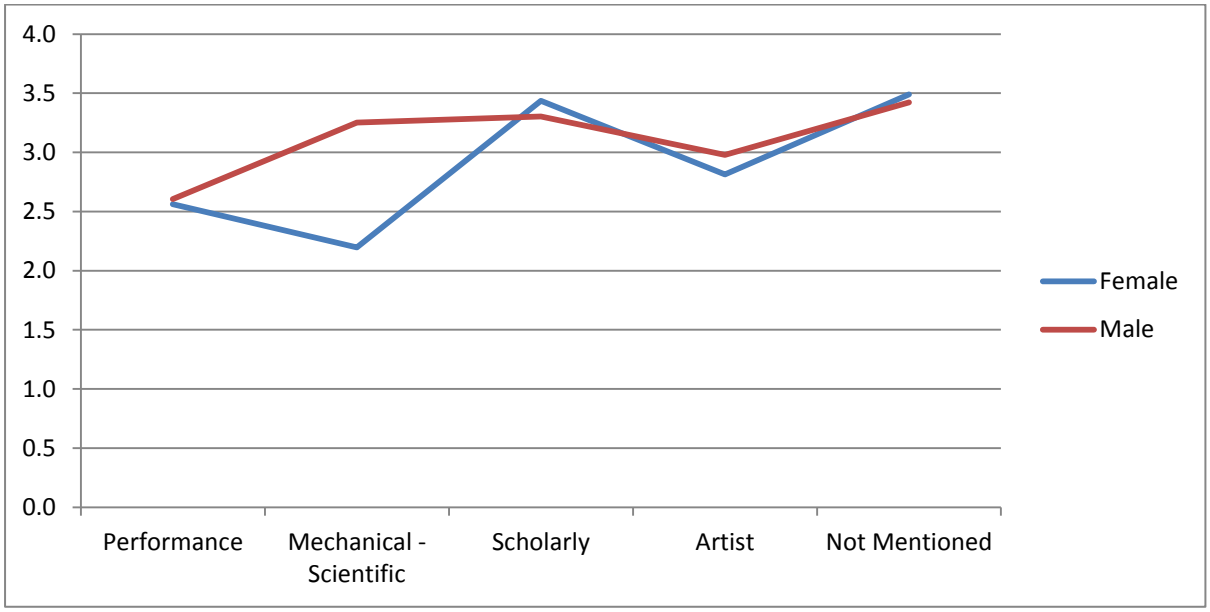
The biggest difference in rankings was 0.4 for scholarly creativity. The highest average ranking was 3.5 and the lowest ranking 2.5. The median ranking was 3. The

average for the items in section one of the questionnaire that was not identified by the EFA was highest. All three groups of students perceived themselves to have a neutral level of creativity compared to their peers. This is true for all respondents.

4.6.4 Gender and self-perception

The gender shows a horizontal and slightly upward trend, similarly to the type of student but differently to age and years' work experience that showed a more horizontal pattern. The results are depicted below.

Graph 4.25: Gender and self-perception



The ability to perceive your own performance creativity was ranked 2.6 by both males and females. The ability to perceive mechanical-scientific creativity was ranked 2.2 by females and 3.3 by males. Scholarly creativity was ranked 3.4 by females and 3.3 by males. Artistic creativity was ranked 2.8 by females and 3 by males. The additional aspects were ranked 3.5 by females and 3.4 by males.

The biggest difference in ranking was for mechanical-scientific creativity where males scored themselves higher by 1.1. The mean and median score was 3. The items not identified by the EFA showed the highest average.

4.7 CONCLUSION

This chapter focused on gaining insight into the results that related to research objective 4 to research objective 6. The four factors that were identified by the EFA for question one was depicted by graphs and tables and discussed. The four factors identified include performance, mechanical-scientific, scholarly and artistic creativity. Secondly, the ability to recognise levels of creativity was discussed. The ability to recognise the level of creativity was compared to years of work experience, age, type of student and gender. The third part of the chapter concentrated on comparing the ability to perceive the respondents own level of creativity with years of work experience, age, type of student and gender.

In chapter five the results obtained from chapter 4 will be utilised to draw conclusions and make recommendations. The conclusions and recommendations will aim to answers research question 4 to research question 6. Further conclusions and recommendations will be made on research question 1 to research question 3. Upon completion of the chapter a summary will be provided on the whole research study.

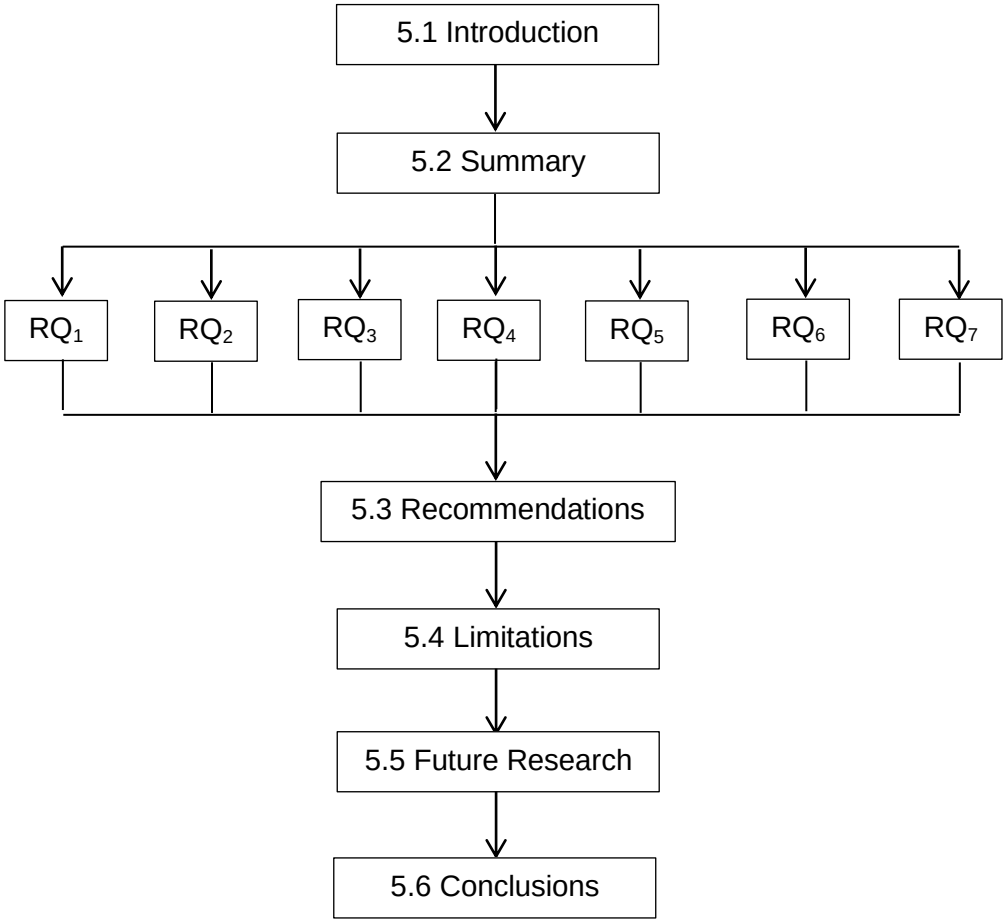
CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In chapter 2 a literature review was conducted that described creativity and innovation in general, in developed and developing countries, organisations and in educational institutions. Chapter 2 also involved a discussion on research done by Kaufman (2003, 2009, 2012 & 2013) on creativity, creative domains and types of creativity and intelligence. Chapter 3 explained how a questionnaire of Kaufman was used in this study to determine MBA students' ability to determine their own level of creativity, creative domains and the ability to recognise the levels of creativity. Chapter 4 showed the results obtained from the questionnaire. This chapter focus on the research questions and aim to answer them as effectively as possible based on the research conducted. A layout of the chapter is depicted below.

Figure 5.1: Layout of chapter 5



Firstly, the summary will state the research questions and provide an answer on each research question. The main research question will also be answered. Secondly, recommendations will be given based on the primary and secondary research conducted. Thirdly, limitation to the study will be mentioned. Fourthly, suggestions for future research will be given after which conclusions will be provided.

5.2 SUMMARY

To reach conclusions on the main research questions, six secondary research questions were identified. The main research question and secondary research questions are listed below:

- RQ_1: What significance does education play in enhancing creativity?
- RQ_2: How important is innovation to countries?
- RQ_3: What role does innovation play in organisations?
- RQ_4: How creative do students perceive they are, using the Kaufman Domains of Creativity Scale (K-DOCS) and creative domains?
- RQ_5: Are students able to recognise different levels of creativity?
- RQ_6: Do demographics influence the perceptions of creativity?
- Main research question: Do students perceive themselves to be creative?

RESEARCH QUESTION RQ_1

The first research question was: *"What significance does education play in enhancing creativity?"* Current characteristics that describe education systems include emphasis on mathematical and linguistic skills and standardised tests. Mathematical skills have similar characteristics to mechanical-scientific creativity while linguistic skills share characteristics with scholarly creativity. Focusing only on standardised tests and mathematical and linguistic domains reduce talent and creativity levels across other domains. Curricula must be developed to teach students to be creative while simultaneously enabling skills development necessary within the work environment. Work environments operate differently depending on the industry; education should focus on different domains of creativity. Different creative domains help students to develop creative skills in different domains and areas of intelligence.

Certain countries, like America and Brazil, have realised the importance of creativity. Brazil has policies, but implementation is poor. America teaches creative classes separate from the normal school curriculum. Standardised testing is happening in all countries that reduce creativity, but help compare cognitive skills across countries. Numerous countries have high drop-out rates from schools. In Switzerland the majority of students prefer vocational training upon completion of high school. The quality of universities is high and attracts foreigners. In South Africa vocational training and practical experience is offered, but due to poor primary and high school background, the students are not of the calibre wanted by industry. Educational institutions should focus equally on teaching students to be creative as well as mathematics and language skills. Cognitive skills and creativity is necessary for being successful in schools and as employees.

Creativity helps with academic achievement. The ability to think creatively is important and originates from teachers and students. Alternative teaching methods should be applied to encourage students to be innovative when employed in an unknown work environment. Two examples are using imagination and alternative solutions to problems. The work environment relates to research question 3 and creative domains to research question 4.

Education also is the first step in developing the ability to recognise different levels of creativity. The first level is little-c creativity that involves the ability to solve problems and use imagination. The ability to solve problems and use imagination is used in creativity. Education is important in the development of mini-c creativity as it involves learning to interpret experiences, events and actions that is meaningful to an individual. The ability to interpret the meaningful experiences, events and actions is necessary for big-c creativity. To reach big-c creativity, pro-c creativity is necessary that involves approximately ten years' experience in a domain. Throughout that ten years a talent is developed that should start during student education.

Based on the above findings two aspects are apparent. The first is that educational institutions focus on mathematical, linguistic skills and standardised tests. The second is that educational institutions, through curricula and teachers, reduce problem solving skills, development in different domains of intelligence and creativity.

The third is while schooled mini-c creativity and little-c creativity should be developed.

RESEARCH QUESTION RQ_2

The second research question was: *"How important is innovation to countries?"* Different countries apply innovation in various means and industries. Technology and agriculture are two examples. The majority of countries have realised the importance of innovation and that it is necessary for economic growth. Government are encouraging innovations by offering incentives. Tax benefits and protocols assist, but are not always successful. Difficulty to obtain patents, bureaucracy and lack of capital are hindering innovation. Developing countries' economies are growing due to increased innovation and affordable labour. Economic growth is also achieved through organisations and universities conducting research to develop innovative products that satisfy customer needs. Reverse innovation is used to create innovative and affordable products by government and organisations that satisfy the need for developing and developed countries.

Countries aim to increase innovation by encouraging industries, universities and organisations to work together, conduct research and be innovative. Although successful in certain circumstances the employees and researchers will be more creative and innovative if exposed to proper training and education. Organisations and innovations are discussed next.

RESEARCH QUESTION RQ_3

The third research question was*: "What significance does innovation play in organisations?"* Creativity in organisations stem from three factors. The first factor is managements' capability to encourage innovation within an organisation. The second factor is conducting research with universities and communicating with customers on their product needs. The third factor is failure and risk that is associated with innovation where initial products are not necessarily as successful as those developed through continuous attempts. These three factors are necessary to create new products and obtain a competitive advantage that involves lower cost.

Designing products that are meaningful to society are classified as big-c creativity that originates from little-c creativity and mini-c creativity - developed through

education. Knowledgeable and educated employees are more innovative than less educated individuals. Apart from being educated, motivation is also important. Motivation leads to more hard-working employees. Management impacts staff and must ensure that the staff are motivated.

Competent management that encourages motivation and innovation is not necessarily sufficient for innovation to occur. It is recommended that organisations hire innovative employees and have managers that recognise different levels of creativity. Employees and managers that are innovative have been exposed to creativity while educated and have developed pro-c creativity and big-c creativity within a domain and organisation.

Similarities exist between experiencing creativity within a business and within an educational institution. The first is that creativity help to solve problems in new ways. The second similarity involves taking a risk. Implementing creative ideas within a business and solving educational problems involves a risk as there is no guarantee that the new solution will work. A third similarity involves learning from failures and a fourth that the individuals with superiority, managers and teachers, encourage and motivate subordinates to be creative. Within businesses and educational institutions there must be a balance between a structured and unstructured environment. Autocracy in both scenarios stifles creativity. The environment and the different resources necessary to enhance creativity is the sixth similarity. A seventh similarity is teamwork and an eight trust between subordinates and superiors. Lastly keeping an end goal or curriculum outcome in mind is important. Research objective one to three are interdependent. Economies that wish to be innovative depend on organisations, research and creative students that contribute to organisations through knowledge and innovation. These innovative employees have to be taught to be creative as creativity leads to innovation. There is a link between educational institutions, organisations and countries and innovation.

The similarities between educational institutions and organisation further prove the importance education play in preparing individuals for a working environment. In educational institutions teachers encourage and recognise creative development and teach management skills. In an organisations management encourage and recognise creative development.

RESEARCH QUESTION RQ_4

The fourth research question was*: "How creative do students perceive they are, using the Kaufman Domains of Creativity Scale (K-DOCS) and creative domains?"* The ability to be creative in specific domains involves accomplishments in disciplines, expertise and mental capabilities. Domain general abilities can be created through education by exposing students to different domains. Kaufman (2009, 2012) mentioned eight domains. An EFA identified four domains: performance, mechanical-scientific, scholarly and artistic. Students perceived themselves to be mostly scholarly creative together with creativity, to a lesser extent, in other domains. Students therefore are domain general creative.

The performance domain identified by MBA students include the ability to create rhymes, songs and poems, playing music in public, debating and shooing a video. Students did not perceive themselves to be performance-creative.

The scholarly domain factors include conducting research, writing letters and articles, analysing books as well as critiquing, responding to, debating and mediating on written aspects. Students perceived themselves to be scholarly creative.

Mechanical-scientific factors identified by respondents include building an object, taking machines apart, experimenting, solving puzzles and mathematical problems, fixing something faulty, writing a computer program and creating something new from various materials. Respondents perceived themselves to be more scholarly creative than mechanical-scientific creative.

The artistic domain factors include drawing, sculpting and photography, interpreting art and painting or going to a museum. Responses were varied from respondents perceiving themselves to be more and less creative depending on the questions asked.

Domain general creativity involves the ability to creatively think in different domains. Domain specific creativity involves the ability to creatively think predominantly in one domain. Students are more domain generally creative. Only seven percent showed they are domain specific creative, based on the EFA conducted. This was based on respondents scoring themselves as creative in one of the questions testing a specific domain.

Respondents own perception of their creativity levels compared to their peers seems mostly neutral with a slight preference to perceiving themselves to be more creative than their peers. With scholarly and mechanical-scientific creativity, respondents perceived themselves to be more creative. This suggests that respondents are exposed to limited domains of creativity and intelligence while studying.

RESEARCH QUESTION RQ_5

The fifth research question was: *"Are students able to recognise different levels of creativity, using the Kaufman Domains of Creativity Scale (K-DOCS)?"* Big-c creativity was the most recognisable level of creativity. Respondents therefore are able to recognise products that are meaningful to society. The majority of respondents also showed the ability to recognise pro-c creativity. Students therefore show that they have experience in specific field or domain in which they practice a talent to one day reach big-c creativity status. Students are able to recognise little-c creativity, but to a lesser extent than big-c creativity and pro-c creativity. Little-c creativity shows the ability to solve problems and use their imagination. Respondents therefore are, to a lesser extent, able to recognise when people use their imagination and solve problems than they are able to recognise talent, experience in a domain and creating new products which are related to pro-c and big-c creativity. Respondents showed the ability to recognise mini-c creativity. Respondents therefore are able to recognise meaningful experiences, events and actions that is necessary for big-c creative ability. This is important as mini-c is necessary for big-c creativity and students are able to recognise both. The amount of students that are able to recognise non-creativity is slightly more than those that do not recognise non-creativity.

The analysis showed that respondents are able to recognise different levels of creativity. Respondents show a better capability to recognise different levels of creativity than when comparing their own creativity levels in different domains to that of their peers.

RESEARCH QUESTION RQ_6

The sixth research question was: *"Do demographics influence the perceptions of creativity?"* The demographic variable includes age, years' work experience, type of

student and gender. Regardless of the four variables, the ability to recognise levels of creativity or the perception of the respondents own creativity levels in comparison of their peers, similar trends was shown and there was no distinguishable difference in results. Thus, in this study demographics did not have a major impact on perception of creativity.

Regardless of the amount of years' work experience, the respondents were able to recognise big-c creativity, pro-c creativity, little-c creativity and mini-c creativity. Age showed a similar pattern. There is a less distinct difference between the ability to notice big-c creativity, pro-c creativity, mini-c creativity and little-c creativity. Male and females all show a good ability to recognise big-c creativity pro-c creativity, middle-c creativity and little-c creativity.

Block release, and first year students show a similar pattern when compared to the levels of creativity. The ability to recognise big-c creativity is higher than the ability to recognise pro-c creativity, middle-c creativity and little-c creativity. The second year students show a distinct downward pattern from recognising big-c creativity to not being able to recognise creativity. This pattern is slightly different than that of first and block release students. This shows responds are best able to recognise big-c creativity; followed by pro-c creativity, mini-c creativity and little-c creativity. Overall the ability between first and second year students to recognise levels and have different domains of creativity is minimal. With all variables respondents showed an ability to recognise non-creativity.

MAIN RESEARCH QUESTION – RQ_7

The main research question was: *"Do students perceive themselves to be creative?"* Considering all results students perceive themselves to be neither more nor less creative than their peers. Students therefore see themselves to have a similar level of creativity across two domains (scholarly and mechanical-scientific). These domains have similar characteristics to mathematical and linguistic intelligence.

Students are more easily able to recognise creativity in other individuals than in themselves. This is based on the results that students are better able to recognise big-c creativity than little-c creativity. This is further proven by students having mini-c creativity which is necessary to reach and recognise big-c creativity. When

considering the levels of creativity compared to demographics there was no distinguishable difference in the ability of students with different age, gender, work experience and year of study.

In the next sections recommendations will be given on how the creativity levels of MBA students can be increased while studying at the NMMU Business School.

5.3 RECOMMENDATIONS

Research has shown that creativity in education leads to innovation in the business environment that further lead to economic and social development. Creative individuals work in teams, have knowledge across domains and are more willing to take risks. Educational institutions focus on standardised tests, mathematical and linguistic skills that reduce creativity.

The NMMU Business School mentions creativity and innovation in the description of their MBA course and Business School. It is also mentioned that innovative students can add to economic, sustainable and social development. Risk taking is encouraged, management skills are taught in different business domains and personality, linguistic and mathematical tests are undertaken to enrol. Various means of lecturing is used, group work is encouraged and standardised is used.

The main research problem was: *"Creativity is not recognised amongst MBA students at NMMU Business School."* Considering the research problem and the primary and secondary research conducted, recommendations is identified and discussed below:

- It is recommended that countries focus on educational variables as the starting point for creativity. Competitiveness and economic growth stem from innovation that originates from creativity that can be taught. Focusing on organisations to be innovative is not sustainable. Education is necessary. Secondary research included criticisms on the South African education system that include poor literacy and mathematical ability and not preparing students for the work environment and the unfamiliar and continuous changes within it. Three factors are therefore important for economic growth: innovation, sustainability and education. The NMMU Business School values innovation and uses education, research and engagement to be sustainable.

The NMMU Business School are therefore aware and aim to contribute to competitiveness and economic growth through students that are able to contribute to the economy and sustainability. The research gave an indication to the extent the NMMU Business School applied these factors

- Secondary research stated that educational institutions, like the NMMU Business School, must strive to work with industry and government to be innovative. Secondary research also states it is important that the students are exposed to creativity during studies and recognise creativity within organisations. The NMMU Business School are affiliated with industry. The students in the MBA course are all working and are therefore applying management skills while assisting organisations to be innovative. The majority of students have between three and eighteen years work experience. Thus a link between the university and industry exists. Research, class discussions, case studies on organisation and guest lecturers is methods the NMMU Business School use to network with and learn about industry. It is recommended that NMMU Business School apply these methods not only to network with industry, but to consciously aim to make students creatively aware of how innovation occur.

  Teaching creatively does not only stem from teaching techniques, teachers and students; but how teachers use teaching techniques in a class creatively. Thus, although research, class discussions, case studies on organisations and guest lecturers teach students about industry, it does not automatically increase creativity. Creativity is necessary in what questions are asked and how the teaching methods are used.

- Secondary research mentioned the gap between what is learnt educational institutions and what is expected when students working in organisations. The NMMU Business School aims to develop innovators that are grounded in business management disciplines and are creative. The curriculum includes the aspects needed when working in an organisation that include theoretical knowledge and problem solving skills.

Both management skills and creativity can be taught. However, both skills must be continuously practised while studying and working. The majority of students indicate an average creativity level of three. Thus there is room for an increase in the ability and perception in own creativity levels. It is recommended that the NMMU Business School focus on increasing creativity levels of students – in general and when students' progress from first to second year. There is little difference in the results between first year and second year's student's creativity levels. The question arises whether the teaching methods applied by the NMMU Business School is increasing creativity?

It is also recommended that the NMMU Business School investigate why, even though teaching methods mentioned that should increase different creative domains, mini-c creativity and little-c creativity; there is little increase in creativity levels between first year students and second year students. The NMMU Business School should therefore focus on teaching students creatively across business domains so that they can be innovative employees that have theoretical knowledge.

- Secondary research showed that being creative across domains is advantageous and assist in decision making processes as solutions can be drawn from more than one domain. It is recommended that when changing educational policies and curricula students should apply different domains of creativity. Students believe themselves to have mostly scholarly creativity. The above information is consistent with secondary research that state that mathematical and linguistic skills is what school curricula focus on.

  The registration process of the NMMU MBA course involves numeric and linguistic tests. The MBA students are exposed to various modules and disciplines while studying at NMMU. Examples include financial management and financial accounting modules that focus on the mathematical-scientific creative domain or mathematical intelligence. A second example includes research and written assessments where the scholarly domain is practiced together with linguistic intelligence. It is recommended that the NMMU Business School encourages additional domains of creativity and intelligence.

The necessity and importance of mathematical and linguistic skills is not debated. However, the modules taught by the MBA program should be taught to incorporate other creative methods of teaching and other domains of intelligence that is linked to creativity. Examples include social intelligence that is linked to human relationships that is currently applied through syndicate groups. Natural intelligence should also be continuously encouraged. Natural intelligence includes using different areas of the brain and being aware of an environment, such as the environment in which a business operates.

- Mini-c creativity is subjective involves gaining knowledge, having novel insights and understanding socio-cultural circumstances through lecturers' help. Mini-c is also necessary for big-c creativity. At NMMU knowledge is increased through the various modules, lecturers and guest speakers that teach students. Socio-cultural circumstances are increased through syndicate groups. Little-c creativity involves analysing situations and solves problems in different ways. At NMMU this is implemented through group discussions, case studies and applied research of business problems.

The NMMU Business School apply the above concepts and students showed the ability recognise mini-c creativity and little-c creativity. Overall respondents are more able to recognise higher levels of creativity that include pro-c creativity and big-c creativity. There is a reduction from the ability to recognise big-c creativity to recognise pro-c creativity, little-c creativity and mini-c creativity. Respondents are therefore more able to recognise larger innovations than smaller innovations. It is recommended that smaller innovations are noticed, encouraged and taught during the MBA course and that students are given feedback on creative ideas.

The above recommendations reiterate the link innovation have with economic growth, organisational success and education. The NMMU Business School MBA program was used as an example on how they can assist in innovation occurring in the South African economy, the organisations that they network with and the students that they teach. It is recommended that the NMMU Business School continuously add to economic growth by conducting research, working with other

organisations and teach students to be creative. Standard teaching methods should be used creatively to increase creativity and management skills as oppose to merely increasing management skills. Creative teaching methods should be increased and combined with different domains of creativity and intelligence. Overall it is recommended that the NMMU Business School encourage and apply creative teaching to increase student creativity across domains and at different levels.

5.4 LIMITATIONS

Three major limitations were identified:

- This South African study was conducted on MBA students at one university. Analysing other MBA students form other universities that follow a similar registration process and have similar demographics will allow for a better comparison of students creativity levels.

- The study merely shows the creativity levels of students. The study does not have proof that respondents actually contribute to the competitiveness or innovativeness of their organisations and the economy.

5.5 FUTURE RESEARCH

- Future research is planned for other students at the NMMU that are not part of the MBA program.

- Research can be done on, not only on the ability to recognise creativity, but whether students are applying innovation in work environment.

- The questionnaire includes questions that relate to self-deception. Future research can focus on how self-deception impacts creativity.

- A comparison on creativity levels of NMMU students and the students on which the similar study will be conducted in Germany and Mexico.

5.6 SUMMARY

The main objective of this research study was: “To determine the perception of tertiary students own creativity as it is important in Entrepreneurship.” Six deliverables were identified that are listed below.

- Teaching increases the level of creativity of students;
- Innovation is necessary for country competitiveness and economic growth;
- Innovation helps organisations to be competitive and sustainable;
- Validation of findings from the creativity test and the impact it can have on management innovation in a business;
- Employees and managers excel in different domains; and
- Employees’ demographics don’t influence creativity perception and innovation levels.

This study determined the perception of MBA students own creativity and ability to recognise the levels of creativity as it is important in entrepreneurship. A summary was given on each research objective and recommendations were made with regard to each research objective.

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Appendix A: Ethics clearance

Nelson Mandela Metropolitan University
for tomorrow

• PO Box 77000 • Nelson Mandela Metropolitan University
• Port Elizabeth • 6031 • South Africa • www.nmmu.ac.za

Vice-Chairperson: Research Ethics Committee (Human)
Tel: +27 (0)41 504-2235

Ref: [H14-BES-MBA-053/Approval]

Contact person: Mrs U Spies

28 May 2014

Dr M Cullen
Faculty of Business and Economic Sciences
Business School
2nd Avenue Campus

Dear Dr Cullen

CREATIVITY: A TRIGGER FOR ENTREPRENEURIAL BEHAVIOUR

PRP: Dr M Cullen
PI: Dr M Cullen

Your above-entitled application for ethics approval served at Research Ethics Committee (Human).

We take pleasure in informing you that the application was approved by the Committee.

The ethics clearance reference number is **H14-BES-MBA-053** and is valid for three years. Please inform the REC-H, via your faculty representative, if any changes (particularly in the methodology) occur during this time. An annual affirmation to the effect that the protocols in use are still those for which approval was granted, will be required from you. You will be reminded timeously of this responsibility, and will receive the necessary documentation well in advance of any deadline.

We wish you well with the project. Please inform your co-investigators of the outcome, and convey our best wishes.

Yours sincerely

Prof CB Cilliers
Chairperson: Research Ethics Committee (Human)

cc: Department of Research Capacity Development
Faculty Officer: BES

Appendix B: Questionnaire

Coding of the questionnaire:

To help us excluding mistakes and doubling of questionnaires please code your questionnaire as follows:

Day and month of your mother's birth date:

D	D	M	M

You father's first name:

_____

Question 1:

Instructions: Compared to people of approximately your age and life experience, **how creative would you rate yourself for each of the following acts?** For acts that you have not specifically done, estimate your creative potential based on your performance on similar tasks. Please use the following scale from 1 to 5:

1 Much less creative	2 Less creative	3 Neither more nor less creative	4 More creative	5 Much more creative

___ Finding something fun to do when I have no money

___ Helping other people cope with a difficult situation

___ Teaching someone how to do something

___ Maintaining a good balance between my work and my personal life

___ Understanding how to make myself happy

___ Being able to work through my personal problems in a healthy way

___ Thinking of new ways to help people

___ Choosing the best solution to a problem

___ Planning a trip or event with friends that meets everyone's needs

___ Mediating a dispute or argument between two friends

___ Getting people to feel relaxed and at ease

___ Writing a nonfiction article for a newspaper, newsletter, or magazine

___ Writing a letter to the editor

Question 1 continued:

Instructions: Compared to people of approximately your age and life experience, **how creative would you rate yourself for each of the following acts?** For acts that you have not specifically done, estimate your creative potential based on your performance on similar tasks.

1 Much less creative	2 Less creative	3 Neither more nor less creative	4 More creative	5 Much more creative

___ Researching a topic using many different types of sources that may not be readily apparent

___ Debating a controversial topic from my own perspective

___ Responding to an issue in a context-appropriate way

___ Gathering the best possible assortment of articles or papers to support a specific point of view

___ Arguing a side in a debate that I do not personally agree with

___ Analyzing the themes in a good book

___ Figuring out how to integrate critiques and suggestions while revising a work

___ Being able to offer constructive feedback based on my own reading of a paper

___ Coming up with a new way to think about an old debate

___ Writing a poem

___ Making up lyrics to a funny song

___ Making up rhymes

___ Composing an original song

___ Learning how to play a musical instrument

___ Shooting a fun video to air on YouTube

___ Singing in harmony

___ Spontaneously creating lyrics to a rap song

___ Playing music in public

___ Acting in a play

___ Carving something out of wood or similar material

___ Figuring out how to fix a frozen or buggy computer

Question 1 continued:

Instructions: Compared to people of approximately your age and life experience, **how creative would you rate yourself for each of the following acts?** For acts that you have not specifically done, estimate your creative potential based on your performance on similar tasks. Please use the following scale from 1 to 5:

1 Much less creative	2 Less creative	3 Neither more nor less creative	4 More creative	5 Much more creative

___ Writing a computer program

___ Solving math puzzles

___ Taking apart machines and figuring out how they work

___ Building something mechanical (like a robot)

___ Helping to carry out or design a scientific experiment

___ Solving an algebraic or geometric proof

___ Constructing something out of metal, stone, or similar material

___ Drawing a picture of something I've never actually seen (like an alien)

___ Sketching a person or object

___ Doodling/drawing random or geometric designs

___ Making a scrapbook page out of my photographs

___ Taking a well-composed photograph using an interesting angle or approach

___ Making a sculpture or piece of pottery

___ Appreciating a beautiful painting

___ Coming up with my own interpretation of a classic work of art

___ Enjoying an art museum

Question 2:

Instructions: Below you find 20 descriptions of products, a persons or a processes. **Please evaluate how creative each option is**. On the 5-point scale 1 represents not at all creative and 5 extremely creative.

1 Not at all creative	2 …	3 …	4 …	5 Extremly creative

___ A creative action that changes an entire field

___ A creative product that is remembered and appreciated for more than 100 years

___ Legendary creative work

___ A creative genius

___ A creative product that is sold around the country

___ A creative idea reflecting years of expertise

___ A creative person who has been practicing his or her skill for many years

___ Creative work done by someone with an advanced degree

___ A creative product that some people would be willing to buy

___ Any type of art that is shared with other people

___ Creativity that has been revised to incorporate the feedback of others

___ A creative hobby encouraged by members of the local community

___ An idea that is new to the creator (even if it is not new to anyone else)

___ A personally meaningful new insight

___ Trying to do something creative for the first time

___ Actively learning something and making new connections

___ The memory of a past event

___ Following directions carefully

___ Solving a problem on the basis of a previously taught method

___ Being asked to do one thing and doing another

Question 3:

Instructions: Please rate the following 20 items on a scale from 1 to 7 according to you feelings.
1 means you do not agree at all and 7 means you fully agree.

1	2	3	4	5	6	7
Do not agree at all	...	...	neutral	...	...	Fully agree

____ My first impression of people usually turn out to be right

____ It would be hard for me to break any of my bad habits

____ I have not always been honest with myself

____ I always know why I like things

____ Once I've made up my mind, other people can seldom change my opinion

____ It's hard for me to shut off disturbing thought

____ I never regret my decisions

____ I rarely appreciate criticism

____ I am very confident of my judgments

____ I don't always know the reason why I do the things I do

____ I sometimes tell lies if I have to

____ I never cover up my mistakes

____ I always obey laws, even if I am unlikely to get caught

____ I have said something bad about a friend behind his or her back

____ When I hear people talking privately, I avoid listening

____ I have received too much change from a salesperson without telling him or her

____ When I was young I sometimes stole things

____ I have done things that I don't tell other people about

____ I never take things that don't belong to me

____ I don't gossip about other people's business

Question 4:

Introduction: Please rate yourself for the following statements on a scale from 1 to 7.
1 means you do not agree at all and 7 means you fully agree.

1	2	3	4	5	6	7
Do not agree at all	...	...	neutral	...	...	Fully agree

____ I'm an artistically gifted person

____ I'm a musically gifted person

____ It's easy for me to solve math problems

____ I am a sporty person

____ I am a humorous person

Demographics:

How many months of work experience do you have? _____ Months

Where do you live? _____

Degree or diploma [studying for]: _____

Nationality: _____

Mother tongue _____

Gender: _____

Age: _____ Years

Thank you very much!

Prof. Dr. Alexander Brem
FAU Erlangen-Nürnberg
Germany

Prof. Dr. Rogelio Puente
Anahuac University
Mexico

Maximilian Maier, M.Sc.
FAU Erlangen-Nürnberg
Germany

Dr Margaret Cullen
NMMU Business School
South Africa