

# **A case study of determining the economic literacy of introductory economic students in South Africa**

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Thesis submitted in fulfilment of the requirements for the degree  
*Philosophiae Doctor* in Economics at the Potchefstroom Campus  
of the North-West University

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May 2016



*This thesis is dedicated to my father Barry Fourie and my mother Sandra Fourie for their lifetime of support, love and guidance.*

## Acknowledgements

First and foremost, I would like to thank my heavenly Father for giving me the strength, endurance, willpower and courage to pursue the task of completing this thesis.

I would also like to thank the following people who have played an enormous role in my finishing this thesis, and none of this would have been possible without them:

- My father Barry and mother Sandra. Thank you for the unconditional love and support. Thank you for giving me hope when times got tough. Thank you is simply not enough. Your love and prayers got me through this. Dad, mom, you are my rock and my salvation. I love you.
- My supervisor, Waldo Krugell. Thank you for all your patience and help during the past few years. No matter how busy you were, your door was always open and you were willing to provide a helping hand and a word of encouragement. Thank you for having my back with my economic education endeavours.
- My dear friend Lee, thank you for listening and just being there for me during this time. Knowing that you are always there is truly a blessing. You are a great friend.
- My friends Carli, Carike and Marianne thank you for the support. A true friend is supports you because they want to see you succeed! Thank you for being such a friend! Each one of you means the world to me.
- My friends at the School of Economics for their advice, support, splendid listening skills and coffee breaks. Chris, André, Frans, Marianne, Requier, Carike, Carli, Alida, Ilza and Henri.
- My colleagues at the School of Economics for always asking, “How is it going?” Thank you Derick, Anmar, Ewert, Andrea, Ermie, Sonja and Ernst.
- Professor Wilma Viviers for supporting me unconditionally in my economic education endeavour.
- My dear Thompson family. You taught me how to believe in myself and to stand up for myself. If it weren’t for you, none of this would even be remotely possible – Shandon, Sadie, Lauren and Lindsey. Thank you for being there by my side the last 11 years.

- A special thank you to Jacky, you got me interested in economic education back when I was an honours student. Thank you for awakening my passion.
- The North-West University for providing me with a PhD bursary.
- Conling Language & Translation Consultants CC, for the language editing.

## Summary

Economic events and economic issues are major concerns worldwide. Leading economies are facing debt crises, recessions and downturns in economic growth. Consumers are confronted daily with increasing food prices, a fluctuating oil price, unemployment and low wages, but despite the attention that has been given to economics in the recent years, economists have found that the public is unfamiliar with economics and basic economic concepts.

But how do economists know what the public's understanding of economics is? Literature suggests that one could test someone's knowledge about economics, or more specifically, test the level of economic literacy. One way to test for economic literacy is by means of the Test of Understanding College Economics (TUCE). The TUCE is a test that was developed by a number of economists to test the economic literacy level of introductory-level economic students in the United States. The TUCE can be used as a pre-test to test students' understanding of economics after High School or as a post-test to test students' understanding of economics after one year's worth of economic instruction.

After testing a sample of South African students' economic literacy levels with the TUCE, it was determined that the TUCE may not be an appropriate measure for testing economic literacy in South Africa and that an economic literacy test should be developed for the South African context. After taking into account the TUCE and the Voluntary National Content Standards in Economics, the Test of Understanding Economics in South Africa (TUESA) was developed.

In July 2013, the TUESA was tested as a pilot study at the North West University *Potchefstroom Campus*. The results of the pilot study were interpreted and the reliability of the questions was determined, after which a final version of the TUESA was compiled. The final version of the TUESA was used as a pre-test, testing the economic literacy of introductory level economics students in South Africa before any form of instruction took place, and a post-test was conducted to determine the economic literacy of introductory economic students after a year's worth of economic instruction. The pre-test was done in February 2014 and the post-test was done in October 2014.

The overall results of the pre-test indicated an economic literacy score of 50.8 per cent, with a microeconomic literacy score of 48.8 per cent and a macroeconomic literacy score of 54.4 per cent.

Results further indicated that there are significant differences between the economic literacy scores by gender, race, majors and students who had been enrolled for Gr12 economics in high school. Results from cross tabulations of data and regression models indicated that students who were enrolled for Gr12 economics in high school have a better chance in passing the TUESA than students who were not enrolled for economics in high school.

The overall post-test results indicated an economic literacy score of 58.26 per cent, with a microeconomic literacy score of 54.4 per cent and a macroeconomic literacy score of 59.3 per cent. Furthermore, it was established that there is a significant difference in the students' pre-test TUESA scores and post-test TUESA scores. The *Eta Squared* value was calculated and it can be concluded that there was a large effect with a substantial difference in the TUESA test scores before and after a year's worth of introductory economics.

*Key words: Economic literacy, TUCE, TUESA, Introductory economics, economics*

## Opsomming

Ekonomiese gebeure en ekonomiese kwessies is 'n bron van groot kommer wêreldwyd. Ontwikkelde ekonomieë staar skuld krisis, resessies en afswaai in ekonomiese groei in die gesig. Verbruikers word daaglik gekonfronteer met toenemende voedselpryse, 'n wisselende olieprys, werkloosheid en lae lone. Ten spyte van die aandag wat die ekonomie die afgelope paar jaar gegeneer het, het ekonome bevind dat die publiek baie onvertrou is met die studie van ekonomie en basiese ekonomiese konsepte.

Maar hoe weet ekonome wat is die publiek se algemene begrip rondom die ekonomie? Literatuur stel voor dat iemand se kennis oor ekonomie getoets kan word, of meer spesifiek, die vlak van ekonomiese geletterdheid getoets kan word. Een manier om ekonomiese geletterdheid te toets, is deur middel van die “*Test of Understanding College Economics*” (TUCE). Die TUCE is 'n toets wat in die V.S.A. ontwikkel is deur 'n aantal ekonome om die ekonomiese geletterdheidsvlak van studente te toets. Die TUCE kan gebruik word as 'n voor-toets wat studente se begrip oor ekonomie toets ná Hoërskool of as 'n na-toets wat studente se begrip van ekonomie toets na een jaar se ekonomie opleiding.

Die TUCE is gebruik om 'n aantal Suid-Afrikaanse studente se ekonomiese geletterdheidsvlakke mee te toets en na die toets is daar vasgestel dat die TUCE dalk nie 'n toepaslike maatstaf is vir die toets van ekonomiese geletterdheid in Suid-Afrika nie. 'n Ekonomiese geletterdheidstoets, vir die Suid-Afrikaanse konteks moet ontwikkel word. Na inagneming van die TUCE en die “*Voluntary National Content Standards of Economics*” is die “*Test of Understanding Economics in South Africa*” (TUESA) ontwikkel.

In Julie 2013 is die TUESA getoets in 'n loodsstudie by die Noordwes-Universiteit Potchefstroomkampus. Die resultate van die loodsstudie is geïnterpreteer en die betroubaarheid van die vrae is bepaal waar daarna 'n finale weergawe van die TUESA saamgestel is. Die finale weergawe van die TUESA is gebruik as 'n voor-toets, wat die ekonomiese geletterdheid van ekonomie studente in Suid-Afrika toets voor enige vorm van onderrig plaasvind en as 'n na-toets wat die ekonomiese geletterdheid van ekonomie studente toets na 'n jaar se onderrig in ekonomie. Die voor-toets is in Februarie 2014 gedoen en die na-toets is in Oktober 2014 gedoen.

Die algehele resultate van die voor-toets het aangedui dat studente 'n ekonomiese geletterdheidsvlak het van 50.8 persent, met 'n makro-ekonomiese geletterdheid vlak van 48.8 persent en 'n makro-ekonomiese geletterdheid vlak van 54.4 persent.

Resultate het verder aangedui dat daar 'n beduidende verskil is tussen die ekonomiese geletterdheidsvlakke van studente volgens geslag, ras, hoofvakke en ook van studente wat vir Gr12 ekonomie in die hoërskool gehad het. Resultate van die logistiese regressie het aangedui dat studente wat vir Gr12 ekonomie in die hoërskool ingeskryf was, het 'n beter kans om die TUESA te slaag as studente wat nie ekonomie in die hoërskool gehad het nie.

Die algehele na-toets resultate dui op 'n ekonomiese geletterdheid vlak van 58.26 persent, met 'n mikro-ekonomiese geletterdheidsvlak van 54.4 persent en 'n makro-ekonomiese geletterdheidsvlak van 59.3 persent. Verder is daar vasgestel dat daar 'n beduidende verskil is in die studente voor-toets vlak en na-toets vlak. Die *Eta Kwadraat* waarde is bereken en dit kan afgelei word dat 'n jaar se ekonomiese opleiding 'n groot effek het op 'n student se ekonomiese geletterdheidsvlak.

*Sleutel woorde: Ekonomiese geletterdheid, TUCE, TUESA, Inleidende ekonomie, ekonomie.*

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## **List of Abbreviations**

<b>GDP</b>	Gross Domestic Product
<b>CEE</b>	Council for Economic Education
<b>NMMU</b>	Nelson Mandela Metropolitan University
<b>NWU</b>	North West University
<b>TEL</b>	Test of Economic Literacy
<b>TUCE</b>	Test of Understanding College Economics
<b>TUESA</b>	Test of Understanding Economics in South Africa

# Chapter 1

## Introduction and research proposal

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### 1.1 Introduction

Economic events and economic issues are major concerns worldwide. Leading economies are facing debt crises, recessions and downturns in economic growth. Six years after the beginning of the global financial crisis, the world economy continues to struggle and the effects of the financial crisis can still be felt. According to the World Economic Outlook, released by the International Monetary Fund in January 2015 (IMF, 2015), it seems that global growth in 2015 will receive a boost owing to lower oil prices as a result of greater supply. There are, however, fears that the growth rate might be influenced by negative factors such as investment weakness, volatility in global financial markets, stagflation, interest rates and low inflation which is still a problem in Japan and the euro area. Overall, the global economic environment remains fragile and likely to lead to disappointment.

Despite the attention that has been given to economics in the recent years, economists have found that the public is unfamiliar with the study of economics and economic concepts such as growth, unemployment, inflation, interest rates, deficits, policy, government spending, choices, utility, firms, resources and the value of the currency. These economic concepts affect the individual and producer in every country on a daily basis and a true understanding of these concepts are of the essence (Jappeli, 2010:429). Trevor Manuel stated in December 2012 during the Mangaung conference that a lack of understanding of the basic economic concepts amongst ANC (African National Congress, the leading political party in South Africa) members side-tracked important economic debates during the conference (Mkokeli, 2012:1). Trevor Manuel further recommended that it is essential for ANC members that they learn the fundamentals of economics, consequently improving their economic literacy levels (Mkokeli, 2012:1).

Economic literacy offers background to current and historical events in order to clarify current news headlines and help individuals to understand topics such as tariffs, balance of trade, inflation, income and wealth (Driver, 2010). Economic literacy is however a concept that is often confused with financial literacy. Financial literacy involves the ability to understand how money works, therefore, how to earn, invest, spend and manage money

(Roberts, 2005:1). Economic literacy, on the other hand, is a broader concept and involves the ability to understand the making of choices and the consequences thereof. Individuals are economics literate if they can apply basic economics concepts in situations relevant to their lives (Salemi, 2005:46). Basic economics concepts are the concepts outlined in the Voluntary National Content Standards in Economics of the National Council on Economic Education (Salemi, 2005:46). These basic concepts include: scarcity, decision-making, allocation, incentives, trade, specialisation, markets and prices, role of prices, competition and market structure, institutions, money and inflation, interest rates, income, entrepreneurship, economic growth, role of the government and market failure, government failure, economic fluctuations, unemployment and inflation, and fiscal and monetary policy. Roberts (2005) has explained that in order to understand the term ‘economic literacy’, it needs to be noted that economic literacy can be divided into two categories: factual and conceptual knowledge. Factual knowledge takes into account facts, for example, how inflation is measured and what the current inflation rate is, while conceptual knowledge deals with mastering the economic way of thinking (Roberts, 2005).

To test for economic literacy, the Council for Economic Education (CEE) in the United States developed two tests of economic literacy taking into account factual and conceptual knowledge. The first is the TEL (Test of Economic Literacy) which is used to test the economic literacy of high school students and the second is the TUCE (Test of Understanding in College Economics) which is used to test the economic literacy of college students. This study will focus on the TUCE, since the TUCE will be used as a measure to test economic literacy of first year economic students at the NWU Potchefstroom Campus and other Universities in South Africa.

In the 1960s the Council for Economic Education of the American Economic Association, the Joint Council on Economic Education, commissioned the preparation of a Test of Understanding in College Economics (TUCE) for testing economic literacy amongst economics students (Fels, 1967:660). The objectives of the TUCE are: 1) to test the hypothesis that a one-year college economics course has no lasting effect on students’ economic literacy (by George Stigler<sup>1</sup>); 2) to offer an effective assessment instrument for students in principles of economics courses; and 3) to provide norming data for a large, sample of students in introductory economics classes (Fels, 1967:663). The TUCE was

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<sup>1</sup> Stigler’s hypothesis suggested that there would be no difference in the performance of those college seniors who have had an introductory course in economics than those students who have not.

distributed to several universities in the United States to test the knowledge of introductory economics students before the start of the introductory economics course and after the completion of the introductory economics course. Since the 1960s, the test has been revised three times and is currently still being used to measure students' economic literacy levels, and to test the effect that a one year economics course has on economic literacy.

In South Africa, introductory economics is a subject taught to a diverse group of mainly *Bachelor of Commerce* university students with different vocational aspirations and fields of study. Introductory economics aims to provide students with the necessary knowledge and skills of basic microeconomic and macroeconomic theory and problems (Islam, 2011:877). It is important to provide students at tertiary level with the necessary skills to think like economists and not merely provide students with textbook knowledge, therefore ensuring the implementation of conceptual knowledge. In order to think like an economist, one needs to use chains of deductive reasoning in conjunction with simplified models, such as supply and demand, marginal analysis, and comparative advantage, to help understand economic reasoning (Siegfried, Bartlett, Hansen, Kelley, McCloskey & Tietenberg, 1991). It further involves not only problem-solving and creative skills, but also identifying trade-offs, distinguishing between positive and normative analysis, testing hypotheses about how consumers and producers make economic choices and how the economic system works (Siegfried, *et al.*, 1991).

Saunders (1980) and Walstad (1997) have indicated that those individuals who had taken economics as a subject at college or university are more likely to understand economic concepts and events than those individuals who did not enrol for an economics course. Walstad (1997) found that prior course work in economics has a small but lasting effect on economics knowledge; therefore students enrolling for an introductory economics course have a better understanding of certain economic concepts (Walstad, 1997).

This study aims to construct a Test of Understanding Economics in South Africa (TUESA) based on the CEE test of economic literacy, the TUCE. TUESA will determine the level of economic literacy at the beginning of the year, before any undergraduate level economics instruction takes place, and again at the end of the year, to evaluate if South African students after a one-year economics course, or two semesters of economics, can apply the basic economic knowledge that they have learned to everyday life scenarios, ensuring the implementation of conceptual knowledge

## 1.2 Background to the TUCE

This section provides a background to a better understanding of the problem statement. Firstly, the TUCE is discussed. A synopsis of the results found through the TUCE is provided.

In the 1960s, the Council for Economic Education appointed a committee to supervise the construction of the TUCE to test the economic literacy of college and undergraduate students (Fels, 1967:660). The committee consisted of six economists (GL Bach, William G Bowen, RA Gordon, Paul A Samuelson, George J Stigler, and R Fels). The TUCE has been revised three times since the 1960s. The committee decided on a multiple-choice form of questioning and the test was constructed in two parts (Fels, 1967:660). The first part of the TUCE was set on the content of the typical, first semester of college economics, microeconomics (30 multiple-choice questions) and the second part was set on the content of the typical second semester of college economics, macroeconomics (30 multiple-choice questions) (Fels, 1967:660). The current TUCE 4<sup>th</sup> edition was published by the National Council on Economic Education in 2007 by the authors WB Walstad, MW Watts and K Rebeck (2007). The basics of the test remained the same, but there were, however, a few small alterations.

Outlines of the different categories in the TUCE questionnaire are described in *Table 1.1* below and *Table 1.2* below.

**Table 1.1: TUCE Part I Microeconomics**

<b>Microeconomic Categories</b>
<b><u>A: The basic economic problem</u></b> Scarcity, opportunity cost, choice
<b><u>B: Markets and price determination</u></b> Determinants of supply and demand, utility, elasticity, price ceilings and floors
<b><u>C: Theories of the firm</u></b> Revenue, cost, profit, market structures
<b><u>D: Factor markets</u></b> Wages, rents, interest, profits, income distribution
<b><u>E: The (microeconomic) role of the government</u></b> Public goods, competition, externalities, taxation, income redistribution, public choice
<b><u>F: International economics</u></b> Comparative advantage, trade barriers, exchange rate

*Source: Walstad, et al., 2007*

The microeconomics section of the test consisted of: 10–15 per cent the basic economic problem, 20–25 per cent markets and price determination, 25–30 per cent theories of the firm,

10–15 per cent factor markets, 15–20 per cent the microeconomic role of government in a market economy, and 10–15 per cent international economics (Walstad, *et al.*, 2007:2).

**Table 1.2: TUCE Part II Macroeconomics**

<b>Macroeconomic Categories</b>
<b><u>A: Measuring aggregate economic performance</u></b> GDP and its components, real vs. nominal values, unemployment, inflation
<b><u>B: Aggregate supply and aggregate demand</u></b> Potential GDP, economic growth and productivity, determinants and components of aggregate supply and demand, income and expenditure approaches to GDP, the multiplier effect
<b><u>C: Money and financial markets</u></b> Money, money creation, financial institutions
<b><u>D: Monetary and fiscal policies</u></b> Tools of monetary policy, automatic and discretionary fiscal policies
<b><u>E: Policy debates</u></b> Policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability.
<b><u>F: International economics</u></b> Balance of payments, exchange rate systems, open-economy macroeconomics

*Source: Walstad, et al., 2007*

The macroeconomics section of the test consisted of: 25–30 per cent monetary and fiscal policy, 10–15 per cent policy debates, 10–15 per cent international economics, 10–15 per cent measuring aggregate economic performance, 25–30 per cent aggregate supply and aggregate demand, and 10–15 per cent money and financial market questions (Walstad, *et al.*, 2007:3).

The 4<sup>th</sup> edition of the TUCE was distributed to over 10 000 students across different universities in the United States. The test was administered at the beginning of the year to determine the level of economic literacy before any undergraduate or college-level economics instruction took place, and at the end of the year in order to determine how student performance might have improved or worsened after a year’s principles of economics course.

The overall test results obtained from Walstad, *et al.*, 2007 of the TUCE were of great concern. The post-test results (after a year of economics instruction) indicated that only 43 per cent of students correctly answer the microeconomics questions, and only 47 per cent of students correctly answer the macroeconomics questions.<sup>2</sup>

To conclude, a test of understanding college economics in the United States was developed and has been used for over 40 years. The main objective of the TUCE is to offer an assessment instrument to test for economic literacy of students in principles of economics.

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<sup>2</sup> The results indicate the percentage of students who answered the micro and macroeconomic questions correctly.

From the results, it was clear that U.S. students were not performing well in the test of economic literacy after one year of an introductory economics course.

### **1.3 Problem statement**

The TUCE was developed in the United States of America to test the economic literacy levels of introductory economic students. Students were asked certain questions relating to economics to test their ability to apply the factual and conceptual economics knowledge that they have learned.

However, the TUCE consists out of economic concepts that are true to the United States. Some examples of these concepts, which are included in the TUCE questions are: The Federal Reserve, the price of gas (petrol) differs from one county to the other, oil is the United States primary source of heat and the term interstate is used instead of the word highway. These concepts can confuse students and therefore this study aims to test the economic literacy level of South African first year university students before and after taking a one-year economics course. From here, the suitability of the TUCE will be used to test the economic literacy of South African students. If not appropriate, a new test for economic literacy for South African university students should be developed based on the literature. The appropriate literacy test can then be used as a pre- and post-test on a sample of first year students enrolled for an introductory economics course at South African universities.

What happens in the economy is linked to everyone's lives and livelihoods and at the broadest level, people's economic literacy will determine their welfare. To determine the economic literacy of the man or women on the street would not be a trivial pursuit, so this study narrows the problem down to developing a test of economic understanding for first-year university students. It draws on the NCEE's experience in the developing the TUCE for college students in the United States.

The primary research question therefore is: "What is the economic literacy level of university students in South Africa, before and after a year of economics instruction?"

## 1.4 Motivation

Economics is everywhere and every day individuals are faced with scarcity, choice and opportunity cost. Economists and economic models work on the assumption that rational utility and profit maximisers understand this and are making decisions for the optimal allocation of resources. The problematic situation is how to test how people apply their factual and conceptual economic knowledge.

To test the economic literacy of the average South African in a scientific way would be a monumental undertaking, but this study makes a start by narrowing the problem down to developing a test of economic understanding for first-year university students. The motivation for this approach lies in following the framework of the TUCE that was developed to test college students in the United States. Introductory economics as a course is lectured at all universities and is described as a subject providing fundamental knowledge and insight into the basic functioning of the economy. It is, therefore, essential to measure whether students are able to grasp and apply the basic concepts<sup>3</sup> and knowledge learned of economics in order to test their economic literacy levels. The TUCE is used as a pre- and post-test of economic literacy. From their results,<sup>4</sup> it is clear that US students struggle with the questions of the TUCE, even though the majority of high schools in the United States require a one-credit economics course. Following the U.S. example, this study's main research question, stated above, is "What is the economic literacy level of university students in South Africa, before and after a year of economics instruction?"

To answer this question will involve two steps: testing the U.S. version of the test with South African students and developing a South African version of the test to use as a pre- and post-test before and after a year of economics instruction. The methods are described in the following section, but it is important to motivate the development of the South African version of the test here.

The first reason is that U.S. and South African students differ in many ways, not least the fact that the majority of high schools in the United States require a one-credit economics course. In South Africa, economics is not a required course in high schools (as from Gr10) and the number of students choosing economics as subject from Gr10 through Gr12 is limited.

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<sup>3</sup> Growth, unemployment, inflation, interest rates, deficits, policy, government spending and the value of the rand.

<sup>4</sup> 4<sup>th</sup> edition TUCE.

According to the Department of Basic Education in South Africa, in 2012, only 134 369<sup>5</sup> students were enrolled for economics as a subject, out of the 511 152 students who wrote the National Senior Certificate examination. Therefore, South African students enrolling for a *Bachelor of Commerce* degree at a tertiary institution may have limited knowledge of economics compared to their U.S counterparts. The aim of the study is not a comparative analysis of high-school level economics curricula, it is to develop a test of economic understanding that is relevant and appropriate to the South African context.

This makes for the second reason: the questions in the TUCE may be quite theoretical, requiring specific textbook knowledge, whereas the aim of a South African version of the test would be to focus more on the application of knowledge and testing an economic way of thinking. This is not to say that the test can be free of theory or economics jargon, but at least the aim should be to develop a measure of the extent to which South African students are equipped with the necessary skills and knowledge to understand and apply basic economic concepts. If the results at the end of the study indicate that students are not economically literate after a year's worth of instruction, it opens the field for further research into the course content and lecture methods that may ensure a higher economic literacy level.

## 1.5 Objectives

The objectives of this study, structured to answer the research question, are:

- To determine how South African students performed with the TUCE in testing for economic literacy in South Africa;
- To develop a test of economic literacy for South Africa;
- To use the newly-developed economic literacy test for South Africa as a pre-test and post-test at three tertiary institutions, the North-West University, Potchefstroom and Mafikeng Campuses, Nelson Mandela Metropolitan University, and Rhodes University, to determine the economic literacy levels of first year students enrolled for an introductory economics course; and
- To determine the effect of a year's worth of an introductory economics courses on economic literacy amongst introductory economic students in South Africa.

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<sup>5</sup> From the 134 369 students, only 97 842 students passed economics.

## 1.6 Research Method

The research method includes a literature overview on economic education and economic literacy, along with a detailed description on how the TUESA (Test of Understanding Economics in South Africa) was developed and various empirical analyses on data obtained from the TUCE and TUESA in this study.

The literature overview will cover literature on the topics of economic education, economic literacy and the different measures in testing for economic literacy. Focus will be placed on the TUCE, where the development, questions and results thereof will be discussed in detail, since the TUCE serves as stepping stone for the development of TUESA. Additionally, thirty TUCE questions were distributed to students at the beginning of the introductory economic course in 2013 as a pre-test, and again in September 2013 as a post-test. Thirty of the TUCE questions that are relevant for the South African context and curriculum were picked for the study. The introductory economics curriculum at the North-West University was used as a guideline when the samples of questions were selected. The curriculum of the North-West University was used since it is a broad curriculum which is used in general in South Africa. Most of the topics which are covered in introductory economics courses across South Africa are similar. Descriptive statistics and frequency tables will be provided on both the pre-test and post-test results. These results will serve as part of the motivation for the development of a TUESA.

Henceforth, focus will be shifted towards the development of the TUESA. The different categories and explanation of each question asked will be discussed. The time period for the development of the Test of Understanding Economics in South Africa, TUESA, was from November 2012 to October 2013. Different economic experts were consulted during this timeframe which led to the development of the TUESA.

After discussing the development of TUESA, empirical evidence of a pilot study done at the North-West University, Potchefstroom Campus, on how students performed on the TUESA will be provided. A pilot study is of the utmost importance in order to determine the reliability of the questions asked by means of the Cronbach alpha reliability test and to determine whether all the questions that were asked are suitable, after careful examination of each answer to each question. The results will be interpreted by means of descriptive statistics and frequency tables, and where necessary, adjustments will be made to ensure the pertinence of the final and correct version of the TUESA used at the beginning and end of

2014 at the North-West University, Potchefstroom and Mafikeng Campus, Nelson Mandela Metropolitan University, and Rhodes University.

Final empirical evidence of the TUESA will be provided by means of descriptive statistics and frequency tables for both the pre-test and post-test to determine the economic literacy levels of introductory economics students in South African. Furthermore, the TUESA post-test results will be used in order to determine whether there is a significant difference between the increase and decrease in economic literacy scores of students, taking into account their demographic information. To test for the significant difference as stated in the previous sentence, T-tests, cross tabulations and regression analysis will be used. To calculate the size of the effect introductory economics has on economic literacy, the *Eta Squared* formula will be used.

## **1.7 Summary and structure**

In this chapter, a brief overview was given of the importance of economics and the public's economic literacy. It was explained that the focus of this study will be on developing a Test of Understanding Economics in South Africa, aimed at first-year university students and based on the Test of Understanding in College Economics that was developed in the United States.

Chapter 2 sets out a literature study of the topic of economic education and economic literacy.

Chapter 3 will investigate whether the TUCE is a relevant measure for testing economic literacy in South Africa, using the North-West University, Potchefstroom Campus, as a sample. Empirical evidence motivates the development of a South African version of the test and henceforth Chapter 4 undertook to develop a new test for economic literacy, specifically for South African students.

Chapter 4 will discuss the process involved in the development of the TUESA, taking into account the National Content Standards in Economics by the CEE and the content of different introductory economics textbooks. The different categories and an explanation of each question asked will be discussed. After discussing the development of TUESA, empirical evidence of a pilot study done at the North-West University, Potchefstroom Campus, on how students performed on the TUESA will be provided. A pilot study is of the utmost importance in order to determine the reliability of the questions. The results will be

interpreted, and where necessary, adjustments will be made to ensure that the final and correct version of the TUESA is relevant.

Chapter 5 provides empirical evidence of the TUESA pre-test. The economic literacy levels of first-year introductory economics students in South Africa will be determined before any economic instruction takes place. The TUESA pre-test will be distributed to the North-West University, Nelson Mandela Metropolitan University and Rhodes University in order to get a broad and unbiased sample.

Chapter 6: Empirical evidence of the TUESA post-test will be provided. The economic literacy levels of first-year introductory economics students in South Africa will be determined after one year's worth of economics instruction. Furthermore, the effect that one year's worth of economics instruction has on economic literacy will be determined.

Chapter 7 summarises, concludes and makes recommendations for further research.

## Chapter 2

### A literature review on the subject of Economic Education

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#### 2.1 Introduction

In Chapter 1, an introduction was given on the motivation, objectives and method of this study. Economic events and issues, such as growth, unemployment, inflation, interest rates, deficits, policy, government spending and the value of the currency, are important to each individual, whether that individual has majored in economics or not. The importance of economics is evident, but unfortunately there are few individuals that have had formal training in economics and can truly apply basic economic principles to everyday life scenarios.

This observation led to the conclusion that a measure to test for economic literacy needs to be set in place to determine whether students can apply factual and conceptual knowledge, which define economic literacy, when they are confronted with everyday economic events. As with the TUCE, one can start with testing the economic literacy levels of introductory level economics students. By testing the economic literacy levels of these students, one can establish which questions students are struggling with and then special attention can be given to these topics in order to ensure that students are equipped with the necessary knowledge regarding basic economic concepts.

This chapter continues by explaining the concept of economic education, and how economic literacy relates to economic education. Furthermore, a definition of what economic literacy is will be provided, as well as a description of the different tests available to test for economic literacy. Lastly, the development of the TUCE will be discussed, as well as the results that were obtained in the U.S. after the development of the fourth edition of TUCE.

#### 2.2 Research on Economic Education

##### 2.2.1 What is Economic Education?

Economic education is a research area within the subject field of economics that focuses specifically on the scholarship of teaching and learning economics (Asarta, Austin and Grimes, 2015). When splitting the concept: “scholarship of teaching and learning

economics” two individual terms are identified: the teaching of economics and the learning of economics. Teaching economics include the use of different techniques, technology, and contextual techniques as discussed in the *International Handbook of Teaching and Learning Economics* that instructors or lecturers use to teach different economic concepts. Teaching is therefore what the instructors or lecturers do. Learning economics can be described when students start to understand basic economic concepts that are taught to them. To determine whether students are learning and understanding the subject of economics, their knowledge of the subject can be tested by means of assessment. A link can therefore be formed between performance and understanding. However, it needs to be noted that a number of factors such as race, age, gender, lecture attendance, mathematical ability and language proficiency can influence a student’s performance in economics:. Consequently, economic education research is research on the teaching and learning of economics (Asarta, Austin and Grimes, 2015).

### 2.2.2 Economic education and who are the organisations supporting it?

Economic education includes: research into the existing economics curriculum, efforts to advance and improve the economics curriculum, resources and educational methods used to teach economics, research into alternative instructional techniques, the level of economic literacy of individuals, and factors that influence the level of economic literacy of individuals (Asarta, Austin and Grimes, 2015)

Internationally, certain organisations aim to ensure the development of economic education. In the United States, the Council for Economic Education works to advance the teaching of economics in the United States and throughout the rest of the world (Saunders, 2012). Numerous other organisations, such as the Junior Achievement, Canadian Foundation for Economic Education, EcEd Web, EconKids, Economic Education Station, Economics and Business Education Association, Faculty Cyber-Handbook on Technology, Economics Network (UK), Foundation for Teaching Economics, Journal of Economic Education, National Centre for Research in Economic Education, Research in Economic Education Database and Resources for University Teachers of Economics, raise funds in the name of economic education in order to improve the teaching of economics (Saunders, 2012). Certain developed countries, including the former Soviet Union, now have programmes aimed to improve the economic literacy of citizens .

In the United States, certain organisations which support the cause of economic education have successfully introduced economics as one of ten subjects which every student should demonstrate competence in before entering college or university. Although certain policies are in place in countries regarding the implementation of economics as a compulsory subject in high school to boost economic literacy, it seems from opinion studies<sup>6</sup> that students are only able to apply certain economic concepts (Siegfried *et al.*, 1991). It was therefore suggested by Siegfried *et al.* (1991) that, in order to gain economic knowledge and skills, more than one economics course is required if individuals wish to obtain the ability to apply basic concepts to everyday life scenarios.

### 2.2.3 The scholarship of teaching: What teaching materials and techniques can be used to improve economic education?

Certain materials and techniques are used to improve economic education. Techniques and materials that are used are: case studies, cooperative learning, media, response systems and economic blogs. Through the use of these techniques and materials, one can ensure the development and improvement of economic education, thus furthering the development of economic literacy. Each of the above-mentioned techniques and materials will be discussed in sections 2.2.2.1 to 2.2.2.4.

#### 2.2.3.1 *The use of cases in economic instruction*

This section deals with the advantages of the use of case studies in an instructional curriculum. Cases are educational tools with exact content, and this section will provide a definition and describe the characteristics of a good case. Cases are effective in stimulating student learning, but are mainly effective in motivating students to apply and develop higher-order concepts (Conway, 2012:37).

Case use has become standard in the curricula of colleges and universities teaching economics owing to its pivotal role in facilitating higher-order learning. Christensen, Hansen and Moore (1987) define a case as: *a group of source materials (written summary, image, video, news article or a cloud of tweets) on one subject that is drawn from a real life experience that places the students in a decision making analytical role* (Conway, 2012).

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<sup>6</sup> Opinion surveys from North America, Europe and Australia.

The advantage of using cases is that students are learning by doing. Stice (1987) found that 80 per cent of engineering students recalled the information learned by means of case study in class 60 days after the material was presented (Conway, 2012). However, for a case to succeed it has to comply with the following characteristics, i.e. it: poses a question that has no obvious answer; requires a student to use information provided by the case, provides enough information to the student for a successful evaluation of the case, and challenges the student to think and to analyse the problem and to identify ways to solve the problem (Conway, 2012).

Using cases in economic instruction creates an active learning environment where students learn to apply the basic economic concepts that they have learned to a real-life scenario, thus improving economic literacy. To ensure that a student can think like an economist, the student needs to be put into a decision-making role in a situation where higher-order skills involving certain economic concepts are required (Conway, 2012).

### 2.2.3.2 *Using cooperative learning exercises in economics*

This section will elaborate on the use of cooperative learning to enhance the way economics is taught. Cooperative learning involves the use of small groups of students to achieve improved learning outcomes (Salvin, 1990).

Cooperative learning is one of the most researched instructional methods owing to the numerous forms that it can take on (Salvin, 1990). It has been established that students that take part in cooperative learning have a higher level of reasoning and can more frequently generate new solutions and ideas (Salvin, 1990). The key to the success of cooperative learning is student engagement.

A study done by Barkley, Cross and Major (2005) identified a few popular cooperative learning formats. One of the most well-known cooperative learning formats is *think-pair-share*, which relies upon student discussions and brainstorming ideas. The think-pair-share format begins with students thinking independently about a certain concept. Later on, students then pair up with other students to share some of their ideas and thoughts (Barkley, *et al.*, 2005).

Another cooperative learning format is the *round table* (Barkley, *et al.*, 2005). This format requires student groups to respond to a question or problem in a round table format. A

student starts by writing down, say, two opinions or answers to a question or problem that was posed and passes it on the next student to do the same. The process is repeated until all the students have written an opinion or an answer. Afterwards, the students form an answer or argument from all the opinions and thoughts that were gathered. The gathered thoughts and opinions are summarised and are reported back to the lecturer (Barkley, *et al.*, 2005).

The last well-known cooperative learning format is the *Jigsaw* format (Barkley, *et al.*, 2005). This learning format begins where students are given a complicated problem by the instructor or lecturer. The problem is divided into several sections where each section is given to a group of students to master. After each group of students has mastered its particular section of the problem, students give feedback in order to solve the initial problem (Barkley, *et al.*, 2005).

Although the different formats of cooperative learning are appealing, it is not the driver of success when it comes to cooperative learning. Salvin (1990) has stated that more effective cooperative learning depends on key structural components. According to Kagan (1992), these structural components are:

- *Positive interdependence*: Positive interdependence is reached when individual and group success is positively allied.
- *Individual and group accountability*: Individual and group accountability ensures that evaluation of success reinforces the individual contribution, as well as collective functioning.
- *Equal participation*: Equal participation ensures that all group members are involved and join in, in the activity.
- *Simultaneous interaction*: Simultaneous interaction occurs when more than one participant is active at the same time when multiple groups are involved in the assignment.

The wide range of cooperative learning formats allows for various methods to integrate these key structures, enhancing the probability of achieving success in the improvement of learning outcomes.

### *2.2.3.3 Incorporating media and response systems in the economics classroom*

The use of media and technology in teaching economics has an impact on economic education (Calhoun & Mateer, 2012). Lecturers of economics use images, movies, music, television, social media and news-related content that relate to economics in order to transfer knowledge from the lecturer or instructor to the student, increasing the efficiency of the learning process (Calhoun & Mateer, 2012).

An additional technique that instructors or lecturers involve students in, during lectures, is a response system, better known as clickers. Clickers are used to get immediate feedback – a question is posed to the students where students click the correct answer on their response systems. Lecturers receive immediate feedback on how students answered the question. Media, technology and response systems are essential to the learning process, since they motivate and reinforce learning (Calhoun & Mateer, 2012).

### *2.2.3.4 Economic blogs*

Blogs are the direct offspring of fixed webpages. A blog is a webpage that is updated hourly, daily, weekly, monthly or occasionally, and each blog post differs in length and content. Blog posts on economic issues typically range from comments about current news events, to essays about current economic issues (Ayres & Sachania, 2009).

According to a study done by Greenlaw (2011), students can use blogs to reflect on a certain economic concept or problem, and lecturers or instructors can use the blogs as a learning platform. The study done by Greenlaw (2011) found that 58 per cent of economic bloggers are employed at an academic institution and are therefore experts on the field of economics. Experts are blogging about economic concepts and they are giving opinions on certain economic problems. Lecturers or instructors should encourage students to make use of economic blogs in order to broaden their field of knowledge (Haab, Schiff & Whitehead, 2012).

It is recommended by researchers that a lecturer or instructor should develop and maintain a class blog as a substitute for a class webpage or curriculum. By implementing such an initiative, students can comment and write blog posts for the blog, thereby ensuring class participation and student involvement (Haab, *et al.*, 2012). In addition, blogs can form the basis of student assignments, students can be assigned blog posts as reading assignments, or as stated above, to design and write blog posts.

Research on the use of different technologies, such as blogs, is relatively new but evidence suggests that blogs are increasingly being used for educational purposes. Blogging may help students to think more carefully about a particular topic, and with blog comments that are provided, it can shape the student's way of thinking (Haab, *et al.*, 2012).

#### 2.2.4 The scholarship of learning: Economic literacy

Economic literacy is a term that is widely misinterpreted. Economic literacy is often confused with financial literacy – some even think that economic literacy is financial literacy, but this cannot be further from the truth. Financial literacy is about money: what is money, how to invest, save and manage money (Roberts, 2005). Economic literacy, on the other hand, is the ability to apply basic economic concepts to everyday life scenarios (Salemi, 2005). Basic economic concepts are concepts that are outlined in the national Voluntary National Content Standards in Economics formulated by the Council for Economic Education in the United States. These basic economic concepts are: scarcity, marginal cost or benefit, allocation of goods and services, role of incentives, gain from trade, specialisation of trade, markets, role of economic institutions, role of money, role of interest rates, role of resources in determining income, profit and the entrepreneur, growth, role of government, using cost or benefit analysis to evaluate government programmes, macro-economy income, unemployment and inflation, and monetary and fiscal policy. These basic economic concepts are recommended to be taught to students in high school. At university or college level, in an introductory economics course, lecturers are recommended to teach students how to apply these basic concepts in order to improve their economic literacy levels (Salemi, 2005).

A first-year introductory economics course is an important course where undergraduate economic students can learn how to apply basic economic concepts and therefore focus on improving their economic literacy level. A study done by Walstad and Larsen (1993) indicated that adults in general are economically illiterate and that a focus needs to be shifted to introductory economics courses to improve economic literacy. In the United States, 40 per cent of students are enrolled for an introductory economics course, while only 2 per cent of students major in economics. If introductory economics courses were to focus on applying the basic concepts of economics, rather than memorizing factual knowledge, economic literacy levels would significantly increase amongst students (Salemi, 2005:48).

Economic literacy can furthermore be divided into two categories: factual and conceptual. Factual literacy is based on facts, for example teaching students basic economic concepts

such as the voluntary national content standards, while conceptual literacy is the ability to apply the basic economic concepts to everyday life scenarios, therefore mastering the way of economic thinking (Roberts, 2005:2). In order to test economic literacy, both these aspects, factual and conceptual literacy, are essential.

#### *2.2.4.1 Factors affecting student performance*

Factors affecting economic literacy which feature in international and South African literature will be discussed in this sub-section. The international literature includes studies that have been done in the United States, United Kingdom and Canada. These studies and the studies done in South Africa looked at the main factors that may affect a student's ability to perform in economics, thus affecting economic literacy. These factors include a student's previous knowledge of economics, mathematics, language, lecture attendance and gender.

##### ***Education***

Mathematics is described as a very valuable subject when it comes to undergraduate economics courses because mathematics can explain certain economic relationships and improve a student's understanding of economics (Cohn, Hult, Balch & Bradley, 1998). A survey was done on the importance of mathematics for 625 economists where the role of mathematics became clear: these economists viewed students' ability to do calculations as 'important', algebra as 'fairly important', and understanding and explaining graphs as 'very important' (Cohn, *et al.*, 1998). Studies in the United States, the United Kingdom and Canada indicate that the significance of high school mathematics does not seem to be country-specific, as it plays an important role in the performance of first year economics (Cohn, *et al.*, 1998) in all these countries.

Researchers typify the United States high school population as one presenting a very low economic literacy rate (Brasfield, Harrison and McCoy 1993:99). Studies done on the effect of high school economics on the performance of first-year economics students have been inconclusive. The literature does not specify to which extent economic learning takes place at high school and whether or not the school is involved in economic education, thus focusing on the improvement of economic literacy (Brasfield, *et al.*, 1993:99). Palmer, Carliner and Romer (1979) found that students who had economics as subject in school did not have a substantially higher level of knowledge than students that did not have economics in high school. Therefore, these students did not perform significantly better in economics at first-

year level. Reid (1983) found that students who had taken economics in high school essentially performed worse than students without high school economics did. Reid (1983) clarified that the reason for this is that students gain a misperception of economics, and of their ability to truly understand economics in high school, and this translates negatively to their performance in economics study at tertiary level.

The results of the study by Brasfield *et al.* (1993) contradict the above-mentioned study by Reid (1983) and find that there is indeed a positive significant relationship between having economics as subject in high school and a student's performance in first-year economics at tertiary level. High school economics teaches a basic understanding of economics and economic principles. Therefore, by obtaining an understanding of these basic principles, students gain the ability to understand tertiary economics better. Brasfield *et al.* (1993) found in their study that the failure rate in first-year college or university economics could be reduced by 33 per cent if all first-year students take economics as a subject in high school. Brasfield *et al.*'s (1993) reason for the positive and significant relationship between high school economics and performance in a first-year economics course is that previous studies were compiled between ten and twelve years ago and since then the school system had changed and is currently still changing. The school system changed in a sense that the quality of teaching and the study material which is covered in high schools improved and the subjects at school, including economics, are seen as assets when it comes to university.

South African literature indicates that economics as subject uses mathematics quite often and therefore students require mathematical ability to understand the basic concepts and perform well in these concepts, concurring with the study done by Cohn *et al.* This statement is reflected in recent studies in South Africa that indicate that there is a positive and significant relationship between student performance in economics and their mathematical ability (Van der Merwe, 2006). A study done by Van Walbeek (2004) with a sample size of 1365 of students who wrote the final exam reported that students at the University of Cape Town with an A-symbol or a B-symbol for mathematics in Grade 12 score on average 8.6 and 4.4 percentage points, respectively, higher in multiple choice questions than students who obtained a C-symbol.

Edwards (2000) compiled a study on the University of Cape Town's Principles of Economics course and discovered that a big contribution to the mathematical and first-year economics course problem in South Africa is that students are able to do the calculations, but lack the

conceptual understanding of the economic significance of the calculated values (Edwards, 2000). The absence of a conceptual understanding of answers turns into a problematic situation where students cannot provide a meaningful interpretation of the answer obtained and are therefore unable to apply their knowledge that they have learned, failing the main objective of economic literacy.

Edwards (2000) found a positive and significant relationship between having economics as a subject at school and a student's ability to perform at first-year tertiary level, concurring with the results of Brasfield *et al.* (1993) In contrast to the findings of Brasfield *et al.* (1993) and Edwards (2000), Smith and Edwards (2007)<sup>7</sup> found that having economics as a subject at high school had no significant impact on student performance in a first-year economics course at university, since their regression results were insignificant.

### ***Lecture Attendance***

A lecture is the primary means of instruction at every university, but lecture attendance is far from ideal (Romer, 1993). Overall, lecture attendance in the United States varies between 66 per cent and 89 per cent (Kirby & McElroy, 2003:311). A study done in California indicated that on an average day at university, one-third of students in economics courses do not attend class (Romer, 1993).

Research indicates that there is a positive relationship between lecture attendance and performance in economics, since it increases a student's ability to perform better (Kirby & McElroy, 2003:311). Furthermore, Kirby and McElroy (2003) found that lecture attendance plays more of a role in the process of improving a grade in economics, rather than just in passing the subject, since several other factors can contribute to a student not attending class: distance from the university, hours worked, students' attitudes towards the importance of attendance, and in some cases students have mastered the work through self-study.

There is a lack of literature studies specific to South Africa which examines the role of lecture attendance on students' performance in economics (Van Walbeek, 2004:862). Van Walbeek (2004) indicated that if a student attends all the monitored lectures he or she would, on average, score 7.3 percentage points higher in multiple-choice questions and 8.7 percentage points higher in essay type questions, than a student who does not attend all his or her lectures.

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<sup>7</sup> The study by Smith and Edwards was done at the University of Cape Town

## ***Language***

Several studies ( Edwards, 2000; Smith & Edwards, 2007; Howie, 2003; Van Walbeek, 2004) have looked at whether having English as a second language (thus not the student's home language) had an impact on student performance in economics.

In 2003, Howie did a study on students' language proficiency in English in all nine provinces in South Africa. The study was done by means of 40 multiple choice questions regarding concord and sequencing sentences, and focused on students whose second language was English. The overall score was 17 out of 40, but no explanation was given regarding the low score or whether this score was unexpected. Students grasp and learn new or difficult concepts better in their home language (Howie, 2003). This however does not translate to an ability to express their learning in English when under pressure (i.e. tests and exams). Therefore, gains from first language tuition are nullified if students are not also evaluated in their home language.

Edwards (2000) and Van Walbeek (2004) examined the effect of English proficiency on performance in first-year economics courses. Smith and Edwards (2007) found that English proficiency does in fact play a significant role in a student's performance in multiple choice questions and essay type questions in economics. They found that students of economics with an A-symbol or B-symbol in English performed between 3.9 and 7.2 percentage points better, respectively, in multiple choice and essay type questions than students who had achieved lower than a B-symbol (Smith & Edwards, 2007). Van Walbeek (2004) found that there is no evidence that substantiates the fact that English as home language contributes to the performance of students in multiple choice questions and essay type questions.

## ***Gender***

Literature suggests that a gender disparity exists: males tend to perform better in economics than females do (Colander & Holmes, 2007).

Females perform better in essay type questions where they can demonstrate their advantage in verbal skills. Males, on the other hand, have a comparative advantage in quantitative skills and scientists have found a possible explanation why: In males, a region in the brain called the inferior-parietal lobule (IPL) is significantly larger than in females, and the size of the IPL

correlates with mathematical abilities (Lumsden & Scott, 1987). Multiple-choice questions involve compound applications and research suggests that males are better equipped to use their knowledge to analyse questions (Lumsden & Scott, 1987). Essay type questions involve a wide range of knowledge and the memorisation of facts; female students perform better owing to their writing and synthesising skills (Lumsden & Scott, 1987). Lumsden and Scott (1987) reported that females scored between three and four per cent lower than males in multiple-choice tests and seven per cent higher in essay type questions (Lumsden & Scott, 1987). In order to understand the gender differences in economic or mathematical achievement and ability, researchers contend that it is critical to identify the specific areas and cognitive skills where males and females differ in order to maximise their ability to perform academically (Gierl, Bisanz and Boughton, 2003).

It has been found that each of the listed factors can affect a student's ability to perform in economics, thus a combination of these factors can have a cumulative impact on student performance and economic literacy.

#### *2.2.4.2 Testing for Economic literacy*

The United States of America is at the forefront in testing economic literacy levels. The Council for Economic Education has several economic literacy tests that are used in testing for economic literacy. They are:

1. Basic Economics Test (BET): BET is used for upper-grade levels of elementary school;
2. Test of Economic Knowledge (TEK): TEK is used for middle schools and lower-grade high schools;
3. Test of Economic Literacy (TEL): TEL is used in upper-grade levels of high school; and
4. Test of Understanding in College Economics (TUCE): Used for undergraduate level, primarily targeting introductory or principles-level coursework in economics.

The TEL and TUCE provide the economic education profession with standardised tests for assessment and research (Asarta and Rebeck, 2012). The norming of these two assessments provides estimates of economic learners' and students' understanding of economics (Asarta and Rebeck, 2012). One other project conducted at the national level have sought to estimate

high school economic literacy is The Standards in Economics Survey conducted in 2005 (Asarta and Rebeck, 2012).

The National Council in Economic Education conducted the Standards in Economics Survey (Markow and Bagnaschi, 2005) to assess the high school student understanding of basic economics and knowledge of the U.S. economy (Asarta and Rebeck, 2012). The test was created by using the Voluntary National Content Standards in Economics. The test consisted out of 20 test items covering various questions on consumer, production, interest rates, inflation, trade and personal finance (Asarta and Rebeck, 2012).

Besides the official tests of economic literacy: BEK, TEK, TEL, TUCE and the Standards in Economics survey a few informal tests are available online to “quickly” test the public’s understanding of certain economic concepts. For these test there are no known formal results or insights on how these tests were compiled. The informal online tests are:

- Test of economic literacy by the NCEE
- The Economic Literacy Survey by the Federal Reserve Bank of Minneapolis.
- Test our economic literacy quiz by the American Institute of Economic Research.
- Test your economic literacy by the New York Times

All these tests are set in an North American context with questions on consumer theory, production theory, monetary policy, fiscal policy, demand, supply and trade.

This study will however focus on the TUCE since the TUCE will be used as a measure to test economic literacy and to test whether or not the TUCE is indeed an appropriate measure of economic literacy at the North-West University, Potchefstroom Campus. The TUCE will, therefore, be discussed in detail in the following section.

#### *2.2.4.3 The Test of Understanding College Economics*

##### ***Introduction***

The TUCE is a test of economic literacy that has been used for nearly 40 years and has an extensive history of use by academia. In the 1960s, the Council for Economic Education appointed a committee to supervise the development of the TUCE (Fels, 1967). The committee comprised six economists (GL Bach, William G Bowen, RA Gordon, Paul A Samuelson, George J Stigler and R Fels). The committee decided on using a multiple-choice form of question for the TUCE ( Fels, 1967, Walstad, *et al.*, 2007:2).

The objectives of the TUCE as discussed in Chapter 1 are: 1) to test the hypothesis by George Stigler 2) to offer a reliable assessment instrument for students in principles of economics courses; and 3) to provide norming data for a large, national sample of students in introductory economic classes (Fels, 1967). The TUCE was distributed to several universities in the United States for testing the economic literacy of introductory economics students before and after the completion of the introductory economics course. Since the 1960s, the test has been revised and is currently at its fourth edition and is still used to measure a student's understanding of the subject and to test the real effect of introductory economics (Walstad, *et al.*, 2007).

### ***Content and cognitive specification***

The TUCE consists of 60 multiple-choice questions and is constructed in two parts; part I is on the content of typical first semester of college economics, macroeconomics (30 multiple-choice questions), and part II is on the content of typical second semester microeconomics (30 multiple-choice questions) (Fels, 1967; (Walstad, *et al.*, 2007).

The categories for the macroeconomics section of the test consisted of:

- A. Measuring Aggregate Economic Performance (GDP and its components, real vs. nominal values, unemployment, and inflation) (10-15 per cent).
- B. Aggregate Supply (AS) and Aggregate Demand (AD), (potential GDP, economic growth and productivity, determinants and components of AS and AD, income and expenditure approaches to GDP, the multiplier effect) (25-30 per cent).
- C. Money and Financial Markets (money, money creation, financial institutions) (10-15 per cent).
- D. Monetary and Fiscal Policies (tools of monetary policy, automatic and discretionary fiscal policies) (25-30 per cent).
- E. Policy Debates (policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability) (10-15 per cent).
- F. International Economics (balance of payments, exchange rate systems, open economy macro) (10-15 per cent) (Walstad, *et al.*, 2007).

The specification categories of the <sup>8</sup>TUCE-4 are basically the same as the categories in the TUCE-3<sup>9</sup> and only seven new questions were added to TUCE-4. Questions that were added to the microeconomic section were international concepts with a microeconomic orientation, such as comparative advantage, trade barriers and exchange rates (Walstad, *et al.*, 2007).

The categories for the microeconomics section of the test consisted of:

- A. The Basic Economic Problem (scarcity, opportunity cost, choice) (10-15 per cent),
- B. Markets and Price Determination (determinants of supply and demand, utility, elasticity, price ceilings and floors) (20-25 per cent),
- C. Theories of the Firm (revenues, costs, marginal analysis, market structures) (25-30 per cent),
- D. Factor Markets (wages, rents, interest, profits, income distribution) (10-15 per cent),
- E. The (microeconomic) role of the government in a Market Economy (public goods, maintaining competition, externalities, taxation, income redistribution, public choice) (10-15 per cent).
- F. International Economics (comparative advantage, trade barriers, exchange rates) (10-15 per cent) (Walstad, *et al.*, 2007).

The macroeconomic categories were further revised more in TUCE-4 owing to the greater changes that occurred in the teaching of macroeconomics. Concepts that were added were: balance of payments, exchange rate systems, open-economy, monetary policy and growth theories. Owing to these changes, ten new macroeconomic questions were added (Walstad, *et al.*, 2007).

*Table 2.1* and *Table 2.2* below show the classification of each of the TUCE microeconomic and macroeconomic questions into three cognitive and six content categories which ensures that students are tested on concepts that are considered to be in a typical introductory economics course.

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<sup>8</sup> 4<sup>th</sup> Edition of the TUCE

<sup>9</sup> 3<sup>rd</sup> Edition of the TUCE

**Table 2.1: Microeconomic: Content and Cognitive Specifications**

Content category	Cognitive categories			
	Recognition and understanding	Explicit Application	Implicit Application	Total (Per cent)
<b>A: Basic Problem</b> <i>Scarcity, opportunity cost, choice</i>			10	2 (6.6)
<b>B: Markets and Prices</b> <i>Determinants of supply and demand, utility, elasticity, price ceilings and floors</i>	19	1, 2, 3, 9, 11, 18		6.5 (21.6)
<b>C: Theories of Firm</b> <i>Revenue, cost, profit, market structures</i>	4, 12	11, 14, 17, 21	13, 20, 22	8.5 (28.3)
<b>D: Factor Markets</b> <i>Wages, rents, interest, profits, income distribution</i>		5	23, 24	3 (10)
<b>E: Micro Role of Government</b> <i>Public goods, competition, externalities, taxation, income redistribution, public choice</i>	6, 25, 27	7, 15, 26	16	7 (23.3)
<b>F: International (Micro)</b> <i>Comparative advantage, trade barriers, exchange rate</i>		28, 30	29	3 (10)
<b>Total (Percent)</b>	6 (20.0)	16 (53.3)	8 (26.6)	30 (100)

Source: Walstad, et al., 2007

The cognitive specifications found in *Table 2.1* and *Table 2.2* are based on *The Taxonomy of Educational Objectives* (Bloom et al., 1956). Instead of using the six categories developed by Bloom's Taxonomy (Knowledge, comprehension, application, analysis, synthesis and evaluation), the developers of the TUCE modified Bloom's Taxonomy and created three broad cognitive specifications: understanding and recognition, explicit application, and implicit application (Walstad, et al., 2007).

*Recognition and understanding* requires that students select the best definition of a given economic principle, term or concept, and *vice versa*, associating terms which are closely related and to recall specific economic rules (Walstad, et al., 2007).

*Explicit application* requires that students apply economic concepts, distinguish between correct and incorrect, and improbable and probable concepts (Walstad, et al., 2007).

*Implicit application* entails that students apply economic concepts when the concepts are not explicitly mentioned, and distinguish between correct and incorrect, and improbable and probable concepts that are not specifically given (Walstad, *et al.*, 2007).

**Table 2.2: Macroeconomic: Content and Cognitive Specifications**

Content category	Cognitive categories			Total (Per cent)
	Recognition and understanding	Explicit Application	Implicit Application	
<b>A: Measuring Aggregate Performance</b> <i>GDP and its components, real vs. nominal values, unemployment, inflation</i>	1	2, 11, 19		4 (13.3)
<b>B: Aggregate Supply and Demand</b> <i>Potential GDP, economic growth and productivity, determinants and components of aggregate supply and demand, income and expenditure approaches to GDP, the multiplier effect.</i>	4, 17	3, 13, 14, 21, 23	15, 20	7.5 (25.0)
<b>C: Money and Financial Markets</b> <i>Money, money creation, financial institutions</i>	5	12, 16, 22		4 (13.3)
<b>D: Monetary and Fiscal Policies</b> <i>Tools of monetary policy, automatic and discretionary fiscal policies</i>	8, 17	6, 7, 18, 23	20, 24, 25, 27	8.5 (28.3)
<b>E: Policy Debates and Applications</b> <i>Policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability.</i>	9	10	26	3 (10)
<b>F: International (Macro)</b> <i>Balance of payments, exchange rate systems, open-economy macroeconomics</i>		30	28, 29	3 (10)
<b>Total (Per cent)</b>	6 (20.0)	16 (53.3)	8 (26.6)	30 (100)

Source: Walstad, *et al.*, 2007

Taking into account Table 2.1 and Table 2.2 above, it can be seen that 53.3 per cent of the questions are explicit application and 26.6 per cent are implicit application questions and are therefore, according to Walstad, *et al.* (2007), consistent with the aim of the TUCE which is to emphasise the ability to apply economic principles to real problems.

### ***Overall TUCE results***

The test data for the fourth edition of the TUCE provides a large national sample of college and university students that were enrolled in a principles of microeconomics or principles of macroeconomics course. In 2005, the TUCE fourth edition was distributed to over 10 000

students. The microeconomic and macroeconomic test questions were distributed to 5 480 and 5 517 students, respectively, across the United States (Walstad, *et al.*, 2007).

The main groups that were used to calculate the average score for TUCE-4 were the matched samples, thus comprising the same students who took both the pre- and post- micro- or macroeconomic TUCE test. There was a total of 3 255 students who took the microeconomic pre- and post-test and 2 789 students who took the macroeconomic pre- and post-test (Walstad, *et al.*, 2007). The reason why the matched scores are used for an average interpretation of the TUCE-4 results is that the differences in the pre-test and post-test scores indirectly control for the characteristics of these students (Walstad, *et al.*, 2007).

*Table 2.3* below displays the overall aggregate statistic results for the TUCE norming sample. The mean score for the pre-test for the microeconomic section of the test was 9.39 out of a score of 30, or 31.3 per cent. The mean score for pre-test for the macroeconomic section of the test was 9.80 out of a score of 30, or 32.7 per cent (Walstad, *et al.*, 2007). These results of the TUCE-4 indicate that the students who completed the test found the test challenging, and this is clear in the high failure rate category (Walstad, *et al.*, 2007). Walstad, Watts and Rebeck reported that the scores for the test were so low that the students were close to guessing.

The post-test results for both the microeconomic and macroeconomic parts of the TUCE improved at the end of the semester, and is significant. The post-test score for the microeconomic part of the TUCE improved to 43 per cent and the post-test score for the macroeconomic part of the TUCE improved to 47 per cent. The overall post-test mean score is 45 per cent, indicating a relatively low economic literacy level, even after a semester or years' worth of economics instruction. Walstad, *et al.* (2007) suggested that an overall post-test mean score of 50 per cent is desirable.

Although the overall scores are low, the absolute differences between the pre-test and post-test scores indicate significant improvement in the learning of economics. The microeconomic results increased by 36 per cent and the macroeconomic results increased by 45 per cent.

**Table 2.3: Aggregate Statistics for TUCE Norming Sample**

	Microeconomics	Macroeconomics
<b>Total Tested</b>		
Matched (Pre and Post)	3255	2789
Pretest only	1621	2022
Posttest only	604	706
<b>Total</b>	<b>5480</b>	<b>5517</b>
<b>Mean Scores</b>		
<i>Matched</i>		
Pretest	9.39	9.80
Posttest	12.77	14.19
Change (%)	36%	45%
<i>Unmatched</i>		
Pretest total	9.37	9.76
Posttest total	12.59	14.06
Change (%)	34%	44%

Source: Walstad, et al., 2007

Table 2.4 below reports the individual scores for each of the microeconomic and macroeconomic TUCE questions. It appears from the results in Table 2.4 below that students struggled with most of the questions. Furthermore, correct answers with more than 50 per cent were obtained to only six microeconomic and twelve macroeconomic questions. Overall, it seems that students struggle more with microeconomics than with macroeconomics. With regard to the microeconomic content categories, on average, majority of students obtained 50 per cent or less on basic economic problems, 57 per cent on markets and prices, 75 per cent on theories of firms, 67 per cent on factor markets, 71 per cent on the microeconomic role of the government, and 67 per cent on international (micro).

With regard to the macroeconomic content categories, on average, 25 per cent of students obtained 50 per cent or less on measuring aggregate performance, 44 per cent on aggregate supply and demand, 50 per cent on money and financial markets, 60 per cent on monetary and fiscal policy, 100 per cent on policy debates and application, and 67 per cent on international (macro).

**Table 2.4: Item Analysis for Micro and Macro pre-post testing**

Micro Pre-Post Matched			Macro Pre-Post Matched		
Question	Per cent Correct Pre-test	Per cent Correct Post-test	Question	Per cent Correct Pre-test	Per cent Correct Post-test
1	39	50	1	23	53
2	33	40	2	49	61
3	36	50	3	46	69
4	14	57	4	36	46
5	40	46	5	11	59
6	23	46	6	33	47
7	45	49	7	51	60
8	21	37	8	41	50
9	22	31	9	22	33
10	37	44	10	35	41
11	11	32	11	34	59
12	24	45	12	40	55
13	37	50	13	56	63
14	30	45	14	25	48
15	22	34	15	50	61
16	43	50	16	28	38
17	32	43	17	31	37
18	30	41	18	17	45
19	43	43	19	33	40
20	17	31	20	51	60
21	43	45	21	20	42
22	56	59	22	18	33
23	24	31	23	26	36
24	41	49	24	26	33
25	23	34	25	44	60
26	29	34	26	22	31
27	29	41	27	17	33
28	24	35	28	35	51
29	31	37	29	25	34
30	41	49	30	34	44

Source: Walstad, et al., 2007

The test results in *Table 2.4* above indicate the degree of consistency in measuring student performance. The reliability of the test results are captured in *Table 2.5* below. The test results in *Table 2.4* above indicate the degree of consistency in measuring student performance. The reliability of the test is measured by means of the Cronbach alpha coefficient. The Cronbach alpha is a coefficient of internal consistency and is estimated to measure the reliability of tests. The value of the alpha coefficient varies between a value of zero and one. Higher values are most desirable, indicating a highly reliable test. The alpha

coefficients for the TUCE test are acceptable, indicating internal consistency with the alpha coefficient for the microeconomic test being 0.70, and 0.77 for the macroeconomic test.

**Table 2.5: Reliability of test results**

	Microeconomics	Macroeconomics
<b>Reliability</b>		
<i>Coefficient alpha</i>		
Matched and Unmatched-Post	0.70	0.77
<i>Standard Error of measurement</i>		
Matched and Unmatched-Post	2.58	2.53

Source: (Walstad, et al., 2007).

Table 2.5 above further reports the *standard error of measurement* which indicates the variation between test scores amongst students. The standard error of measurement for the microeconomic post-test score was 2.58, and 2.53 for the macroeconomic post-test score. Therefore, in approximately two-thirds of the scores obtained, the error of measurement will be 2.58 or less for microeconomics and 2.53 or less for macroeconomics. The smaller the standard error of measurement is, the more accurate is the test as a measuring instrument for student achievement.

To conclude, a test of understanding college economics in the United States has been used for over 40 years. The main objective of the TUCE is to offer a reliable and valid assessment instrument to test economic literacy of students in principles of economics courses. From the results, it was clear that students in the US were not performing well in the test of economic literacy after a one-year introductory economics course, although improvement in their knowledge of economics was experienced. This raises the question whether or not the TUCE is an appropriate measure for testing economic literacy in South Africa?

#### 2.2.4.4 How the TUCE is used: Case studies.

As stated above the TUCE has been used for many years to test for economic literacy. Besides, from testing economic literacy the TUCE is used by many researchers as a method to test the effect of: technology in the classroom, high school economics curriculum, class size, online homework tools, and the internet on economic literacy. Each of the above-mentioned aspects will be discussed below.

### ***The impact of the internet on economic education***

Using internet resources in economic education have been identified to have two major advantages for students: Firstly, resources that can be found on the internet complement classroom instruction and secondly it teaches students how to work with the internet and assist them for future academic and career paths (Agarwal & Day, 1998). A study done by Agarwal & Day (1998) tested the impact of internet on economic education.

Differences in student learning and retention resulting from internet implementation were measured using the TUCE-3. The TUCE was administered as part of the final exam, and counted five per cent of the student's grade (Agarwal & Day, 1998). In the study done by Agarwal & Day (1998) regression models were used to test student learning and retention as measured by the scores received on the TUCE. The results in this study indicated that students who made use of the internet performed better on the TUCE and had higher final grades.

### ***Teaching with technology: Does access to computer technology increase student performance?***

A study done by Harter & Harter (2004) focused on determining whether using computer technology as a supplement to classroom activities actually enhances student achievement in introductory economics.

Harter & Harter (2004) tested the effectiveness of new web pages. The students were tested on basic economic concepts where eleven multiple-choice questions were chosen to be representative of the important concepts. Harter & Harter took four questions from the TUCE-3 and the authors wrote the remaining seven questions. The eleven questions remained the same over four semesters. During the first semester, the web pages were not in place and therefore the first semester was used as the control group. During the three semesters that followed, web pages were used. The results of the study done by Harter & Harter (2004) indicated that adding web pages to assist with learning does not increase student performance on multiple-choice questions.

Furthermore, a study done by Sosin *et al* (2004) determined whether technology-enhanced introductory economics courses are more effective than traditionally taught courses. Sosin *et al* (2004) used the TUCE as a measure of student performance. The TUCE was used as a pre- and a post test, testing the differences between non-tech instruction and tech instruction.

Results from this study indicated that the mean differences in the TUCE scores for the micro courses are 4.7 and 4 for non-tech and tech respectively and 3.6 and 3 for the macro courses. Overall, Sosin *et al* (2004) found that technology use in some cases enhance student performance and others do not – it depends on the type of technology that is used.

### ***The effects of the high school economics curriculum on learning in the college principle economic class.***

There is conflicting literature on whether taking a high school economics class affects initial knowledge and learning in undergraduate economics classes. A study done by Lopus (1997), suggest that the conflicting results may not reflect the quality of high school economics per se but may reflect the variation in high school economics content and curriculum. Lopus (1997) used the data that was obtained from the norming sample of the TUCE-3 where a total of 2888 students participated in the macroeconomic pre- and post-test and 3052 students participated in the microeconomic pre- and post-test. As part of the TUCE questionnaire students were asked to indicate whether or not they had taken high school economics and what kind of economics was covered.

Lopus (1997) found that students whose high school economics classes covered macro- and microeconomics entered college principles of economics classes with more knowledge than the students with no high school-level economics.

### ***Class size***

Does class size affect achievement in introductory economics? A study done by Kennedy and Siegfried (1997) addressed this question by using the TUCE-3. The data was consolidating that each observation represented a single class rather than a single student. Kennedy and Siegfried (1997) found that that larger class size does not reduce learning in principles of economics. Kennedy and Siegfried stated that the reason class size does not reduce learning is that large instructors of introductory economics classes do not change their behaviour as class size changes.

### ***Online homework tools***

A study done by Lee, Courtney and Balassi (2010) investigated the effect on student learning of an online homework tool (Aplia) compared to the more traditional instructor-assigned and graded homework. The study done Lee, Courtney and Balassi (2010) was conducted over three semesters (fall, 2007, spring, 2008 and fall 2008). In the fall of 2007 traditional graded

homework was used. In the spring and fall of 2008 *Aplia* was used. Lee, Courtney and Balassi (2010) compared the average TUCE-4 scores achieved by students using the different homework methods. The improvement in average scores ranged from 5.35 to 5.48 points and the differences in scores between the pre- and post-test scores are significant. However, overall results indicated while students significantly improved their understanding of economics, measured by the TUCE, this improvement does not appear to be affected by use of different homework methods. The only statistically significant predictors in this study were mathematics (Lee, Courtney and Balassi, 2010).

### 2.2.5 Taking into account the scholarship of teaching and learning: What is the effect of a one year economic course?<sup>10</sup>

When looking at the international literature on the topic of “The effect of economics?” it seems to be a rather controversial topic with different opinions on the matter.

The first and most common reference to the topic of the effect of introductory economics is that of George Stigler. Stigler offered the hypothesis that a test should be conducted by selecting an adequate sample of seniors, equally divided between those who have never had a course in economics and those who have had a conventional one-year course. If both of these groups are given the same test on current economic problems, Stigler (1963) predicted that they would not differ in their performance (Stigler, 1963). The feasibility of testing the hypothesis proposed by Sigler is argued to be impracticable, since it requires a large nationwide sample essential to adequately test the hypothesis in its original form (Saunders, 1980). A study done by Saunders (1980) contradicted the hypothesis stated by Stigler (1963) revealing that introductory economics does appear to have some affect.

Contradicting Sigler’s hypothesis was that of Saunders & Bach (1970) who found that those students who have had an introductory economics course lost on average about 10 per cent of the score which they had attained at the end of their introductory course. Nevertheless , the score of those seniors were significantly higher than a similar group of students who were yet

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<sup>10</sup> The size of the effect that introductory economics has on a student’s economic literacy score will be determined in Chapter 7. It needs to be noted that this is not the primary objective of this study and the literature as well as the analysis is additional.

to complete an introductory economic course, however those students who enrolled in additional economics course were found to have a higher test score when compared to the score attained at the end of their introductory course (Saunders & Bach, 1970).

A similar study done by Walstad & Allgood (1999) found that seniors who have had an introductory economics course on average achieved 14 per cent higher scores than those who have not. Regrettably the study concluded that economic education does not have a significant impact on a student's economic knowledge (Walstad & Allgood, 1999).

Furthermore, an econometric study done by Crowley & Wilton (1974) found that students who have enrolled in an introductory economics course acquired new economic knowledge. They also found that students who have completed an introductory economics course significantly improved their results on a post-test test on economic principles (Crowley & Wilton, 1974).

A more recent study done by Tang & Robinson (2004) found that both those students who have completed an introductory economics course and those who have not, attained similar economic knowledge and informal reasoning skills. Furthermore, there were no significant difference in the results between the two groups when considering non-technical economic issues, while those students who have completed an introductory course did outperform those who did not complete such a course in the case of technical economic knowledge (Tang & Robinson, 2004). The conclusion which can be made from this particular study is that those students who have completed an introductory economics course only outperformed those who did not on textbook questions, yet when considering economic reasoning skills both groups had similar results. This is in line with Stigler's hypotheses, although his hypothesis required college seniors or persons five years out of college whereas the study by Tang & Robinson (2004) tested students prior to and directly after the introductory course.

## **2.3 Conclusion**

Economic education is a field within economics that focuses on the scholarship of teaching and learning economics. It was established in this chapter that research on economic education includes: the current state of the economics curriculum, efforts to improve the economics curriculum, materials and educational techniques used to teach economics at all education levels, research into the effectiveness of alternative instructional techniques in

economics, the levels of economic literacy of various groups and of the factors that influence the level of economic literacy. Techniques and materials that are used in teaching in order to improve economic literacy are: cases, cooperative learning, media, response systems and economics blogs. Through the use of these techniques and materials, one can ensure the development and improvement of economic education, ensuring the further development of economic literacy.

To elaborate on economic education, a broad definition of economic literacy was provided. Economic literacy is the ability to apply basic economic concepts to everyday life scenarios, using both factual and conceptual knowledge, given economic literacy is influenced by certain factors. These factors include: students' previous knowledge of economics, mathematics, language, lecture attendance and gender.

Although certain factors may influence the economic literacy of students, a measure to test for their economic literacy needs to be set in place to determine whether individuals can apply factual and conceptual knowledge, which define economic literacy, when they are confronted with everyday economic events. The United States of America is at the forefront in testing economic literacy levels. The National Council on Economic Education have several economic literacy tests that are used in testing for economic literacy. They are: Basic Economics Test which is used for upper-grade levels of elementary school; Test of Economic Knowledge which is used for middle schools and lower-grade high schools; Test of Economic Literacy which is used in upper-grade levels of high school; and Test of Understanding in College Economics used for undergraduate level, primarily targeting introductory- or principles-level coursework in economics. Since first-year economics students are targeted in this study, attention was drawn to the Test of Understanding College Economics, as discussed in this chapter.

The TUCE tests the hypothesis that a one-year college economics course has no lasting effect. It also aims to offer a reliable and valid assessment instrument for students in principles of economics courses; and to provide norming data for a large, national sample of students in introductory economic classes. The results of the TUCE as reported by Walstad, Watts and Rebeck (2007) indicated that the majority of students struggled with the questions of the TUCE, with the mean scores for the microeconomic and macroeconomic test reported as 31.3 per cent 32.7 per cent, respectively. This raises the question whether or not the TUCE is an appropriate measure of testing economic literacy in South Africa?

*Chapter 3* reports the results of using the U.S. version of the TUCE as a measure for testing economic literacy in South Africa, using the North-West University, Potchefstroom Campus, as a sample.

## Chapter 3

### Using the TUCE is a measure of economic literacy in South Africa

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#### 3.1 Introduction

The previous chapter provided a literature overview on what research in economics education is, and what the techniques and resources are that improve economic education. The definition of economic education was further extended to include economic literacy and what economic literacy entails. It was argued that economic literacy is the ability to apply basic economic concepts to everyday life scenarios, using both factual and conceptual knowledge.

Literature has suggested that a test for economic literacy needs to be set in place by academia to determine whether individuals, specifically undergraduate economics students, can apply factual and conceptual economic knowledge. In the United States, the Council for Economic Education developed several economic literacy tests that are used in the testing for economic literacy. They are: Basic Economics Test; Test of Economic Knowledge; Test of Economic Literacy; and Test of Understanding in College Economics (TUCE) used for undergraduate level, primarily targeting students of introductory- or principles-level coursework in economics. Since first-year economics students are targeted in this study, focus was shifted towards the TUCE and it was discussed in further detail.

The TUCE consists of two parts (microeconomics and macroeconomics). In 2005, the test was distributed to a number of introductory economic students at universities in the United States in order to test their economic literacy levels. The results of the TUCE indicated that the majority of students struggled with the questions of the TUCE, with the mean scores for the microeconomic and macroeconomic tests reported as 31.3 per cent and 32.7 per cent, respectively.

This chapter will investigate whether or not the TUCE as a test of economic literacy, as described in Chapter 2, is a useful measure of economic literacy in South Africa. The TUCE may be an inappropriate measure of testing for economic literacy in South African since students may not have the prior learning or prior knowledge expected in the TUCE. Economics is not a required subject course in high school from Gr10 – Gr12 and thus the number of students choosing economics as subject is low. According the Department of

Basic Education in South Africa, in 2012, only 134 369<sup>11</sup> students were enrolled for economics as a subject out of the 511 152 students who wrote the National Senior Certificate examination. Therefore, South African students enrolling for a *Bachelor of Commerce* degree at a tertiary institution may have limited knowledge of economics.

In order to test the TUCE, certain questions will be selected from the TUCE. A sample of 15 microeconomic and 15 macroeconomic questions were selected from the TUCE. After the questions were selected, this sample of questions from the TUCE were distributed to a sample of introductory economics students at the North-West University, Potchefstroom Campus, as a pre-test and post-test.. The results from the selected TUCE questions were interpreted and analysed and the results are described in the remained of the chapter.

## **3.2 The TUCE as a test of economic literacy**

### **3.2.1 Introduction**

In Chapter 2, economic literacy was defined as the ability to apply basic economic concepts to everyday life scenarios (Salemi, 2005). In order to apply basic economic concepts, an individual is required to rely on conceptual knowledge.

Certain TUCE questions are, however, based on very specific factual economic knowledge and may therefore not be suitable for testing a student's general knowledge of the subject or the ability to apply basic economic knowledge. *Table 3.1* below contains specific TUCE questions that can be considered as testing theoretical knowledge of the subject, without which, the question cannot be answered.

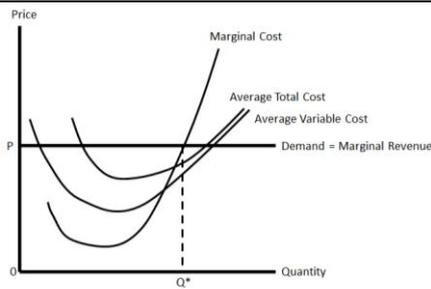
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11 From the 134 369 students, only 97 842 students passed economics.

**Table 3.1: Sample of theoretical TUCE questions**

TUCE Question	Theoretical knowledge required in order for a student to answer the TUCE question
<b>Microeconomics</b>	
<b>Question</b>	
<p>At the profit maximising level of output, a purely competitive firm will:</p> <ol style="list-style-type: none"> <li>1. Produce the quantity of output at which marginal cost equals price.</li> <li>2. Produce the quantity of output at which marginal cost is minimised</li> <li>3. Keep marginal cost lower than price, so profits will be greater than zero</li> <li>4. Try to sell all the output it can produce, to spread fixed costs across the largest possible number of units.</li> </ol> <p>(Walstad, <i>et al.</i>, 2007)</p>	<p>In order to answer this question a student needs to know the definition of a purely competitive firm: It involves a large number of firms producing a standardised product. New firms can enter or exit the industry easily (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013)</p> <p>With regard to profit, the firm compares the amounts that each additional unit of output would add to total revenue and to total cost. In other words, the firm compares the marginal revenue and the marginal cost of each successive unit of output (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p> <p>The profit maximising guide is known as the <math>MR = MC</math> rule but the rule can be restated as <math>P = MC</math> when applied to a purely competitive firm because the demand schedule faced by a competitive seller is perfectly elastic at the going market price, product price and marginal revenue are therefore equal (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p>
<b>Question</b>	
<p>The demand for a factor of production will usually be more elastic when:</p> <ol style="list-style-type: none"> <li>1. Few close substitutes for the factor exist.</li> <li>2. The time period under consideration is very short</li> <li>3. Demand for the product the factor produces is highly elastic</li> <li>4. The factor's consist is a small part of the final product's total cost of production</li> </ol> <p>(Walstad, <i>et al.</i>, 2007)</p>	<p>Firstly, a student needs to identify what is meant by The factor's consist is a small part of production. Production factors include: labour, capital, entrepreneurial ability and natural resources (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p> <p>Secondly, a student needs to understand the concept of Price elasticity of demand. The law of demand states that a consumer will buy more of a product when the price of the product decreases and less of a product when the price increases. The responsiveness of consumers to price changes is price elasticity of demand (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p>

<b>Question</b>	
<p>A firm is most likely to monopolise a market whenever:</p> <ol style="list-style-type: none"> <li>1. It has a u-shaped average total cost curve.</li> <li>2. Fixed capital costs are small relative to total costs.</li> <li>3. Economies of scale are larger relative to market demand</li> <li>4. Income elasticity of demand is high for the firm's product.</li> </ol> <p>(Walstad, <i>et al.</i>, 2007)</p>	<p>A student needs to be able to identify what is a monopoly. A monopoly exists when a single firm is the sole producer of a product where there are no close substitutes (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p> <p>Furthermore, students are required to recall knowledge of how a monopoly is graphically illustrated and furthermore recall knowledge of certain cost concepts, as well as income elasticity.</p>
<b>Question</b>	
<p>As a firm increases its output level in the short run, the costs of producing additional units of output eventually increase because of:</p> <ol style="list-style-type: none"> <li>1. diseconomies of scale</li> <li>2. diminishing marginal returns</li> <li>3. increases in average fixed costs</li> <li>4. specialisation and division of labour.</li> </ol> <p>(Walstad, <i>et al.</i>, 2007)</p>	<p>Diseconomies of scale: increases in the average total cost of producing a product as the firm expands the size of its plant in the long run (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p> <p>Diminishing marginal returns is the principle that as successive increments of a variable resource are added to a fixed resource, the marginal product of the variable resource will eventually decrease (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013). Specialisation and division of labour is based on the invisible hand theory of Adam Smith. Specialisation and division of labour will result in the increase in output (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p>

**Question**

Which of the following is true for this profit-maximising firm at price P in the graph above?

1. It is not earning any economic profits
2. It is currently earning short-run economic profits
3. It should shut down to minimise its economic losses
4. It will continue to earn economic profits in the long run.

In order for a student to answer this question, a clear knowledge of microeconomics theory is required.

A student needs to be able to identify the graph as being that of a perfect competitive firm making an economic profit, since marginal revenue is greater than average total cost (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013)

This occurrence will only happen in the short run, since in the long run a normal profit is current (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

**Question**

One way in which monopolistic competition and oligopoly are similar is that typically, in both kinds of industries:

1. there are no barriers to entry for firms.
2. each firm has a small share of the market for a product.
3. there are a large number of independent firms selling similar but differentiated products
4. resources are under allocated to the production of goods and services produced by these firms at their profit-maximising level of output.

(Walstad, *et al.*, 2007)

A clear fundamental knowledge of monopolistic competition and oligopoly are necessary since characteristics of both the monopolistic competition and oligopoly are listed in the multiple-choice options (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

**Macroeconomics****Question**

The basic money supply (M1) in the United States consists primarily of:

1. currency and checkable deposits.
2. currency and government bonds.
3. currency, checkable deposits, and government bonds.
4. currency, checkable deposits and credit card accounts

(Walstad, *et al.*, 2007)

The definition of money supply (M1) can be defined as coins and banknotes in circulation, cheques, transmission deposits and demand deposits. Therefore, a definition of money supply is needed in order for a student to successfully answer the question (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Question	
<p>Increased government budget deficits cause crowding out if:</p> <ol style="list-style-type: none"> <li>1. imports are decreased more than exports.</li> <li>2. a recession causes businesses to lower prices or shut clown.</li> <li>3. Private investment spending for capital goods is decreased.</li> <li>4. spending on projects funded by the deficit increases households' spending on goods and services.</li> </ol> <p>(Walstad, <i>et al.</i>, 2007)</p>	<p>An understanding and knowledge of the term 'crowding out' is necessary in order for a student to answer the question regarding crowding out.</p> <p>Crowding out entails the rise in interest rates and a resulting decrease in planned investment caused by the government's increased borrowing to finance budget deficits and refinance debt (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, <i>et al.</i>, 2013).</p>

Students who do not have some background in economics have a small chance of correctly answering the questions mentioned in *Table 3.1* above correctly. If the questions were formulated in a different way, or more background on a certain aspect were presented, a student with no higher level (Gr10 – 12 economics) of understanding or knowledge of economics may be able to interpret and argue a particular question. Otherwise, one would probably struggle.

### 3.2.2 Sample selection of the TUCE

Certain TUCE questions are written in the US context and some of the economic curricula that are covered in the TUCE are not covered at the North-West University. Certain questions in the TUCE are based on the assumption that students answering the TUCE have already developed an understanding of economics, since a one-credit economics course is required in high schools in the United States. Economics in South Africa as subject in high school is an elective subject (Gr10 – 12) and few students choose economics in high school. It is therefore unreasonable to ask South African students questions that test knowledge of topics that they have never heard of, nor have had any exposure to before. Thus, from the 60 TUCE questions, 30 questions that are applicable for the South African context and curriculum were picked for the study. The introductory economics curriculum at the North-West University was used as a guideline when the samples of questions were selected. The curriculum of the North-West University was used since it is a broad curriculum which is used in general in South Africa. Most of the topics which are covered in introductory economics courses across South Africa are similar. *Table 3.2* and *Table 3.3* below specify

the questions that were selected out of each of the six TUCE categories for the microeconomic and macroeconomic section of the test.

**Table 3.2: Microeconomic questions picked from the TUCE**

Question classification		Full set of TUCE Questions	15 Questions picked	New Question numbers
<b>A</b>	Basic problem (Scarcity, opportunity cost, choice)	8, 10	8, 10	9, 11
<b>B</b>	Markets and Prices (Supply, demand, utility, elasticity, price ceilings and floors)	1, 2, 3, 9, 11, 18, 19	1, 2, 9, 18, 19	5,6,10,13,14
<b>C</b>	Theories of firms (Revenues, costs, marginal analysis, market structures)	4, 11, 12, 14, 17, 21, 20, 22, 13	22	15
<b>D</b>	Factor Markets (Wages, rents, interest, profits, income distribution)	5, 23, 24	5, 23	7,16
<b>E</b>	Role of Government (Public goods, externalities, taxation, income redistribution, public choice)	6, 25, 27, 7, 15, 16, 26	6, 27, 16	8,17,12
<b>F</b>	International Economics (Comparative advantage, trade barriers, exchange rate)	28, 29, 30	29, 30	18,19

**Table 3.3: Macroeconomic questions picked from the TUCE**

Question classification		Full set of TUCE Questions	15 Questions picked	New Question numbers
<b>A</b>	Measuring aggregate performance (GDP and its components, real vs. nominal, unemployment ,inflation)	1, 2, 11, 19	1, 2, 11	20,21,26
<b>B</b>	Aggregate supply and aggregate demand (Potential GDP, economic growth, and productivity, determinants and components of AS and AD, income and expenditure approaches to GDP, the multiplier effect)	4, 17, 3, 13, 14, 21, 23, 15, 20	4, 17, 21	22,27,29
<b>C</b>	Money and financial markets (Money, money creation, financial institutions)	5, 12, 16, 22	5	23
<b>D</b>	Monetary and fiscal policies (Tools of monetary policy, automatic and discretionary fiscal policies)	8, 17, 6, 7, 18, 23, 20, 24, 25, 27	6, 7, 18, 23	24,25,28,30
<b>E</b>	Policy debates (Policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability)	9, 10, 26	26	31

Question classification		Full set of TUCE Questions	15 Questions picked	New Question numbers
F	International economics (Balance of payments, exchange rate systems, open-economy macro)	28, 29, 30	28, 29, 30	32,33,34

### 3.2.3 Empirical results

Subsequently, the TUCE test was tested at North-West University to determine how students at the *Potchefstroom campus* performs in the TUCE. The test was applied as a pre-test and a post-test in order to measure economic literacy at the beginning of the year and to determine whether or not any learning activity had taken place after a year of introductory economics instruction.

During the first week of February 2013, a test comprising 30 preselected TUCE questions was completed by 1006 first-year students, for the pre-test. During the first week in September 2013, 760 first-year students completed the post-test of the same 30 preselected TUCE questions.

#### 3.2.3.1 Pre-test results

One thousand and six first-year introductory economics students completed the pre-test of 30 pre-selected TUCE questions in February 2013.

Out of the 1006 students, 56.1 per cent were female and 47.8 per cent were male. The majority of students were between the ages of 18 and 20 and spoke Afrikaans, and 73.8 per cent of the students did not have economics as subject in Gr 12. The descriptive statistics of the demographic information of the students answering the pre-selected TUCE questions are presented in *Table 3.4* below.

**Table 3.4: Demographic Information**

	Frequency	Per cent	Cumulative Percentage
<b>Gender</b>			
Did not answer	6	.6	.6
Male	481	47.8	48.3
Female	519	51.6	100.0
Total	1006	100.0	
<b>Age in years</b>			
Did not answer	6	.6	.6
18-20	915	91.0	91.6
21-23	76	7.6	99.1
24 and older	9	.9	100.0
Total	1006	100.0	
<b>Language</b>			
Did not answer	4	.4	.4
Afrikaans	852	84.7	85.1
English	74	7.4	92.4
Setswana	41	4.1	96.5
Other	35	3.5	100.0
Total	1006	100.0	
<b>High School Economics</b>			
Did not answer	12	1.2	1.20
Yes	251	25.0	25.6
No	743	73.8	100.0
Total	1006	100.0	

The overall results for the pre-test were poor. The poor test results for the pre-test can be attributed to a lack of economic background. Of the 743 students who were not enrolled for economics in Gr12, only 6.9 per cent of students passed the TUCE pre-test.

*Table 3.5* below and *Table 3.6* below indicate the percentage of students who answered the TUCE test questions correctly. The overall average percentage score for the pre-test was 28.40 per cent. The average percentages for the microeconomic and macroeconomic pre-test questions that were answered correctly were 31.01 per cent and 26.78 per cent, respectively. Students performed significantly worse in certain questions, specifically question nine on the topic of basic economic problem, question ten on the topic of markets and prices, question 18 on the topic of international economics, question 23 on the topic of money and financial markets, question 26 on the topic of measuring aggregate performance, question 29 on aggregate demand and supply, and question 30 on monetary and fiscal policy.

**Table 3.5: Percentage correct microeconomic questions**

Question number	Frequency	Percentage
5	227	22.6
6	347	34.5
7	362	36.0
8	374	37.2
9	40	4.0
10	185	18.4
11	234	23.3
12	375	37.3
13	442	43.9
14	409	40.7
15	556	55.3
16	280	27.8
17	297	29.5
18	115	11.4
19	285	28.3
<b>Average</b>		<b>31.01</b>

**Table 3.6: Percentage correct macroeconomic questions**

Question number	Frequency	Percentage
20	265	26.3
21	550	54.7
22	361	35.9
23	98	9.7
24	344	34.2
25	406	40.4
26	153	15.2
27	204	20.3
28	131	13.0
29	156	15.5
30	183	18.2
31	274	27.2
32	257	25.5
33	377	37.5
34	283	28.1
<b>Average</b>		<b>26.78</b>

The TUCE categorises questions into classifications which are used to interpret results in groups, rather than to interpret the results one question at a time. The average percentage of students that correctly answered the questions for each of the classifications for the microeconomic and macroeconomic sections are reported in *Table 3.7* below and *Table 3.8* below.

**Table 3.7: Microeconomic – Average percentage correct for each classification**

Question classification		<sup>12</sup> Average
<b>A</b>	Basic problem (Scarcity, opportunity cost, choice)	13.7
<b>B</b>	Markets and Prices (Supply, demand, utility, elasticity, price ceilings and floors)	32.4
<b>C</b>	Theories of firms (Revenues, costs, marginal analysis, market structures)	55.3
<b>D</b>	Factor Markets (Wages, rents, interest, profits, income distribution)	31.9
<b>E</b>	Role of Government (Public goods, externalities, taxation, income redistribution, public choice)	26.7
<b>F</b>	International Economics (Comparative advantage, trade barriers, exchange rate)	19.9

*Source: Compiled by author*

**Table 3.8: Macroeconomic - Average percentage correct for each classification**

Question classification		Average
<b>A</b>	Measuring aggregate performance (GDP and its components, real vs. nominal, unemployment, inflation)	32.1
<b>B</b>	Aggregate supply and aggregate demand (Potential GDP, economic growth, and productivity, determinants and components of AS and AD, income and expenditure approaches to GDP, the multiplier effect)	23.9
<b>C</b>	Money and financial markets (Money, money creation, financial institutions)	9.7
<b>D</b>	Monetary and fiscal policies (Tools of monetary policy, automatic and discretionary fiscal policies)	26.4
<b>E</b>	Policy debates (Policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability)	27.2
<b>F</b>	International economics (Balance of payments, exchange rate systems, open-economy macro)	30.4

*Source: Compiled by author*

In the microeconomics pre-test, the classification on theories of firms yielded the highest percentage of students that correctly answered the question in the classification, a percentage of 55.3 per cent, and the classification on the basic economic problem yielded the lowest percentage of students who answered the questions correctly, a percentage of 13.7 per cent. With regard to the macroeconomic section, the classification measuring aggregate performance yielded the highest percentage of students that correctly answered the questions in the classification, a percentage of 32 per cent, and the classification money and financial markets yielded the lowest, at a mere 9.7 per cent. Unlike the case in TUCE in the United States, it seems that South African student's struggle more with macroeconomics than with microeconomics.

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<sup>12</sup> A student should have had to answer all the questions correctly in the specific classification to be listed here.

It is clear from the results that students struggled with the pre-selected TUCE questions, with the majority of students failing the test of economic literacy. It seems from the results that students may have difficulty with some of the questions owing to their limited exposure to the subject field of economics. The majority of the questions asked in the TUCE include economic terms such as economic rent, marginal, monopoly and perfect competition. Accordingly, students without previous knowledge of the subject will have difficulty grasping these terms.

### *3.2.3.2 Post-test results*

Seven-hundred and sixty introductory-level economics students at the North-West University, Potchefstroom Campus, completed the post-test of the 30 preselected TUCE questions in September 2013. The same test was used in the post-test, than in the pre-test.

Out of the 760 students, 55.2 per cent were female and 44.6 per cent were male. The majority of students were between the ages of 18 and 20 and spoke Afrikaans. The greater part of the students did not take economics as a subject in high school, in comparison with 24 per cent of students that had taken economics in high school. The descriptive statistics of the demographic information of the students answering the preselected TUCE questions are set out in *Table 3.9* below.

**Table 3.9: Descriptive statistics of demographic information**

	Frequency	Percentage	Cumulative Percentage
<b>Gender</b>			
Did not answer	1	.1	.1
Male	339	44.6	44.8
Female	419	55.1	100.0
Total	760	100.0	
<b>Age</b>			
Did not answer	2	.3	.3
18-20	681	89.6	89.9
21-23	64	8.4	98.3
24 and older	13	1.7	100.0
Total	760	100.0	
<b>Language</b>			
Afrikaans	639	84.1	84.1
English	53	7.0	91.1
Setswana	31	4.1	95.1
Other	37	4.9	100.0
Total	760	100.0	
<b>High school economics</b>			
Did not answer	6	0.79	0.79
Yes	179	23.6	24.4
No	575	75.7	100.0
Total	760	100.0	

*Source: Compiled by author*

The overall average percentage score for the post-test was 34.97 per cent. The average percentages for the microeconomic and macroeconomic post-test questions that were answered correctly were 35.12 per cent and 34.75 per cent, respectively. An outline of the microeconomic and macroeconomic questions and the numbers of students who answered each question correctly are presented in *Table 3.10* and *Table 3.11* below.

**Table 3.10: Percentage correct microeconomic questions**

Question number	Pre-test Percentage	Post-test Per cent	Post-test Frequency
5	22.6	32.6	248
6	34.5	37.0	281
7	36.0	55.1	419
8	37.2	32.1	244
9	4.0	5.0	38
10	18.4	31.6	240
11	23.3	39.5	300
12	37.3	42.4	322
13	43.9	39.1	297
14	40.7	42.8	325
15	55.3	60.7	461
16	27.8	20.8	158
17	29.5	39.2	298
18	11.4	12.8	97
19	28.3	36.1	274
<b>Average</b>	<b>30.01</b>	<b>35.12</b>	

*Source: Compiled by author*

**Table 3.11: Percentage correct macroeconomic questions**

Question number	Pre-test Percentage	Post-test Per cent	Post-test Frequency
20	26.3	25.8	196
21	54.7	82.9	630
22	35.9	42.5	323
23	9.7	50.0	380
24	34.2	40.5	308
25	40.4	49.1	373
26	15.2	29.9	227
27	20.3	18.3	139
28	13.0	17.6	134
29	15.5	14.3	109
30	18.2	23.3	177
31	27.2	28.4	216
32	25.5	29.3	223
33	37.5	39.3	299
34	28.1	30.1	229
<b>Average</b>	<b>26.78</b>	<b>34.75</b>	

*Source: Compiled by author*

When comparing the pre-test scores with the post-test scores for both the microeconomic section of the test and the macroeconomic section of the test in *Table 3.10 and 3.11* it seems that students performed better in the TUCE after two semesters of economics although the results are still poor.

The average percentages for each of the question classifications for the microeconomic and macroeconomic pre-test and post-test sections are reported in *Table 3.12 and Table 3.13* below. In the microeconomic section, the classification on theories of firms yielded the highest percentage of students that correctly answered the questions in the classification, with a percentage of 60.7 per cent, and the classification on the basic economic problem yielded the lowest, at 22.3 per cent. With regard to the macroeconomic section, the classification money and financial markets yielded the highest percentage of students that correctly answered the questions in the classification, with a percentage of 50 per cent, and the classification aggregate demand and supply yielded the lowest, with 25 per cent correct.

When comparing the pre-test results with the post-test results there an improvement on every classification is apparent. With regard to the microeconomic classification, it appears that the largest change in answering questions correctly was with the classification, basic economic problem, with a 62.74 per cent improvement. The classification that presented the least improvement was factor markets, with a percentage improvement of 9.12 per cent. With regard to the macroeconomic classification, money and financial markets presented the

largest improvement, with a percentage change of 415.46 per cent. Aggregate supply and aggregate demand, on the other hand, presented the smallest improvement at 4.60 per cent.

**Table 3.12: Microeconomic - Average percentage for each classification**

Question classification		Average Pre - test	Average Post - test	Percentage improvement
<b>A</b>	Basic problem (Scarcity, opportunity cost, choice)	13.7	22.3	62.74
<b>B</b>	Markets and Prices (Supply, demand, utility, elasticity, price ceilings and floors)	32.4	36.6	12.96
<b>C</b>	Theories of firms (Revenues, costs, marginal analysis, market structures)	55.3	60.7	9.76
<b>D</b>	Factor Markets (Wages, rents, interest, profits, income distribution)	31.9	38.0	9.12
<b>E</b>	Role of Government (Public goods, externalities, taxation, income redistribution, public choice)	26.7	37.9	41.95
<b>F</b>	International Economics (Comparative advantage, trade barriers, exchange rate)	19.9	24.45	22.86

*Source: Compiled by author*

**Table 3.13: Macroeconomic - Average percentage for each classification**

Question classification		Average Pre - test	Average Post test	Percentage improvement
<b>A</b>	Measuring aggregate performance (GDP and its components, real vs. nominal, unemployment, inflation)	32.1	46.2	43.93
<b>B</b>	Aggregate supply and aggregate demand (Potential GDP, economic growth, and productivity, determinants and components of AS and AD, income and expenditure approaches to GDP, the multiplier effect)	23.9	25.0	4.60
<b>C</b>	Money and financial markets (Money, money creation, financial institutions)	9.7	50.0	415.46
<b>D</b>	Monetary and fiscal policies (Tools of monetary policy, automatic and discretionary fiscal policies)	26.4	32.7	23.86
<b>E</b>	Policy debates (Policy lags and limitations, rules vs. discretion, long run vs. short run, expectations, sources of macroeconomic instability)	27.2	28.5	4.78
<b>F</b>	International economics (Balance of payments, exchange rate systems, open-economy macro)	30.4	33.0	8.55

*Source: Compiled by author*

### 3.2.3.3 Comparing pre- and post-test results

It is clear from the pre-test and post-test results that students still struggled with the preselected TUCE questions, with the majority of students failing the post-test, notwithstanding having had two semesters of introductory economics instruction. Although the results of the post-test were not desirable, there were some improvements that took place amongst the different microeconomic and macroeconomic questions.

The absolute differences in the pre-test and post-test scores are used to calculate the percentage gain from the pre-test when looking at the percentage of questions correctly

answered. The microeconomic results indicated a 13.22 per cent increase over the pre-test score, and the macroeconomic results indicated a 33.85 per cent increase over the pre-test score. It seems from the results that some improvement did take place and the TUCE is able to measure the learning that might take place, but the percentage improvement seems small, taking into account the fact that students had undergone two semesters of economics.

Table 3.14 below indicates the percentage change in answering each question correctly. The results indicated that each question, except for questions 8, 13, 16, 20, 27 and 29, improved by between 4 per cent and 96 per cent. Question 8 on the topic of external benefits, question 9 on the topic of firm revenue, question 16 on the topic of economic rent, question 20 on the topic of fiscal policy, and question 29 on the topic of economic growth showed a decline; in other words, fewer students answered the post-test questions correctly than in the pre-test.

**Table 3.14: Comparison of pre and post TUCE results**

Question Number	Percentage Improvement	Question Number	Percentage Improvement
<b>Microeconomics</b>		<b>Macroeconomics</b>	
5	43.54%	20	-1.97%
6	7.19%	21	51.62%
7	34.82%	22	18.43%
8	-13.64%	23	80.52%
9	26.25%	24	18.52%
10	72.63%	25	21.61%
11	70.15%	26	96.65%
12	13.66%	27	-9.81%
13	-11.06%	28	35.58%
14	5.18%	29	-7.51%
15	9.90%	30	28.71%
16	-25.31%	31	4.49%
17	32.99%	32	14.86%
18	11.65%	33	5.12%
19	27.43%	34	7.54%

*Source: Compiled by author*

Table 3.15 below contains the results summary for the TUCE that was administered at the North-West University Potchefstroom campus. The pre-test average for the test was 28.40% and a post-test average of 34.97. The two tailed significance value was calculated as 0.000 which is a value less than 0.05 indicating that there is a significant difference between the pre-test score and post-test score.

**Table 3.15: Summary of results**

Pre test average	28.40%
Microeconomic average	30.01%
Macroeconomic average	26.78%
Post test average	34.97
Microeconomic average	35.12
Macroeconomic average	34.75
Significance of the difference between pre- and post-test	0.000

### 3.3 Conclusion

Literature suggests the use of the Test of Understanding College Economics in order to test for economic literacy amongst college or undergraduate students. It needs to be noted that the TUCE was developed in the United States according to their academic standards and that each high school student in the United States is required to enrol for a one-credit economic course, thus obtaining knowledge in economics before entering university or college. In South Africa, only 27 per cent of high school students enrolled for economics in Gr12 in 2012, leaving 73 per cent of high school students without having accessed formal economic knowledge.

This chapter has argued that certain questions in the TUCE cannot be answered without some existing knowledge of economics. The TUCE is, therefore, very dependent on previous knowledge of economics in order to answer the questions correctly.

An extract of 30 TUCE questions was selected from the 60 questions. The questions that were selected were not written in an American context and were applicable to the curriculum of an introductory economics course at the North-West University. Thirty of the TUCE questions were taken to test the economic literacy of students at the North-West University. The test was implemented as a pre-test (in February 2013), testing the economic literacy levels before any economic instruction took place, and at the end of the academic year (in September 2013) as a post-test after two semesters of economic instruction, thus establishing the level of improvement that took place.

It was clear from the results that students still struggled with the selected TUCE questions, with the majority of students failing the post-test after having studied two semesters of introductory economics. The reason why students may be performing poorly in the sample test of the TUCE is that the questions that are asked in the TUCE are quite theoretical and

may not test the students' true understanding of the subject field of economics. The test needs to include more applied questions on basic important economic issues so that researchers and lecturers can test whether students can think like economists and can apply certain basic theories, rather than simply memorising certain definitions and graphs.

Thus the challenge is to develop a test of the understanding of economics for South Africa, taking into account the fact that introductory economics students have had limited exposure to the field of economics and asking questions that test conceptual knowledge.

*Chapter 4* will explain the process involved in the development of the TUESA, taking into account the National Content Standards in Economics formulated by the CEE and the content of different introductory-level economics textbooks. The different categories of questions and an explanation of each question asked will be discussed.

# Chapter 4

## Development of the Test of Understanding Economics in South Africa

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### 4.1 Introduction

In the previous chapters, it was established that literature suggests the use of the Test of Understanding College Economics in order to test economic literacy amongst undergraduate economics students. Besides testing for economic literacy, the TUCE has been widely used to test the impact of specific interventions such as the technology use in the class or the use of the internet.

Chapter 3 reported the results when a group of South African students took the TUCE. It was shown that students at the North-West University, Potchefstroom Campus, struggled with the pre-selected TUCE questions, with the majority of students still failing the post-test after having had two semesters of introductory economics. The improvement that took place amongst students after a year's worth of economics instruction, was significant.

The conclusion was that the test needs to include more applied questions on basic economic issues so that researchers and lecturers can test whether students can think like economists and can apply certain basic theories, rather than simply memorising certain definitions and graphs.

It is therefore important to develop a test of understanding economics for South Africa, taking into account the fact that introductory economics students will have had limited exposure to the field of economics beforehand, while the aim is to get closer to a test of whether they can think and reason like economists.

This chapter explains the development of the Test of Understanding Economics in South Africa. Literature regarding the twenty national content standards will be provided which led to the development of TUESA

The development of TUESA will be discussed in the following sections. Firstly the Voluntary National Content Standards in Economics as well as the Framework for teaching basic economics concepts will be discussed since the questions developed for TUESA are based on the categories suggested in literature. Secondly, the questions of the TUESA will

be presented with an explanation and objective of each question, together with the basic concept in the literature from which the question was developed

## **4.2 An overview of the voluntary national content standards in economics and the framework for teaching basic economic concepts.**

The framework for teaching basic economic concepts the voluntary national content standards in economics are reviewed in this section, since the questions developed for TUESA are based on the categories suggested in the framework and content standards. The framework for teaching basic economic concepts and the voluntary national content standards in economics are documents developed by the National Council of Economic Education in the United States, which were developed to establish important basic economic concepts and make suggestions on how to teach these concepts.

### **4.2.1 A Framework for teaching basic economic concepts**

The *Framework for Teaching Basic Economic Concepts* is a project undertaken by the National Council on Economic Education and the purpose of this project was to identify a set of basic concepts for teaching economics (Saunders & Gilliard, 2000). The objective for this framework is to enable students, after mastering these concepts, to understand enough economics to make reasoned judgements about economic questions (Saunders & Gilliard, 2000).

The framework identified four main categories which include: Fundamental economic concepts, Microeconomic concepts, Macroeconomic concepts, and International economic concepts (Saunders & Gilliard, 2000). *Table 4.1* below contains an explanation of each category with the basic economic topics which are associated with each of the categories.

**Table 4.1: Framework for teaching basic economic concepts**

**Basic Economic Concepts**

*Basic economic concepts are the bases of economic understanding and decision-making. The basic economic problem confronting individuals, companies and societies is that resources are limited. Because of this, the basic condition of scarcity arises (Saunders & Gilliard, 2000).*

<b>1</b>	Scarcity and Choice	Scarcity is the condition that results from the imbalance between relatively unlimited wants and limited resources (Saunders & Gilliard, 2000).
<b>2</b>	Opportunity Cost and Trade-offs	Opportunity cost is the forgone benefit of the next best alternative when scarce resources are used. Trade-offs involves accepting or choosing less of one thing to get more of something else (Saunders & Gilliard, 2000).
<b>3</b>	Productivity	Productivity is the amount of output produced per unit of input (Saunders & Gilliard, 2000).
<b>4</b>	Economic Systems	An economic system is the collection of institutions, laws, and activities that provide a framework for economic decision-making (Saunders & Gilliard, 2000).
<b>5</b>	Economic Institutions and Incentives	Economic institutions are banks, government agencies, unions and cooperatives, whereas incentives are those factors that motivate and influence human behaviour (Saunders & Gilliard, 2000).
<b>6</b>	Exchange, Money and Interdependence	Producers produce goods and services and exchange these goods and services for money. Money was developed to facilitate exchange. Exchange reduces self-sufficiency and thus increases interdependence, meaning the decisions or events in one part of the economy or world affect the other part of the economy or world (Saunders & Gilliard, 2000).

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## Microeconomic Concepts

*Microeconomics is the study of the behaviour of the individual households, firms and markets, of how prices and outputs are determined in those markets and of how the price mechanism allocates resources and distributes income (Saunders & Gilliard, 2000).*

- |    |                                  |  |
|----|----------------------------------|--|
| 7  | Markets and Prices               | Markets are the institutional arrangements that enable buyers and sellers to exchange goods and services. Prices are the amounts of money that people pay in exchange for goods or services (Saunders & Gilliard, 2000).   |
| 8  | Supply and Demand                | Supply is the different quantities of a resource, good or service that will be offered for sale at various prices. Demand is the different quantities of a resource, good or service that will be purchased at various prices (Saunders & Gilliard, 2000).   |
| 9  | Competition and Market Structure | Market structure refers to the extent to which competition prevails in particular markets. Market structures run from highly competitive markets to those that contain only a single seller. This includes perfect competitive market, monopoly and oligopoly (Saunders & Gilliard, 2000).   |
| 10 | Income Distribution              | In an economy, individuals' incomes depend on the value of goods or services they are able to sell in the marketplace. Division of an economy's total income is called the functional distribution of income and for an individual's distribution of income, one can refer to the personal distribution of income (Saunders & Gilliard, 2000). |
| 11 | Market Failures                  | Markets function when they are reasonably competitive, when buyers and sellers have access to information, when resources are mobile and when market prices reflect the full costs and benefits. Market failures occur when there are significant deviations from these conditions (Saunders & Gilliard, 2000).                                |
| 12 | The Role of Government           | The role of the government is to provide a framework of law and order, and to safeguard the economy. A market economy cannot function without the protection of property rights and the enforcement of contracts (Saunders & Gilliard, 2000).  |
-

## Macroeconomic Concepts

*Macroeconomics is the study of the functioning of the economy as a whole, and it deals mainly with the total output and income of the economy, the total level of employment, and movements in the average level of all prices (Saunders & Gilliard, 2000).*

**13** Gross Domestic Product      Gross Domestic Product (GDP) measures the economy's level of output (Saunders & Gilliard, 2000).

**14** Aggregate Supply and Aggregate Demand      Aggregate supply is the total amount of goods and services produced by the economy during a specific time, whereas aggregate demand is the total amount of spending on goods and services in the economy during a specific time period (Saunders & Gilliard, 2000).

**15** Unemployment      Unemployment, the number of people without jobs and who are actively seeking work. The types of unemployment can be identified as: frictional unemployment, structural unemployment and cyclical unemployment.

Unemployment is measured by the unemployment rate (Saunders & Gilliard, 2000).

**16** Inflation and Deflation      Inflation is a sustained increase in the average price level of the entire economy, whereas deflation is a sustained decrease in the average price level of the entire economy. Inflation is measured by the CPI index (Saunders & Gilliard, 2000).

**17** Monetary Policy      Monetary policy affects the amount of money available in the economy and its cost (interest rates) (Saunders & Gilliard, 2000).

**18** Fiscal Policy      Fiscal policy consists of changes in taxes and government expenditure (Saunders & Gilliard, 2000).

## International Economic Concepts

*International economics is the study of economic relations among nations, including international trade and investment and international monetary relations (Saunders & Gilliard, 2000).*

**19** Absolute and comparative advantage and barriers to trade      Absolute advantage and comparative advantage is used to explain why trade takes place between countries (Saunders & Gilliard, 2000).

**20** Exchange rates and the balance of payments      An exchange rate is the price of a nation's currency in terms of another nation's currency. The balance of payment of a country is the accounting record for a given period of all the payments that the residents, business and government of one country make to the rest of the world, as well as all the receipts which they receive from the rest of the world (Saunders & Gilliard, 2000).

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Source: (Saunders & Gilliard, 2000)

## 4.2.1 Voluntary National Content Standards in Economics

The *Voluntary National Content Standards in Economics* published the second edition in 2010 by the Council for Economic Education. The standards are generalisations of basic economic principles and are the fundamental propositions of economics (Siegfried & Meszaros, 1997). The *Voluntary National Content Standards in Economics* consist of twenty standards where each standard is accompanied by a rationale for its inclusion.

These basic concepts include: scarcity, decision-making, allocation, incentives, trade, specialisation, markets and prices, role of prices, competition and market structure, institutions, money and inflation, interest rates, income, entrepreneurship, economic growth, role of the government and market failure, government failure, economic fluctuations, unemployment and inflation, and fiscal and monetary policy. *Table 4.2* below includes an explanation of each standard and how students will apply the knowledge that they have learned from the standard as presented in the *Voluntary National Content Standards in Economics* document, developed by the writing committee: Siegfried, J., Krueger, A., Collins, S., Frank, R., MacDonald, R., McGoldrick, K. and Taylor, J (Council of Economic Education, 2010).

**Table 4.2: Outline of Standards in the Voluntary National Content Standards.**

<b>Voluntary National Content Standard:</b>	<b>How students can apply the knowledge that they have learned:</b>
<b>Standard 1: Scarcity</b> Productive resources are limited. Therefore, people cannot have all the goods and services they want; As a result, people must choose certain goods or services and give up other goods or services.	Students will be able to identify what they gain and what they give up when it comes to making choices.
<b>Standard 2: Decision-Making</b> Decision-making involves comparing the additional costs of alternatives with the additional benefits thereof. Many choices involve doing more or less of something. There are few choices which are “all or nothing” decisions.	Students will be able to make effective decisions as consumers, producers, savers, investors, and citizens.

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**Standard 3: Allocation**

Different methods can be used to allocate goods and services. People acting individually or collectively must choose which methods to use to allocate different kinds of goods and services.

Students will be able to evaluate different methods of allocating goods and services by comparing the benefits to the costs of each method.

**Standard 4: Incentives**

People usually respond predictably to positive and negative incentives.

Students will be able to identify incentives that affect people's behaviour and explain how incentives affect their own behaviour.

**Standard 5: Trade**

Voluntary exchange occurs only when all participating parties expect to gain. This is true for trade among individuals or organisations within a nation, and among individuals or organisations in different nations.

Students will be able to negotiate exchanges and identify the gains to themselves and others. Compare the benefits and costs of policies that change trade barriers between nations, such as tariffs and quotas.

**Standard 6: Specialisation**

When individuals, regions, and nations specialise in what they can produce at the lowest cost and then trade with others, both production and consumption increase.

Students will be able to explain how they can benefit themselves and others by developing special skills and strengths.

**Standard 7: Markets and Prices**

A market exists when buyers and sellers interact. This interaction determines market prices and thereby allocates scarce goods and services.

Students will be able to identify markets in which they have participated as a buyer and as a seller and describe how the interaction of all buyers and sellers influences prices. Also, predict how prices change when there is either a shortage or surplus of the product available.

**Standard 8: Role of Prices**

Prices send signals and provide incentives to buyers and sellers. When supply or demand changes, market prices adjust, affecting incentives.

Students will be able to predict how changes in factors such as consumers' tastes or producers' technology affect prices.

**Standard 9: Competition and market structure**

Competition among sellers usually lowers costs and prices, and encourages producers to produce what consumers are willing and able to buy. Competition among buyers increases prices and allocates goods and services to those people who are willing and able to pay the most for them.

Students will be able to explain how changes in the level of competition in different markets can affect price and output levels.

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**Standard 10: Institutions**

Institutions evolve and are created to help individuals and groups accomplish their goals. Banks, labour unions, markets, corporations, legal systems, and not-for-profit organisations are examples of important institutions. In addition to these, an institution which clearly defines and enforces property rights is essential to a market economy.

Students will be able to describe the roles of various economic institutions and explain the importance of property rights in a market economy

**Standard 11: Money and Inflation**

Money makes it easier to trade, borrow, save, invest, and compare the value of goods and services. The amount of money in the economy affects the overall price level. Inflation is an increase in the overall price level that reduces the value of money.

Students will be able to explain how their lives would be more difficult in a world with no money, or in a world where money sharply loses its value.

**Standard 12: Interest rates**

Interest rates, adjusted for inflation, rise and fall to balance the amount saved with the amount borrowed, which affects the allocation of scarce resources between present and future uses.

Students will be able to explain situations in which they pay or receive interest, and explain how they would react to changes in interest rates if they were making or receiving interest payments.

**Standard 13: Income**

Income for most people is determined by the market value of the productive resources they sell. What workers earn primarily depends on the market value of what they produce.

Students will be able to predict future earnings based on their current plans for education, training, and career options.

**Standard 14: Entrepreneurship**

Entrepreneurs take on the calculated risk of starting new businesses, either by embarking on new ventures similar to existing ones or by introducing new innovations. Entrepreneurial innovation is an important source of economic growth.

Students will be able to identify the risks in, and potential returns to, entrepreneurship, as well as the skills necessary to engage in it. Understand the importance of entrepreneurship and innovation to economic growth.

**Standard 15: Economic growth**

Investment in factories, machinery, new technology, and in the health, education, and training of people, stimulates economic growth and can raise future standards of living.

Students will be able to predict the consequences of investment decisions made by individuals, businesses, and governments.

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**Standard 16: Role of government and market failure**

There is an economic role for government in a market economy whenever the benefits of a government policy outweigh its costs. Governments often provide for national defence, address environmental concerns, define and protect property rights, and attempt to make markets more competitive. Most government policies also have direct or indirect effects on peoples' incomes.

Students will be able to identify and evaluate the benefits and costs of alternative public policies, and assess who enjoys the benefits and who bears the costs.

**Standard 17: Government failure**

Costs of government policies sometimes exceed benefits. This may occur because of incentives facing voters, government officials and government employees, attributable to actions by special interest groups that can impose costs on the general public, or because social goals other than economic efficiency are being pursued.

Students will be able to identify some public policies that may cost more than the benefits they generate, and assess who enjoys the benefits and who bears the costs. Explain why the policies exist.

**Standard 18: Economic fluctuations**

Fluctuations in a nation's overall levels of income, employment, and prices are determined by the interaction of spending and production decisions made by all households, firms, government agencies, and others in the economy. Recessions occur when overall levels of income and employment decline.

Students will be able to interpret media reports about current economic conditions and explain how these conditions can influence decisions made by consumers, producers, and government policy makers.

**Standard 19: Unemployment and inflation**

Unemployment imposes costs on individuals and the overall economy. Inflation, both expected and unexpected, also imposes costs on individuals and the overall economy. Unemployment increases during recessions and decreases during recoveries.

Students will be able to make informed decisions by anticipating the consequences of inflation and unemployment.

**Standard 20: Fiscal and Monetary Policy**

Federal government budgetary policy and the Federal Reserve System's monetary policy influence the overall levels of employment, output, and prices.

Students will be able to anticipate the impact of federal government and Federal Reserve System macroeconomic policy decisions on themselves and others.

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Source: Council for Economic Education

In conclusion, the *Voluntary National Content Standards in Economics* is an essential tool for informing economic education. The *Voluntary National Content Standards in Economics* focus on fundamental economic ideas and concepts that are widely shared by economists. These national content standards make it easier to impart the powerful fundamental principles of economics to students.

*Economics: A Framework for Teaching the Basic Concepts* is a review of the fundamental principles of economics, and gives introductions to the concepts of microeconomics and macroeconomics. The framework examines how scarce productive resources are used to satisfy human needs and wants, and how markets and government policy regulate the process.

Both the *Voluntary National Content Standards in Economics* and the *Economics: A Framework for Teaching the Basic Concepts* contain fundamental concepts underlying all economic study, including scarcity, opportunity cost, economic systems and institutions, and distribution and exchange, which are the foundation of all economic activity. Microeconomic concepts, such as markets, supply and demand, competition, income distribution, and the role of government, operate together to determine the flow of money and factors of production in economies. Macroeconomic concepts, such as Gross National Product, aggregate supply and demand, unemployment, inflation, and monetary and fiscal policy, are functions of economic aggregates or averages.

### **4.3 Test of Understanding Economics in South Africa**

#### **4.3.1 Test development**

The development of the Test of Understanding Economics in South Africa, TUESA, started in November 2012, drawing on the TUCE. Questions were developed by making use of the basic concepts that are outlined in the *Voluntary National Content Standards in Economics* and the *Economics: A Framework for Teaching the Basic Concepts*. These concepts are used to identify the different types of questions that can be asked. The questions that were developed were further edited by economic experts and were specifically written for the South African context by making use of South African examples and case studies.

A first draft of the new questionnaire was completed in July 2013 and sent out for review and inputs from the staff of the School of Economics at the North-West University's Potchefstroom Campus. Their comments and suggestions were incorporated into a second draft of the test that was presented at the Biennial Conference of the Economic Society of South Africa, held at the University of the Free State in September 2013. Participants at the conference made a number of inputs. The second draft of the TUESA was also sent to staff members of Economics Departments across South Africa, who indicated at the conference that they would provide an additional round of inputs. Based on all this feedback, a third draft of the TUESA was completed. This third draft of the TUESA was tested in a pilot study at the Potchefstroom Campus at the end of October 2013. The results obtained from the pilot study were used as inputs into a final revision of the questionnaire items and a fourth and final version of the TUESA was produced.<sup>13</sup>

#### 4.3.2 Content specification: TUESA

The TUESA test of economic literacy is divided into three sections. Section 1: questions 1 to 6 consists of demographic information: gender, age, race, course of study, level of education, and whether or not students had studied economics in high school. Section 2: questions 1 to 21 comprise microeconomic questions. Section 3: questions 1 to 15 comprise macroeconomic questions.

#### 4.3.3 Section 1: Demographic information

Demographic information forms part of questionnaire to allow later for analysis of performance according to gender, age and race, and to determine whether having studied economics in high school affects a student's overall economic literacy score. Below are the six demographic questions of the TUESA.

##### QUESTION 1

Are you:	
1.	Male
2.	Female

<sup>13</sup> Experts involved in the process by means of comments and suggestions were: Jen Snowball, Jess de Beer, Wilma Viviers, Ernst Idsardi and Lorainne Greyling,

## QUESTION 2

How old are you?	
1.	18 years and younger
2.	19 – 25 years
3.	26 – 35 years
4.	36 – 45 years
5.	46 years and older

## QUESTION 3

How would you identify your race group?	
1.	Black
2.	White
3.	Indian
4.	Coloured
5.	Other

#### QUESTION 4

Course of study	
1.	Economics (Economics, finance, banking, risk management, international trade and econometrics)
2.	Business management (Industrial psychology, tourism, business management and entrepreneurship)
3.	Human Resources (Human resources and labour relations)
4.	Accounting Sciences (Chartered, forensic, financial and management accounting)
5.	Other BCom
6.	Other BA
7.	Other BSc

#### QUESTION 5

Did you have economics in Gr12?	
1.	Yes
2.	No

#### QUESTION 6

Highest current level of education:	
1.	Matric
2.	Diploma
3.	Degree
4.	Post graduate qualification (Honours, Master's, PhD)

#### 4.3.4 Section 2: Microeconomics

Microeconomics is the part of economics which is concerned with individual units, such as an individual, a household or a firm. At the microeconomic level, the details of an economic unit or small segment of the economy are being investigated. Furthermore, microeconomics focuses on the decision-making by individual customers, workers, households or firms; the measuring of prices of specific products; the number of workers employed; and the revenue made by a firm or the income earned by an individual.

The microeconomic topics that will be investigated in the TUESA are:

- a) The basic economic problem;
  - i. Scarcity
  - ii. Opportunity cost
  - iii. Production factors
- b) Demand, supply and elasticity;
- c) Consumer theory; and
- d) Theory of production.

Each microeconomic topic and question will be discussed and an indication will be given of which basic economic concept as described in the literature is applicable.

##### **The basic economic problem**

The basic economic problem is a fundamental economic concept. The concept states that there are limited resources available and these resources are insufficient to satisfy all human wants and needs, and therefore scarcity emerges. The economic problem is therefore how to determine what needs to be produced and how the factors of production can be allocated, given that resources are limited. Economics, therefore, revolves around methods and possibilities of solving the economic problem.

Questions one to eight test the principles of the basic economic problem and therefore test whether students can demonstrate knowledge on the economic problem and how it is experienced by the different participants in an economy.

## QUESTION 1

Question one involves the question of what economics is. The objective of question one is to test whether students can identify the point that economics is not only about money, finance or the stock market, but that economics is a social science that focuses on the optimal allocation of limited and scarce resources to obtain the highest level of needs satisfaction of a society's infinite needs.

Economics is about:	
1.	the study of money
2.	how scarce resources are used to satisfy people's wants
3.	the study of stock markets
4.	creating jobs and fighting inflation

## QUESTION 2

Question two involves the topic of scarcity. The objective of this question is to test whether a student is able to identify when a resource is scarce. Scarce resources mean limited goods and services; therefore, scarcity restricts options and demands choices. A resource is scarce when a price is allocated to it, whereas if a resource is not scarce at all, such as sunlight, it is free (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

A resource is scarce when:	
1.	you have to pay to use it
2.	the resource is freely available
3.	the resource is supplied by the government
4.	it is a gift of nature

### QUESTION 3

Question three involves the income which production factors can generate. Resources are also known as production factors. The production factors are listed in the question, labour, capital, natural resources and entrepreneurial ability, to assist students who did not study economics in high school and have not had previous exposure to economics. The objective of question three is to test whether students can ascertain that payments received by production factors play an important role in determining the extent to which individuals are able to satisfy their needs and wants. Every factor of production earns a reward when it is employed in producing output. Therefore, the factor of production is paid for its services. The payment that a factor of production receives is called income. The income earned from natural resources is rent, the income earned from labour is wages, the income earned from capital is interest, and the income earned from entrepreneurial ability is profit (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

A household may consist of a single person or a whole family but nevertheless, households are the suppliers of all production factors. What is the income generated by the production factors: labour, capital, natural resources and entrepreneurial ability, respectively:

1.	Wages, rent, interest and profit
2.	Profit, rent, interest and wages
3.	Wages, interest, rent and profit
4.	Profit, interest, rent and wages

### QUESTION 4

Question four deals with the topic of circular flows in an economy. Before students can identify the flow of an economy and identify which elements can be considered as leakage or injections, students need to identify the two role players in an economy. The objective of question four is therefore to test whether students can identify the two role players in an economy. The first role player in an economy comprises firms which produce goods and

services, and the second role player comprises households which supply labour, capital, natural resources and entrepreneurial ability (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013). It is important for students to identify the point that households constitute the supplier of labour, capital, natural resources and entrepreneurial ability, since households are the basic units in the economy, and in a market economy they determine what should be produced (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Households, firms, government and the rest of the world's interaction with one another determines how an economy's resources are allocated. Which of the following is the supplier of labour, capital, natural resources and entrepreneurial ability?	
1.	Households
2.	Firms
3.	Government
4.	Rest of the world

### **QUESTION 5 and QUESTION 6**

In questions five and six, students need to distinguish between macroeconomic and microeconomic statements. It is essential for a student to identify whether a particular situation requires a microeconomics or a macroeconomics perspective. The objective of these two questions is to test whether students can distinguish between microeconomics and macroeconomics. Microeconomics deals with the behaviour of a single firm in an industry or of a single individual in a market, whereas macroeconomics deals with the economy as a whole (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Which of the following can be considered as a statement about a macroeconomic issue:	
1.	A household deciding on how much money to save
2.	A firm looking at maximising profit
3.	The impact of higher national saving on economic growth
4.	A wage dispute at a small firm in Pretoria

Which of the following can be considered as a statement about a microeconomic issue:	
1.	The impact of higher national saving on economic growth
2.	A firms' decision about how many workers to recruit
3.	Prices of all goods and services increased
4.	The effect of government regulations on car emissions

## QUESTION 7

In question seven, the topic of opportunity cost is tested. The objective of this question is to test whether or not students can grasp the concept of opportunity cost.

The concept of opportunity cost means, for example, that there are only so many things one can buy with R200, such as a DVD or a book. But, the problem is that the R200 can only go so far, since you cannot buy a DVD and a book with R200. A consumer will have to choose what to buy since resources are scarce and wants and needs are plenty. If a consumer chooses to buy a book, the consumer is giving up the opportunity of buying a DVD. The loss of buying the DVD is the book. Students need to be able to apply the concept of opportunity cost to everyday life scenarios and realise that the opportunity cost of any action is the next best alternative forgone (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

You just won R45 000 000 in the Powerball lottery. You have a choice between spending the money now or investing it at 5 per cent interest annually. What is the opportunity cost of spending the R45 000 000?

1.	R 47 250 000
2.	R 2 250 000
3.	R 27 000 000
4.	There will be no opportunity cost

### QUESTION 8

Question eight tests the basic way of economic thinking. The objective, therefore, is to determine whether students can identify some of the basic economic principles.

People respond to incentives: An incentive is something, which is either positive or negative, that influences the choices that a person makes. When incentives change, people's actions also change. When people's actions change, it is usually in predictable ways. For example, when real interest rates increase, there is an incentive for people to save more and consume less.

People's choices have consequences: People's choices can have unintended consequences, for example: A person's choice to become a doctor will have intended consequences – many years of advanced schooling and training and hard work, but probably resulting in a higher income.

Every action has a cost: There is no such thing as a free lunch, free is not free. If an individual spends thirty minutes in line waiting for a slice of free pizza and the individual's next best alternative would be working for R55 per hour, then that slice of pizza has cost that individual the opportunity to earn R55.

Which of the following, in your opinion, can be considered as a key principle or principles of economics	
1.	Individuals respond to incentives
2.	There's no such thing as a free lunch
3.	Law of unintended consequences
4.	All of the above

### **Demand, Supply and Elasticity**

Demand and supply are the building blocks of studying economics. Equilibrium prices and quantities provide an indication of the needs that exist in a community and of how to address it. Demand and supply are accompanied by elasticity. Elasticity measures the price sensitivity of consumers and producers (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

In order to answer questions nine to fourteen, students need to distinguish between changes in demand and supply and be able to identify when there is a change in demand or supply, and when there is a change in quantity demanded or quantity supplied. The skills of knowing about demand and supply are essential for students and are tools that they can apply to everyday life to understand changes in prices (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

### **QUESTION 9 and QUESTION 10**

Questions nine and ten provide scenarios of demand, and the objective of these questions is to test whether students can apply the principles of demand. Every day, an individual is confronted with the theories of demand and it is therefore important that students can apply these principles to scenarios in order to understand the influence of price changes and changes in other factors, such as tastes, preferences, income, prices of related goods, substitutes, compliments, and consumer expectations (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Demand represents the various amounts of a product that consumers are willing to purchase at each of a series of possible prices during a certain period. The law of demand states that if prices increase, the quantity demanded for this particular good or service will increase, *ceteris paribus* (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Bacon and eggs are often eaten together, therefore we call them complements. Suppose that the price of bacon has risen and the quantity of eggs has fallen. What could be responsible for this pattern?	
1.	A rise in the price of chicken feed
2.	A rise in the price of pig feed
3.	Decrease in wages for workers on pig farms
4.	A news article stating that bacon causes heart attacks

Suppose that in the year 2005 the number of births is temporarily high. How might this baby boom affect the price of babysitting services in 2010 and 2020?	
1.	The price of babysitting services will increase in 2010 and 2020
2.	The price of babysitting services will increase in 2010 and decrease in 2020
3.	The price of babysitting services will decrease in 2010 and 2020
4.	The price of babysitting services will decrease in 2010 and increase in 2020

**QUESTION 11 and QUESTION 12**

Questions eleven and twelve test the concept of elasticity. Students are required to apply the idea of sensitivity to changes in prices or income to real-world situations. Question eleven tests whether students are able to identify the fact that during an economic downturn, individuals tend to spend less on luxury goods, such as restaurant meals, and that a luxury good falls under the category of income elasticity. Question twelve tests whether students

can identify whether art lovers would be sensitive or insensitive to an increase in the price of a Picasso painting.

Elasticity is an important economic term since elasticity measures how sensitive consumers or producers are to price changes. If an individual is very sensitive to a change in price, it means that they are very elastic to price changes (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013). If an individual is very insensitive to a change in price, it means that they are very inelastic to price changes. Elasticity also investigates why higher market prices for some products cause producers to greatly increase their output, while a rise in prices for other products cause only limited increases in output (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Economists have observed that spending on restaurant meals declines more during economic downturns than spending on food to be eaten at home. How might the concept of elasticity help to explain this?	
1.	Consumers are relatively sensitive to changes in prices
2.	Consumers are relatively insensitive to changes in prices
3.	A restaurant meal can be classified as a luxury good when looking at income elasticity
4.	A restaurant meal can be classified as a necessity when looking at income elasticity

The famous artist, Picasso, died in 1973. How sensitive will art lovers be to a change in the price of Picasso paintings?	
1.	Art lovers are relatively sensitive to changes in prices
2.	Art lovers are relatively insensitive to changes in prices
3.	Art lovers are insensitive to changes in prices
4.	Art lovers are sensitive to changes in prices

### QUESTION 13

Question thirteen deals with market shortages and market surpluses, given the implementation of a price ceiling or price floor by the government. The objective of question thirteen is to test whether students are able to understand that with a price floor, prices for a specific good or service are set above the market equilibrium price, creating a shortage of goods or services, and that with a price ceiling, prices are set below equilibrium price, creating a surplus of goods and services (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

*Jo'burg Day* is a concert organised by a local Johannesburg radio station, 94.7 Highveld Stereo, each year in September. The price per ticket is R400 for the day. Suppose the government imposes a price ceiling of R200 per ticket at the concert, what will the effect be?

1.	More people will attend the concert and the organisers will make a profit
2.	Less people will attend the concert and result in a surplus of tickets
3.	More people will attend the concert and result in a shortage of tickets
4.	More people will attend the concert and the organisers will make a loss

### QUESTION 14

Question fourteen provides a scenario of supply to test whether students can apply the principles of supply. The objective of question fourteen is to test, when students are confronted with the theories of supply, whether they can apply these principles to everyday life scenarios in order to understand the influences of price changes and other factors, such as productivity, input costs, technology, taxes, producer expectations and weather.

Supply is the various amounts of a product that producers are willing to make available for sale at each of a series of possible prices during a certain period. The law of supply states that as a price rises, the quantity supplied rises, *ceteris paribus* (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

South Africa is home to approximately 21 000 rhinos. Rhino hunting is illegal in South Africa and leads to rhino poaching since rhino horn is a well-known commodity in parts of Asia. In 2000, 7 rhinos were poached and in 2012, 633 rhinos were poached for their horns. What is the reason for the increase in the amount of rhinos being poached?

1.	Increase in the price of rhino horn
2.	Increase in the demand for rhino horn due to a decrease in price
3.	Increase in the price of rhino horn due to limited supply
4.	Increase in the supply for rhino horn

### **Consumer theory**

Individual consumers allocate their incomes among the various goods and services that are available. Given a consumer's budget and income, the consumer decides where to buy and the consumer will decide which goods and service he or she will purchase, given his or her income and budget.

### **QUESTION 15**

Question fifteen deals with consumer theory. The objective of question fifteen is to test whether students understand how consumers behave in general when facing the economic problem: unlimited wants and needs. The question tests whether students can grasp the point that each consumer has individual own wants, needs and preferences, bearing in mind the individual's monthly income.

If you walk into Pick ‘n Pay and were to compare the shopping carts of any two consumers, you would observe clear differences. Why is that?

1.	Given a certain budget, consumers decide which goods and services to buy
2.	Individual consumer’s preferences on certain goods and services differ
3.	Individual consumers allocate their incomes among the various goods and services available to them
4.	All of the above

### **Theory of Production**

The theory of production focuses on the behaviour of producers. In an economy, businesses produce a wide variety of goods and service and each of these businesses requires economic resources to produce these goods and services. In obtaining these resources, a business makes payments to resource owners and these payments make up a business’s cost of production (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

### **QUESTION 16, QUESTION 17 and QUESTION 18**

Questions sixteen, seventeen and eighteen focus on the cost of production. Students’ abilities to understand that economic costs include all payments that must be received by resource owners to ensure a continued supply of needed resources to a particular line of production are tested in questions sixteen and seventeen. In addition, students are required to distinguish between fixed and variable cost. Fixed costs are costs that in total do not change with the level of output. Variable costs, on the other hand, change with the level of output (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Question eighteen focuses on the calculation of a firm’s profit. It is tested whether or not a student is familiar with a basic profit calculation of profit equals total revenue minus total costs (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Shane sells hamburgers every day in front of a butcher shop in Cape Town. In order for Shane to produce hamburgers he needs to pay the owner of the butcher shop R500 for the day to sell hamburgers in front of his butcher shop. In addition, he needs a grill, tongs, hamburger patties, hamburger rolls, tomatoes, tomato sauce, mustard and chutney. Which of the following can be considered as a fixed cost for Shane?

1.	Overtime wages for the employees
2.	Paying R500 rent for the butcher
3.	Hamburger patties and hamburger rolls
4.	Tomato sauce, mustard and chutney

If you walk into a restaurant and almost all the tables are empty the question “why is this restaurant still open” probably crosses your mind. You may think that the revenue made from the few tables that are occupied cannot cover the cost of the restaurant. But what you need to keep in mind is the fixed and variable cost of the restaurant. Considering the short-run, the restaurant can stay open to customers as long as:

1.	The fixed costs are covered
2.	The variable costs are covered
3.	Both fixed and variable costs are covered
4.	Some of the fixed and variable costs covered.

Barry runs a biltong shop in the Northern Cape. December is his busiest time of year but he needs your help calculating his loss or profit for December. He bought 2000kg of beef from a local farmer at R55 per kilogram and 10kg of spices at R20 per kilogram. Furthermore, he pays wages for two workers at R5000 per month. From the 2000kg of beef, he manages to make 1000kg of biltong which he sells at R95 per kilogram, 500kg of chilly bites at R45 per kilogram and 500kg of “droëwors” at R80 per kilogram. Calculate Barry’s loss or profit for December.

1.	R 27 300 loss
2.	R 37 300 profit
3.	R 47 300 loss
4.	R 57 300 profit

### QUESTION 19

Question nineteen asks a question on the topic of long-run costs. The objective of this question is to test whether or not a student is able to ascertain that there are no fixed costs in the long run and to acknowledge that there is enough time for a firm to change the quantities of all inputs in the production process in the long run. In the long run, a firm has to make decisions about the scale of its production process, the location of its operations and the techniques of production it will use. All these decisions that a firm has to make will affect the cost of production (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Question nineteen tests whether students are able to calculate each scenario’s cost per unit to establish whether it becomes cheaper to produce more goods in the long run (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Boeing Commercial Airplanes is the manufacturer of the world's most recognisable aircraft, the Boeing 747. If Boeing Commercial Airplanes produces 10 Boeings per month, its long-run total cost is 200 million US dollars. If Boeing Commercial Airplanes produces 15 Boeings per month, its long-run total cost is 215 million US dollars. This example resembles:

1.	Economies of scale : Long-run average total cost falls as the quantity of output increases
2.	Diseconomies of scale : Long-run average total cost rises as the quantity of output increases
3.	Constant returns to scale : Long-run average total cost stays the same as the quantity of output increases
4.	Constant returns to scale : Long-run average total cost falls as the quantity of output increases

## QUESTION 20

A firm's decisions concerning price and production depend greatly on the character of the industry in which it is operating. At one extreme is a single producer that dominates the market, and at the other extreme are industries in which firms each produce a fraction of market supply. By understanding markets, students are able to understand how price and output are determined in the many product markets in the economy and will also be able to evaluate the efficiency or inefficiency of markets.

Question twenty is on the topic of market structures, specifically, the perfectly competitive market. The objective of this question is to determine whether or not a student can identify the point that a firm in a perfectly competitive market earns an economic profit or an economic loss in the short run, but a normal profit in the long run.

Mr Mushroom is a business in a competitive market. In 2005 during Aardklop (a national arts festival) Mr Mushroom sold over 200kg of mushrooms and made an economic profit. During the period between 2006 and 2008, several other firms entered the mushroom market at Aardklop in hope of also making an economic profit. In 2010 there were almost 10 different mushroom stands at Aardklop, which resulted in an economic loss for the 10 mushroom stands. In your opinion, what happened in 2011?

1.	The different mushroom businesses that entered the Aardklop market exited the market, leaving the original Mr Mushroom with a normal profit
2.	The different mushroom businesses that entered the Aardklop market exited the market, leaving the original Mr Mushroom with an economic profit
3.	The different mushroom businesses that entered the Aardklop market stayed in the market and made an economic loss
4.	The different mushroom businesses that entered the Aardklop market stayed in the market and still made an economic profit

## QUESTION 21

Question twenty-one deals with the topic of monopoly, but focuses in more detail on price discrimination. The objective of question twenty-one is to test whether students can identify an example of price discrimination.

Price discrimination is an important concept to grasp. Certain monopolistic firms sell products at a single price, regardless of where, to whom or how much of these products are sold. However, sometimes firms with market power find it profitable to sell the same product to different consumers or groups at different prices (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Most consumers live according to their means, but consumers do not walk into an airport with a sign displaying how much they are willing to pay for a ticket to Beijing, China. Instead, firms price discriminate by dividing consumers into different groups, for example: young and old, rich and middle class, South Africans and foreigners. Which of the following is not an example of price discrimination:

1.	Ster-Kinekor movie theatres charge a lower price for children, senior citizens and Discovery Health Vitality members.
2.	When going to a craft market, for example at Hartbeespoortdam, you negotiate a price that you as consumer are willing to pay.
3.	Most airlines, such as SAA, KLM and AA, charge a lower price for a round-trip ticket in comparison with a one-way ticket.
4.	Edgars decided to decrease the price of all Levis jeans.

Table 4.3 below indicates the question number for each of the microeconomic questions and under which *Voluntary National Content Standards in Economics* and *Framework for Teaching Basic Economic Concepts* the question can be classified as.

**Table 4.3: Classification of microeconomic questions.**

Microeconomic question number	Voluntary National Content Standards in Economics	Framework for Teaching Basic Economic Concepts
Question 1	Standard 1	Framework 1
Question 2	Standard 1	Framework 1
Question 3	Standard 1	Framework 1
Question 4	Standard 1	Framework 4
Question 5	Standard 1	Framework 1
Question 6	Standard 1	Framework 1
Question 7	Standard 1	Framework 1
Question 8	Standard 4	Framework 1
Question 9	Standard 7	Framework 8
Question 10	Standard 7	Framework 8
Question 11	Standard 7	Framework 8
Question 12	Standard 7	Framework 8
Question 13	Standard 8	Framework 8
Question 14	Standard 7	Framework 8
Question 15	Standard 7	Framework 7
Question 16	Standard 7	Framework 8
Question 17	Standard 7	Framework 8
Question 18	Standard 7	Framework 8
Question 19	Standard 7 , 8 and 9	Framework 7 and 9
Question 20	Standard 7 , 8 and 9	Framework 7 and 9
Question 21	Standard 7 and 9	Framework 9

### 4.3.5 Section 3: Macroeconomics

Macroeconomics examines either the economy as a whole, or its basic subdivisions or aggregates, such as government, household, investments, consumption, savings, and exports or imports. An aggregate is the collection of specific economic units (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

The macroeconomic topics that will be investigated in the TUESA are:

**a) Measuring economic performance through**

**I. Gross Domestic Product**

**II. Inflation**

**III. Unemployment**

**b) Monetary and Fiscal authorities**

**I. Fiscal (Tax and expenditure)**

**II. Monetary (Supply of money)**

**c) International relations**

**I. Trade**

**II. Why countries trade**

**III. Balance of payments**

Each macroeconomic topic and question will be discussed and an indication will be given of which basic economic concept as described in the literature is applicable.

#### **QUESTION 1**

Question one is on the topic of the components of GDP. The objective of this question is to determine whether students can distinguish between the different components of GDP, given that each component is reflected by an everyday life scenario.

The four major components of GDP are: Consumption, which is the total spending by households; Investment, which includes expenditure on production capacity; Government expenditure, which includes the spending by government; and net exports (Mohr, 2015)

(Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013). By understanding the different economic components that form GDP, one can understand the composition of GDP (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Gross Domestic Product (GDP) is the market value of all final goods and services produced within a country in a given period. Additionally, any country's GDP consists of four components: Consumption, Investment, Government expenditure, and Net exports. Which of the following transactions can be considered as an investment?

1.	A family buys a new washing machine
2.	Government pays the salaries of teachers
3.	Volkswagen expands its factory in Uitenhage
4.	You buy a Steers hamburger

## QUESTION 2

Question two deals with short-term unemployment. The objective of this question is for students to identify which situation will affect an individual in the short run. The student is required to weigh each of the options against each other, and to argue if the particular situation has a long-term or short-term effect, to obtain the correct answer.

Which of the following workers are more likely to experience short-term unemployment?

1.	An agriculture worker laid off because of bad weather.
2.	A construction worker who loses her job at a plant in an isolated area.
3.	An expert packager at a factory with little formal education who loses his job when companies start to install automatic machinery that package goods.
4.	A pharmacist, because doctors are now permitted to dispense medicine.

### QUESTION 3

Question three deals with the topic of unemployment. This question requires no formal training in economics but the objective of this question is to test whether or not a student can consider each option and make a valid assessment in choosing the correct answer.

Low legal minimum wages will cause individuals not to seek work owing to the low wage payments.

Constant strikes by employees have an effect on the production process of a company and do not affect the workers individually or the unemployment rate, since these striking employees do not lose their jobs owing to the strike, thus leaving them still part of the workforce.

Poor welfare benefits discourage unemployment and will result in a lower unemployment rate. Individuals will seek work since a higher income will be generated by working instead of waiting for unemployment benefits (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

In your opinion, which of the following might be a reason for a high unemployment rate in South Africa?	
1.	Low legal minimum wages
2.	Constant strikes by employees
3.	Limited unemployment benefits
4.	Small welfare benefits payments

### QUESTION 4

Question four tests the concept of inflation. The objective of this question is to establish if students are familiar with the fact that inflation is not just an increase of prices of a few products but that inflation is an increase of prices in general.

The inflation rate in South Africa increased from 5.8% in January 2013 to 6.3% September 2013.  
This means that:

1.	The prices of certain goods and services increased.
2.	Purchasing power for goods and services decreased.
3.	The prices of goods and services decreased.
4.	The prices of goods and services in general increased

### QUESTION 5 and QUESTION 6

Question five and question six deal with the topic of economic indicators. The objective of these questions is to determine if students are knowledgeable about basic economic indicators, by simply naming the indicators.

GDP measures the total value of all final goods and services produced within the boundaries of a country in a specific period. CPI measures inflation, and since inflation is continuous, CPI represents the cost of the “typical shopping basket” of goods and services of an average South African household. (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013)

Economic growth in South Africa is typically measured by which one of the following:

1.	GDP
2.	GNP
3.	GNI
4.	GDE

Inflation in South Africa is typically measured by which of the following:	
1.	CPIX
2.	CPI
3.	GNP Deflator
4.	GDE

### QUESTION 7

Question seven deals with the topic of money. The objective of this question is to identify whether students can correctly identify what money is. It is an important question and concept since it is used every day as a trading method to buy goods and services.

Students need to identify that a Picasso painting is an asset, a government bond is an investment, a R20 note is money, and a credit card is debt.

Which of the following can be considered as money in the South African economy?	
1.	A Picasso painting
2.	A Government bond
3.	A R20 bank note
4.	A credit card

### QUESTION 8

Question eight deals with monetary policy. The objective of this question is to determine whether students can correctly identify a statement related to monetary policy. Monetary policy is conducted through the South African Reserve Bank and is primarily concerned with

maintaining a stable and enabling financial environment. Fiscal policy refers to the government's decisions about expenditure and taxes.

Which of the following statements is false:	
1.	In an economy, money takes the form of currency and various types of bank deposits
2.	The South African Reserve bank regulates government expenditure
3.	The South African Reserve bank is the central bank for South Africa
4.	A central bank controls the money supply

### QUESTION 9

Question nine deals with fiscal policy. The objective of this question is to determine whether students can correctly identify a statement about fiscal policy. Monetary policy is conducted through the South African Reserve Bank and is primarily concerned with maintaining a stable and enabling financial environment. Fiscal policy refers to the government's decisions about expenditure and taxes.

Which of the following can be associated with fiscal policy and fiscal authorities?	
1.	Interest rates
2.	Tax and government expenditure
3.	Money supply
4.	South African Reserve Bank

### QUESTION 10

Question ten deals with balance of payments. The objective of this question is for students to distinguish between important concepts such as the current account balance, budget deficit, public debt and monetary finance. A shortage on the current account of the balance of payments indicates that imports exceeded exports, taking into account gold exports. A budget deficit indicates that spending exceeds the current government income, and public debt indicates the total of the nation's government debt (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

If government spending exceeds the current government income, it is referred to as	
1.	A shortage on the current account of the balance of payments.
2.	Budget deficit.
3.	Public debt
4.	Monetary financing.

### QUESTION 11, QUESTION 12 AND QUESTION 13

Questions eleven, twelve and thirteen are on the topic of international trade. The objective is to test whether students can ascertain that one of the important reasons why countries trade is because of limited resources. Furthermore, students should be aware that trade between countries leads to greater world production, but that every government takes steps to protect domestic firms against foreign competition. These measures are: import tariffs, quotas, subsidies and exchange controls (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Which one of the following statements is false on why countries trade?

- |    |   |
|----|---|
| 1. | The distribution of natural, human and capital resources amongst countries is uneven                    |
| 2. | Countries do not differ in their endowments of economic resources                                       |
| 3. | Efficient production of goods and services requires different technologies or combinations of resources |
| 4. | Consumers may prefer certain imported goods to similar domestically produced goods.                     |

The removal of tariff protection for the South African textile industry is likely to:

- |    |  |
|----|--|
| 1. | harm South African consumers.                              |
| 2. | benefit the textile industry.                              |
| 3. | harm the clothing industry that uses textiles as an input. |
| 4. | cause some unemployment in this industry.                  |

If a government imposes a tariff on an imported product, we would expect local production to \_\_\_\_\_ and imports to \_\_\_\_\_.

- |    |                    |
|----|--------------------|
| 1. | increase; increase |
| 2. | increase; decrease |
| 3. | decrease; increase |
| 4. | decrease; decrease |

#### QUESTION 14

Question fourteen is on the topic of balance of payments, more specifically, the current account. The objective is to determine whether students can calculate the current account balance. The current account captures all exports and imports (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

By making use of the current account information below, calculate South Africa's balance of trade:

<b>Current account</b>	<b>(R millions)</b>
<i>Merchandise exports</i>	398 532
<i>Net gold exports</i>	35 475
<i>Service receipts</i>	81 353
<i>Income receipts</i>	40 234
<i>Merchandise imported</i>	-476 545
<i>Payment for services</i>	-96 950
<i>Income payments</i>	-75 990
<i>Current transfers</i>	-17 186

1.	+ R 78 013
2.	- R 78 013
3.	- R 42 538
4.	- R 174 963

## QUESTION 15

Question fifteen is on the topic of exchange rates. Foreign trade involves payment in foreign currencies. The rate at which currencies are exchanged is known as the exchange rate. The objective is to determine whether students can express the price of one currency in terms of another currency, taking into account certain aspects that may weaken or strengthen the currency (Mohr, 2015) (Mankiw and Taylor, 2010) and (Parkin, *et al.*, 2013).

Due to the weak rand in 2013 more Americans visited South Africa, and so we can expect, <i>ceteris paribus</i> , that:	
1.	the rand will appreciate against the dollar.
2.	the rand will depreciate against the dollar.
3.	the dollar will appreciate against the rand.
4.	it will cost South Africans more to visit the USA.

Table 4.4 below indicates the question number for each of the macroeconomic questions and under which *Voluntary National Content Standards in Economics* and *Framework for Teaching Basic Economic Concepts* the question can be classified as.

**Table 4.4: Classification of microeconomic questions.**

Microeconomic question number	Voluntary National Content Standards in Economics	Framework for Teaching Basic Economic Concepts
Question 1	Standard 15 and 9	Framework 13
Question 2	Standard 19	Framework 15
Question 3	Standard 19	Framework 15
Question 4	Standard 19	Framework 46
Question 5	Standard 19	Framework 15 and 16
Question 6	Standard 19	Framework 15 and 16
Question 7	Standard 20	Framework 17
Question 8	Standard 20	Framework 17
Question 9	Standard 20	Framework 18
Question 10	Standard 20	Framework 17
Question 11	Standard 5	Framework 19
Question 12	Standard 5	Framework 19
Question 13	Standard 5	Framework 19
Question 14	Standard 15	Framework 20
Question 15	Standard 5	Framework 20

## **4.4 Conclusion**

This chapter explained the development of the Test of Understanding Economics in South Africa. The voluntary national content standards in economics and the basic framework for teaching economics informed the development of TUESA. An overview of the 35 questions that were developed for TUESA, together with an explanation of what each question entails, was presented.

The next chapter will include the results of the pilot study that was done with the TUESA which was used to determine reliability and to establish how students answered the different TUESA questions.

## Chapter 5

### Results of the TUESA pilot study

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#### 5.1 Introduction

*Chapter 4* discussed the development of the TUESA and an overview of the 35 questions that were developed for TUESA, together with an explanation of what each question entails, was presented.

This chapter continues to describe the process of test development by providing empirical evidence from a pilot study that was done at the North-West University, Potchefstroom Campus, on how students performed on the TUESA. A pilot study is of the utmost importance in order to determine the reliability of the questions. The results will be interpreted and where necessary, adjustments will be made to ensure that the final version of the TUESA can serve as a test of economic literacy in South Africa.

#### 5.2 Test Data

After the development of the TUESA, a pilot study was done during the first week in October 2013 on the TUESA with the 2013 cohort of introductory economic students of the North-West University, Potchefstroom Campus. The reason for conducting the pilot study was to evaluate the viability of a South African tests and to determine the reliability of the test items. The test data that is provided comprise the results obtained from this pilot study. A total of 648 students completed the microeconomic section of the test and 720 students completed the macroeconomic section of the test during the first week of October 2013<sup>14</sup>.

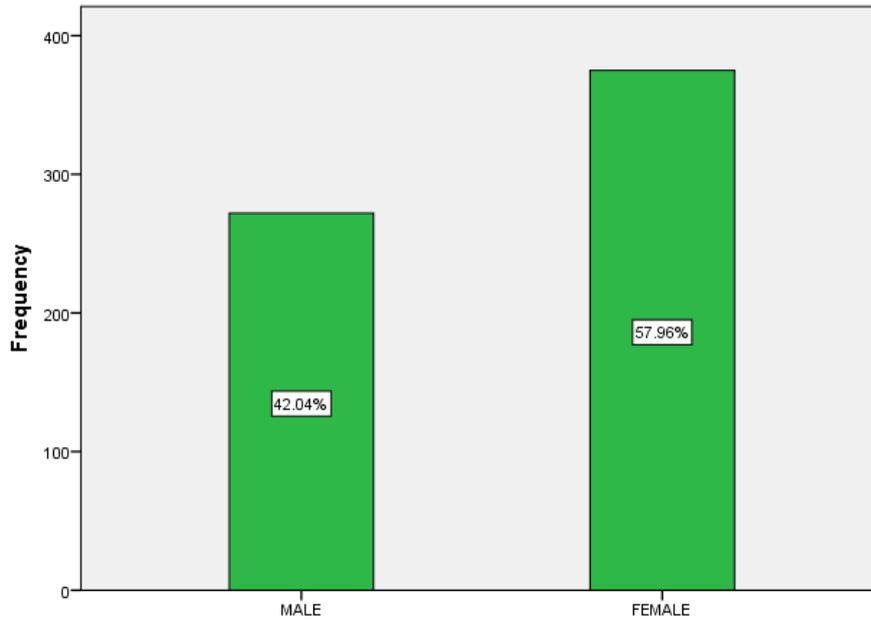
##### 5.2.1 Analysis of TUESA questions

The demographic results indicated that 57.96 per cent of students were female and that the majority of students were between the ages of 19 and 25 years. With regard to race, 85.16 per cent of students were white, while 8.96 per cent of students were black. The majority of the students had majored in Accounting Sciences, while 11.73 per cent of students were majoring in Economics and 12.82 per cent were Business Management majors.

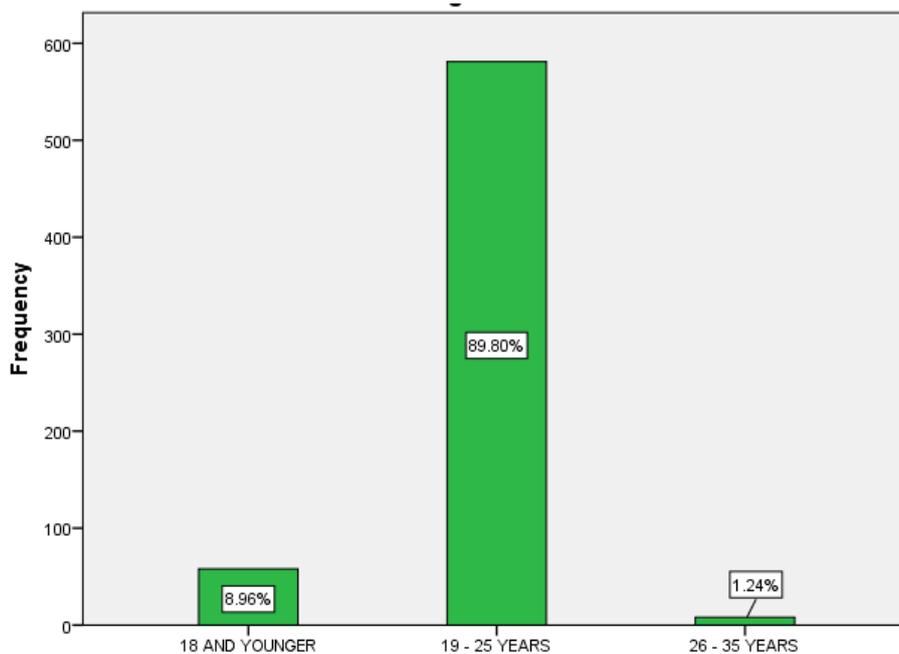
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<sup>14</sup> Note that this part of the process occurred almost at the end of the academic year. Here the aim was not a pre-test, post-test format. It was simply a pilot of the test items.

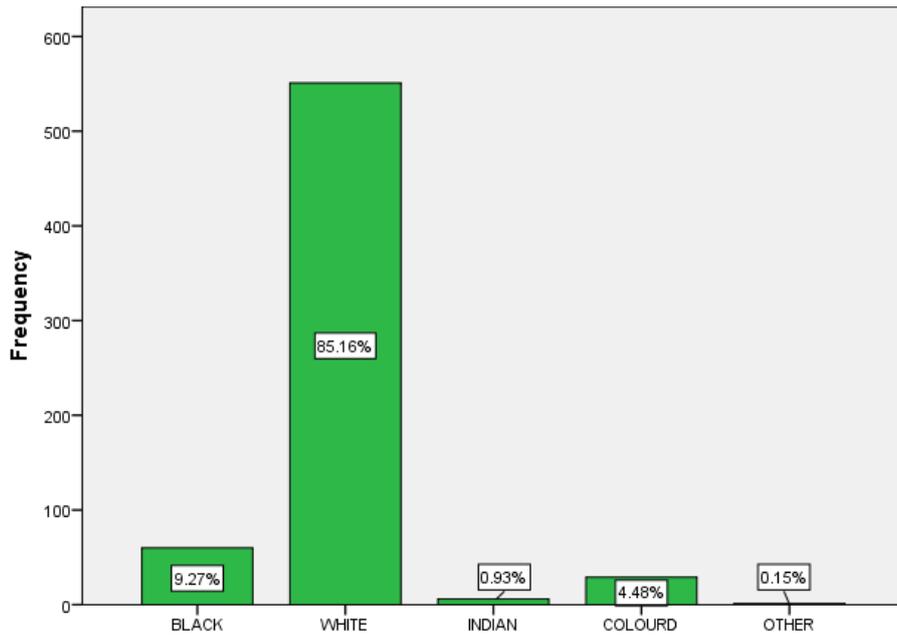
The majority of students, 76.59 per cent, did not have economics as a subject in high school, indicating that the majority of the students did not have previous exposure to economics. It needs to be noted, though, that the pilot test of the TUESA run in October 2013 after the students had studied two semesters of introductory economics. *Figure 5.1, figure 5.2, figure 5.3, figure 5.4 and figure 5.5* below capture the demographic results obtained in the pilot study conducted in October 2013.



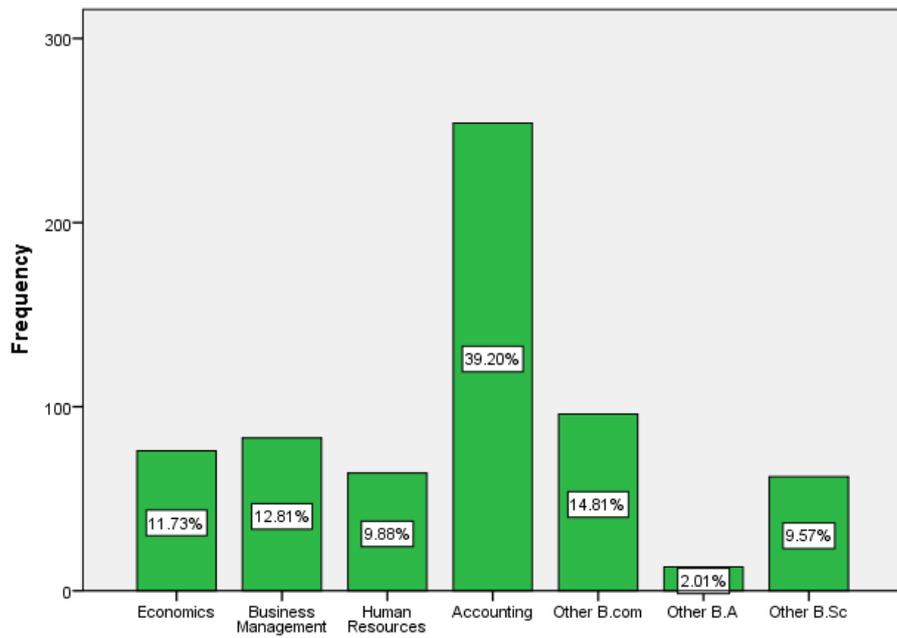
**Figure 5.1: Distribution of gender**



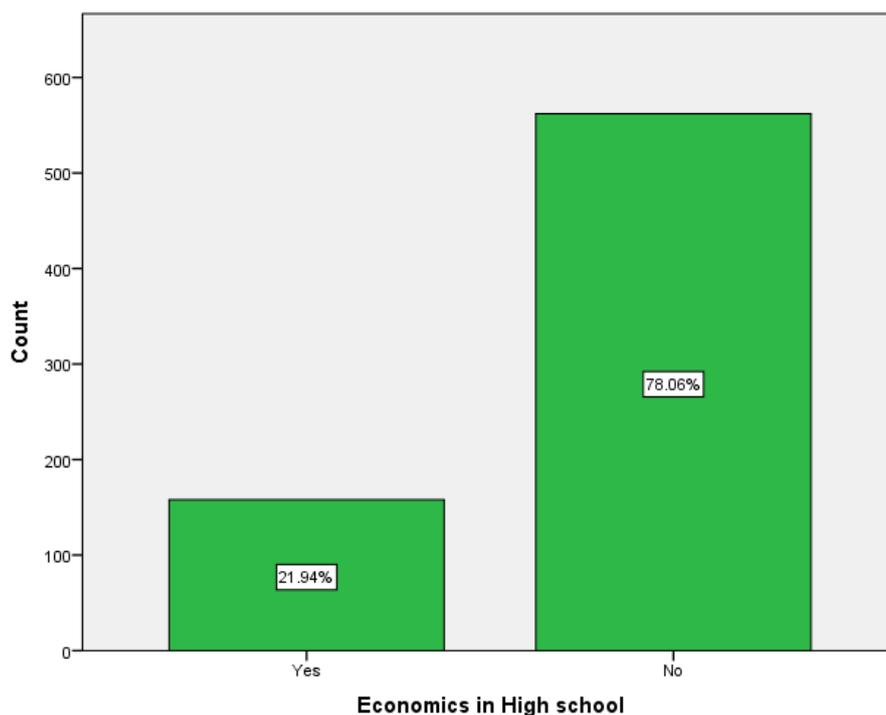
**Figure 5.2: Distribution of age**



**Figure 5.3: Distribution of race**



**Figure 5.4: Distribution of students' course of study**



**Figure 5.5: Distribution of students having economics in high school**

Table 5.1 and Table 5.2 below present the average scores for the microeconomic and macroeconomic questions.

**Table 5.1: Average score per microeconomic question**

TUESA Microeconomics	
Question 1	88.73%
Question 2	44.19%
Question 3	64.40%
Question 4	55.99%
Question 5	89.45%
Question 6	83.01%
Question 7	76.21%
Question 8	53.49%
Question 9	61.72%
Question 10	61.36%
Question 11	79.07%
Question 12	28.62%
Question 13	44.19%
Question 14	71.56%
Question 15	90.70%
Question 16	96.06%
Question 17	23.97%
Question 18	68.87%
Question 19	42.58%
Question 20	46.51%
Question 21	55.81%
<b>Average</b>	<b>63.17%</b>

**Table 5.2: Average score per macroeconomic question**

TUESA Macroeconomics	
Question 1	37.75%
Question 2	66.91%
Question 3	47.05%
Question 4	78.18%
Question 5	79.61%
Question 6	81.57%
Question 7	80.86%
Question 8	49.91%
Question 9	59.93%
Question 10	45.97%
Question 11	78.00%
Question 12	14.85%
Question 13	79.25%
Question 14	31.66%
Question 15	49.73%
<b>Average</b>	<b>58.75%</b>

The average economic literacy score for the microeconomics section of the pilot study was 63.17 per cent, and 58.75 per cent for the macroeconomics section.

*Table 5.3* below indicates the average scores for the microeconomics content. Students obtained the lowest average score of 55.64 per cent for the questions on theory of production, and they obtained the highest score of 90.70 per cent for the questions on consumer theory.

**Table 5.3: Average microeconomic score per content category**

Microeconomic Content Categories	Question	Average
Basic economic problem	1,2,3,4,5,6,7,8	69.43%
Demand, Supply and Elasticity	9,10,11,12,13,14	57.75%
Consumer theory	15	90.70%
Theory of production	16,17,18,19,20,21	55.64%

*Table 5.4* below indicates the average scores for the macroeconomics content. For the category on International relations, students obtained the lowest average score of 51.34 per cent, and for the questions on monetary and fiscal authorities, they obtained the highest score of 65.38 per cent.

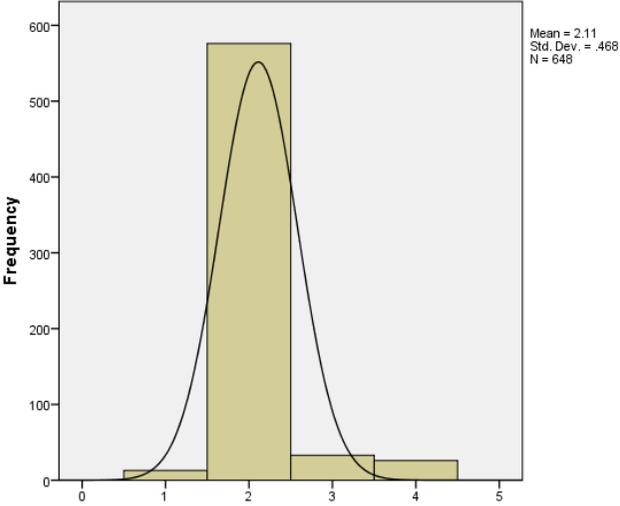
**Table 5.4: Average macroeconomic score per content category**

Macroeconomic Content Categories	Question	Average
Measuring Economic Performance	1,2,3,4,5,6	65.18%
Monetary and Fiscal Authorities	7,8	65.38%
International relations	9,10,11,12,13,14,15	51.34%

Overall, the students performed better in microeconomics than macroeconomics. The average scores for each question and each content category are high, but it must be borne in mind that the pilot study was done as a post-test at the end of October 2013, thus after one year of economic instruction took place.

*Table 5.5* below provides an analysis of how students answered each of the questions of the TUESA pilot study. A detailed overview of each question is provided to show the distribution of answers of the questions and to establish whether any questions are misleading and thus in need of change. It also allows one to see how students answered the different questions and to establish which options caused confusion. A detailed overview of the questions and student responses are presented next to illustrate the process involved in the development of the final draft of the TUESA.

**Table 5.5: Analysis of TUESA questions**

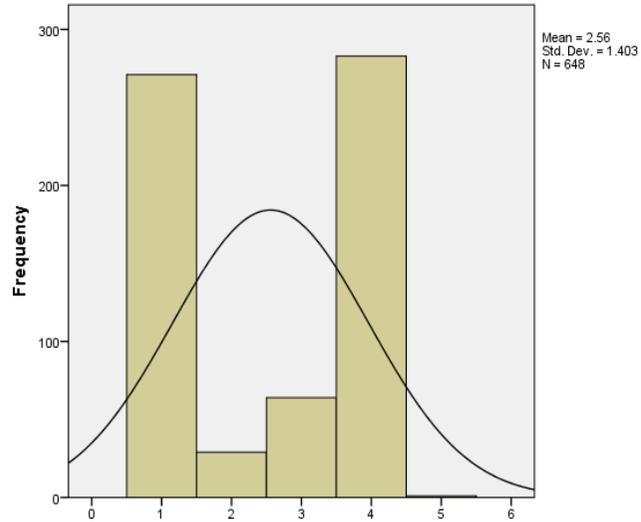
Question	Histogram	Data analysis																																				
<p><b>Section B: Microeconomics</b>  <b>Question 1</b>                      Economics is about:</p> <ol style="list-style-type: none"> <li>1. The study of money</li> <li>2. The use of scarce resources to satisfy unlimited wants</li> <li>3. The study of stock markets</li> <li>4. creating jobs and fighting inflation</li> </ol>	<div style="text-align: center;">  </div> <table border="1"> <thead> <tr> <th></th> <th>Frequency</th> <th>Per cent</th> <th>Valid cent</th> <th>Per</th> <th>Cumulative Per cent</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>13</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr style="background-color: yellow;"> <td></td> <td>2</td> <td>576</td> <td>88.9</td> <td>88.9</td> <td>90.9</td> </tr> <tr> <td>Valid</td> <td>3</td> <td>33</td> <td>5.1</td> <td>5.1</td> <td>96.0</td> </tr> <tr> <td></td> <td>4</td> <td>26</td> <td>4.0</td> <td>4.0</td> <td>100.0</td> </tr> <tr> <td>Total</td> <td>648</td> <td>100.0</td> <td>100.0</td> <td></td> <td></td> </tr> </tbody> </table>		Frequency	Per cent	Valid cent	Per	Cumulative Per cent		1	13	2.0	2.0	2.0		2	576	88.9	88.9	90.9	Valid	3	33	5.1	5.1	96.0		4	26	4.0	4.0	100.0	Total	648	100.0	100.0			<p>A total of 648 students answered the question on what economics is. Of these students, 88.9 per cent answered the question correctly, that economics is about the use of scarce resources to satisfy unlimited wants.</p>
	Frequency	Per cent	Valid cent	Per	Cumulative Per cent																																	
	1	13	2.0	2.0	2.0																																	
	2	576	88.9	88.9	90.9																																	
Valid	3	33	5.1	5.1	96.0																																	
	4	26	4.0	4.0	100.0																																	
Total	648	100.0	100.0																																			

**Section B: Microeconomics**

**Question 2**

A resource is scarce when:

1. you have to pay to use it
2. the resource is freely available
3. the resource is supplied by the government
4. it is a gift of nature



A total of 648 students answered the question on when a resource is scarce. A total of 271 (41.8 per cent) of students answered the question correctly, that a resource is scarce when one has to pay to use it. 43.7 per cent of students were of the opinion that if a resource is a gift of nature, then a resource is scarce.

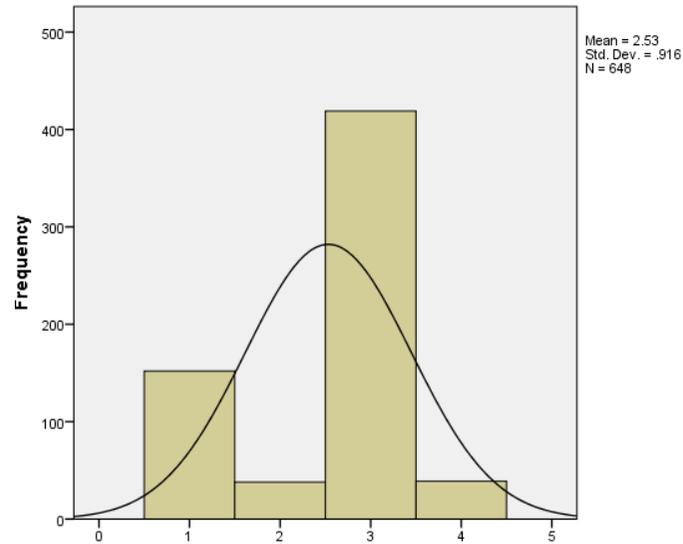
	Frequency	Per cent	Valid cent	Per	Cumulative Per cent
Valid 1	271	41.8	41.8		41.8
2	29	4.5	4.5		46.3
3	64	9.9	9.9		56.2
4	283	43.7	43.7		99.8
5	1	.2	.2		100.0
Total	648	100.0	100.0		

**Section B: Microeconomics**

**Question 3**

A household may consist of a single person or a whole family but nevertheless, households are the suppliers of all production factors. What is the income generated by the production factors: labour, capital, natural resources and entrepreneurial ability, respectively:

1. Wages, rent, interest and profit
2. Profit, rent, interest and wages
3. Wages, interest, rent and profit
4. Profit, interest, rent and wages



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	152	23.3	23.5	23.5
2	38	5.8	5.9	29.3
Valid 3	419	64.4	64.7	94.0
4	39	6.0	6.0	100.0
Total	648	99.5	100.0	

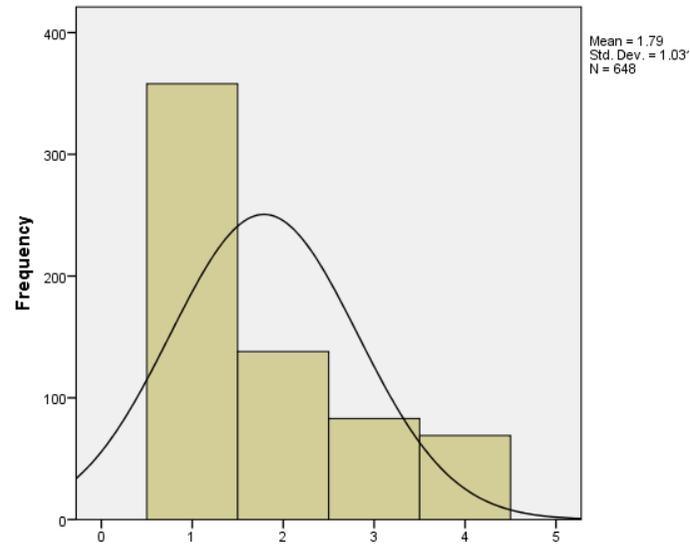
A total of 648 students answered the question on production factors. A total of 419 (64.7per cent) of students answered the question correctly, that the income generated from the specific production factors are: wages, interest, rent and profit. 23.3 per cent of students indicated that the income generated from the specific production factors were: wages, rent, interest and profit.

**Section B: Microeconomics**

**Question 4**

Households, firms, government and the rest of the world's interaction with one another determines how an economy's resources are allocated. Which of the following is the supplier of labour, capital, natural resources and entrepreneurial ability?

1. Households
2. Firms
3. Government
4. Rest of the world



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	358	55.0	55.2	55.2
2	138	21.2	21.3	76.5
3	83	12.7	12.8	89.4
4	69	10.6	10.6	100.0
Total	648	99.5	100.0	

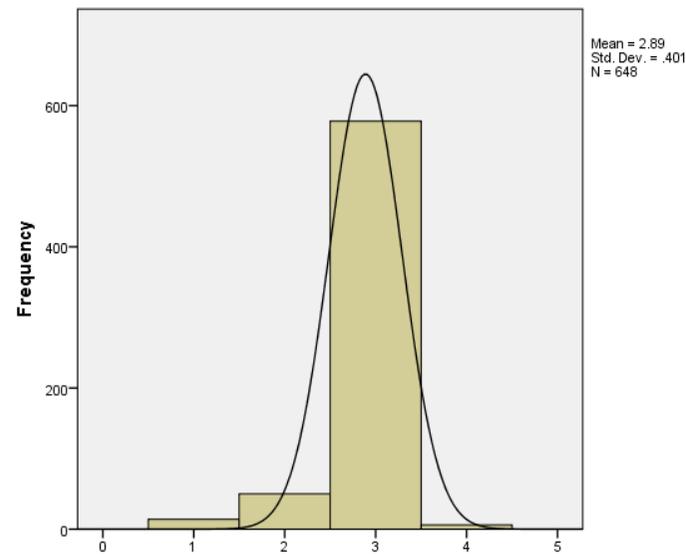
A total of 648 students answered the question on circular flows. A total of 358 (55 per cent) of students answered the question correctly, that households are the provider of production factors. 21.3 per cent of students indicated that firms, and 12.7 per cent indicated that government, are the provider production factors.

**Section B: Microeconomics**

**Question 5**

Which of the following can be considered as a statement about a macroeconomic issue:

1. A household deciding on how much money to save
2. A firm looking at maximising profit
3. The impact of higher national saving on economic growth
4. A wage dispute at a small firm in Pretoria



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	14	2.2	2.2	2.2
2	50	7.7	7.7	9.9
Valid 3	578	88.8	89.2	99.1
4	6	.9	.9	100.0
Total	648	99.5	100.0	

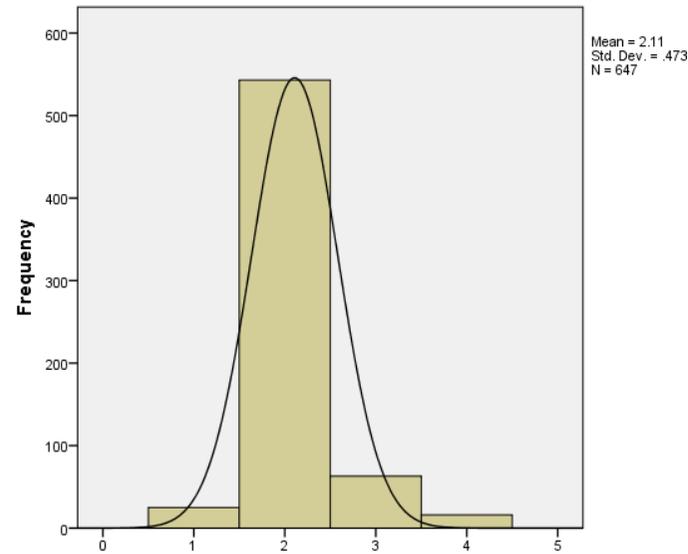
A total of 648 students answered the question on a macroeconomic statement. A total of 578 (88.8 per cent) of students identified the macroeconomic statement correctly. 7.7 per cent of students indicated that a firm looking to maximising profit is a macroeconomic statement.

**Section B: Microeconomics**

**Question 6**

Which of the following can be considered as a statement about a microeconomic issue:

1. The impact of higher national saving on economic growth
2. A firms' decision about how many workers to recruit
3. Prices of all goods and services increased
4. The effect of government regulations on car emissions



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	25	3.8	3.9	3.9
	2	543	83.4	83.9	87.8
Valid	3	63	9.7	9.7	97.5
	4	16	2.5	2.5	100.0
	Total	647	99.4	100.0	
Missing	System	1	.2		
Total		648	100.0		

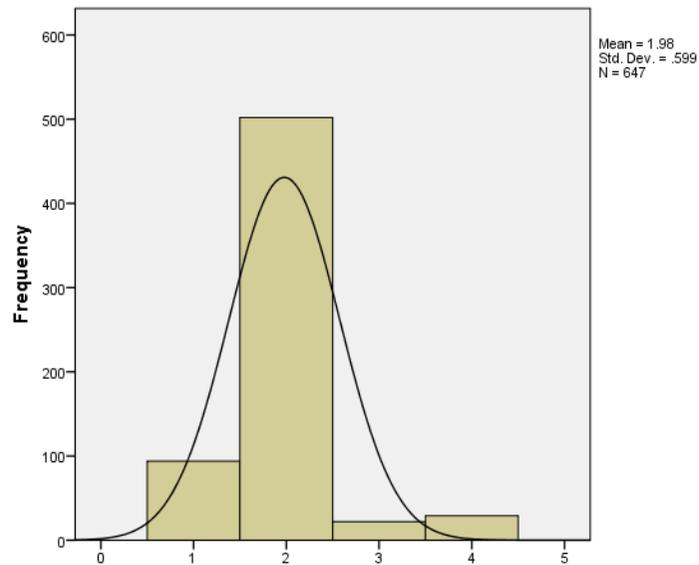
A total of 648 students answered the question on a microeconomic statement. A total of 543 (83.4 per cent) of students identified the microeconomic statement correctly. 9.7 per cent of students indicated that prices of all goods and services increased is a microeconomic statement.

**Section B: Microeconomics**

**Question 7**

You just won R45 000 000 in the Powerball lottery. You have a choice between spending the money now or investing it at 5 per cent interest annually. What is the opportunity cost of spending the R45 000 000?

1. R 47 250 000
2. R 2 250 000
3. R 27 000 000
4. There will be no opportunity cost



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	94	14.4	14.5	14.5
	2	502	77.1	77.6	92.1
	3	22	3.4	3.4	95.5
	4	29	4.5	4.5	100.0
	Total	647	99.4	100.0	
Missing	System	4	.6		
Total		651	100.0		

A total of 647 students answered the question on opportunity cost. A total of 502 (77.1 per cent) calculated opportunity cost correctly, being R 2 250 000. 14.4 per cent of students indicated that the opportunity cost is R47 250 000.

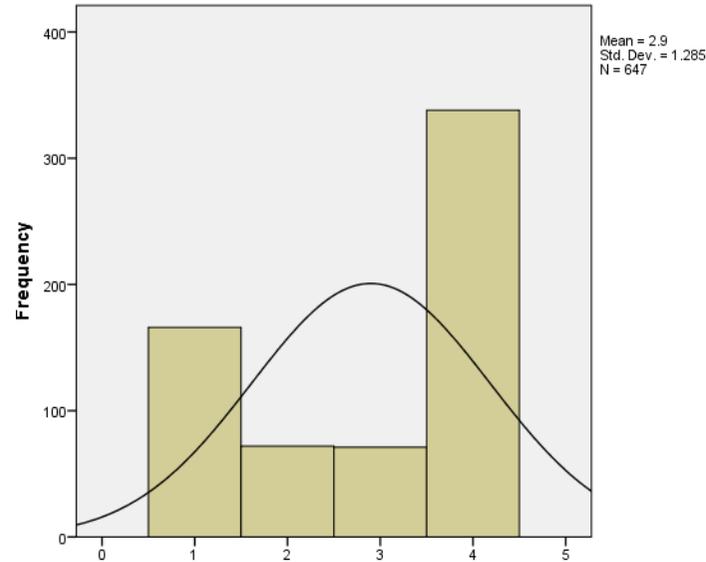
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**Section B: Microeconomics**

**Question 8**

Which of the following, in your opinion, can be considered as a key principle or principles of economics:

1. Individuals responds to incentives
2. There's no such thing as a free lunch
3. Law of unintended consequences
4. All of the above



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	166	25.5	25.7	25.7
	2	72	11.1	11.1	36.8
	3	71	10.9	11.0	47.8
	4	338	51.9	52.2	100.0
	Total	647	99.4	100.0	
Missing	System	1	.2		
Total		648	100.0		

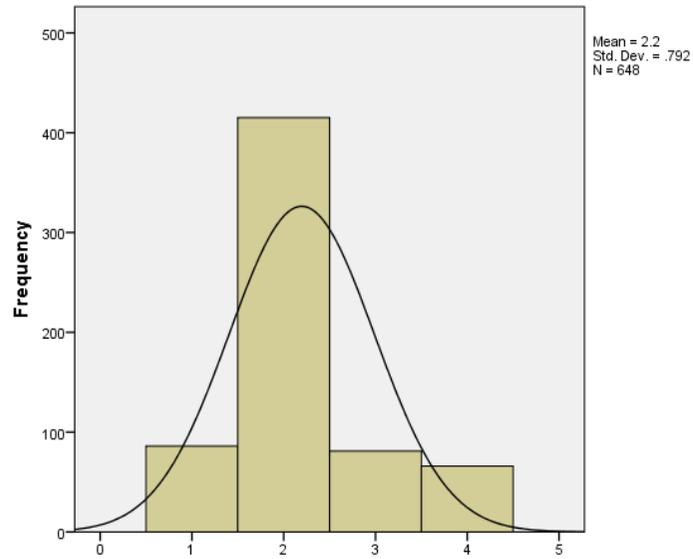
A total of 647 students answered the question on consumer theory. A total of 338 (51.9 per cent) answered the question correctly. All the options mentioned are correct. 25.5 per cent of students indicated individuals responding to incentives as the only correct answer, while 11.1 per cent thought it was 'there is no such thing as a free lunch'.

**Section B: Microeconomics**

**Question 9**

Bacon and eggs are often eaten together, therefore we call them complements. Suppose that the price of bacon has risen and the quantity of eggs has fallen. What could be responsible for this pattern?

1. A news article stating that bacon causes heart attacks
2. Decrease in wages for workers on pig farms
3. A rise in the price of pig feed
4. A rise in the price of chicken feed



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	86	13.2	13.3	13.3
2	415	63.7	64.0	77.3
Valid 3	81	12.4	12.5	89.8
4	66	10.1	10.2	100.0
Total	648	99.5	100.0	

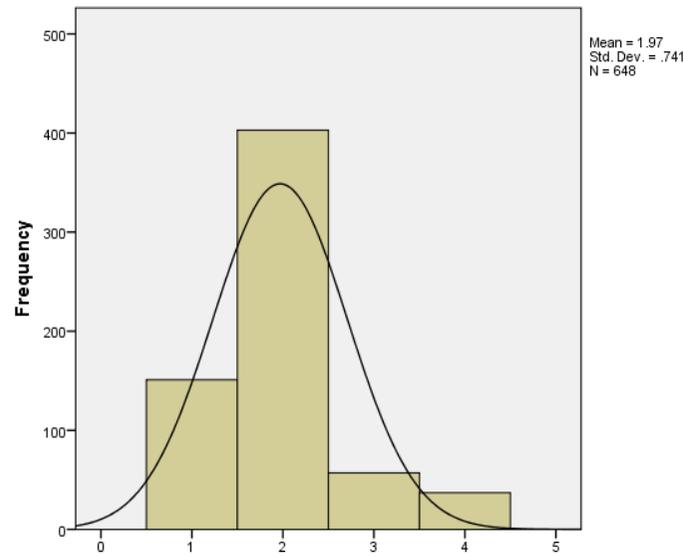
A total of 648 students answered this question on demand. A total of 415 (63.7 per cent) answered the question correctly. 13.2 per cent of students were under the impression that news articles which stated that bacon causes heart attacks would result in the price of bacon increasing and the quantity of eggs to fall.

**Section B: Microeconomics**

**Question 10**

Suppose that in the year 2005 the number of births is temporarily high. How might this baby boom affect the price of babysitting services in 2010 and 2020?

1. The price of babysitting services will increase in 2010 and 2020
2. The price of babysitting services will increase in 2010 and decrease in 2020
3. The price of babysitting services will decrease in 2010 and 2020
4. The price of babysitting services will decrease in 2010 and increase in 2020



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	151	23.2	23.3	23.3
2	403	61.9	62.2	85.5
Valid 3	57	8.8	8.8	94.3
4	37	5.7	5.7	100.0
Total	648	99.5	100.0	

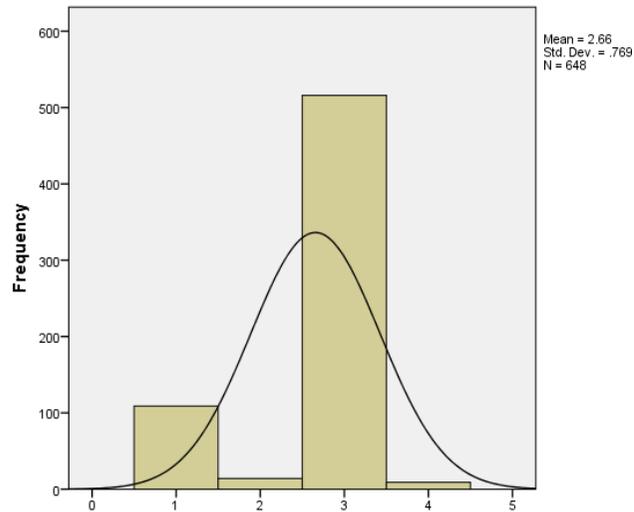
A total of 648 students answered this question on demand. A total of 403 (61.9 per cent) answered the question correctly. 23.2 per cent of students were under the impression that the price of babysitting services would increase in 2010 and 2020.

**Section B: Microeconomics**

**Question 11**

Economists have observed that spending on restaurant meals declines more during economic downturns than spending on food to be eaten at home. How might the concept of elasticity help to explain this?

1. Consumers are relatively sensitive to changes in prices
2. Consumers are relatively insensitive to changes in prices
3. A restaurant meal can be classified as a luxury good when looking at income elasticity
4. A restaurant meal can be classified as a necessity when looking at income elasticity



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	109	16.7	16.8	16.8
	2	14	2.2	2.2	19.0
Valid	3	516	79.3	79.6	98.6
	4	9	1.4	1.4	100.0
	Total	648	99.5	100.0	
Missing	System	1	.2		
	Total	648	100.0		

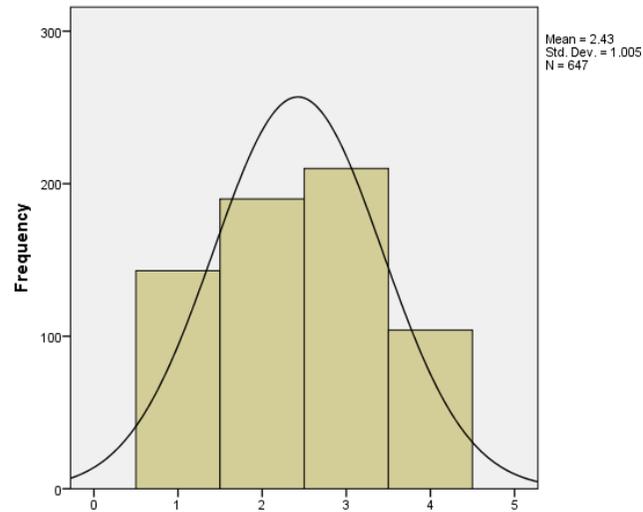
A total of 648 students answered this question on elasticity. A total of 516 (79.3 per cent) answered the question correctly, that a restaurant meal can be considered a luxury good. 16.7 per cent of students were under the impression that consumers are relatively sensitive to price changes.

**Section B: Microeconomics**

**Question 12**

The famous artist, Picasso, died in 1973. How sensitive will art lovers be to a change in the price of Picasso paintings?

1. Art lovers are relatively sensitive to changes in prices
2. Art lovers are relatively insensitive to changes in prices
3. Art lovers are insensitive to changes in prices
4. Art lovers are sensitive to changes in prices



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	143	22.0	22.1	22.1
	2	190	29.2	29.4	51.5
	3	210	32.3	32.5	83.9
	4	104	16.0	16.1	100.0
	Total	647	99.4	100.0	
Missing	System	1	.2		
Total		648	100.0		

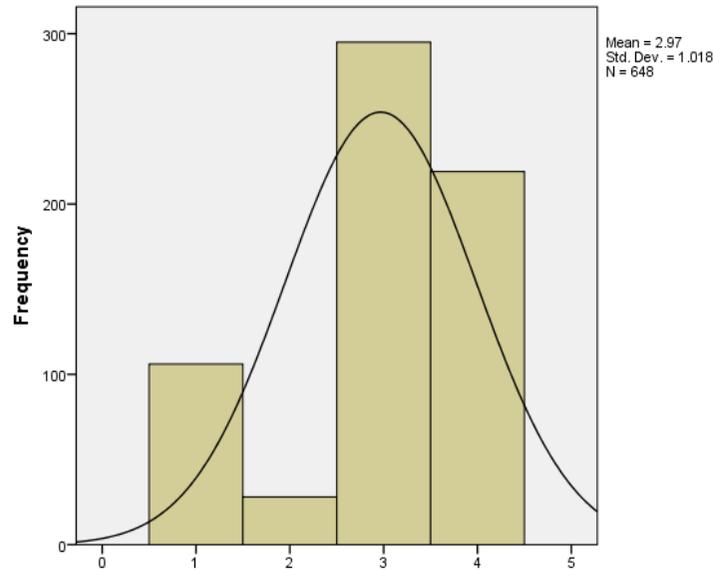
A total of 647 students answered this question on elasticity. A total of 190 (29.2 per cent) answered the question correctly, that art lovers are relatively sensitive to price changes. 32.3 per cent of students were under the impression that art lovers are insensitive to changes in prices.

**Section B: Microeconomics**

**Question 13**

Jo'burg day is a concert organised by a local Johannesburg radio station, 94.7 Highveld Stereo, each year in September. The price per ticket is R400 for the day. Suppose the government imposes a price ceiling of R200 per ticket at the concert, what will the effect be?

1. More people will attend the concert and the organisers will make a profit
2. Less people will attend the concert and result in a surplus of tickets
3. More people will attend the concert and result in a shortage of tickets
4. More people will attend the concert and the organisers will make a loss



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	106	16.3	16.4
	2	28	4.3	20.7
Valid	3	295	45.3	66.2
	4	219	33.6	100.0
	Total	648	99.5	100.0

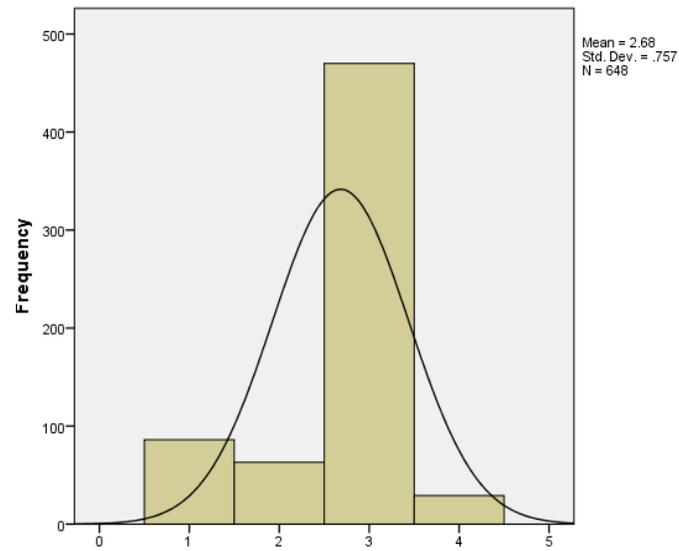
A total of 648 students answered the question on government intervention. A total of 295 (45.5 per cent) answered the question correctly, that there will be a shortage of tickets. 33.6 per cent of students were under the impression that the organizers will make a loss.

**Section B: Microeconomics**

**Question 14**

South Africa is home to approximately 21 000 rhinos. Rhino hunting is illegal in South Africa and leads to rhino poaching, since rhino horn is a well-known commodity in parts of Asia. In 2000, 7 rhinos were poached and in 2012, 633 rhinos were poached for their horns. What is the reason for the increase in the amount of rhinos being poached?

1. Increase in the price of rhino horn
2. Increase in the demand for rhino horn due to a decrease in price
3. Increase in the price of rhino horn due to limited supply
4. Increase in the supply for rhino horn



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	86	13.2	13.3	13.3
2	63	9.7	9.7	23.0
Valid 3	470	72.2	72.5	95.5
4	29	4.5	4.5	100.0
Total	648	99.5	100.0	

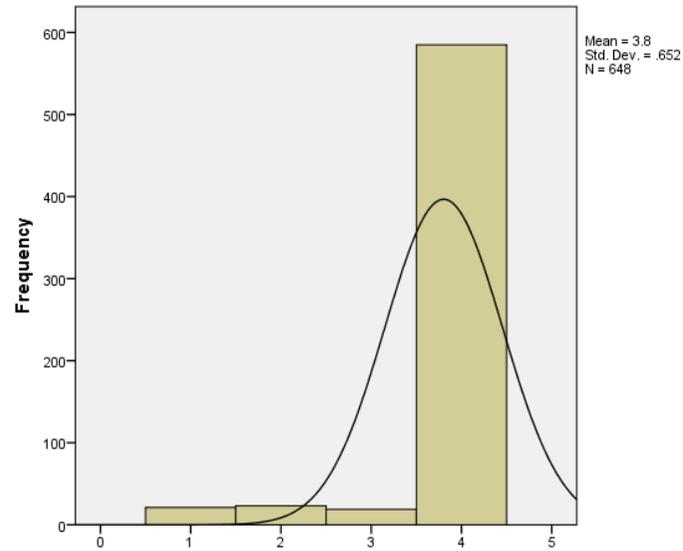
A total of 648 students answered the question on supply. A total of 470 (72.2 per cent) answered the question correctly, that the price of rhino horn increase due to limited supply. 13.2 per cent of students were under the impression that the increase in the amount of rhinos being poached was due to the increase in the price of rhino horn.

**Section B: Microeconomics**

**Question 15**

If you walk into Pick ‘n Pay and were to compare the shopping carts of any two consumers, you would observe clear differences. Why is that?

1. Given a certain budget, consumers decide which goods and services to buy
2. Individual consumer’s preferences on certain goods and services differ
3. Individual consumers allocate their incomes among the various goods and services available to them
4. All of the above



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
1	21	3.2	3.2	3.2
2	23	3.5	3.5	6.8
Valid 3	19	2.9	2.9	9.7
4	585	89.9	90.3	100.0
Total	648	99.5	100.0	

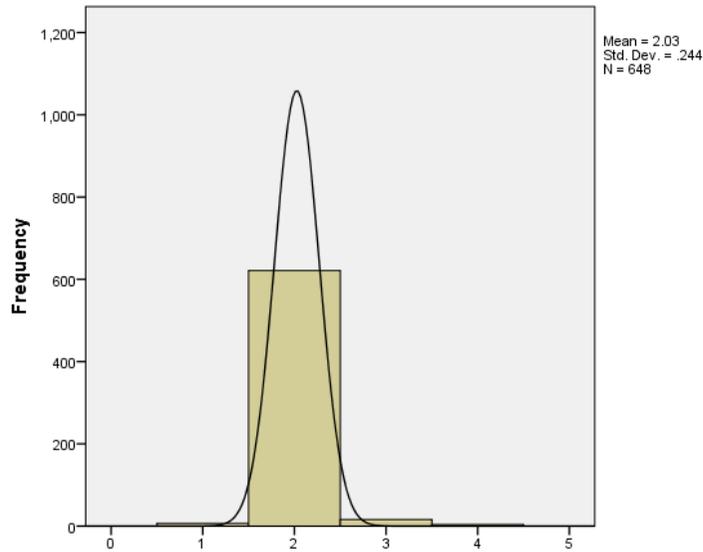
A total of 648 students answered the question on consumer theory. A total of 585 (89.9 per cent) answered the question correctly, that the all the options needs to be taken in account. .

**Section B: Microeconomics**

**Question 16**

Shane sells hamburgers every day in front of a butcher shop in Cape Town. In order for Shane to produce hamburgers, he needs to pay the owner of the butcher shop R500 for the day to sell hamburgers in front of his butcher shop. In addition, he needs a grill, tongs, hamburger patties, hamburger rolls, tomatoes, tomato sauce, mustard and chutney. Which of the following can be considered as a fixed cost for Shane?

1. Overtime wages for the employees
2. Paying R500 rent for the butcher
3. Hamburger patties and hamburger rolls
4. Tomato sauce, mustard and chutney



	Frequency	Per cent	Valid cent	Per	Cumulative Per cent
1	7	1.1	1.1		1.1
2	621	95.4	95.8		96.9
Valid 3	16	2.5	2.5		99.4
4	4	.6	.6		100.0
Total	648	99.5	100.0		

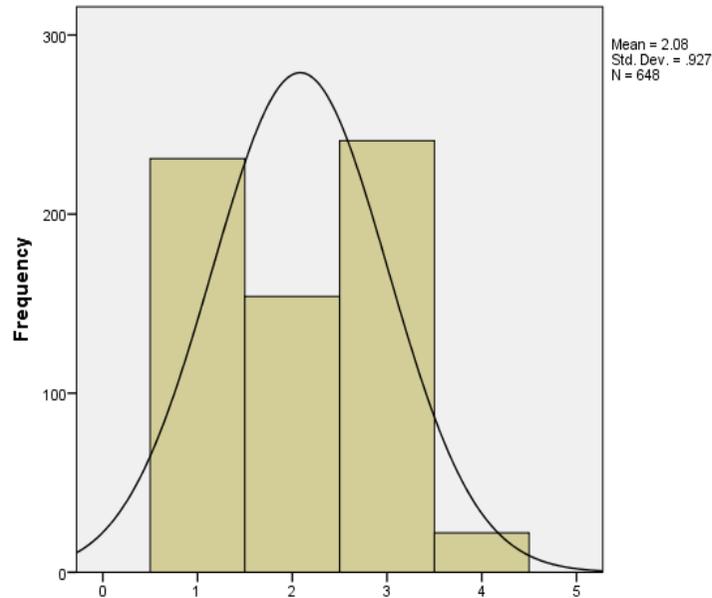
A total of 648 students answered this question on producer theory. A total of 621 (95.4 per cent) answered the question correctly, that paying rent is an example of fixed costs.

**Section B: Microeconomics**

**Question 17**

If you walk into a restaurant and almost all the tables are empty the question “why is this restaurant still open” probably crossed your mind. You may think that the revenue made from the few tables that are occupied cannot cover the cost of the restaurant. But what you need to keep in mind is the fixed and variable cost of the restaurant. Considering the short run, the restaurant can stay open to consumers as long as:

1. The fixed costs are covered
2. The variable costs are covered
3. Both fixed and variable costs are covered
4. Some of the fixed and variable costs covered.



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	231	35.5	35.6
	2	154	23.7	59.4
Valid	3	241	37.0	96.6
	4	22	3.4	100.0
	Total	648	99.5	100.0

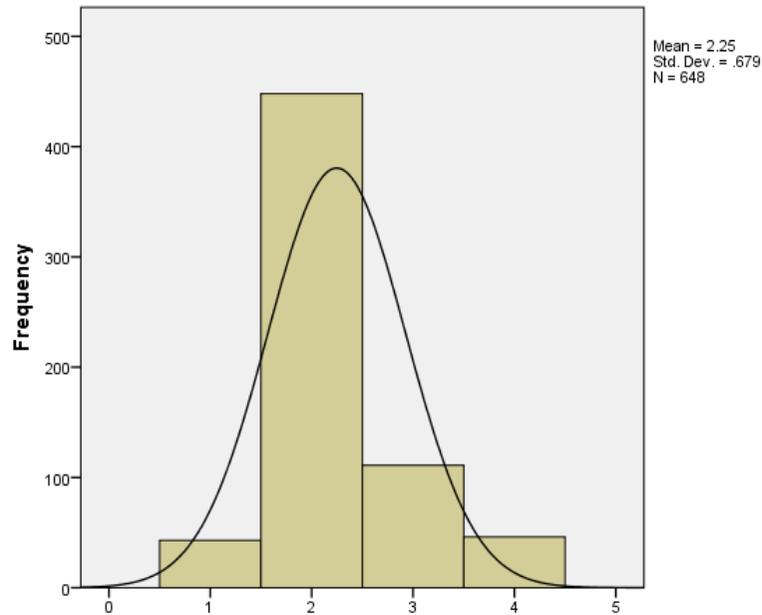
A total of 648 students answered this question on producer theory. A total of 154 (23.7 per cent) answered the question correctly, that the variable costs must be covered in the short run in order for a restaurant or any other firm to remain open. 35.6 per cent of students were under the impression that the fixed costs must be covered and 37 per cent of students were under the impression that both fixed and variable costs must be covered.

**Section B: Microeconomics**

**Question 18**

Barry runs a biltong shop in the Northern Cape. December is his busiest time of year but he needs your help calculating his loss or profit for December. He bought 2000kg of beef from a local farmer at R55 per kilogram and 10kg of spices at R20 per kilogram. Furthermore, he pays wages for two workers at R5000 per month. From the 2000kg of beef, he manages to make 1000kg of biltong which he sells at R95 per kilogram, 500kg of chilly bites at R45 per kilogram and 500kg of “droëwors” at R80 per kilogram. Calculate Barry’s loss or profit for December.

1. R 27 300 loss
2. R 37 300 profit
3. R 47 300 loss
4. R 57 300 profit



	Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	43	6.6	6.6
	2	448	68.8	75.8
Valid	3	111	17.1	92.9
	4	46	7.1	100.0
	Total	648	99.5	100.0

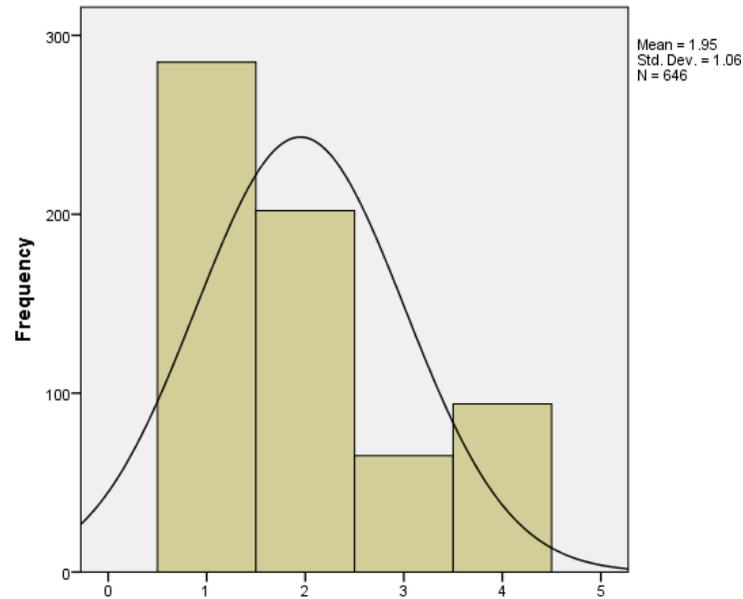
A total of 648 students answered this question on producer theory. A total of 448 (68.8 per cent) answered the question correctly, calculating the profit at R37300 (Total revenue minus total cost). 17.1 per cent of students calculated a loss of R 47 300.

**Section B: Microeconomics**

**Question 19**

Boeing Commercial Airplanes is the manufacturer of the world's most recognisable aircraft, the Boeing 747. If Boeing Commercial Airplanes produces 10 Boeings per month, its long-run total cost is 200 million US dollars. If Boeing Commercial Airplanes produces 15 Boeings per month, its long-run total cost is 215 million US dollars. This example resembles:

1. Economies of scale : Long-run average total cost falls as the quantity of output increases
2. Diseconomies of scale : Long-run average total cost rises as the quantity of output increases
3. Constant returns to scale : Long-run average total cost stays the same as the quantity of output increases
4. Constant returns to scale : Long-run average total cost falls as the quantity of output increases



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	285	43.8	44.1	44.1
	2	202	31.0	31.3	75.4
Valid	3	65	10.0	10.1	85.4
	4	94	14.4	14.6	100.0
	Total	646	99.2	100.0	
Missing	System	2	.3		
Total		648	100.0		

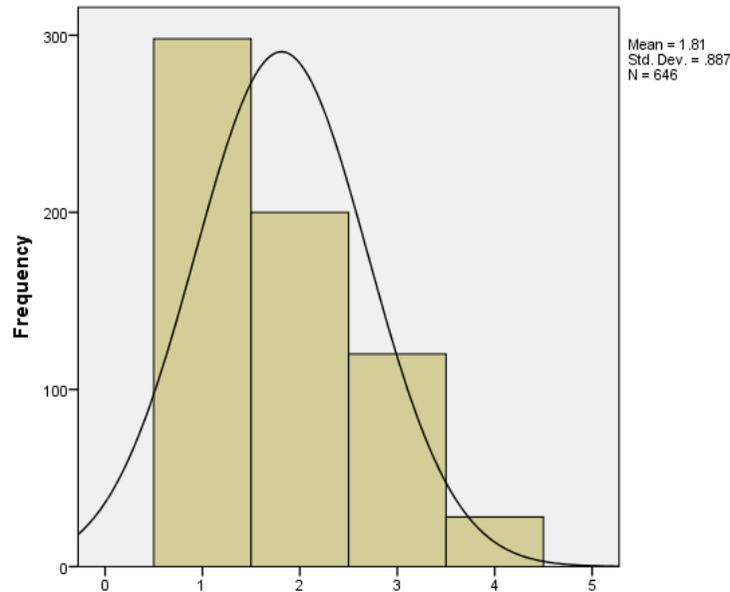
A total of 646 students answered this question on producer theory. A total of 285 (43.8 per cent) answered the question correctly, that in the long run, the average total cost decreases as output increases. 31 per cent of students indicated that in the long run, average cost rises as the quantity of output increases.

**Section B: Microeconomics**

**Question 20**

Mr Mushroom is a business in a competitive market. In 2005 during Aardklop (a national arts festival) Mr Mushroom sold over 200kg of mushrooms and made an economic profit. During the period between 2006 and 2008, several other firms entered the mushroom market at Aardklop in hope of also making an economic profit. In 2010 there were almost 10 different mushroom stands at Aardklop, which resulted in an economic loss for the 10 mushroom stands. In your opinion what happened in 2011?

1. The different mushroom businesses that entered the Aardklop market exited the market, leaving the original Mr. Mushroom with a normal profit
2. The different mushroom businesses that entered the Aardklop market exited the market, leaving the original Mr. Mushroom with an economic profit
3. The different mushroom businesses that entered the Aardklop market stayed in the market and made an economic loss
4. The different mushroom businesses that entered the Aardklop market stayed in the market and still made an economic profit



A total of 646 students answered the question on perfect competitive market. A total of 289 (46.1 per cent) answered the question correctly, that in the long run, a firm in a perfect competitive market will always make a normal profit. 30.7 per cent of students indicated that in the long run, a firm in a perfect competitive market will make an economic profit.

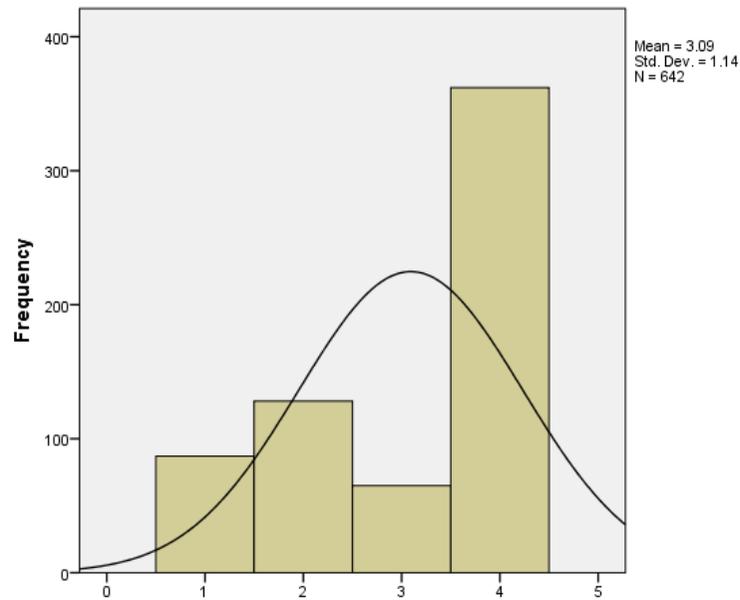
		Frequency	Per cent	Valid Per cent	Cumulative Per cent
	1	298	45.8	46.1	46.1
	2	200	30.7	31.0	77.1
Valid	3	120	18.4	18.6	95.7
	4	28	4.3	4.3	100.0
	Total	646	99.2	100.0	
Missing	System	2	.3		
Total		648	100.0		

**Section B: Microeconomics**

**Question 21**

Most consumers live according to their means, but consumers do not walk into an airport with a sign displaying how much they are willing to pay for a ticket to Beijing, China. Instead, firms price discriminate by dividing consumers into different groups, for example: young and old, rich and middle class, South Africans and foreigners. Which of the following is not an example of price discrimination:

1. Ster-Kinekor movie theatres charge a lower price for children, senior citizens and Discovery Health Vitality members.
2. When going to a craft market, for example at Hartbeespoortdam, you negotiate a price that you as consumer are willing to pay.
3. Most airlines, such as SAA, KLM and AA, charge a lower price for a round-trip ticket in comparison with a one-way ticket.
4. Edgars decided to decrease the price of all Levis jeans.



A total of 642 students answered the question on a monopoly market structure. A total of 362 (56.4 per cent) answered the question correctly, an increase in the price of Levis jeans at Edgars is not an example of price discrimination. 19.7 per cent of students indicated that negotiating a price at Hartbeespoortdam is not an example of price discrimination.

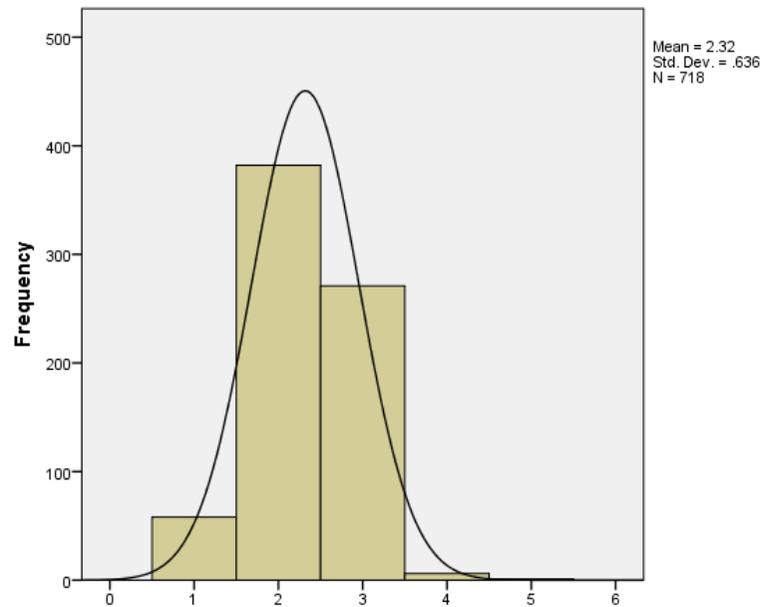
		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	87	13.4	13.6	13.6
	2	128	19.7	19.9	33.5
	3	65	10.0	10.1	43.6
	4	362	55.6	56.4	100.0
	Total	642	98.6	100.0	
Missing	System	6	0.9		
Total		648	100.0		

**Section C: Macroeconomics**

**Question 1**

Gross Domestic Product (GDP) is the market value of all final goods and services produced within a country in a given period. Additionally, any country's GDP consists of four components: Consumption, Investment, Government expenditure, and Net exports. Which of the following transactions can be considered as an investment?

1. A family buys a new washing machine
2. Government pays the salaries of teachers
3. Volkswagen expands its factory in Uitenhage
4. You buy a Steers hamburger



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	58	8.1	8.1	8.1
	2	382	53.1	53.2	61.3
	3	271	37.6	37.7	99.0
	4	6	.8	.8	99.9
	5	1	.1	.1	100.0
	Total	718	99.7	100.0	
Missing	System	2	.3		
Total		720	100.0		

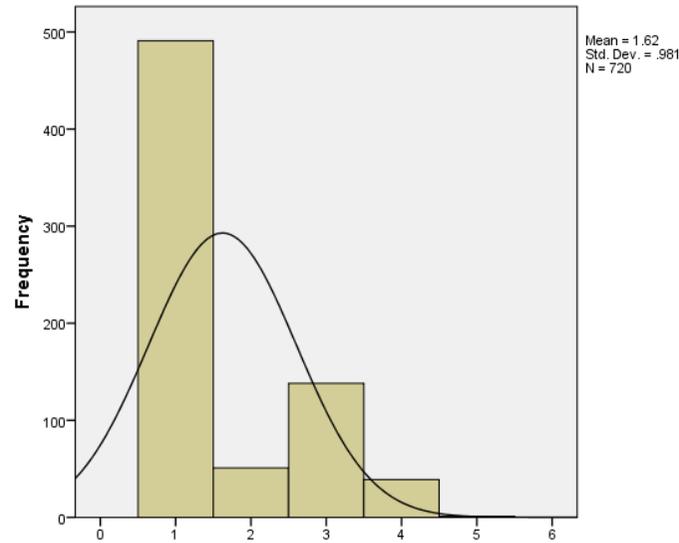
A total of 718 students answered the question on the components of GDP. A total of 271 (37.6 per cent) answered the question correctly, that when Volkswagen expands its factory, it can be considered as an investment. 53.1 per cent of students indicated that when government pays the salaries of teachers, it could be considered an investment.

**Section C: Macroeconomics**

**Question 2**

Which of the following workers are more likely to experience short-term unemployment?

1. An agriculture worker laid off because of bad weather.
2. A construction worker who loses her job at a plant in an isolated area.
3. An expert packager at a factory with little formal education who loses his job when companies start to install automatic machinery that package goods.
4. A pharmacist, because doctors are now permitted to dispense medicine.



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	491	68.2	68.2	68.2
	2	51	7.1	7.1	75.3
	3	138	19.2	19.2	94.4
	4	39	5.4	5.4	99.9
	5	1	.1	.1	100.0
	Total	720	100.0	100.0	

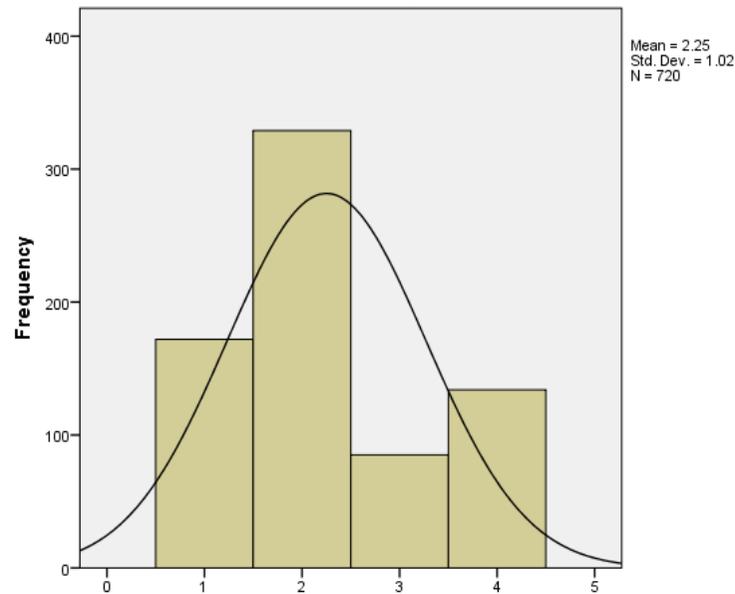
A total of 720 students answered this question on unemployment. A total of 491 (68.2 per cent) answered the question correctly, that an agriculture worker laid off because of bad weather experiences short-term unemployment. 19.2 per cent of students indicated that an expert packager at a factory with little formal education who loses his job when companies start to install automatic machinery that package goods is considered short-term unemployment.

**Section C: Macroeconomics**

**Question 3**

In your opinion, which of the following might be a reason for a high unemployment rate in South Africa?

1. Low legal minimum wages
2. Constant strikes by employees
3. Limited unemployment benefits
4. Small welfare benefits payments



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	172	23.9	23.9	23.9
	2	329	45.7	45.7	69.6
	3	85	11.8	11.8	81.4
	4	134	18.6	18.6	100.0
	Total	720	100.0	100.0	

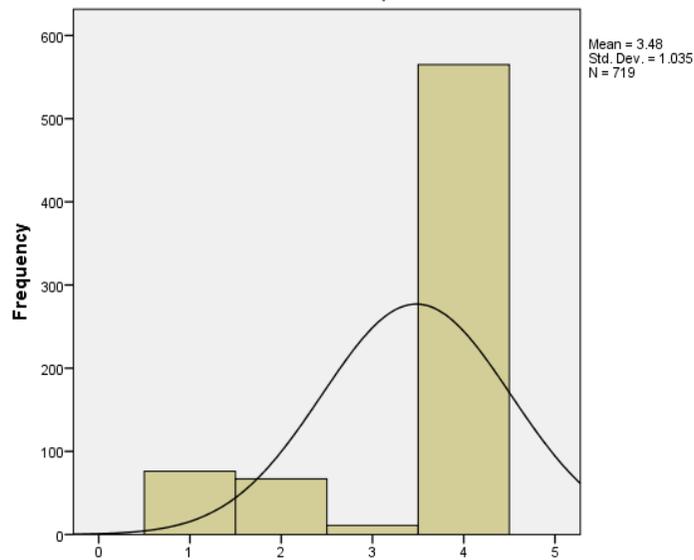
A total of 720 students answered this question on unemployment. A total of 329 (45.7 per cent) answered the question correctly, that the reason for high unemployment in South Africa is the constant strikes by employees. 23.9 per cent of students indicated that low legal minimum wages are the reason for high unemployment.

**Section C: Macroeconomics**

**Question 4**

The inflation rate in South Africa increased from 5.8% in January 2013 to 6.3% September 2013. This means that:

1. The prices of certain goods and services increased.
2. Purchasing power for goods and services decreased.
3. The prices of goods and services decreased.
4. The prices of goods and services in general increased



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	76	10.6	10.6	10.6
	2	67	9.3	9.3	19.9
	3	11	1.5	1.5	21.4
	4	565	78.5	78.6	100.0
	Total	719	99.9	100.0	
Missing	System	1	.1		
Total		720	100.0		

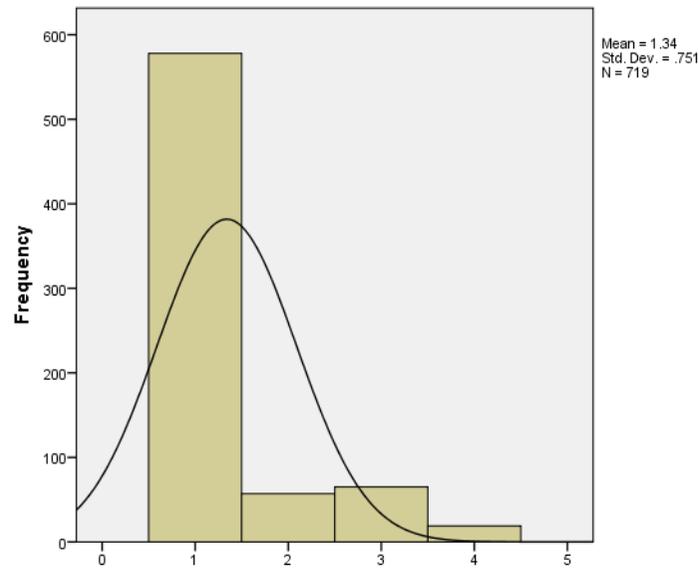
A total of 719 students answered the question on inflation. A total of 565 (78.5 per cent) answered the question correctly, that inflation is the general increase in prices of goods and services. 10.6 per cent of students indicated that inflation entails the increase of prices of certain goods and services.

**Section C: Macroeconomics**

**Question 5**

Economic growth in South Africa is typically measured by which one of the following:

1. GDP
2. GNP
3. GNI
4. GDE



A total of 719 students answered the question on economic growth. A total of 578 (80.3 per cent) students answered the question correctly, that GDP measures economic growth. 9 per cent of students indicated that GNI measures economic growth.

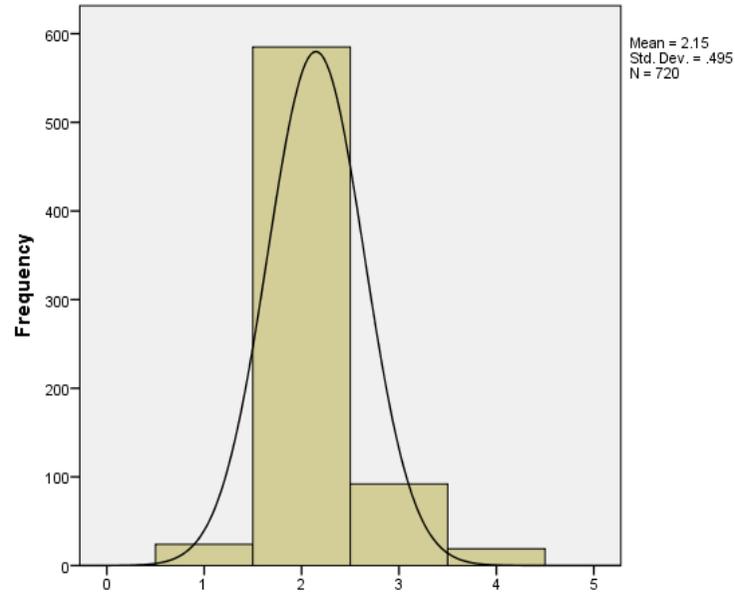
		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	578	80.3	80.4	80.4
	2	57	7.9	7.9	88.3
	3	65	9.0	9.0	97.4
	4	19	2.6	2.6	100.0
	Total	719	99.9	100.0	
Missing	System	1	.1		
	Total	720	100.0		

**Section C: Macroeconomics**

**Question 6**

Inflation in South Africa is typically measured by which of the following:

1. CPIX
2. CPI
3. GNP Deflator
4. GDE



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	24	3.3	3.3	3.3
	2	585	81.3	81.3	84.6
	3	92	12.8	12.8	97.4
	4	19	2.6	2.6	100.0
	Total	720	100.0	100.0	

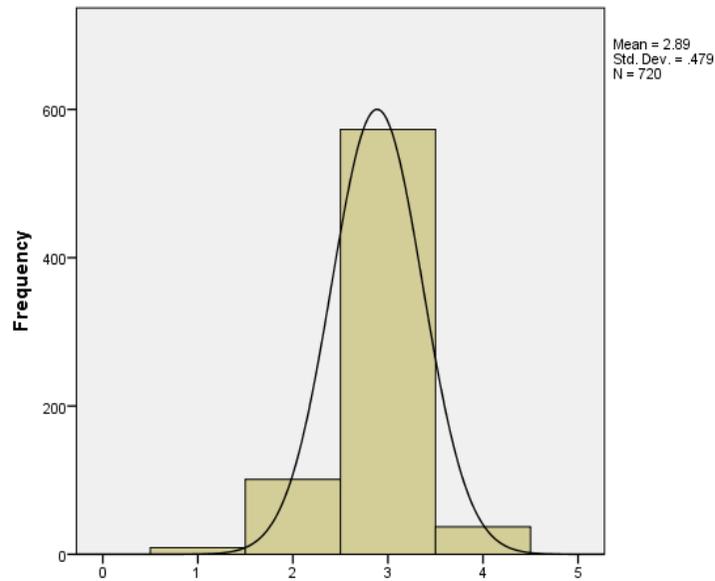
A total of 719 students answered the question on inflation. A total of 585 (81.3 per cent) students answered the question correctly, that CPI measures inflation. 12.8 per cent of students indicated that GNP deflator measures

**Section C: Macroeconomics**

**Question 7**

Which of the following can be considered as money in the South African economy?

1. A Picasso painting
2. A Government bond
3. A R20 bank note
4. A credit card



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	9	1.3	1.3	1.3
	2	101	14.0	14.0	15.3
	3	573	79.6	79.6	94.9
	4	37	5.1	5.1	100.0
Total		720	100.0	100.0	

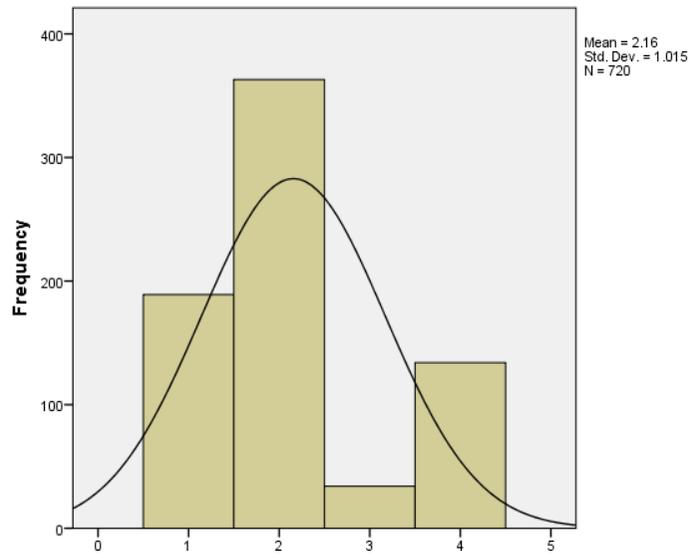
A total of 720 students answered the question on money. A total of 573 (79.6 per cent) students answered the question correctly, a R20 note can be considered as money. 14 per cent of students indicated that a government bond is money.

**Section C: Macroeconomics**

**Question 8**

Which of the following statements is false:

1. In an economy, money takes the form of currency and various types of bank deposits
2. The South African Reserve bank regulates government expenditure
3. The South African Reserve bank is the central bank for South Africa
4. A central bank control the money supply



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	189	26.3	26.3	26.3
	2	363	50.4	50.4	76.7
	3	34	4.7	4.7	81.4
	4	134	18.6	18.6	100.0
	Total	720	100.0	100.0	

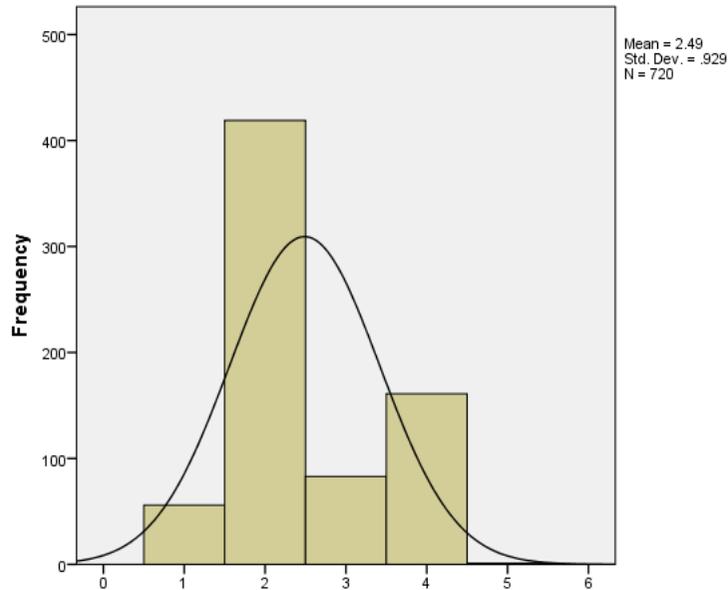
A total of 720 students answered the question on monetary policy. A total of 363 (50.4 per cent) correctly identified the incorrect answer, that the South African Reserve bank regulates government expenditure. 26.3 per cent of students indicated that the incorrect answer is in fact that in an economy, money takes the form of currency and various types of bank deposits.

**Section C: Macroeconomics**

**Question 9**

Which of the following can be associated with fiscal policy and fiscal authorities?

1. Interest rates
2. Tax and government expenditure
3. Money supply
4. South African Reserve bank



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	56	7.8	7.8	7.8
	2	419	58.2	58.2	66.0
	3	83	11.5	11.5	77.5
	4	161	22.4	22.4	99.9
	5	1	.1	.1	100.0
	Total	720	100.0	100.0	

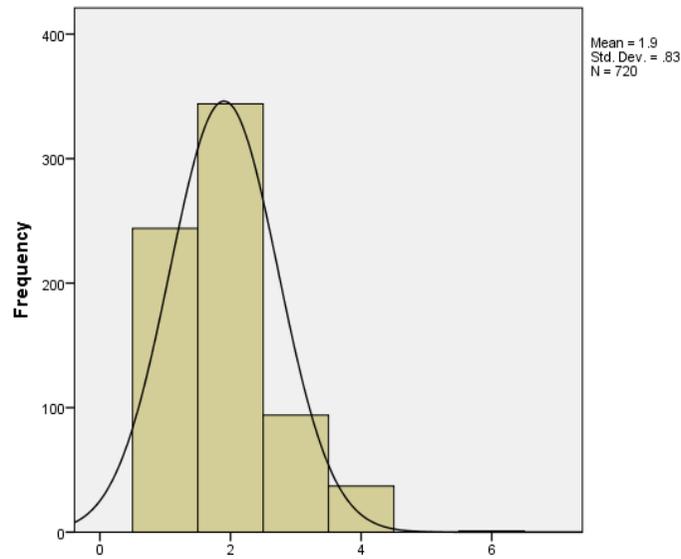
A total of 720 students answered the question on fiscal policy. A total of 419 (58.2 per cent) correctly identified the fiscal policy statement that tax and government expenditure are considered fiscal policy. 22.4 per cent of students indicated that the South African Reserve Bank is affiliated with fiscal policy.

**Section C: Macroeconomics**

**Question 10**

If government spending exceeds the current government income, it is referred to as

1. A shortage on the current account of the balance of payments.
2. Budget deficit.
3. Public debt
4. Monetary financing.



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	244	33.9	33.9	33.9
	2	344	47.8	47.8	81.7
	3	94	13.1	13.1	94.7
	4	37	5.1	5.1	99.9
	6	1	.1	.1	100.0
Total		720	100.0	100.0	

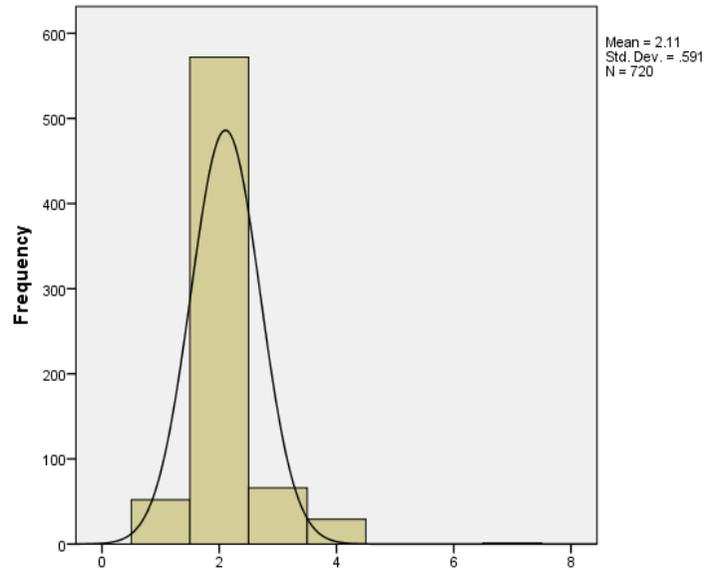
A total of 720 students answered the question on budget deficit. A total of 344 (47.8 per cent) correctly identified a budget deficit as referring to when government expenditure exceeds government income. 33.9 per cent of students indicated that a shortage in the current account of the balance of payments occurs when government expenditure exceeds government income.

**Section C: Macroeconomics**

**Question 11**

Which one of the following statements is false on why countries trade?

1. The distribution of natural, human and capital resources amongst countries is uneven
2. Countries do not differ in their endowments of economic resources
3. Efficient production of goods and services requires different technologies or combinations of resources
4. Consumers may prefer certain imported goods to similar domestically produced goods.



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	52	7.2	7.2	7.2
	2	572	79.4	79.4	86.7
	3	66	9.2	9.2	95.8
	4	29	4.0	4.0	99.9
	Other	1	.1	.1	100.0
Total		720	100.0	100.0	

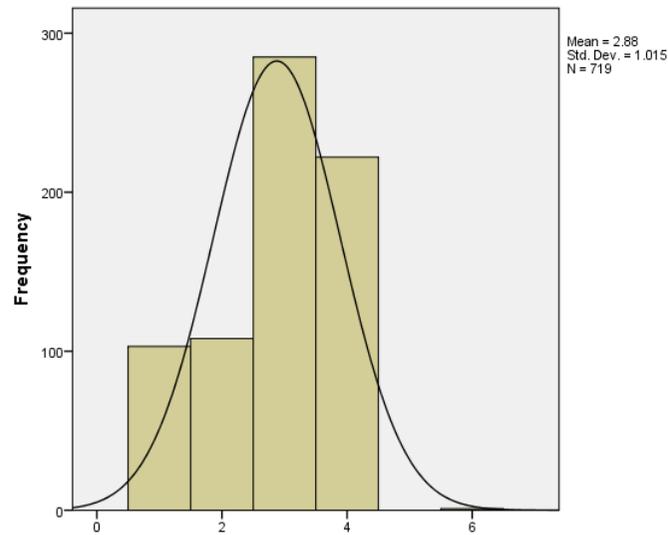
A total of 720 students answered this question on international trade. A total of 572 (79.4 per cent) correctly identified the false statement that countries trade due to the fact that they do not differ in their endowments of economic resources.

**Section C: Macroeconomics**

**Question 12**

The removal of tariff protection for the South African textile industry is likely to:

1. harm South African consumers.
2. benefit the textile industry.
3. harm the clothing industry that uses textiles as an input.
4. cause some unemployment in this industry.



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	103	14.3	14.3	14.3
	2	108	15.0	15.0	29.3
	3	285	39.6	39.6	69.0
	4	222	30.8	30.9	99.9
	6	1	.1	.1	100.0
	Total	719	99.9	100.0	
Missing	System	1	.1		
	Total	720	100.0		

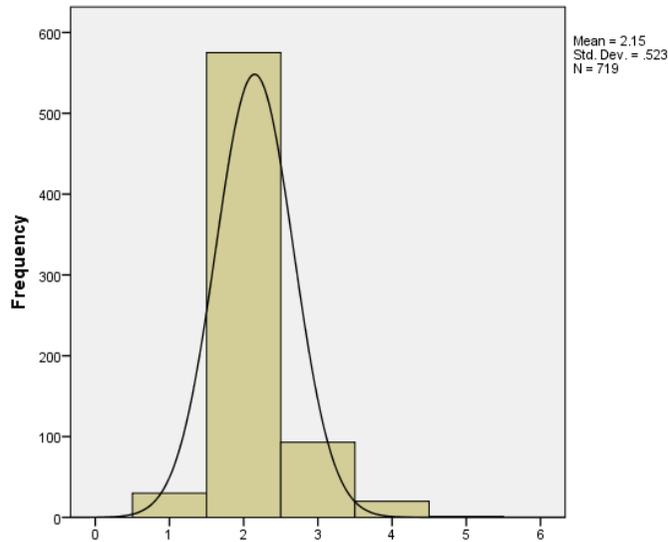
A total of 719 students answered this question on international trade. A total of 108 (15 per cent) correctly stated that a removal of tariff protection for the South African textile industry is likely to benefit the textile industry. 39.6 per cent of students indicated that a removal of tariff protection for the South African textile industry is likely to harm the clothing industry that uses textiles as an input...

**Section C: Macroeconomics**

**Question 13**

If a government imposes a tariff on an imported product, we would expect local production to \_\_\_\_\_ and imports to \_\_\_\_\_:

1. increase; increase
2. increase; decrease
3. decrease; increase
4. decrease; decrease



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	30	4.2	4.2	4.2
	2	575	79.9	80.0	84.1
	3	93	12.9	12.9	97.1
	4	20	2.8	2.8	99.9
	5	1	.1	.1	100.0
	Total	719	99.9	100.0	
Missing	System	1	.1		
Total		720	100.0		

A total of 719 students answered this question on international trade. A total of 575 (79.9 per cent) correctly stated that if government imposes a tariff on an imported product, we would expect local production to increase and imports to decrease.

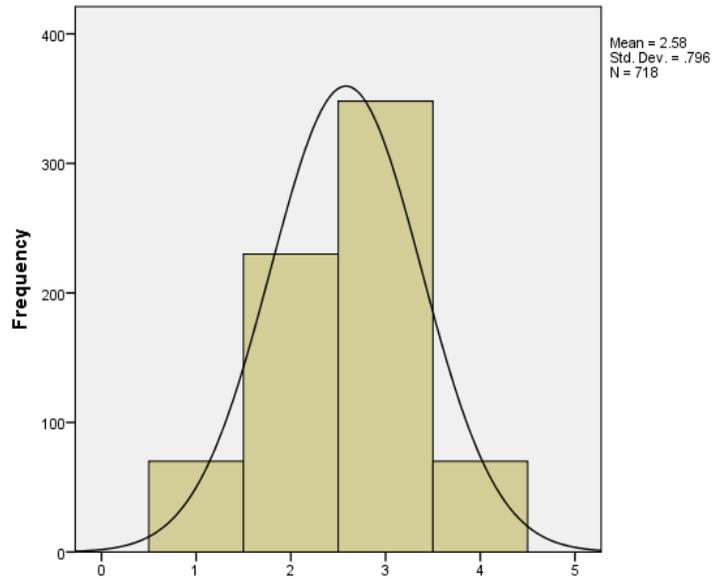
**Section C: Macroeconomics**

**Question 14**

By making use of the current account information below, calculate South Africa's balance of trade:

<b>Current account</b>	<b>(R millions)</b>
<i>Merchandise exports</i>	398 532
<i>Net gold exports</i>	35 475
<i>Service receipts</i>	81 353
<i>Income receipts</i>	40 234
<i>Merchandise imported</i>	-476 545
<i>Payment for services</i>	-96 950
<i>Income payments</i>	-75 990
<i>Current transfers</i>	-17 186

1. + R 78 013
2. R 78 013
3. R 42 538
4. R 174 963



		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	70	9.7	9.7	9.7
	2	230	31.9	32.0	41.8
	3	348	48.3	48.5	90.3
	4	70	9.7	9.7	100.0
	Total	718	99.7	100.0	
Missing	System	2	.3		
Total		720	100.0		

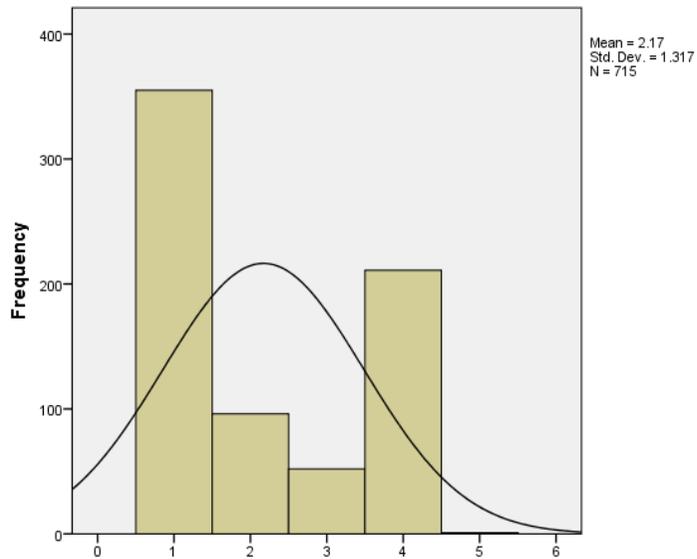
A total of 718 students answered the question on the current account. A total of 230 (31.9 per cent) correctly calculated the balance of trade, by taking into account net gold exports, at a value of R78 013.

**Section C: Macroeconomics**

**Question 15**

Due to the weak rand in 2013, more Americans visited South Africa, we can expect, *ceteris paribus*, that:

1. The rand will appreciate against the dollar.
2. the rand will depreciate against the dollar.
3. the dollar will appreciate against the rand.
4. it will cost South Africans more to visit the USA.



A total of 715 students answered the question on exchange rates. A total of 355 (49.3 per cent) correctly identified that . 39.6 per cent of students indicated that due to the weak rand in 2013 resulting in more Americans visiting South Africa, we can expect, *ceteris paribus*, that the rand will appreciate against the dollar.

		Frequency	Per cent	Valid Per cent	Cumulative Per cent
Valid	1	355	49.3	49.7	49.7
	2	96	13.3	13.4	63.1
	3	52	7.2	7.3	70.3
	4	211	29.3	29.5	99.9
	5	1	.1	.1	100.0
	Total	715	99.3	100.0	
Missing	System	5	.7		
Total		720	100.0		

## 5.2.2 Reliability testing

<sup>15</sup>It is important to test whether the questions asked in the TUESA are reliable or not. Since the TUCE was the basis of this study and the basis of the development of the TUESA the same test of reliability will be used as with the TUCE-4 developed by Walstad, *et al.*, 2007, namely the Cronbach alpha.

The reliability of the test is the degree of consistency with which the test measures student performance. One measure of overall test reliability as stated is by calculating the Cronbach's alpha coefficient (Cronbach 1951). The Cronbach's alpha is a measure of the internal consistency amongst test items. The alpha statistic ranges from zero to one (Cronbach 1951). The higher the coefficient is, the more reliable the test is. Alpha coefficients between 0.0 and 0.4 are considered unacceptable, alpha values between 0.5 and 0.6 are considered poor, alpha values between 0.6 and 0.7 are considered acceptable, alpha values between 0.7 and 0.8 are considered good, and an alpha value greater than 0.9 is considered excellent (Cronbach 1951). The formula for the Cronbach alpha is:

### Formula 5.1: Cronbach's Alpha

$$\alpha = n/(n - 1)[1 - (\sum Vi/Vt)]$$

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<sup>15</sup> Because the TUESA is in the form of multiple-choice questionnaire with a clear correct answer traditional measures of validity such as factor analysis and principle component analysis is not appropriate. Answers cannot be grouped together as with for example a likert scale questionnaire where respondents are asked to indicate: Agree, strongly agree, disagree, strongly disagree. Strong covariance between answers cannot speak to the reliability of the test items.

In email correspondents regarding this issue William Walstad indicated that a way to calculate validity would be to give the test to the same group of students as a pre-test (no undergraduate economic instruction) and then as a post-test (completed undergraduate level instruction) (Walstad, 2015). Compare the pre-test and post-test results (mean scores and item scores) for the same group of students. One should get an expected increase in mean scores and for most of the test items. – Therefore have validity. As one shall see when comparing chapter 6 and 7 the overall item score and mean score of the TUESA increased.

where  $n$  represents the number of test items,  $V_t$  represents the variance of the total test and  $V_i$  represents the sum of the variance of the individual test items.

Table 5.6 below shows the Cronbach's Alpha for the economic literacy test, TUESA. The Cronbach's Alpha was measured taking into account the microeconomic and macroeconomic test results. A Cronbach's Alpha coefficient of 0.62 indicates that the test's reliability is acceptable and that the test can be considered as being reliable.

**Table 5.6: Cronbach's Alpha Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
0.62	0.62	36.0

### 5.2.3 Changes made to the TUESA after pilot study results

After the results of the pilot study were obtained, certain changes were made to some of the questions of the TUESA.

Microeconomic questions 4, 7, 8, 9 and 12 and Macroeconomic question 2, 3, 5, 10, 12 and 15 were changed in consequence of the *scale after item deleted* results obtained from the Cronbach's Alpha reliability test. The results indicated that if these questions were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.

Table 5.7 below indicates the original question that was asked, together with the question that now replaces that particular question.

**Table 5.7: Explanation of new questions inserted**

<b>Original TUESA question</b>	<b>Question replacing the original TUESA question</b>	<b>Reason for change in question</b>
<p><i>Microeconomics</i>  <b>Question 4</b>            Households, firms, government and the rest of the world’s interaction with one another determines how an economy’s resources are allocated. Which of the following is the supplier of labour, capital, natural resources and entrepreneurial ability?</p> <ol style="list-style-type: none"> <li>1. Households</li> <li>2. Firms</li> <li>3. Government</li> <li>4. Rest of the world</li> </ol>	<p>None</p>	<p>Question 4 has been deleted. The use and true objective of the question has been questioned.</p>

<p><b>Microeconomics</b> <b>Question 7</b></p> <p>You just won R45 000 000 in the Powerball lottery. You have a choice between spending the money now or investing it at 5 per cent interest annually. What is the opportunity cost of spending the R45 000 000?</p> <ol style="list-style-type: none"> <li>1. R 47 250 000</li> <li>2. R 2 250 000</li> <li>3. R 27 000 000</li> <li>4. There will be no opportunity cost</li> </ol>	<p><b>Microeconomics</b> <b>Question 6</b></p> <p>After being caught allegedly smoking weed in his hotel room in Amsterdam, John Thompson, an Australian cricket player, receives a fine of R10 000 and a three-match suspension from international cricket. For each match, Thompson receives a match fee of R25 000 and a further R50 000 per match from his sponsors. He also pays R5 000 per match for insurance against injury. In opportunity cost terms, the cost of this incident to Thompson can be estimated as:</p> <ol style="list-style-type: none"> <li>1. R 10 000.00</li> <li>2. R 35 000.00</li> <li>3. R 85 000.00</li> <li>4. R 220 000.00</li> </ol>	<p>The original question 7 was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>
<p><b>Microeconomics</b> <b>Question 8</b></p> <p>Which of the following, in your opinion, can be considered as a key principle or principles of economics:</p> <ol style="list-style-type: none"> <li>1. Individuals responds to incentives</li> <li>2. There's no such thing as a free lunch</li> <li>3. Law of unintended consequences</li> <li>4. All of the above</li> </ol>	<p><b>Microeconomics</b> <b>Question 7</b></p> <p>A machine used to produce paper coffee cups would be considered:</p> <ol style="list-style-type: none"> <li>1. an intermediary good</li> <li>2. capital</li> <li>3. a natural resource</li> <li>4. a final good</li> </ol>	<p>The original question 8 was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>

<p><b>Microeconomics</b> <b>Question 9</b></p> <p>Bacon and eggs are often eaten together, therefore we call them complements. Suppose that the price of bacon has risen and the quantity of eggs has fallen. What could be responsible for this pattern?</p> <ol style="list-style-type: none"> <li>1. A news article stating that bacon causes heart attacks</li> <li>2. Decrease in wages for workers on pig farms</li> <li>3. A rise in the price of pig feed</li> <li>4. A rise in the price of chicken feed</li> </ol>	<p><b>Microeconomics</b> <b>Question 8</b></p> <p>Bacon and eggs are often eaten together, therefore we call them complementary goods. Suppose that the price of bacon has increased, what will the effect be on the market for eggs?</p> <ol style="list-style-type: none"> <li>1. The demand for eggs will decrease</li> <li>2. The demand for eggs will increase</li> <li>3. The supply for eggs will increase</li> <li>4. The supply for eggs will decrease</li> </ol>	<p>The original question 9 was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p> <p>Question 9, however, was only rephrased to eliminate the possibility of confusion.</p>
<p><b>Microeconomics</b> <b>Question 12</b></p> <p>The famous artist, Picasso, died in 1973. How sensitive will art lovers be to a change in the price of Picasso paintings?</p> <ol style="list-style-type: none"> <li>1. Art lovers are relatively sensitive to changes in prices</li> <li>2. Art lovers are relatively insensitive to changes in prices</li> <li>3. Art lovers are insensitive to changes in prices</li> <li>4. Art lovers are sensitive to changes in prices</li> </ol>	<p><b>Microeconomics</b> <b>Question 11</b></p> <p>If your pocket money doubles, and everything else remains the same, how will this change your spending on life's luxuries?</p> <ol style="list-style-type: none"> <li>1. Will increase by more than 100%.</li> <li>2. Will decrease by more than 100%.</li> <li>3. My spending will remain unchanged.</li> <li>4. Will increase, but by less than 100%.</li> </ol>	<p>The original question twelve was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>

**Microeconomics**

**Question 15**

If you walk into Pick ‘n Pay and were to compare the shopping carts of any two consumers, you would observe clear differences. Why is that?

1. Given a certain budget, consumers decide which goods and services to buy
2. Individual consumer’s preferences on certain goods and services differ
3. Individual consumers allocate their incomes among the various goods and services available to them
4. All of the above

**Microeconomics**

**Question 20**

You have decided to go out with friends and have R100 to spend. One beer costs R10 and a plate of chips costs R10. The following table contains the marginal utility you obtain from each beer and each plate of chips. (*Marginal utility is the extra satisfaction a consumer realises from an additional unit of that product.*)

<b>Quantity Beer and Chips consumed:</b>	<b>Marginal utility for Beer</b>	<b>Marginal utility for Chips</b>
1	20	10
2	19	8
3	15	5

If you only have R10 left, what will you buy?

1. A beer
2. A plate of chips
3. Tip the car guard
4. Buy a half a litre of petrol to get home

Question 15 was changed because 90.3 per cent of students managed to get the question correct. The level of difficulty of the question could, therefore, be questioned. Accordingly, a new question on consumer theory has been inserted.

<p><b>Macroeconomics</b> <i>Question 2</i></p> <p>Which of the following workers are more likely to experience short-term unemployment?</p> <ol style="list-style-type: none"> <li>1. An agriculture worker laid off because of bad weather.</li> <li>2. A construction worker who loses her job at a plant in an isolated area.</li> <li>3. An expert packager at a factory with little formal education who loses his job when companies start to install automatic machinery that package goods.</li> <li>4. A pharmacist, because doctors are now permitted to dispense and research medicine.</li> </ol>	<p><b>Macroeconomics</b> <i>Question 2</i></p> <p>Spending on GDP does not include:</p> <ol style="list-style-type: none"> <li>1. Exports</li> <li>2. Imports</li> <li>3. Government goods</li> <li>4. Private goods</li> </ol>	<p>The original question two was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>
<p><b>Macroeconomics</b> <i>Question 3</i></p> <p>In your opinion which of the following can be a reason for a high unemployment rate in South Africa?</p> <ol style="list-style-type: none"> <li>1. Low legal minimum wages</li> <li>2. Constant strikes by employees</li> <li>3. Poor unemployment benefits</li> <li>4. Poor welfare benefits</li> </ol>	<p><b>Macroeconomics</b> <i>Question 3</i></p> <p>During the 2007 recession, sales fell and some workers lost their jobs. This unemployment is referred to as:</p> <ol style="list-style-type: none"> <li>1. seasonal unemployment.</li> <li>2. frictional unemployment.</li> <li>3. cyclical unemployment.</li> <li>4. structural unemployment.</li> </ol>	<p>The original question three was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>

<p><b>Macroeconomics</b> <i>Question 4</i></p> <p>The inflation rate in South Africa increased from 5.8% in January 2013 to 6.3% September 2013. This means that:</p> <ol style="list-style-type: none"> <li>1. The prices of certain goods and services increased.</li> <li>2. Purchasing power for goods and services decreased.</li> <li>3. The prices of goods and services decreased.</li> <li>4. The prices of goods and services in general increased</li> </ol>	<p><b>Macroeconomics</b> <i>Question 4</i></p> <p>Which of the following cannot contribute to the growth in South Africa's government expenditure:</p> <ol style="list-style-type: none"> <li>1. Changing consumer preferences</li> <li>2. Changing producer preferences</li> <li>3. Population growth</li> <li>4. Urbanisation</li> </ol>	<p>A new question four was developed to further test a student's knowledge on economic growth. The original question four was not omitted, but was shifted downwards to question six.</p>
<p><b>Macroeconomics</b> <i>Question 5</i></p> <p>Economic growth is measured by which one of the following:</p> <ol style="list-style-type: none"> <li>1. GDP</li> <li>2. GNP</li> <li>3. GNI</li> <li>4. GDE</li> </ol>	<p><b>Macroeconomics</b> <i>Question 5</i></p> <p>Which one of the following might be expected to generate employment?</p> <ol style="list-style-type: none"> <li>1. Higher taxes for small businesses.</li> <li>2. An increase in the wage rate, considering that all other factors are held constant.</li> <li>3. A fall in the productivity of workers.</li> <li>4. The promotion of exports and investment.</li> </ol>	<p>The original question five was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>

<p><b>Macroeconomics</b> <i>Question 6</i></p> <p>Inflation is measured by which of the following:</p> <ol style="list-style-type: none"> <li>1. CPIX</li> <li>2. CPI</li> <li>3. GNP Deflator</li> <li>4. GDE</li> </ol>	<p><b>Macroeconomics</b> <i>Question 6</i></p> <p>The inflation rate in South Africa increased from 5.8% in January 2013 to 6.3% September 2013. This means that:</p> <ol style="list-style-type: none"> <li>1. The prices of certain goods and services increased.</li> <li>2. Purchasing power increased.</li> <li>3. The prices of all goods and services decreased.</li> <li>4. The prices of goods and services in general increased</li> </ol>	<p>Question 6 was replaced with the original Question 4, which was moved down in the order of questions.</p>
<p><b>Macroeconomics</b> <i>Question 7</i></p> <p>Which of the following can be considered as money in the South African economy?</p> <ol style="list-style-type: none"> <li>1. A Picasso painting</li> <li>2. A Government bond</li> <li>3. A R20 bank note</li> <li>4. A credit card</li> </ol>	<p><b>Macroeconomics</b> <i>Question 7</i></p> <p>Which of the following is not a source of economic growth?</p> <ol style="list-style-type: none"> <li>1. Saving and investment in new factories</li> <li>2. Increase in imports</li> <li>3. Investment in higher education</li> <li>4. Advancement in technology</li> </ol>	<p>A new question seven was developed to further test a student's knowledge on economic growth. The original question seven was not omitted, but was shifted downwards to question nine.</p>

<p><b>Macroeconomics</b> <i>Question 8</i></p> <p>Which of the following statements is false:</p> <ol style="list-style-type: none"> <li>1. In an economy, money takes the form of currency and various types of bank deposits</li> <li>2. The South African Reserve bank regulates government expenditure</li> <li>3. The South African Reserve bank is the central bank for South Africa</li> <li>4. A central bank control the money supply</li> </ol>	<p><b>Macroeconomics</b> <i>Question 8</i></p> <p>In South Africa, the official inflation rate is measured by which of the following:</p> <ol style="list-style-type: none"> <li>1. CPIX</li> <li>2. CPI</li> <li>3. GNP Deflator</li> <li>4. GDE</li> </ol>	<p>Question eight was replaced with the original question six. The original question eight was not omitted, but was shifted down to question ten.</p>
<p><b>Section C: Macroeconomics</b> <i>Question 9</i></p> <p>Which of the following is can be associated with fiscal policy and fiscal authorities?</p> <ol style="list-style-type: none"> <li>1. Interest rates</li> <li>2. Tax and government expenditure</li> <li>3. Money supply</li> <li>4. South African Reserve bank</li> </ol>	<p><b>Macroeconomics</b> <i>Question 9</i></p> <p>Which of the following can be considered as money in the South African economy?</p> <ol style="list-style-type: none"> <li>1. A Picasso painting</li> <li>2. A Government bond</li> <li>3. A R20 bank note</li> <li>4. A credit card</li> </ol>	<p>Question nine was replaced with the original question seven. The original question nine was not omitted, but was shifted down to question eleven.</p>

<p><b>Macroeconomics</b> <i>Question 10</i></p> <p>If government spending exceeds the current government income, it is referred to as</p> <ol style="list-style-type: none"> <li>1. A shortage on the current account of the balance of payments.</li> <li>2. Budget deficit.</li> <li>3. Public debt</li> <li>4. Monetary financing.</li> </ol>	<p><b>Macroeconomics</b> <i>Question 10</i></p> <p>Which of the following statements is false regarding monetary policy:</p> <ol style="list-style-type: none"> <li>1. In an economy, money takes the form of currency and various types of bank deposits</li> <li>2. The South African Reserve bank regulates government expenditure</li> <li>3. The South African Reserve bank is the central bank for South Africa</li> <li>4. A central bank control the money supply</li> </ol>	<p>The original question ten was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>
<p><b>Macroeconomics</b> <i>Question 11</i></p> <p>Which one of the following statements is false on why do countries trade?</p> <ol style="list-style-type: none"> <li>1. The distribution of natural, human and capital resources amongst countries are uneven</li> <li>2. Countries do not differ in their endowments of economic resources</li> <li>3. Efficient production of goods and services requires different technologies or combinations of resources</li> <li>4. Consumers may prefer certain imported goods to similar domestically produced goods.</li> </ol>	<p><b>Macroeconomics</b> <i>Question 11</i></p> <p>Which of the following can be associated with fiscal policy and fiscal authorities?</p> <ol style="list-style-type: none"> <li>1. Interest rates</li> <li>2. Tax and government expenditure</li> <li>3. Money supply</li> <li>4. South African Reserve bank</li> </ol>	<p>Question eleven was replaced with the original question nine. The original question eleven was not omitted, but was shifted down to question thirteen.</p>

<p><b>Macroeconomics</b> <b>Question 12</b></p> <p>The removal of tariff protection for the South African textile industry is likely to:</p> <ol style="list-style-type: none"> <li>1. harm South African consumers.</li> <li>2. benefit the textile industry.</li> <li>3. harm the clothing industry that uses textiles as an input.</li> <li>4. cause some unemployment in this industry.</li> </ol>	<p><b>Macroeconomics</b> <b>Question 12</b></p> <p>What is the primary function of the government?</p> <ol style="list-style-type: none"> <li>1. To provide households and firms with law and order, education and health services</li> <li>2. To establish a framework within which the economy operates</li> <li>3. To determine how to educate the public</li> <li>4. To provide households with health services and dams</li> </ol>	<p>The original question twelve was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>
<p><b>Macroeconomics</b> <b>Question 13</b></p> <p>If a government imposes a tariff on an imported product, we would expect local production to _____ and imports to _____:</p> <ol style="list-style-type: none"> <li>5. increase; increase</li> <li>6. increase; decrease</li> <li>7. decrease; increase</li> <li>8. decrease; decrease</li> </ol>	<p><b>Macroeconomics</b> <b>Question 13</b></p> <p>Which one of the following statements is false on why countries trade?</p> <ol style="list-style-type: none"> <li>1. The distributions of natural, human and capital resources amongst countries are uneven</li> <li>2. All countries have the same economic resources</li> <li>3. Efficient production of goods and services requires different technologies or combinations of resources</li> <li>4. Consumers may prefer certain imported goods to similar domestically produced goods.</li> </ol>	<p>Question thirteen has been replaced with the original question eleven. The original question thirteen has been deleted since a better question on trade has been developed.</p>

**Macroeconomics****Question 14**

By making use of the current account information below, calculate South Africa's balance of trade:

<b>Current account</b>	<b>(R millions)</b>
<i>Merchandise exports</i>	398 532
<i>Net gold exports</i>	35 475
<i>Service receipts</i>	81 353
<i>Income receipts</i>	40 234
<i>Merchandise imported</i>	-476 545
<i>Payment for services</i>	-96 950
<i>Income payments</i>	-75 990
<i>Current transfers</i>	-17 186

1. + R 78 013
2. R 78 013
3. R 42 538
4. R 174 963

**Macroeconomics****Question 14**

Tariffs on imported goods benefit domestic producers by:

1. Decreasing the wage rate for labour in the domestic industry.
2. Increasing the prices of imported goods.
3. Decreasing price of domestic goods.
4. Causing a decrease in government revenue.

A few students took net gold exports into account when working on the original question. A new question on the benefits of tariffs has been posed to elaborate on the students' understanding of international trade relations.

<p><b>Macroeconomics</b></p> <p><b>Question 15</b></p> <p>Due to the weak rand in 2013 more Americans visited South Africa, we can expect, <i>ceteris paribus</i>, that:</p> <ol style="list-style-type: none"> <li>1. The rand will appreciate against the dollar.</li> <li>2. the rand will depreciate against the dollar.</li> <li>3. the dollar will appreciate against the rand.</li> <li>4. it will cost South Africans more to visit the USA.</li> </ol>	<p><b>Macroeconomics</b></p> <p><b>Question 15</b></p> <p>Say the Rand:Dollar exchange rate on 01 November 2013 was US\$1:R10.80. The exchange rate then changes to US\$1:R10.90 on 28 November 2013. Which of the following is true:</p> <ol style="list-style-type: none"> <li>1. The rand appreciated against the dollar</li> <li>2. The rand depreciated against the dollar</li> <li>3. The dollar depreciated against the rand</li> <li>4. Americans will not visit South Africa anytime soon</li> </ol>	<p>The original question fifteen was changed owing to the <i>scale after item deleted</i> results obtained from the Cronbach's Alpha reliability test. The results indicated that if this question were to be deleted or changed, the Cronbach Alpha coefficient would increase to a higher coefficient.</p>
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### **5.3 Conclusion**

This chapter provided the results of the TUESA pilot study that was run in October 2013, whereafter the results were used to determine the distribution of answers for each question, as well as to determine the reliability of the test by means of the Cronbach Alpha. Overall, the results were satisfying, with a macroeconomic literacy level of 58.75 per cent and a microeconomic literacy level of 63.17 per cent. The result of the Cronbach Alpha showed a coefficient of 0.62, indicating that the test is acceptable.

Given the results of the pilot study, the questions of the TUESA were revised and a final draft of the TUESA was compiled in order to test the economic literacy levels of introductory-level economics students in South Africa. Appendix A presents the final and complete draft of the TUESA.

The next chapter will discuss the evidence of the TUESA pre-test. The economic literacy levels of first-year introductory economics students in South Africa were determined before any economics instruction took place. The TUESA pre-test was distributed to the North-West University, the Nelson Mandela Metropolitan University, and Rhodes University in order to get a broad and unbiased sample.

## Chapter 6

### TUESA Pre-test results

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#### 6.1 Introduction

In Chapter 4 and 5 an overview of the *Voluntary National Content Standards in Economics* and the *Framework for Teaching Basic Economic Concepts* was provided. These two documents, which were developed by the CEE, served as stepping stones for the development of the Test of Understanding Economics in South Africa (TUESA).

Chapter 4 furthermore discussed the development of TUESA, giving a comprehensive explanation of each of the questions asked, as well as of the objective of each question. The results of the pilot study carried out in October 2013 were provided in Chapter 5. These results showed the distribution of answers to questions. The results furthermore indicated that the TUESA questionnaire is reliable by means of the Chronbach alpha test. Students did relatively well in the pilot test, taking into account that at the time of the test, the students had received only one year of economic instruction.

This chapter continues by providing the pre-test results of the TUESA that was administered during 2014 at the North-West University, Potchefstroom and Mafikeng Campuses, Rhodes University, and the Nelson Mandela Metropolitan University. Statistics on the demographic information, microeconomic test results, macroeconomic test results and overall test results will be discussed. The aim of this chapter is therefore to calculate the economic literacy score for the TUESA pre-test, to determine whether there is a significant difference between the economic literacy scores of students, taking into account their demographic information, and to determine whether having studied Gr12 economics as subject in high school is a significant factor in passing the TUESA.

#### 6.2 TUESA Pre-test results

In February 2014, the TUESA questionnaire was distributed to 2 717 students at three universities in South Africa. The TUESA questionnaire was administrated as a pre-test, testing the economic literacy levels of introductory-level economics students before any economics instruction took place.

In the following sections, the results of the demographic information, microeconomic test results, macroeconomic test results and the overall test results will be discussed in detail.

### 6.2.1 TUESA Demographic information

The demographic information for the 2 717 introductory economic students indicated that the majority of students were female and were between 19 to 25 years of age. Of the students 49.6 per cent are Black and 42.2 per cent of students are White. With regard to courses of study, it appears that the majority of introductory-level economics students were majoring in Accounting Sciences. Only 13.3 per cent of students were majoring in Economics. Of the 2 717 students, only 30.3 per cent had studied economics as a subject in high school, compared with the 69.7 per cent who had not studied economics in high school. *Table 6.1* below contains the overall results of the demographic information from the TUESA results.

**Table 6.1: TUESA Demographic information**

	Frequency	Per cent	Valid Per cent	Cumulative Per cent
<b><i>Gender</i></b>				
Male	1277	47.0	47.4	47.4
Female	1418	52.2	52.6	<b>100.0</b>
<b><i>Age</i></b>				
18 years and younger	1096	40.3	40.6	40.6
19 - 25 years	1570	57.8	58.2	98.9
26 - 35 years	27	1.0	1.0	99.9
36 - 45 years	4	.1	.1	<b>100.0</b>
<b><i>Race</i></b>				
Black	1347	49.6	50.0	50.0
White	1147	42.2	42.6	92.5
Indian	57	2.1	2.1	94.7
Coloured	122	4.5	4.5	99.2
Other	22	.8	.8	<b>100.0</b>
<b><i>Course of study</i></b>				
Economics	355	13.1	13.2	13.2
Business Management	272	10.0	10.1	23.3
Human Resources	170	6.3	6.3	29.7
Accounting Sciences	815	30.0	30.3	60.0
Other BCom	580	21.3	21.6	81.5
Other BA	227	8.4	8.4	90.0
Other BSc	269	9.9	10.0	<b>100.0</b>
<b><i>Did the student have Economics in Gr12</i></b>				
Yes	822	30.3	30.3	30.3
No	1887	69.5	69.7	<b>100.0</b>
<b><i>University</i></b>				
Missing	9	0.3	0.3	0.3
NMMU	347	12.8	12.8	13.1
NWU – Potchefstroom Campus	713	26.2	26.2	39.3
NWU – Mafikeng Campus	1107	40.7	40.7	80.1
Rhodes University	541	19.9	19.9	<b>100.0</b>

## 6.2.2 TUESA Microeconomic results

A total of 2 717 introductory-level economics students across three universities in South Africa completed the Microeconomics TUESA<sup>16</sup> pre-test in February 2014. The average economic literacy score for the microeconomics section of the test was 46.38 per cent. Students performed relatively well in some of the microeconomics questions, especially questions on the microeconomic problem (questions seven, eight and ten). Furthermore, students performed well in question sixteen by identifying the point that a restaurant meal can be classified as a luxury good; in question nineteen on the topic of demand, where students identified that the price of rhino horn will increase owing to limited supply; and in question fifteen on the topic of production theory, where majority of students correctly identified the fixed cost in the given scenario. *Table 6.2* below sets out the average score for each microeconomics question.

**Table 6.2: Average for each microeconomic question**

Question	Frequency	Valid per cent
Question 7	1658	61.1
Question 8	1676	61.9
Question 9	1447	53.8
Question 10	2178	80.3
Question 11	433	16.0
Question 12	961	36.4
Question 13	794	29.2
Question 14	1511	55.7
Question 15	1228	45.3
Question 16	2226	82.2
Question 17	664	24.5
Question 18	1343	49.8
Question 19	2281	84.3
Question 20	1165	43.2
Question 21	2444	90.3
Question 22	183	6.8
Question 23	1297	49.7
Question 24	1000	37.2
Question 25	583	21.7
Question 26	1061	39.4
<b>Mean</b>		<b>46.38</b>

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<sup>16</sup> Please note that the questions of the TUESA are going to be discussed according to the new question numbers as indicated in the appendix.

Furthermore, for questions 9, 11, 12, 13, 15, 17, 20, 22, 24, 25 and 26, students obtained, on average, less than 55 per cent per question. However, it seems that students who had been enrolled for Gr12 economics in high school had a better chance of answering certain questions correctly than those students who had not studied economics in high school. *Table 6.3* below sets out the average for each microeconomic question. It needs to be noted that *Table 6.3* indicates the percentage of students who correctly answered the question taking into account whether or not students had Gr12 economics in high school.

**Table 6.3: Average for each microeconomic question taking into account GR 12 economics**

Microeconomic	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26
Gr 12 Economics: Yes	80.7	62.4	64.2	81.0	17.2	29.4	42.9	57.1	38.9	79.9	27.6	48.8	77.7	44.8	92.1	9.0	46.0	39.5	27.4	39.4
Gr 12 Economics: No	9.4	19.9	20.5	34.2	6.3	19.8	8.9	23.7	21.8	37.2	10.1	22.5	38.0	19.2	38.3	2.4	21.0	14.8	8.2	15.5

As indicated above in *Table 6.3* question 9, relating to the topic of production factors, was answered correctly by 64.23 per cent of students who had been enrolled for economics in Gr12, whereas only 19.9 per cent of students who had not studied economics in Gr12 answered the question correctly. Regarding question 11, on the topic of microeconomic statements, 17.2 per cent of students who had been enrolled for economics in Gr12 answered the question correctly, whereas 6.3 per cent of students who had not studied economics in Gr12 answered the question correctly. For question 17 on the topic of elasticity, 27.6 per cent of students who had been enrolled for economics in Gr12 answered the question correctly, whereas 10.1 per cent of students who did not study economics in Gr12 answered the question correctly. Regarding question 20 on the topic of consumer theory, 44.8 per cent of students who had been enrolled for economics in Gr12 answered the question correctly, whereas 19.2 per cent of students who did not study economics in Gr12 answered the question correctly. For questions 22, 24 and 25 on the topic of producer theory, 9.0 per cent, 39.5 per cent and 27.4 per cent, respectively, of students who had been enrolled for economics in Gr12 answered the questions correctly, whereas 2.4 per cent, 21.0 per cent and 8.2 per cent, respectively, of students who did not study economics in Gr12 answered the question correctly.

Furthermore, a paired sample T-Test was done in order to test whether there is a significant difference in the pre-test TUESA scores of students who had Gr12 economics in high school compare to those who did not have economics in Gr12. The results indicated that students who had Gr12 economics performed significantly better in the microeconomic TUESA test than the students who did not had Gr12 economics Results showed:  $SD = 3.966$ ,  $t = 135.00$ ,  $p < .0000$ .

### 6.2.3 TUESA Macroeconomic results

A total of 2 717 introductory economic students across three universities in South Africa completed the macroeconomic TUESA pre-test in February 2014. The average economic literacy score for the macroeconomics section of the test was 55.61 per cent. Students performed relatively well in some of the macroeconomics questions, especially questions on measuring economic performance (questions 31, 32 and 33). Furthermore, students performed well in question 35 on the topic of money, and in question 39 on the topic of international trade. *Table 6.4* below contains the average score for each macroeconomics question.

**Table 6.4: Average for each macroeconomic question**

Question	Frequency	Valid Per cent
Question 27	1996	73.8
Question 28	588	21.7
Question 29	979	36.1
Question 30	830	30.7
Question 31	1743	64.4
Question 32	1987	73.4
Question 33	1711	63.4
Question 34	1240	46.0
Question 35	2136	78.9
Question 36	1118	41.4
Question 37	1542	57.1
Question 38	1128	41.6
Question 39	2223	82.0
Question 40	1551	57.4
Question 41	1788	66.2
<b>Mean</b>		<b>55.61</b>

Furthermore, in questions 28, 29, 30, 34, 36 and 38, students obtained, on average, less than 55 per cent per question.

As the case with the microeconomic questions, it seems that students who had been enrolled for Gr12 economics in high school had a better chance of answering certain macroeconomic questions correctly than those students who had not studied economics in high school. *Table 6.5* below sets out the average for each macroeconomic question. It needs to be noted that *Table 6.5* indicates the percentage of students who correctly answered the question taking into account whether or not students had Gr12 economics in high school.

**Table 6.5: Average for each microeconomic question taking into account GR 12 economics**

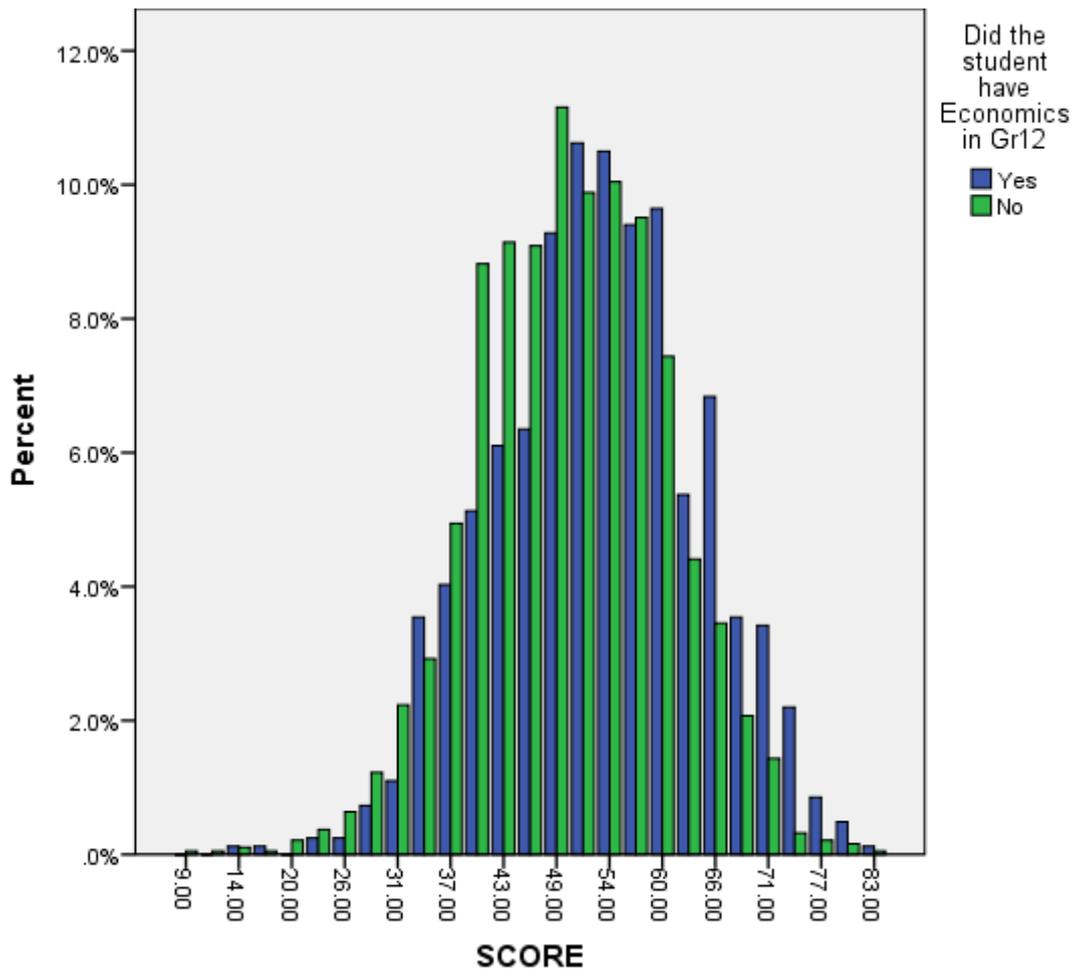
Macroeconomic	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41
Gr 12 Economics: Yes	72.7	30.4	48.5	31.8	71.3	74.8	69.1	48.8	81.5	41.1	66.9	38.4	85.0	64.2	66.2
Gr 12 Economics: No	39.3	0.7	14.3	13.5	27.0	31.8	25.1	19.3	32.8	17.7	23.2	19.0	35.5	24.1	28.3

With regard to question 28 relating to the topic of GDP spending, 30.4 per cent of students who had been enrolled for economics in Gr12 answered the question correctly, whereas only 0.7 per cent of students who did not study economics in Gr12 answered the question correctly. For question 29 on the topic of unemployment, 48.5 per cent of students that had been enrolled for economics in Gr12 answered the question correctly, whereas 14.3 per cent of students who did not study economics in Gr12 answered the question correctly. Regarding question 34 on the topic of inflation, 48.8 per cent of students that had been enrolled for economics in Gr12 answered the question correctly, whereas 19.3 per cent of students who did not study economics in Gr12 answered the question correctly. In question 36 on the topic of monetary policy, 41.1 per cent of students that had been enrolled for economics in Gr12 answered the question correctly, whereas 17.7 per cent of students who did not study economics in Gr12 answered the question correctly. For question 38 relating to the role of government, 38.4 per cent of students that had been enrolled for economics in Gr12 answered the question correctly, whereas 19.0 per cent of students who did not study economics in Gr12 answered the question correctly.

From the results, it is clear that, as with the microeconomic results, students who had been enrolled for economics in Gr12 performed better in the macroeconomic questions than those students who did not study economics in Gr12. The results indicated that students who had Gr12 economics performed significantly better in the macroeconomic TUESA test than the students who did not had Gr12 economics Results showed:  $SD = 4.611$ ,  $t = 133.34$ ,  $p < .0000$ .

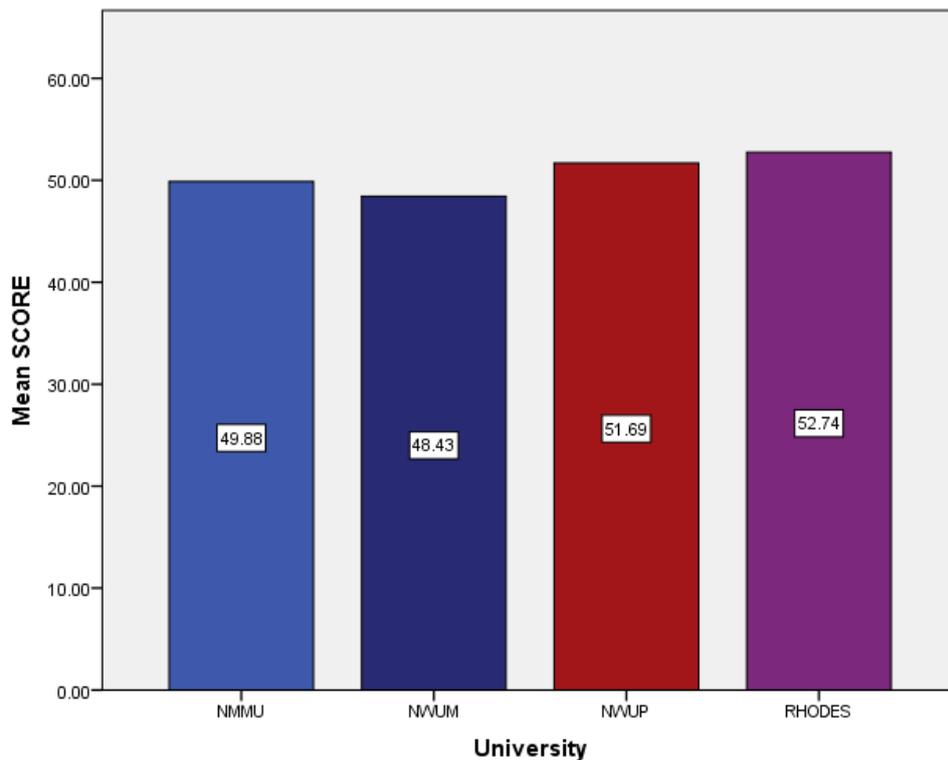
#### **6.2.4 Overall results from TUESA**

A total of 2 717 introductory economic students across three universities in South Africa completed the TUESA pre-test in February 2014. The total average economic literacy score for the test was 50.99 per cent, taking into account the fact that no economic instruction had yet taken place at tertiary level. The only economic instruction that had taken place is represented by the 30.3 per cent of students who had studied Gr12 economics in high school. The pre-test economic literacy score for students who had studied economics in Gr12 was 52.3 per cent, in comparison with the 49.2 per cent economic literacy rate of students who did not study economics in Gr12. *Figure 6.3* below indicates the distribution of economic literacy scores with regard to students who had studied Gr12 economics in high school and confirms that these students performed better in the TUESA pre-test than those students who had not studied Gr12 economics. The results from the microeconomic and macroeconomic questions indicated that students performed better in the macroeconomic section of the TUESA than in the microeconomic section of the TUESA.



**Figure 6.1: Distribution of economic literacy scores with respect to having Gr12 economics.**

With regard to the economic literacy scores according to university, the results indicated that Rhodes University obtained the highest economic literacy pre-test scores, followed by the North-West University, Potchefstroom Campus, Nelson Mandela Metropolitan University, and lastly, the North-West University, Mafikeng Campus. Rhodes University obtained an overall economic literacy score of 52.74 per cent, the North-West University Potchefstroom Campus, 51.69 per cent, Nelson Mandela Metropolitan University, 49.88 per cent, and North-West University, Mafikeng Campus, 48.43 per cent. *Figure 6.4* below indicates the economic literacy scores according to university.



**Figure 6.2: Economic literacy scores per university.**

### 6.3 Empirical analysis

The aim of this section is to determine whether there is a significant difference between the mean economic literacy score and demographic factors, and to determine whether having studied Gr12 economics as subject in high school is a significant factor in passing the TUESA.

#### 6.3.1 Crosstabulations

Cross tabulations are used to indicate whether there is a statistical relationship between the demographic characteristics of the students and whether they passed the TUESA or not. To test the relationship between two categorical variables, the Pearson Chi-Square test can be used. The results of the cross tabulations are presented in *Tables 6.6 – 6.9* below.

*Table 6.6* below indicates the results of the cross tabulations between genders and whether students passed or failed the TUESA. The objective is to determine whether a statistically significant difference exists between genders and whether students passed or failed the

TUESA. When looking at the *percentage within gender* with regard to males and females, it indicates that males are more likely to pass the TUESA than females are. Males who failed the TUESA pre-test comprised 41.9 per cent, whereas 58.1 per cent of males passed the TUESA. With regard to females, 50.7 per cent of females failed the TUESA pre-test, and 49.3 per cent of females passed the TUESA. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between the pass rates of genders, with a  $p = 0.000$ .

**Table 6.6: Cross tabulation between gender and passing or failing the TUESA.**

			PASS_FAIL		Total
			Fail	Pass	
Gender	Male	Count	534	739	1273
		% within Gender	41.9%	58.1%	100.0%
		% within PASS_FAIL	42.7%	51.5%	47.4%
		% of Total	19.9%	27.5%	47.4%
	Female	Count	717	697	1414
		% within Gender	50.7%	49.3%	100.0%
		% within PASS_FAIL	57.3%	48.5%	52.6%
		% of Total	26.7%	25.9%	52.6%
Total		Count	1251	1436	2687
		% within Gender	46.6%	53.4%	100.0%
		% within PASS_FAIL	100.0%	100.0%	100.0%
		% of Total	46.6%	53.4%	100.0%

Table 6.7 below indicates the results of the cross tabulations between students who had, and those who had not, studied economics as subject in Gr12 and whether the students passed or failed the TUESA. The objective is to determine whether a statistically significant difference exists between students having studied economics as subject in Gr12 and whether students passed or failed the TUESA. When looking at the *percentage within did students have economics in Gr12* with regard to ‘yes’ and ‘no’, the results indicate that students who had been enrolled for economics in Gr12 were more likely to pass the TUESA than students who had not been enrolled for Gr12 economics. Thirty-seven per cent of students who had been enrolled for Gr12 economics in high school failed the TUESA pre-test, whereas 63 per cent of students who had been enrolled for Gr12 economics in high school passed the TUESA. Concerning those students who had not been enrolled for Gr12 economics in high school, 51 per cent failed the TUESA pre-test, and 49 per cent passed the TUESA. The Pearson Chi-

Square test results indicated, given the sample, that there is a significant difference between the pass rate of students who were enrolled for Gr12 economics and students who were not enrolled for Gr12 economics with a  $p = 0.000$ .

**Table 6.7: Cross tabulation between students who were enrolled for Gr12 economics and passing or failing the TUESA.**

			PASS_FAIL		Total
			Fail	Pass	
Did the student have Economics in Gr12	Yes	Count	303	516	819
		% within Did the student have Economics in Gr12	37.0%	63.0%	100.0%
		% within PASS_FAIL	24.0%	35.9%	30.3%
		% of Total	11.2%	19.1%	30.3%
	No	Count	960	922	1882
		% within Did the student have Economics in Gr12	51.0%	49.0%	100.0%
		% within PASS_FAIL	76.0%	64.1%	69.7%
		% of Total	35.5%	34.1%	69.7%
Total	Count	1263	1438	2701	
	% within Did the student have Economics in Gr12	46.8%	53.2%	100.0%	
	% within PASS_FAIL	100.0%	100.0%	100.0%	
	% of Total	46.8%	53.2%	100.0%	

Table 6.8 below indicates the results of the cross tabulations between race and whether students passed or failed the TUESA. The objective is to determine whether a statistically significant difference exists between race and whether students passed or failed the TUESA. When looking at the *percentage within race* with regard to black, white, Indian, coloured and “other” categories, the results indicate that students who were white and Indian were more likely to pass the TUESA than students who were black or coloured. The races of students who failed the TUESA pre-test were distributed as follows: 54.1 per cent were black, 36.9 per cent were white, 41.1 per cent were Indian, and 57.4 per cent had classified themselves under “other”. Students who passed the TUESA classified their races as follows: 45.9 per cent were black, 63.1 per cent were white, 58.9 per cent were Indian, 42.6 per cent were coloured, and 40.9 per cent classified themselves under “other”. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between race and students who passed and failed the TUESA with a  $p = 0.000$ .

**Table 6.8: Cross tabulation between race and passing or failing the TUESA.**

			PASS_FAIL		Total
			Fail	Pass	
Race	Black	Count	725	615	1340
		% within Race	54.1%	45.9%	100.0%
		% within PASS_FAIL	57.8%	42.9%	49.9%
		% of Total	27.0%	22.9%	49.9%
	White	Count	423	724	1147
		% within Race	36.9%	63.1%	100.0%
		% within PASS_FAIL	33.7%	50.5%	42.7%
		% of Total	15.7%	26.9%	42.7%
	Indian	Count	23	33	56
		% within Race	41.1%	58.9%	100.0%
		% within PASS_FAIL	1.8%	2.3%	2.1%
		% of Total	.9%	1.2%	2.1%
	Coloured	Count	70	52	122
		% within Race	57.4%	42.6%	100.0%
		% within PASS_FAIL	5.6%	3.6%	4.5%
		% of Total	2.6%	1.9%	4.5%
	Other	Count	13	9	22
		% within Race	59.1%	40.9%	100.0%
		% within PASS_FAIL	1.0%	.6%	.8%
		% of Total	.5%	.3%	.8%
Total	Count	1254	1433	2687	
	% within Race	46.7%	53.3%	100.0%	
	% within PASS_FAIL	100.0%	100.0%	100.0%	
	% of Total	46.7%	53.3%	100.0%	

Table 6.9 below indicates the results of the cross tabulations between course of study and whether students passed or failed the TUESA. The objective is to determine whether a statistically significant difference exists between the course of study and whether students passed or failed the TUESA.

**Table 6.9: Cross tabulation between course of study and passing or failing the TUESA.**

			PASS_FAIL		Total
			Fail	Pass	
Course of study	<b>Economics</b>	Count	151	201	352
		% within Course of study	42.9%	57.1%	100.0%
		% within PASS_FAIL	12.1%	14.1%	13.1%
		% of Total	5.6%	7.5%	13.1%
	<b>Business Management</b>	Count	138	134	272
		% within Course of study	50.7%	49.3%	100.0%
		% within PASS_FAIL	11.0%	9.4%	10.1%
		% of Total	5.1%	5.0%	10.1%
	<b>Human Resources</b>	Count	107	62	169
		% within Course of study	63.3%	36.7%	100.0%
		% within PASS_FAIL	8.6%	4.3%	6.3%
		% of Total	4.0%	2.3%	6.3%
	<b>Accounting Sciences</b>	Count	306	507	813
		% within Course of study	37.6%	62.4%	100.0%
		% within PASS_FAIL	24.5%	35.5%	30.3%
		% of Total	11.4%	18.9%	30.3%
	<b>Other BCom</b>	Count	284	295	579
		% within Course of study	49.1%	50.9%	100.0%
		% within PASS_FAIL	22.7%	20.6%	21.6%
		% of Total	10.6%	11.0%	21.6%
	<b>Other BA</b>	Count	132	95	227
		% within Course of study	58.1%	41.9%	100.0%
		% within PASS_FAIL	10.6%	6.6%	8.5%
		% of Total	4.9%	3.5%	8.5%
	<b>Other BSc</b>	Count	133	135	268
		% within Course of study	49.6%	50.4%	100.0%
		% within PASS_FAIL	10.6%	9.4%	10.0%
		% of Total	5.0%	5.0%	10.0%
<b>Total</b>	Count	1251	1429	2680	
	% within Course of study	46.7%	53.3%	100.0%	
	% within PASS_FAIL	100.0%	100.0%	100.0%	
	% of Total	46.7%	53.3%	100.0%	

When looking at the *percentage within course of study* with regard to Economics, Business Management, Human Resources, Accounting Sciences, other BCom and other BA, the results indicate that students who were majoring in Economics, Accounting Sciences and other BCom degrees were more likely to pass the TUESA than students who were majoring in Business Management, Human Resources and other BA degrees. The courses of students

who failed the TUESA pre-test were distributed as follows: 42.9 per cent were majoring in Economics, 50.7 per cent were majoring in Business Management, 63.3 per cent were majoring in Human Resources, 37.6 per cent were majoring in Accounting Sciences, 49.1 per cent were majoring in other B.com degrees, and 58.1 per cent were majoring in other BA degrees. The courses of students who passed the TUESA pre-test were distributed as follows: 57.1 per cent were majoring in Economics, 49.3 per cent were majoring in Business Management, 36.7 per cent were majoring in Human Resources, 62.4 per cent were majoring in Accounting Sciences, 50.9 per cent were majoring in other BCom degrees, and 41.9 per cent were majoring in other BA degrees. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference the pass rate of different majors with a  $p = 0.000$

To elaborate on the argument that having studied Gr12 economics in high school will improve a student's chance of passing the TUESA pre-test, a logistic regression was performed to assess the impact of having studied Gr12 economics in high school on the likelihood of passing the TUESA pre-test. The model contained the dependent variable (PASS\_FAIL) and is encoded into a dummy variable, with failing the TUESA representing a zero and passing the TUESA representing a one. The model further contained one independent variable (Gr12\_Economics) and is encoded into a dummy together with 'yes' representing a one and 'no' representing a zero.

The full model containing all predictors was statistically significant,  $\chi^2(1, N=2717) = 45.459, p < 0.01$ , indicating that the model was able to distinguish between students who had passed the TUESA pre-test and students who had failed the TUESA pre-test.

As indicated in *Table 6.10* below, Gr12\_Economics are statistically significant. Having studied Gr12 economics in high school reported an odds ratio of 1.773. This indicated that students who had studied Gr12 economics in high school were 1.773 times more likely to pass the TUESA than those students who did not.

**Table 6.10: Logistic regression predicting likelihood of passing the TUESA**

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Gr12_Economics	.573	.086	44.545	1	.000	1.773	1.499	2.098
Constant	-.040	.046	.767	1	.381	.960		

### 6.3.2 Multiple regression analysis

Multiple regression analysis is an extension of a linear regression and it is used to predict the value of the dependent variable based on the value of two or more independent variables (Pallant, 2013). Multiple regressions determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (Pallant, 2013). Multiple regression analysis therefore used to determine what variables can predict the TUESA pre-test scores.

The model in this section contained the dependent variable Pre-test TUESA scores with the independent variables, gender, having high school economics in Gr12 and course of study *Table 6.11* below contains the results from the multiple regression analysis. The reference category for race is black students and for major the reference category is economics.

**Table 6.11: Multiple regression analysis in predicting the TUESA pre-test score**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	16.494	.336		49.099	.000
Major_BusinessManagement	-.532	.440	-.046	-1.209	.227
Major_HR	-1.612	.595	-.090	-2.709	.007**
Major_Accounting	.727	.352	.089	2.067	.039
Major_OtherB.com	-.419	.401	-.041	-1.046	.296
Major_OtherB.A	.083	.535	.005	.155	.877
Major_OtherB.Sc	.050	.457	.004	.110	.912
Race_White	1.908	.247	.247	7.732	.000*
Race_Indian	1.341	.708	.056	1.894	.058
Race_Coloured	-.065	.569	-.003	-.115	.908
Race_Other	.349	1.182	.009	.295	.768
Gender	-.857	.226	-.111	-3.788	.000*
ECON_HS	1.597	.253	.189	6.301	.000*

A multiple regression was run to predict the TUESA pre-test scores from gender, having economics in Gr12, course of study and age. These variables statistically significantly predicted TUESA pre-test scores,  $F(11,1648) = 11.073$ ,  $p < .0005$ ,  $R^2 = .093$ . From the output above in *Table 6.11* when looking at the B-unstandardized Coefficients, it can be concluded that females performed better in the TUESA pre-test than males. Furthermore, students majoring in human resources scored significantly less in the TUESA pre-test than students majoring in economics. With regards to race, white students scored significantly higher in the pre-test than black students. The coefficient ECON\_HS indicates that students that had economics in high school scored significantly higher in the pre-test comparing to the students that who did not have economics in high school.

## **6.4 Conclusion**

The TUESA pre-test was administered at three universities in South Africa, North West University, Potchefstroom Campus, North West University, Mafikeng Campus, Rhodes University, and Nelson Mandela Metropolitan University in February 2014. The overall results indicated an economic literacy score of 50.99 per cent, with a microeconomic literacy score of 46.38 per cent and a macroeconomic literacy score of 55.61 per cent.

The results further indicated that there is a significant difference in the economic literacy scores between gender, race, course majors, and having enrolled for Gr12 economics in high school. Results from cross tabulations and logistic regression indicated that students who had been enrolled for Gr12 economics in high school have a better chance of passing the TUESA than students who had not been enrolled for economics in high school. Lastly, multiple regression analysis was performed and it was established that gender, an accounting major and having high school economics significantly predicted the TUESA pre test scores. Finally, the question remains, what difference does a year's worth of Economics instruction at University make?

The next chapter will provide empirical evidence of the TUESA post-test. The economic literacy levels of first-year introductory economics students in South Africa will be determined after one year's worth of economics instruction. Furthermore, the effect that one year's worth of economics instruction has on economic literacy will be determined.

## **Chapter 7**

### **TUESA Post-test and matching results**

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#### **7.1 Introduction**

Chapter 6 sets out the results of the TUESA pre-test. The TUESA pre-test was administered at three universities in South Africa to test the economic literacy levels of introductory-level economic students in February, 2014. The overall results indicated an economic literacy rate of 50.8 per cent, with a microeconomic literacy rate of 48.8 per cent and a macroeconomic literacy rate of 54.4 per cent.

The results further indicated that there is a significant difference in the economic literacy scores between gender, races, course majors and having enrolled for Gr12 economics in high school. Results from cross tabulations and logistic regression indicated that students who had been enrolled for Gr12 economics in high school have a better chance of passing the TUESA than students who had not been enrolled for economics in high school.

This chapter continues by providing the post-test scores obtained in October 2014 which have been matched with the February 2014 pre-test scores of the TUESA that had been administered at the North-West University, Potchefstroom Campus, North-West University, Mafikeng Campus, Rhodes University and Nelson Mandela Metropolitan University. Statistics on the demographic information, microeconomic test results, macroeconomic test results and overall test results will be discussed.

The aim of this chapter is therefore to calculate the economic literacy score for the TUESA post-test and to determine whether having a year's worth of economic instruction had significant effects on a student's TUESA post-test.

#### **7.2 TUESA matched Post-test results**

The TUESA questionnaire was distributed in October 2014 to 1 560 students at three universities in South Africa. From the 1 560 post-test cases, 1 085 cases were matched with the pre-test scores and student information. The TUESA questionnaire was administered as a post-test, testing the economic literacy levels of introductory economics students after having received a year's economic instruction.

In the following sections, the demographic information of the matched sample, the microeconomic test results, the macroeconomic test results and the overall results will be discussed in detail.

### 7.2.1 TUESA Demographic information

The demographic information of the 1 085 introductory-level economics students showed that the majority of students were females (54.4 per cent) and between 19 to 25 years of age (83.6 per cent). The majority of students (50.2 per cent) were white and 38.8 per cent of students were black, which is a major change from the pre-test. With regard to course of study, it appears that the majority of introductory economics students were majoring in Accounting Sciences (33.1 per cent), whereas only 12.4 per cent of students were majoring in economics. Of the 1 085 students, only 28.1 per cent of students had studied economics as a subject in high school. *Table 7.1* below contains the overall results of the demographic information from the TUESA results.

Apart from the 1 085 students that were matched with their pre-test results, 423 students wrote the post-test who did not write the pre-test. Therefore, 38.99 per cent of the total 1 508 sample cannot be used owing to absent pre-tests. Of the 423 students, 44.7 per cent were male and 57.3 were female. The majority of students were between the ages of 19 and 25 years. Of the students, 37.1 per cent were Accounting Sciences majors and 13 per cent were Economics majors. Again, the majority of students (70.9 per cent) had not studied economics in Gr12.

**Table 7.1: TUESA Demographic information**

	Frequency	Per cent	Valid Per cent	Cumulative Per cent
<b><i>Gender</i></b>				
Male	468	44.2	44.2	44.2
Female	591	55.8	55.8	100.0
<b><i>Age</i></b>				
18 years and younger	138	12.7	12.8	14.8
19 - 25 years	907	83.6	83.9	98.7
26 - 35 years	11	1.0	1.0	99.7
36 - 45 years	1	.1	.1	99.8
Older than 46 years	2	.2	.2	100.0
<b><i>Race</i></b>				
Black	421	38.8	38.9	39.8
White	545	50.2	50.9	90.7
Indian	29	2.7	2.9	93.6
Coloured	48	4.4	4.9	98.5
Other	10	1.0	1.5	100.0
<b><i>Course of study</i></b>				
Economics	135	12.8	12.5	12.5
Business Management	137	12.9	12.8	25.3
Human Resources	53	5.0	5.0	30.3
Accounting Sciences	359	33.9	33.9	64.2
Other BCom	190	18.0	18.1	82.3
Other BA	69	6.5	6.6	88.9
Other BSc	116	11.0	11.1	100.0
<b><i>Did the student study Economics in Gr12?</i></b>				
Yes	305	28.8	28.8	28.8
No	744	70.3	69.3	98.1
Missing	21	2.0	1.9	100.0
<b><i>University</i></b>				
Rhodes University	259	23.9	23.9	23.9
NMMU	52	4.8	4.8	28.7
NWU: Mafikeng campus	130	12.0	12.0	40.6
NWU: Potchefstroom campus	644	59.4	59.4	100.0

### 7.2.2 TUESA Microeconomic results

A total of 1 085 introductory-level economics students across three universities in South Africa completed the Microeconomics section of the TUESA post-test in October 2014. The average economic literacy score for the microeconomics section of the test was 58.79 per cent. Students performed relatively well in certain microeconomics questions. The questions that they performed well in, in the pre-test, were the same questions that they performed well in, in the post-test. The questions they performed well in were questions on the microeconomic problem (questions 7, 8 and 10). Furthermore, students performed well in: question 16, identifying that a restaurant meal can be classified as a luxury good; question 19 on the topic of demand, where students identified the point that the price of rhino horn will increase owing to limited supply; and question 21 on the topic of production theory, where majority of students correctly identified the fixed cost in the given scenario.

In ten out of the twenty questions, results improved by more than 30 per cent, when comparing the averages for the pre-test questions with the averages of the post-test questions. The questions where the students showed improvement by more than 30 per cent were: question 7 on the topic of what economics is; question 11 on the topic of microeconomic statements; question 12 on the topic of opportunity cost; questions 14, 15 and 18 on the topic of demand and supply; question 20 on the topic of utility; question 22 on the topic of theory of production; question 23 on the topic of economic profit; and question 25 on the topic of economies of scale. *Table 7.2* below contains the average score and rate of improvement for each microeconomic question.

**Table 7.2: Average for each microeconomic question**

Question	Pre-Test Scores	Post-Test Scores
Question 7	61.1	92.1
Question 8	61.9	62.1
Question 9	53.8	68.4
Question 10	80.3	84.9
Question 11	16	21.1
Question 12	36.4	54.2
Question 13	29.2	59
Question 14	55.7	74.6
Question 15	45.3	62.2
Question 16	82.2	85.9
Question 17	24.5	25.6
Question 18	49.8	70.2
Question 19	84.3	90.2
Question 20	43.2	61.9
Question 21	90.3	94.2
Question 22	6.8	13.5
Question 23	49.7	69.6
Question 24	37.2	39.3
Question 25	21.7	33.9
Question 26	39.4	47.5
Mean	46.38	58.79

When taking into account the pre-test scores and post-test scores mentioned in *Table 7.2* from the microeconomic section of the TUESA, the rate of improvement is calculated at 26.76 per cent, which seems to be a sizable improvement. When performing a T-test to determine the significance of difference between the pre- and post-test it was found that the difference is significant with a  $p < .000$  (two tailed).

### 7.2.3 TUESA Macroeconomic results

A total of 1 085 introductory-level economics students across three universities in South Africa completed the macroeconomics section of the TUESA post-test in October 2014. The average economic literacy score for the macroeconomics section of the test was 62.47 per cent. Students performed relatively well in certain macroeconomics questions. The questions that they performed well in, in the pre-test, were the same questions that they performed well in, in the post-test. More particularly, these were questions one and seven on

growth, questions six and eight on inflation, question nine on inflation, and question thirteen on international trade. *Table 7.3* below contains the average scores for each macroeconomics question.

In three out of the fifteen questions, students improved by more than 30 per cent when comparing the averages for the pre-test questions with the averages of the post-test questions. The questions where the results improved by more than 30 per cent were: question 29 on the topic of unemployment, question 34 on the topic of inflation, and question 38 on the topic of the function of the government. There were questions where students performed worse in the post-test than they did in the pre-test. These questions were: question 30 on the topic of economic growth, question 37 on fiscal policy, and question 39 on international trade. *Table 7.3* below contains the average score and rate of improvement for each macroeconomic question.

**Table 7.3: Average for each macroeconomic question**

Question	Pre-Test Scores	Post-Test Scores
Question 27	73.8	75.5
Question 28	21.7	25.8
Question 29	36.1	56.2
Question 30	30.7	19.4
Question 31	64.4	64.4
Question 32	73.4	78.1
Question 33	63.4	76.4
Question 34	46.0	78.8
Question 35	78.9	82.5
Question 36	41.4	50.2
Question 37	57.1	56.2
Question 38	41.6	61.4
Question 39	82.0	75.1
Question 40	57.4	67.5
Question 41	66.2	69.5
Mean	55.61	62.47

When taking into account the pre-test scores and post-test scores mentioned in *Table 7.3* from the macroeconomic section of the TUESA the rate of improvement is calculated at 12.82% per cent, which seems to be a slight improvement. When performing a T-test assuming to determine the significance of difference between the pre- and post-test it was found that the difference is however significant with a  $p < .000$  (two tailed).

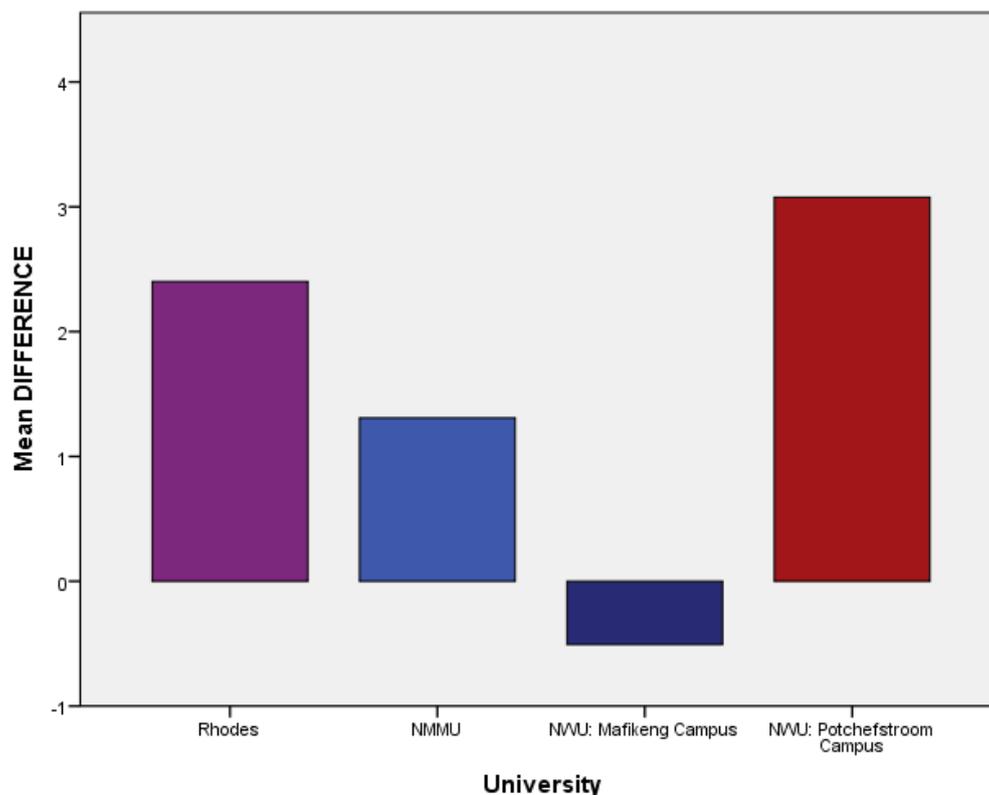
#### **7.2.4 Overall matched results from TUESA**

The average economic literacy score for the test was 20.4 out of a possible score of 35, giving the economic literacy rate of introductory-level economics students in South Africa at 58.26 per cent. It needs to be noted that a year's worth of economic instruction had taken place, increasing the economic literacy rate from 50.99 per cent to 60.63 per cent, an improvement rate of 18.9 per cent.

*Figure 7.1* below indicates the differences between the pre-test and post-test scores across the different universities. The results indicated that students at the North-West University, Potchefstroom Campus, improved their economic literacy levels the most, with an improvement rate of 49.00 per cent. The North-West University, Potchefstroom Campus,

students' TUESA marks increased, on average, by 3 points out of a possible 35 points. Students at Rhodes University improved their economic literacy levels by 38.26 per cent. The Rhodes University students' TUESA marks increased, on average, by 2 points out of a possible 35 points. The Nelson Mandela Metropolitan University students improved their economic literacy levels by 20.83 per cent. The Nelson Mandela Metropolitan University students' TUESA marks increased, on average, by 1 point out of a possible 35 points. On the contrary, the economic literacy of the students at the North-West University, Mafikeng Campus, declined by 8.09 per cent. The North-West University, Mafikeng Campus, students' TUESA marks declined by 1 point, on average, out of a possible 35 points.

Furthermore, a paired-sample T-test was done to determine if there is a significant difference between the pre- and post-test scores of students between different universities. When testing the data the probability value was calculated as  $p = 0.000$  concluding that there is a significant difference between the post test scores of students from different universities.

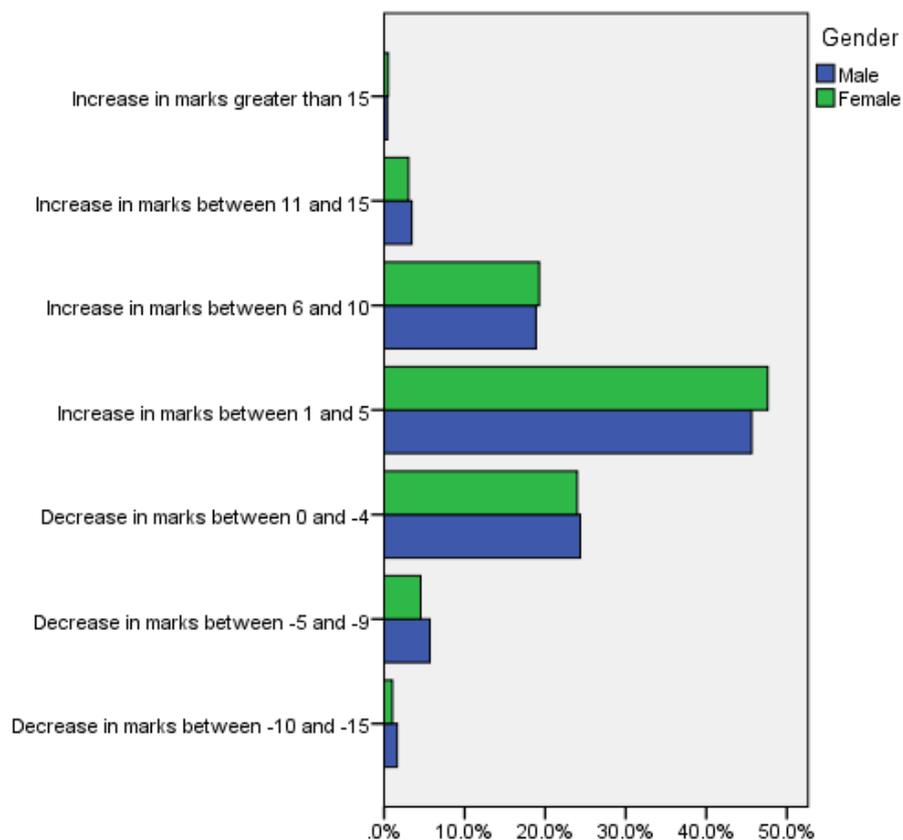


**Figure 7.1: Difference in Pre-Test and Post-Test TUESA scores per university.**

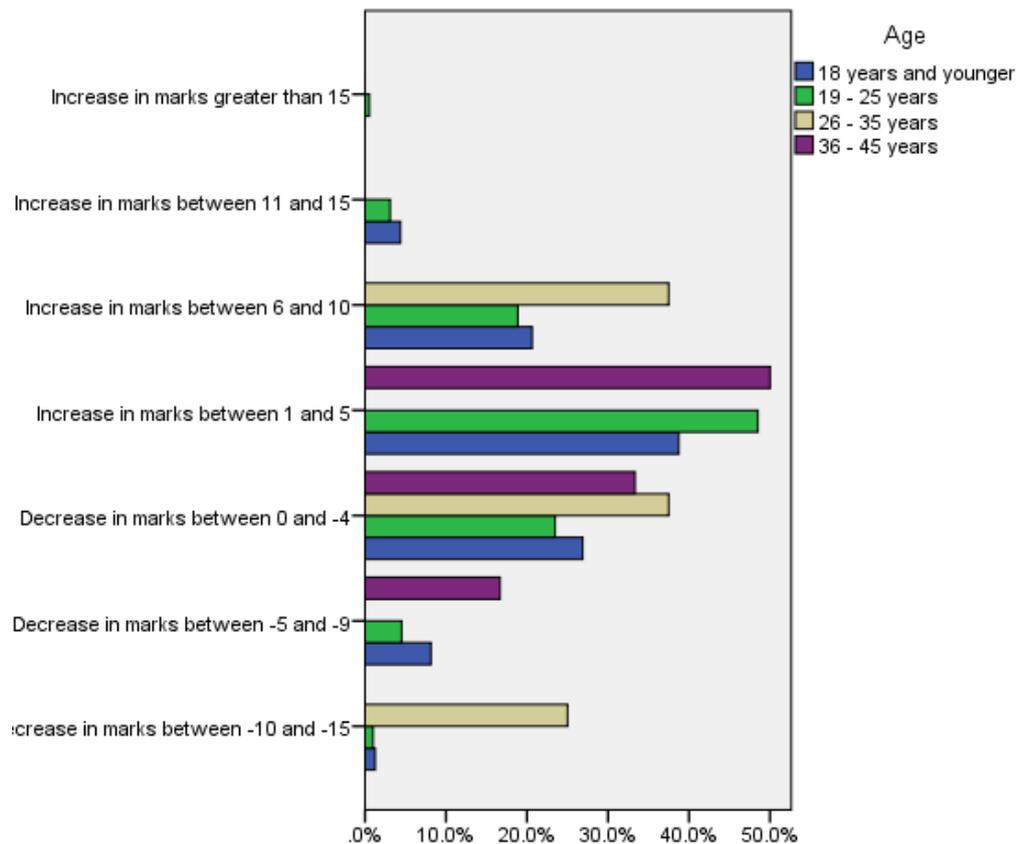
Figure 7.2 below shows the gender differences and how each gender's marks improved, on average, from the pre-test to the post-test. It appears from the graph that females overall

improved their economic literacy score, more than males did. Of the 1 085 students, 19.26 per cent of females improved their economic literacy scores between six and ten points out of a possible 35 points, whereas males increased their marks by 18.86 per cent. Of the students who increased their economic literacy scores between one and five points out of a possible 35 points, 47.64 per cent were females and 45.64 were males. Approximately three per cent of males and females increased their economic literacy scores between 11 and 15 points out of a possible 35 points, whereas 24.34 per cent of males and 23.99 per cent of females experienced a decline in their economic literacy scores of between zero and -4 points, out of a possible 35 points.

Additionally, when testing the difference in test scores between males and females, the probability value was calculated at  $p = 0.000$  concluding that there is a significant difference between the difference in scores and the different genders.



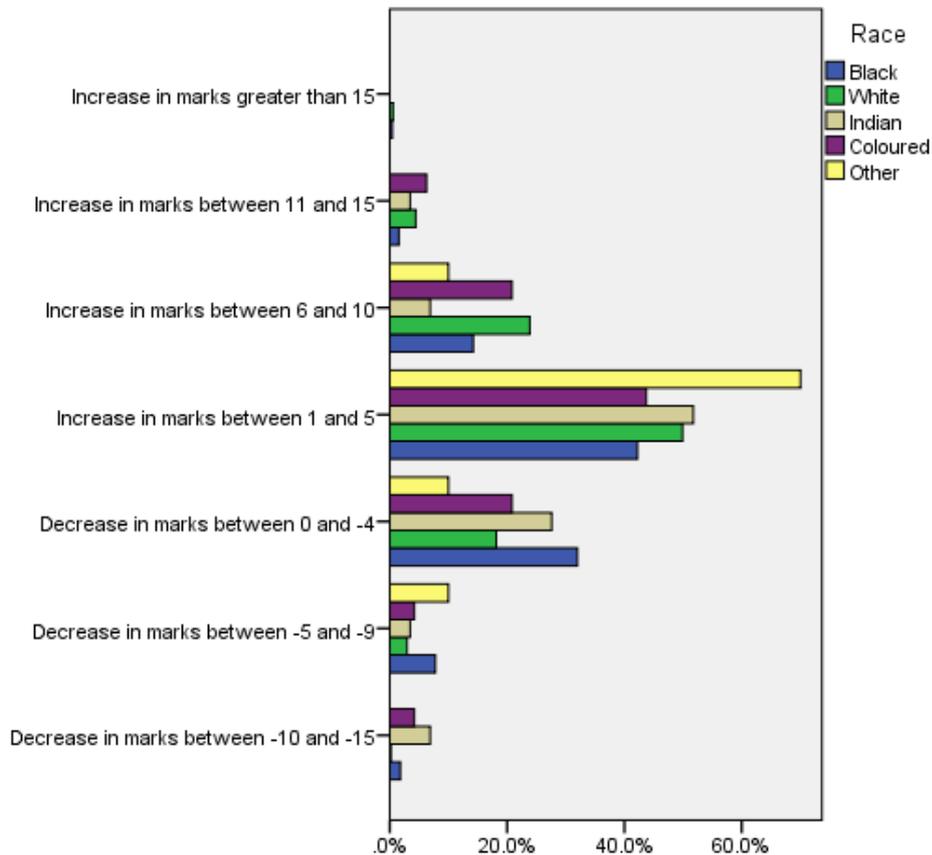
**Figure 7.2: Gender differences in marks from Pre-test and Post-test**



**Figure 7.3: Age differences in marks from Pre-test and Post-test**

Figure 7.3 above indicates age differences and how the different age groups' marks improved, on average, from the pre-test to the post-test. Of the 1 085 students, 20.63 per cent of students aged 18 years and younger (at the time of the pre-test) improved their economic literacy scores by between six and ten points out of a possible 35 points, whereas 18.85 per cent of students aged between 19 and 25 years improved their marks in this same points range. Thirty-seven per cent of students aged from 26 to 35 years improved their economic literacy scores by between six and 10 points out of a possible 35 points. Of the students who increased their economic literacy scores by between one and five points of out a possible 35 points, 38.75 per cent were aged 18 years and younger, 48.51 per cent were between the ages of 26 and 35 years, and 33.33 per cent of students were between the ages of 36 and 45 years. Students who experienced a decrease in their economic literacy scores of between zero and -4 points out of a possible 35 points were amongst the other categories aged 18 years and younger, with 26.88 per cent and 16.67 per cent for students aged between 36 and 45 years, respectively.

In addition, it was determined that there is a significant difference between age and the pre- and post-test scores of students. When testing the data the probability value was calculated as  $p = 0.000$  concluding that there is a significant difference between the difference in scores and the different age groups.



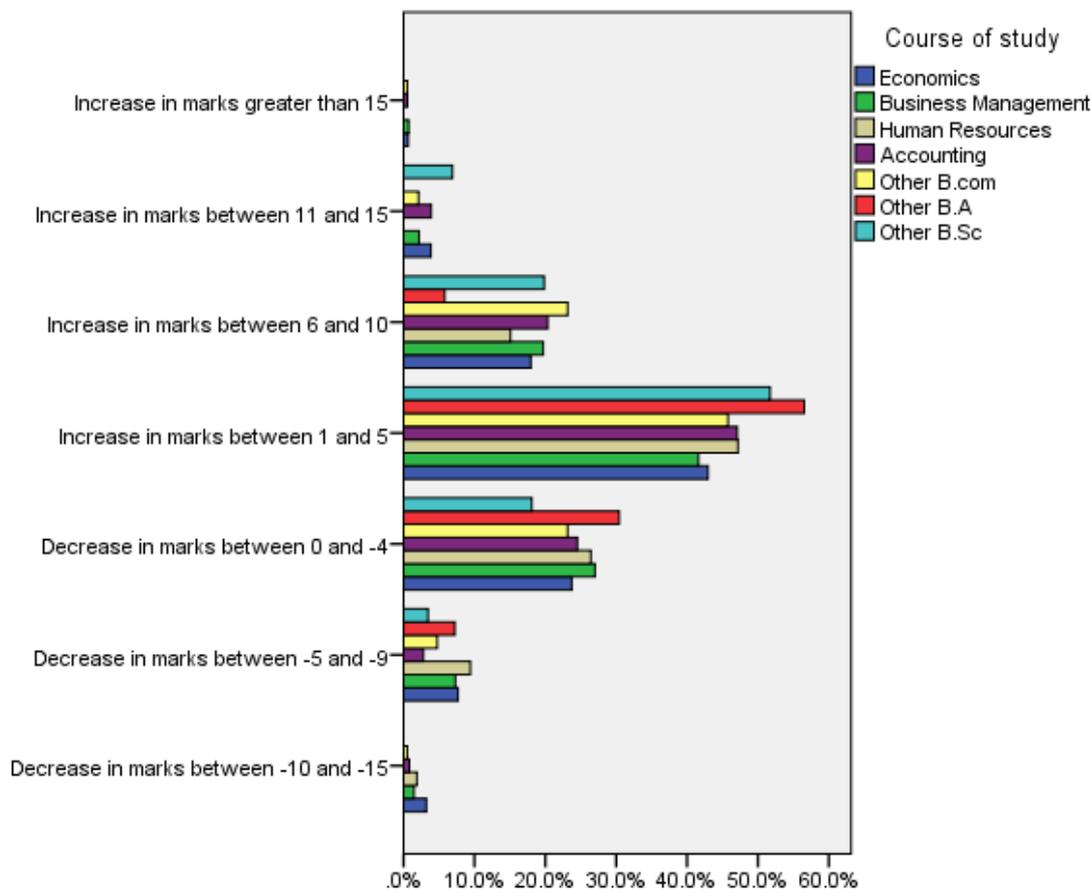
**Figure 7.4: Race differences in marks from Pre-test and Post-test**

Figure 7.4 above indicates race differences and how the different races' marks improved, on average, from the pre-test to the post-test. Of the 1 085 students, 14.22 per cent were black, 23.85 per cent were white, 6.89 per cent were Indian, 20.83 per cent were coloured, and 10 per cent were from other ethnic groups.

Out of the students who increased their economic literacy scores by between one and five points out of a possible 35 points, 42.22 per cent were black, 49.91 per cent were white, 51.72 per cent were Indian, 43.75 per cent were coloured, and 70 per cent were from other ethnic groups. From the students who experienced a decrease in their economic literacy scores of between zero and -4 points out of a possible 35 points, 32 per cent were black,

18.17 per cent white, 27.59 per cent Indian, 20.83 per cent coloured, and 10 per cent were from other ethnic groups.

When testing for significance to determine if there is a significant difference between race and the pre- and post-test scores of students the results indicated that there is a significant difference between the difference in scores and the race groups, with a  $p = 0.000$ .



**Figure 7.5: Course of study differences in marks from Pre-test and Post-test**

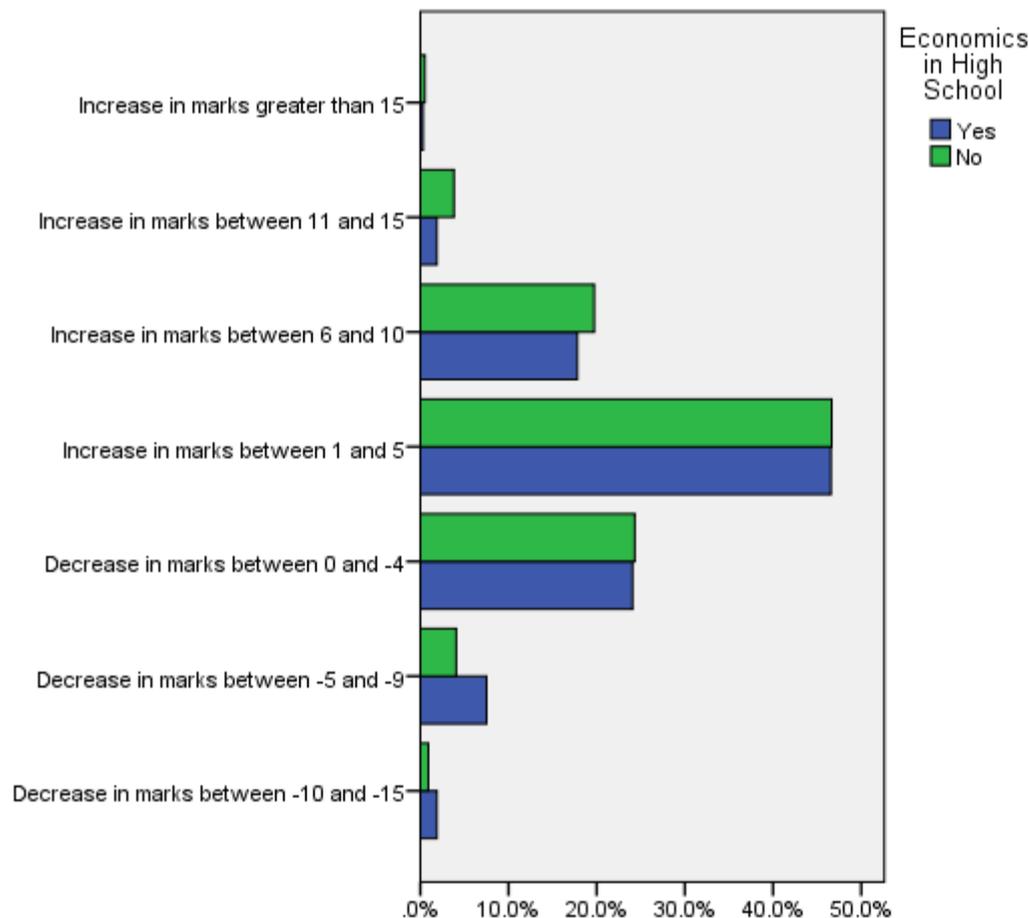
Figure 7.5 above indicates differences in the courses of study and how the different majors' marks improved, on average, from the pre-test to the post-test. Of the 1 085 students who increased their economic literacy marks by between six and 10 points out of a possible 35 points, 17.95 per cent were Economics majors, 19.17 per cent were Business Management majors, 15.09 per cent were Human Resources majors, 20.33 per cent were Accounting Sciences majors, 23.16 per cent were other BCom majors, 5.79 per cent were other BA majors, and 19.83 per cent were other BSc majors. From the students who increased their economic literacy scores by between one and five points out of a possible 35 points, 42.95 per cent were Economics majors, 41.61 per cent were Business Management majors, 47.17

per cent were Human Resources majors, 47.08 were Accounting Sciences majors, 45.79 per cent were other BCom majors, 56.52 per cent were other BA majors, and 51.52 per cent were other BSc majors. Concerning the students who experienced a decrease in their economic literacy scores of between zero and -4 points out of a possible 35 points, 23.72 per cent were Economics majors, 27.01 per cent were Business Management majors, 26.42 per cent were Human Resources majors, 23.16 per cent were other BCom majors, 30.43 per cent were other BA majors, and 18.1 per cent were other BSc majors.

On the other side of the cross tabulation, it was determined that of the 17.95 per cent of students who were majoring in Economics, 13.29 per cent had increased their marks by between one and five marks, 13.53 per cent had increased their marks by between 6 and 10 marks, 14.14 per cent had increased their marks by between eleven and fifteen marks, and 20 per cent had increased their marks by more than 15 marks.

The course major with the most improvement was Accounting Sciences. Of the 20.33 per cent of students who were majoring in Accounting Sciences, 33.53 per cent increased their marks by between one and 5 marks, 35.27 per cent increased their marks by between 6 and 10 marks, 40 per cent increased their marks by between 11 and 15 marks, and 40 per cent increased their marks by more than 15 marks.

Furthermore, when testing for significance, the probability value was calculated as  $p = 0.000$  concluding that there is a significant difference between the difference in scores and the different majors in which the student specialise.



**Figure 7.6: Having economics in Gr12 differences in marks from Pre-test and Post-test**

Figure 7.6 above indicates how the marks of students who had studied Gr12 economics in high school differed from those of the students who did not study economics in high school. Of the 1 085 students, 17.18 per cent of students who did study Gr12 economics and 19.71 per cent of students who did not study Gr12 economics managed to increase their economic literacy scores by between six and 10 points. Of the students who increased their economic literacy scores by between one and five points, 46.56 per cent indicated that they had studied Gr12 economics, and 46.65 per cent indicated that they did not study Gr12 economics. Of the students who experienced a decrease in their economic literacy scores of between zero and -4 points, 24.06 per cent indicated that they had studied Gr12 economics in high school and 24.31 per cent indicated they did not study Gr12 economics in high school. From this result, it appears that students who did study Gr12 economics and students who did not study Gr12 economics performed relatively the same in the post-test of the TUESA. It therefore seems that having studied Gr12 economics in high school gives students an advantage at the

beginning of the year over the students who did not study economics in high school, but the gap is quickly narrowed after a year's worth undergraduate economics study.

On the other side of the cross tabulation, it was determined that of the students who had studied economics in high school, 29.56 per cent increased their marks by between one and five marks, 27.54 per cent by between 6 and 10 marks, 17.14 per cent by between 11 and 15 marks, and 20 per cent by more than 15 marks.

Students who did not study economics in high school improved their marks more than the students who studied economics in high school did. Of the students who did not study economics in high school, 70.44 per cent increased their marks by between one and five marks, 72.46 per cent by between 6 and 10 marks, 82.86 per cent by between 11 and 15 marks, and 80 per cent by more than 15 marks.

Additionally, a paired-sample T-test was done to determine if there is a significant difference between students who had Gr12 economics and the pre- and post-test scores of students. When testing the data the probability value was calculated as  $p = 0.000$  concluding that there is a significant difference between the difference in scores and having had Gr12 economics, or not.

### **7.3 Empirical analysis**

The aim of this section is to determine whether there is a significant difference in the students' pre-test TUESA scores and post-test TUESA scores, and whether or not a year's worth of an introductory economics course has a significant effect on students' economic literacy scores.

Firstly, T-tests will be performed to determine if there is a significant difference between the pre- and post-test scores of students. Secondly, multiple regression analysis will be used to predict a student's TUESA score based on demographic factors. Thirdly, logistic regression will be performed to determine what factors predict the likelihood that respondents will increase or decrease their TUESA scores. Lastly, cross tabulations and ANOVA is used to determine the significance of race, age and course of study. The results of the cross tabulations and ANOVA for this chapter can be found in appendix C.

### 7.3.1 T-tests

In this section, a paired-sample t-test is used in order to compare the mean scores of the same group of people on two different occasions. In this case, the same group of students will be the matched group of students and the two different occasions will be the pre-test in February 2014 and the post-test in October 2014.

The research question for this part of the analysis is, therefore: Is there a significant difference in the students' pre-test TUESA scores and post-test TUESA scores?

The results for the paired samples t-test are presented in *Table 7.8* below. When looking at the significance value, it indicates that the probability is less than 0.05, allowing the conclusion that there is a significant difference between the TUESA pre-test scores and the TUESA post-test scores. The mean difference of the two scores was an improvement of 2.401 out of a possible score of 35, with a 95 per cent confidence interval stretching from a lower bound of 2.129 to an upper bound of 2.673.

**Table 7.4: Paired samples Test**

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
POST_TEST - PRE_TEST	2.401	4.562	.138	2.129	2.673	17.335	1084	.000

Having established that there is a significant difference, *Table 7.9* below indicates which of the two scores (pre-test or post-test) was higher. The results indicate that the post-test results are higher, therefore leading to the conclusion that there was a significant increase in the economic literacy scores for introductory-level Economics students.

**Table 7.5: Paired Samples Statistics**

	Mean	N	Std. Deviation	Std. Error Mean
POST_TEST	20.39	1085	4.579	.139
PRE_TEST	17.99	1085	3.863	.117

The results presented above indicate that there is a difference between the results obtained in the pre-test and the results obtained in the post-test. However, the results do not indicate the magnitude of the effect of the interaction, in this case, from a year's worth of economic instruction. It needs to be noted that IBM SPSS does not provide effect size statistics for t-test output and therefore the effect size for the paired-samples t-test is calculated by means of the following formula:

**Formula 7.1: Eta Squared**

$$Eta\ Squared = \frac{t^2}{t^2 + (N - 1)}$$

Cohen (1988) proposed guidelines for interpreting the *Eta Squared value*. A value of 0.01 indicates a small effect, a value of 0.06 indicates a moderate effect, and a value of 0.10 indicates a large effect. The *Eta Squared* value was calculated at 0.22, indicating a value larger than 0.14. Therefore, given the *Eta Squared* value of 0.22, it can be concluded that there was a large effect with a substantial difference in the TUESA test scores before and after the intervention.

To answer the research question stated above: yes, there is a significant difference in introductory-level Economic students' pre-test TUESA scores and post-test TUESA scores. In addition, the *Eta Squared* value was calculated and it was determined that not only were the results significant, but that there was a large effect with a substantial difference between the TUESA pre-test scores and TUESA post-test scores.

### **7.3.2 Multiple regression analysis**

As indicated in Chapter 6 Multiple regressions determine the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained (Pallant, 2013). Multiple regression analysis therefore used to determine what variables can predict the TUESA post-test scores.

The model in this section contained the dependent variable Post-test TUESA scores with the independent variables, gender, having high school economics in Gr12, course of study and age. *Table 7.18* below contains the results from the multiple regression analysis.

**Table 7.18: Multiple regression analysis in predicting the TUESA pre-test score**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	18.312	.529		34.611	.000
Major_BusinessManagement	-1.138	.483	-.083	-2.355	.019
Major_HR	-2.548	.655	-.120	-3.890	.000*
Major_Accounting	1.642	.388	.169	4.235	.000*
Major_OtherB.com	.091	.441	.008	.206	.837
Major_OtherB.A	-.090	.587	-.005	-.153	.878
Major_OtherB.Sc	1.156	.501	.078	2.308	.021
Race_White	4.062	.272	.444	14.952	.000*
Race_Indian	.776	.776	.027	.999	.318
Race_Coloured	1.675	.625	.075	2.680	.007*
Race_Other	1.838	1.299	.038	1.415	.157
ECON_HS	1.072	.279	.107	3.847	.000*
Gender	-.516	.250	-.056	-2.065	.039

A multiple regression was run to predict the TUESA post-test scores from gender, having economics in Gr12 and course of study. These variables statistically significantly predicted TUESA post-test scores,  $F(12,1072) = 26.906$   $p < .0005$ ,  $R^2 = .223$ . The results indicated that females performed better in the post-test than males but the result was not significant. Students who majored in human resources obtained 2.548 point less in the TUESA post-test score than students who majored in economics. On the other hand, students majoring in accounting scored 1.642 points higher than students majoring in economics. When looking at race, white students scored 4.062 points higher than black students and coloured students scored 1.675 points higher than black students in the TUESA post-test. From the results it seems that having Gr12 still makes a difference after one year of introductory economic courses, students who had economics in high school scored 1.072 points more on the TUESA post-test than the students who did not had economics in high school. Students who had economics in high school performed significantly better than students who did not have economics in Gr12. Course of study and gender furthermore are statistically significant to the prediction,  $p < .005$ .

### 7.3.3 Logistic regression

Logistic regression allows the testing of models to predict categorical outcome. The research question for this part of the analysis is: What demographic factors predict the likelihood that respondents would increase or decrease their TUESA scores?

The model in this section contained the dependent variable (Increase\_Decrease) and is encoded into a dummy variable with marks increasing representing a ‘one’, and decreasing marks representing a zero. The model further contained five independent variables: Gender, Age, Race, Course of study, and whether or not the students had studied economics in Gr12. *Table 7.16* below contains the results from the logistic regression.

**Table 7.6: Logistic Regression predicting the likelihood of increasing or decreasing TUESA scores**

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Gender(1)	.299	.155	3.711	1	.054	1.348	.995	1.828
Age			6.171	3	.104			
19 - 25 years	.814	1.148	.503	1	.478	2.257	.238	21.421
26 - 35 years	.587	1.138	.266	1	.606	1.798	.193	16.717
36 - 45 years	2.260	1.354	2.786	1	.095	9.579	.675	136.033
Race			45.212	4	.000			
Race_White	1.583	1.067	2.200	1	.138	4.868	.601	39.414
Race_Indian	.429	1.068	.161	1	.688	1.535	.189	12.442
Race_Coloured	1.557	1.138	1.874	1	.171	4.745	.510	44.106
Race_Other	.803	1.123	.511	1	.475	2.232	.247	20.179
Course_of_study			11.141	6	.084			
Major_BusinessManagement	.235	.324	.528	1	.467	1.265	.671	2.386
Major_Accounting	.793	.328	5.850	1	.016*	2.209	1.162	4.199
Major_HR	.651	.423	2.367	1	.124	1.918	.837	4.398
Major_OtherB.com	.054	.290	.035	1	.852	1.055	.597	1.865
Major_OtherB.A	.379	.313	1.471	1	.225	1.461	.792	2.697
Major_OtherB.Sc	.273	.380	.517	1	.472	1.314	.624	2.769
Gr12_Economics(1)	.003	.170	.000	1	.985	1.003	.719	1.399
Constant	-3.353	1.585	4.478	1	.034	.035		

Direct logistic regression was performed to assess the significance of a number of factors on the likelihood that students would increase or decrease their TUESA scores. The full model containing all predictors was statistically significant,  $\chi^2(15, N=1085) = 69.152, p < 0.001$ , indicating that the model was able to distinguish between students whose marks increased or decreased. As indicated in *Table 7.16* above, only one of the independent variables made a unique statistically significant contribution to the model, being the Accounting Sciences course of study, relative to the reference category, Economics. The model reported an odds

ratio of 2.209, indicating that the students who majored in Accounting Sciences will be 2.209 times more likely to do better in the TUESA in comparison to other students majoring in other subjects, controlling for all other factors.

## **7.4 Conclusion**

The TUESA post-test was administered at three universities in South Africa in October 2014. The overall results indicated an economic literacy score of 60.63 per cent, with a microeconomic literacy score of 58.79 per cent and a macroeconomic literacy score of 62.47 per cent.

The results indicated that there is a significant difference between the increase and decrease in students' economic literacy scores and their demographic information. It was determined that there is a significant difference between the demographic information of the students and their pre-test TUESA scores and post-test TUESA scores. Results indicated that more female students increased their TUESA score than male students who increased their scores, that more students who did not study Gr12 economics in high school increased their TUESA scores than students who had studied Gr12 economics in high school, and that more white students and BSc students performed better than the other ethnic groups and students majoring in other courses.

Furthermore, it was established that there is a significant difference in the students' pre-test TUESA scores and post-test TUESA scores. The *Eta Squared* value was calculated and it can be concluded that there was a large effect with a substantial difference in the TUESA test scores before and after studying a one-year introductory-level Economics course.

The results from the logistic regression did not show promising results. The only demographic factor predicting the likelihood that respondents would increase or decrease their TUESA scores was course of study, in that Accounting Sciences students would most likely increase their marks. Results from the multiple regression analysis indicated that course of study, specifically accounting, race (white) and high school economics significantly predict a student's TUESA post-test score.

## Chapter 8

### Conclusion and recommendations

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#### 8.1 Introduction

The world as we know it today is confronted with economic concepts and issues. Economies are facing debt crises, recessions and downturns in economic growth. Consumers are confronted daily with increasing food prices, a fluctuating oil price, unemployment and low wages, but despite the attention that has been given to economics in the recent years, economists have found that the public is very unfamiliar with economics and basic economic concepts.

But how do economists know what the public's known understanding about economics is? Literature suggests that one should test a consumer's knowledge about economics, or more specifically, test the level of economic literacy. One way to test for economic literacy is by means of the Test of Understanding College Economics (TUCE). The TUCE is a test that was developed by a number of economists to test the economic literacy level of introductory-level economic students. The TUCE can be used as a pre-test to test students' known understanding about economics after High School or as a post-test to test students' known understanding of economics after one year's worth of economic instruction.

The TUCE is, however, a test that was developed for the United States of America. The TUCE consists out of economic concepts that are true to the United States. Some examples of these concepts, which are included in the TUCE questions are: The Federal Reserve, the price of gas (petrol) differs from one county to the other, oil is the United States primary source of heat and the term interstate is used instead of the word highway. These concepts can confuse students and therefore this study aims to test the economic literacy level of South African first year university students before and after taking a one-year economics course. After testing a sample of South African students' economic literacy levels with the TUCE, it was determined that the TUCE may not be an appropriate test for testing economic literacy in South Africa and that an economic literacy test should be developed for the South African context. After taking into account the TUCE and the National Voluntary Content Standards in Economics, the Test of Understanding Economics in South Africa (TUESA) was

developed to test the economic literacy of introductory-level economic students in South Africa.

This chapter will reiterate the objectives of the study and how the objectives of the study were met, to conclude the study by discussing the overall results, and to make recommendations in order to expand the study further.

## **8.2 Objectives and research question**

The objectives of this study, structured to answer the research question “What is the economic literacy level of introductory economic students in South Africa”, were:

- To determine how South African students performed with the TUCE in testing for economic literacy in South Africa;
- To develop a test of economic literacy for South Africa;
- To use the newly-developed economic literacy test for South Africa as a pre-test and post-test at the North-West University, Potchefstroom and Mafikeng Campuses, Nelson Mandela Metropolitan University, and Rhodes University in order to determine the economic literacy levels of first-year students enrolled for an introductory Economics course; and
- To determine the effect of a year’s worth of introductory Economics courses on economic literacy in South Africa amongst introductory-level Economics students.

## **8.3 Reaching the objectives and answering the research question**

### **8.3.1 To determine how South African students performed with the TUCE in testing for economic literacy in South Africa;**

The reviewed literature suggested the use of The Test of Understanding College Economics in order to test for economic literacy amongst college or undergraduate students. The TUCE was developed in the United States and it needs to be noted that each high school student in the United States is required to enrol for a one-credit economics course, thus obtaining knowledge in economics before entering university or college. In South Africa only 27 per cent of high school students enrolled for economics in Gr 10-12 in 2012, leaving 73 per cent of high school students only with economic knowledge gained in Gr 7-9.

Certain questions in the TUCE cannot be answered without some existing knowledge of economics. The TUCE is, therefore, very dependent on previous knowledge of economics in order to answer the questions correctly.

Of the 60 TUCE questions, 30 questions were selected. The questions that were selected were not written in an American context and were applicable to the curriculum of an introductory economics course in South Africa. The 30 TUCE questions were used to test the economic literacy of students at the North-West University, Potchefstroom Campus, according to the TUCE and to establish whether or not the TUCE is an appropriate measure for testing economic literacy in South Africa. The test were implemented as a pre-test (in February 2013), testing the economic literacy levels before any economic instruction took place and at the end of the academic year (in September 2013) as a post-test after two semesters of economic instruction, thus establishing the level of improvement that took place.

It was clear from the results that students still struggled with the selected TUCE questions, with the majority of students failing the post-test after having studied two semesters of introductory economics. Although improvement took place amongst students after a year's worth of economics, the improvement was significant. The reason why students may be performing poorly in the sample test of the TUCE is that the questions that are asked in the TUCE are very theoretical and do not test the students' application of economic thinking. The test needs to include more applied questions on basic important economic issues so that researchers and lecturers can test whether students can think and reason like economists and can apply certain basic theories, rather than simply memorising certain definitions and graphs.

It is, therefore, important to develop a test of the understanding of economics for South Africa, taking into account the fact that introductory economics students have had limited exposure to the field of economics.

### **8.3.2 Developing a test of economic literacy for South Africa.**

This objective entails the development of the Test of Understanding Economics in South Africa. Literature regarding the twenty national content standards was presented. This informed the development of TUESA.

The development of the Test of Understanding Economics in South Africa, TUESA, started in November 2012, drawing on the TUCE. Questions were selected, edited and rewritten for

the South African context. A first draft of the new questionnaire was completed in July 2013 and sent out for review and inputs from the staff of the School of Economics at the North-West University's Potchefstroom Campus. Their comments and suggestions were incorporated into a second draft of the test that was presented at the Biennial Conference of the Economic Society of South Africa, held at the University of the Free State in September 2013. Participants at the conference made a number of inputs. The second draft of the TUESA was also sent to staff members of Economics Departments across South Africa, who indicated at the conference that they would provide an additional round of inputs. Based on all this feedback, a third draft of the TUESA was completed. This third draft of the TUESA was tested in a pilot study at the Potchefstroom Campus at the end of October 2013. The results obtained from the pilot study were used as inputs into a final revision of the questionnaire items and a fourth and final version of the TUESA was produced.

The final draft of the TUESA test of economic literacy is divided into three sections. Section 1: question 1 to question 5 consists of demographic information: gender, age, race, course of study, and whether students had studied economics in high school or not. Section 2: question 1 – 20 consists of microeconomics questions. Section 3: questions 1 – 15 consist of macroeconomics questions. Certain topics that were covered in the test were questions on: the basic economic problem, scarcity, choices, opportunity cost, supply, demand, elasticity, utility, consumer behaviour, perfect competitive firms, monopoly, economic growth, inflation, unemployment, fiscal policy, monetary policy, international trade and exchange rates.

### **8.3.3 Using the newly developed economic literacy test for South Africa.**

TUESA was administered as a pre-test and post-test at the North-West University, Potchefstroom and Mafikeng Campuses, Nelson Mandela Metropolitan University, and Rhodes University in order to determine the economic literacy levels of first-year students enrolled for an introductory Economics course

#### **8.3.3.1 Pre-Test**

The TUESA pre-test was administered in February 2014 at three universities in South Africa, North-West University, Potchefstroom and Mafikeng Campuses, Rhodes University, and Nelson Mandela Metropolitan University. The overall results indicated an economic literacy

score of 50.99 per cent, with a microeconomic literacy score of 46.38 per cent and a macroeconomic literacy score of 55.61 per cent.

The results further indicated that there was a significant difference between the economic literacy scores between different genders, races, majors and students who had enrolled for Gr12 economics in high school. Results from cross tabulations and logistic regression indicated that students who had been enrolled for Gr12 economics in high school had a better chance of passing the TUESA than students who had not been enrolled for economics in high school.

### **8.3.3.2 Post-Test**

The TUESA post-test was administered in October 2014 at three universities in South Africa: North-West University, Potchefstroom and Mafikeng Campuses, Rhodes University, and Nelson Mandela Metropolitan University. The overall results indicated an economic literacy score of 60.63 per cent, with a microeconomic literacy score of 58.79 per cent and a macroeconomic literacy score of 62.47 per cent.

The results indicated that there is a significant difference between the increase and decrease in students' economic literacy scores and their demographic differences. Results indicated that more female students increased their TUESA scores than male students did, that more students who did not study Gr12 economics in high school increased their TUESA scores than students who had studied Gr12 economics in high school, and that more white students and BSc students performed better than the other ethnic groups and students majoring in other majors.

### **8.3.4 Determining the effect of a year's worth of introductory economics courses on economic literacy in South Africa amongst introductory economic students.**

The TUESA post-test was administered at three universities in South Africa in October 2014, as noted above. The overall results indicated an economic literacy score of 60.63 per cent, with a microeconomic literacy score of 58.79 per cent and a macroeconomic literacy score of 62.47 per cent. The results from the students from the three universities who completed both the pre-test and the post-test have been used to calculate what effect introductory economics has on their economic literacy level.

It was established by means of ANOVA and T-tests that there is a significant difference in the students' pre-test TUESA scores and post-test TUESA scores. This indicates that a year's worth of introductory economics had a positive and significant effect on students' economic literacy scores. The *Eta Squared* value was calculated in order to determine the size of the effect and it can be concluded from the results that there was a large effect with a substantial difference in the TUESA test scores before and after a year's worth of introductory economics.

In conclusion, all the objectives of this study were met in order to answer the research question: "What is the economic literacy level of introductory economic students in South Africa?" To answer the research question, the economic literacy level of introductory economic students after a year's worth of economic instruction was 60.63 per cent.

#### **8.4 Limitations**

The limitation of this study is that although the TUESA was distributed to a large sample of students, this was only done at three universities in South Africa. Three universities is still a relatively small sample of South African universities. The reason why these three universities were used is that these were the only universities that gave permission for the study to be conducted.

#### **8.5 Recommendations**

The following recommendations are made for developing the study further. It will be beneficial for endeavours to be made:

- To refine the TUESA so that the questions are short and compact. Some of the questions are lengthy and students take too long to answer the questions;
- To embed the TUESA electronically on a website so that all Universities in South Africa have access to the questionnaire.
- To use the TUESA as a baseline and to develop a test of economic literacy to test the public's understanding of economics.
- To use the TUESA as a baseline and to develop a test of economic literacy for final-year economics students to test their economic literacy levels. More complex

economic concepts and scenarios should be included in the questionnaire to see if students are ready to enter the labour market and whether or not they are capable of evaluating and applying different economic concepts and scenarios.

- To use the TUESA as a pre-and post-benchmark mark test for scholarship of teaching and learning type research.

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# Appendix A

## TEST OF UNDERSTANDING ECONOMICS IN SOUTH AFRICA

by

Alicia Fourie and Waldo Krugell

### Demographic information

#### QUESTION 1

Are you:	
1.	Male
2.	Female

#### QUESTION 2

How old are you?	
1.	18 years and younger
2.	19 – 25 years
3.	26 – 35 years
4.	36 – 45 years
5.	46 years and older

#### QUESTION 3

How would you identify your race group?	
1.	Black
2.	White
3.	Indian
4.	Coloured
5.	Other

#### QUESTION 4

Course of study	
1.	Economics (Economics, finance, banking, statistics, risk management, international trade and or econometrics)
2.	Business management (Industrial Psychology, Tourism, Business management and or Entrepreneurship)
3.	Human Resources (Human resources and Labour relations)
4.	Accounting Sciences (Chartered, Forensic, Financial and or Management accounting)
5.	Other B.Com
6.	Other B.A
7.	Other B.Sc

#### QUESTION 5

Did you have Economics in Gr12?	
1.	Yes
2.	No

#### QUESTION 6

Highest current level of education:	
1.	Matric
2.	Diploma
3.	Graduate degree
4.	Post graduate degree (Honors, Masters, PhD)

## MICROECONOMICS

### QUESTION 7

Economics is about:	
1.	the study of money
2.	how scarce resources are used to satisfy people's wants
3.	the study of stock markets
4.	creating jobs and fighting inflation

### QUESTION 8

A resource is scarce when:	
1.	when you have to pay to use it
2.	the resource is freely available
3.	the resource is supplied by the government
4.	it is a gift of nature

### QUESTION 9

A household may consist of a single person or a whole family but never the less, households are the suppliers of all production factors. What is the income generated by the production factors: labour, capital, natural resources and entrepreneurial ability, respectively:	
1.	Wages, rent, interest and profit
2.	Profit, rent, interest and wages
3.	Wages, interest, rent and profit
4.	Profit, interest, rent and wages

**QUESTION 10**

Which of the following is a macroeconomic issue:	
1.	A household deciding on how much money to save
2.	A firm maximizing profit
3.	The link between national saving and economic growth
4.	A wage dispute at a small firm in Pretoria

**QUESTION 11**

Which of the following is a microeconomic issue:	
1.	The link between investment and economic growth
2.	The budget deficit increased with 5%
3.	Prices of all goods and services increased
4.	The effect of government regulations on car emissions

**QUESTION 12**

After being caught allegedly smoking weed in his hotel room in Amsterdam, John Thompson, an Australian cricket player, receives a fine of R10 000 and a three-match suspension from international cricket. For each match, Thompson receives a match fee of R25 000 and a further R50 000 per match from his sponsors. He also pays R5 000 per match for insurance against injury. In opportunity cost terms, the cost of this incident to Thompson can be estimated as:	
1.	R 10 000.00
2.	R 35 000.00
3.	R 85 000.00
4.	R 220 000.00

**QUESTION 13**

A machine used to produce paper coffee cups would be considered:

1.	an intermediary good
2.	capital
3.	a natural resource
4.	a final good

**QUESTION 14**

Bacon and eggs are often eaten together therefore we call them complementary goods. Suppose that the price of bacon has increased, what will the effect be on the market for eggs?

1.	The demand for eggs will decrease
2.	The demand for eggs will increase
3.	The supply for eggs will increase
4.	The supply for eggs will decrease

**QUESTION 15**

In 2005 the number of births was temporarily high. How might this baby boom affect the price of babysitting services in 2010 and 2020.

1.	The price of babysitting services will increase in 2010 and 2020
2.	The price of babysitting services will increase in 2010 and decrease in 2020
3.	The price of babysitting services will decrease in 2010 and 2020
4.	The price of babysitting services will decrease in 2010 and increase in 2020

### QUESTION 16

During an economic downturn people's spending on groceries tends to remain unchanged, but spending on restaurant meals decline. This could be explained by the reasoning that:

1.	Consumers are relatively sensitive to changes in prices of groceries
2.	Consumers are relatively insensitive to changes in prices of restaurant meals
3.	A restaurant meal can be classified as a luxury good
4.	A restaurant meal can be classified as a necessity

### QUESTION 17

If your pocket money doubles, and everything else remains the same, how will this change your spending on life's luxuries?

1.	Will increase by more than 100%.
2.	Decreases by more than 100%.
3.	My spending will remain unchanged.
4.	Will increase, but by less than 100%.

### QUESTION 18

Jo'burg day is a concert organized by a local Johannesburg radio station 94.7 Highveld Stereo each year in September. The price per ticket is R400 for the day and there are 20 000 tickets available. Suppose the government imposes a price ceiling of R200 per ticket at the concert, what will the effect be?

1.	More people will attend the concert and the organizers will make a profit
2.	Less people will attend the concert and result in a surplus of tickets
3.	More people will want to attend the concert and result in a shortage of tickets
4.	More people will attend the concert and the organizers will make a loss

### QUESTION 19

South Africa is home to approximately 21 000 rhinos. Rhino hunting is illegal in South Africa and leads to rhino poaching since rhino horn is a sought after commodity in parts of Asia. In 2000, one kilogram of rhino horn was selling at approximately \$4700 and in 2012 one kilogram of rhino horn was selling for approximately at \$65 000. What is the reason for the increase in the price of rhino horn?

1.	Increase in the price of rhino horn due to decrease in the demand
2.	Weapons to poach rhinos became cheaper
3.	Increase in the price of rhino horn due to limited supply
4.	Increase in the price of rhino horn due to increase in the supply

### QUESTION 20

You decided to go out with friends and have R100 to spend. One beer costs R10 and a plate of chips costs R10. The following table contains the marginal utility you obtain from each beer and each plate of chips. (*Marginal utility is the extra satisfaction a consumer realizes from an additional unit of that product.*)

<b>Quantity Beer and Chips consumed:</b>	<b>Marginal utility for Beer</b>	<b>Marginal utility for Chips</b>
1	20	10
2	19	8
3	15	5

If you only have R10 left, what will you buy?

1.	A beer
2.	A plate of chips
3.	Tip the car guard
4.	Buy a half a liter of petrol to get home

### QUESTION 21

Shane sells hamburgers every day in front of a butcher shop in Cape Town. In order for Shane to produce hamburgers he needs to pay the owner of the butcher shop R500 for the day to sell hamburgers in front of his butcher shop. In addition he needs a grill, tongs, hamburger patties, hamburger rolls, tomatoes, tomato sauce, mustard and chutney. Which of the following can be considered as a fixed cost for Shane?

1.	Overtime wages for the employees
2.	Paying R500 rent for the butcher
3.	Hamburger patties and hamburger rolls
4.	Tomato sauce, mustard and chutney

### QUESTION 22

If you walk into a restaurant and almost all the tables are empty the question “why is this restaurant still open” probably crossed your mind. You may think that the revenue made from the few tables that are occupied cannot cover the costs. But what you need to keep in mind is the fixed and variable cost of the restaurant. Considering the short-run, the restaurant can stay open to costumers as long as:

1.	The fixed costs are covered
2.	The variable costs are covered
3.	Both fixed and variable costs are covered
4.	Some of the fixed and variable costs covered.

### QUESTION 23

Barry runs a biltong shop in the Northern Cape. December is his busiest time of year and he needs your help calculating his loss or profit for December. He bought 2000kg of beef from a local farmer at R55 per kilogram and 10kg of spices at R20 per kilogram. Furthermore he pays wages for two workers at R5000 per month. From the 2000kg of beef he managed to make 1000kg of biltong which he sold at R95 per kilogram, 500kg of chilly bites at R45 per kilogram and 500kg of “droëwors” at R80 per kilogram. Calculate Barry’s loss or profit for December.

1.	R 27 300 loss
2.	R 37 300 profit
3.	R 47 300 loss
4.	R 57 300 profit

### QUESTION 24

Boeing Commercial Airplanes is the manufacturer of the world’s most recognisable aircraft Boeing 747. If Boeing Commercial Airplanes produces 10 Boeings per month, its long-run total cost is 200 million US dollars. If Boeing Commercial Airplanes produces 15 Boeings per month its long run total cost is 215 million US dollars. This example resembles:

1.	Economies of scale : Long-run average total cost falls as the quantity of output increases
2.	Diseconomies of scale : Long-run average total cost rises as the quantity of output increases
3.	Constant returns to scale : Long-run average total cost stays the same as the quantity of output increases
4.	Constant returns to scale : Long-run average total cost falls as the quantity of output increases

### QUESTION 25

Mr Mushroom is a business in a competitive market. In 2005 during Aardklop (a national arts festival) Mr Mushroom sold over 200kg of mushrooms and made an economic profit. During the period between 2006 and 2008 several other firms entered the mushroom market at Aardklop in hope of also making an economic profit. In 2010 there were almost 10 different mushroom stands at Aardklop which resulted in an economic loss for the 10 mushroom stands. In your opinion what happened in 2011?

1.	The different mushroom businesses that entered the Aardklop market exited the market in 2011, leaving the original Mr Mushroom with a normal profit
2.	The different mushroom businesses that entered the Aardklop market exited the market in 2011, leaving the original Mr Mushroom with an economic profit
3.	The different mushroom businesses that entered the Aardklop market stayed in the market in 2011, and made an economic loss
4.	The different mushroom businesses that entered the Aardklop market stayed in the market in 2011 and still made an economic profit

### QUESTION 26

Most consumers live according to their means, but consumers do not walk into an airport with a sign displaying how much they are willing to pay for a ticket to Beijing, China. Instead, firms price discriminate by dividing consumers into different groups for example: young and old, rich and middle class, South African's and foreigners. Which of the following is not an example of price discrimination:

1.	Ster-Kinekor movie theater charges a lower price for children, senior citizens and Discovery Health Vitality members.
2.	When going to a market for example at Hartbeespoortdam, you negotiate a price that you are willing to pay.
3.	Most airlines such as SAA, KLM and AA charge a lower price for a round-trip ticket in comparison with a one way ticket.
4.	Edgars decided to decrease the price of all Levis jeans.

## MACROECONOMICS

### QUESTION 27

Gross Domestic Product (GDP) is the market value of all final goods and services produced within a country in a given period. Additionally, any country's GDP consists of four components: Consumption, Investment, Government expenditure and Net exports. Which of the following transactions can be considered as an investment?

1.	A family buys a new washing machine
2.	Government pays the salaries of teachers
3.	Volkswagen expands its factory in Uitenhage
4.	You buy a Steers hamburger

### QUESTION 28

Spending on GDP does not include:

1.	Exports
2.	Imports
3.	Government goods
4.	Private goods

### QUESTION 29

During the 2007 recession, sales fell and some workers lost their jobs. This unemployment is referred to as:

1.	seasonal unemployment.
2.	frictional unemployment.
3.	cyclical unemployment.
4.	structural unemployment.

**QUESTION 30**

Which of the following cannot contribute to the growth in South Africa's government expenditure:	
1.	Changing consumer preferences
2.	Changing producer preferences
3.	Population growth
4.	Urbanisation

**QUESTION 31**

Which one of the following might be expected to generate employment?	
1.	Higher taxes for small businesses.
2.	An increase in the wage rate, considering that all other factors are held constant.
3.	A fall in the productivity of workers.
4.	The promotion of exports and investment.

**QUESTION 32**

The inflation rate in South-Africa increased from 5.8% in January 2013 to 6.3% September 2013. This means that:	
1.	The prices of certain goods and services increased.
2.	Purchasing power increased.
3.	The prices of all goods and services decreased.
4.	The prices of goods and services in general increased

**QUESTION 33**

Which of the following is not a source of economic growth?	
1.	Saving and investment in new factories
2.	Increase in imports
3.	Investment in higher education
4.	Advancement in technology

**QUESTION 34**

In South Africa the official inflation rate is measured by which of the following:

- |    |              |
|----|--------------|
| 1. | CPIX         |
| 2. | CPI          |
| 3. | GNP Deflator |
| 4. | GDE          |

**QUESTION 35**

Which of the following can be considered as money in the South African economy?

- |    |                    |
|----|--------------------|
| 1. | A Picasso painting |
| 2. | A Government bond  |
| 3. | A R20 bank note    |
| 4. | A credit card      |

**QUESTION 36**

Which of the following statements is false regarding monetary policy:

- |    |  |
|----|--|
| 1. | In an economy, money takes the form of currency and various types of bank deposits |
| 2. | The South African Reserve bank regulates government expenditure                    |
| 3. | The South African Reserve bank is the central bank for South Africa                |
| 4. | A central bank control the money supply  |

**QUESTION 37**

Which of the following can be associated with fiscal policy and fiscal authorities?

- |    |                                |
|----|--------------------------------|
| 1. | Interest rates                 |
| 2. | Tax and government expenditure |
| 3. | Money supply                   |
| 4. | South African Reserve bank     |

**QUESTION 38**

What is the primary function of the government?	
1.	To provide households and firms with law and order, education and health services
2.	To establish a framework within which the economy operates
3.	To determine how to educate the public
4.	To provide households with health services and dams

**QUESTION 39**

Which one of the following statements is false on why countries trade?	
1.	The distribution of natural, human and capital resources amongst countries are uneven
2.	All countries has the same economic resources
3.	Efficient production of goods and services requires different technologies or combinations of resources
4.	Consumers may prefer certain imported goods to similar domestically produced goods.

**QUESTION 40**

Tariffs on imported goods benefit domestic producers by:	
1.	Decreasing the wage rate for labour in the domestic industry.
2.	Increasing the prices of imported goods.
3.	Decreasing price of domestic goods.
4.	A decrease in government revenue.

### QUESTION 41

Say the Rand:Dollar exchange rate on 1 November 2013 was US\$1:R10.80. The exchange rate changes to US\$1:R10.90 on 28 November 2013. Which of the following is true:

1.	The rand appreciated against the dollar
2.	The rand depreciated against the dollar
3.	The dollar depreciated against the rand
4.	Americans will not visit South Africa anytime soon

## **Appendix B**

TEST OF UNDERSTANDING COLLEGE ECONOMICS – Please see PDF documents TUCE microeconomics and TUCE macroeconomics.

## Appendix C

### Cross tabulations

Cross tabulation was applied to the data to determine whether or not statistically significant differences occur between the demographic characteristics of the students and whether their marks increased or decreased (Field, 2013). A dummy variable was computed for the two variables, 'marks increased' and 'marks decreased', where a one indicated marks increased and a zero indicated marks decreased. After the dummy variable was computed, the relationship between the two categorical variables was tested by means of the Pearson's Chi-Square. The results of the cross tabulations are presented in *Tables 7.4– 7.7* below.

*Table 7.4* indicates the results of the cross tabulations between genders and whether students' marks for the TUESA increased or decreased. The objective is to determine whether a statistically significant difference exists between genders and whether students' marks for the TUESA had increased or decreased. *Table 7.4* indicates that, overall, 842 students' marks increased from the pre-test to the post-test and that 239 students' marks decreased from the pre-test to the post-test. Of the 842 students whose marks increased, 361 were male and 471 were female. When looking at *percentage within gender*, the results indicate that 77.1 per cent of males increased their TUESA marks, whereas 22.9 per cent of males decreased their TUESA marks. With regard to females, 79.6 per cent of females increased their TUESA marks and 20.4 per cent of females decreased their TUESA marks. From the results, it appears that more females improved their TUESA scores than males did. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between the marks increasing and decreasing between genders, with a  $p = 0.000$ .

**Table 7.1: Cross tabulation between gender and increase or decreasing marks.**

			Increase_Decrease		Total
			Marks Increased	Marks Decreased	
Gender	Missing variables	Count	10	11	21
		% within Gender	47.6%	52.4%	100.0%
		% within Increase_Decrease	1.2%	4.6%	1.9%
		% of Total	.9%	1.0%	1.9%
	Male	Count	361	107	468
		% within Gender	77.1%	22.9%	100.0%
		% within Increase_Decrease	42.9%	44.8%	43.3%
		% of Total	33.4%	9.9%	43.3%
	Female	Count	471	121	592
		% within Gender	79.6%	20.4%	100.0%
		% within Increase_Decrease	55.9%	50.6%	54.8%
		% of Total	43.6%	11.2%	54.8%
Total	Count	842	239	1081	
	% within Gender	77.9%	22.1%	100.0%	
	% within Increase_Decrease	100.0%	100.0%	100.0%	
	% of Total	77.9%	22.1%	100.0%	

Table 7.5 indicates that, overall, 842 students' marks increased from the pre-test to the post-test and 239 students' marks decreased from the pre-test to the post-test. Of the 842 students whose marks increased, 237 had studied Gr12 economics and 601 did not study Gr12 economics. When looking at *percentage within economics in High School*, the results indicate that 77.7 per cent of students who had studied Gr12 economics increased their TUESA marks, whereas 22.3 per cent of students who had studied Gr12 economics experienced a decrease in their TUESA marks. With regard to students who did not study Gr12 economics, 79 per cent of students increased their TUESA marks and 21 per cent of students decreased their TUESA marks. From the results, it appears that more students who did not study economics in high school improved their TUESA score than the students who had studied economics in high school did. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between the marks increasing and decreasing between having and not having Gr12 economics in high school, with a  $p = 0.000$ . -

**Table 7.2: Cross tabulation between students who were enrolled for Gr12 economics and increasing or decreasing TUESA marks.**

			Increase_Decrease		Total
			Marks Increased	Marks Decreased	
Economics in High School	Missing variables	Count	4	11	15
		% within Economics in High School	26.7%	73.3%	100.0%
		% within Increase_Decrease	.5%	4.6%	1.4%
		% of Total	.4%	1.0%	1.4%
	Yes	Count	237	68	305
		% within Economics in High School	77.7%	22.3%	100.0%
		% within Increase_Decrease	28.1%	28.5%	28.2%
		% of Total	21.9%	6.3%	28.2%
	No	Count	601	160	761
		% within Economics in High School	79.0%	21.0%	100.0%
		% within Increase_Decrease	71.4%	66.9%	70.4%
		% of Total	55.6%	14.8%	70.4%
Total	Count	842	239	1081	
	% within Economics in High School	77.9%	22.1%	100.0%	
	% within Increase_Decrease	100.0%	100.0%	100.0%	
	% of Total	77.9%	22.1%	100.0%	

Table 7.6 **Error! Reference source not found.** indicates that, overall, 842 students' marks increased from the pre-test to the post-test, and 239 students' marks decreased from the pre-test to the post-test. Of the 842 students whose marks increased, 293 were black, 468 were white, 20 were Indian, 38 were coloured, and 9 were from other ethnic groups. When looking at *percentage within race*, the results indicate that 69.9 per cent of blacks increased their marks, as did 85.9 per cent of whites, 69 per cent of Indians, 79.2 per cent of coloureds, and 90 per cent of the other ethnic groups. With regard to students whose marks decreased, 30.4 per cent were black, 14.1 per cent were white, 31 per cent were Indian, 20.8 per cent were coloured and 10 per cent were from other ethnic groups. From the results, it appears that white students improved their TUESA scores more than the students in the other race categories did. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between the marks increasing and decreasing between races, with a  $p = 0.000$

**Table 7.3: Cross tabulation between race and increasing or decreasing TUESA marks.**

			Increase Decrease		Total
			Marks Increased	Marks Decreased	
Race	Missing variables	Count	15	14	29
		% within Race	51.7%	48.3%	100.0%
		% within Increase_Decrease	1.8%	5.9%	2.7%
		% of Total	1.4%	1.3%	2.7%
	Black	Count	293	128	421
		% within Race	69.6%	30.4%	100.0%
		% within Increase_Decrease	34.8%	53.6%	38.9%
		% of Total	27.1%	11.8%	38.9%
	White	Count	468	77	545
		% within Race	85.9%	14.1%	100.0%
		% within Increase_Decrease	55.5%	32.2%	50.4%
		% of Total	43.3%	7.1%	50.4%
	Indian	Count	20	9	29
		% within Race	69.0%	31.0%	100.0%
		% within Increase_Decrease	2.4%	3.8%	2.7%
		% of Total	1.8%	.8%	2.7%
	Coloured	Count	38	10	48
		% within Race	79.2%	20.8%	100.0%
		% within Increase_Decrease	4.5%	4.2%	4.4%
		% of Total	3.5%	.9%	4.4%
Other	Count	9	1	10	
	% within Race	90.0%	10.0%	100.0%	
	% within Increase_Decrease	1.1%	.4%	.9%	
	% of Total	.8%	.1%	.9%	
Total	Count	843	239	1082	
	% within Race	77.9%	22.1%	100.0%	
	% within Increase_Decrease	100.0%	100.0%	100.0%	
	% of Total	77.9%	22.1%	100.0%	

Table 7.7 indicates the results of the cross tabulations between course majors and whether the marks of the students for the TUESA increased or decreased. The objective is to determine whether a statistically significant difference exists between course majors and whether students' marks for the TUESA increased or decreased. The results indicate that, overall, 842 students' marks increased from the pre-test to the post-test, and 239 students' marks decreased from the pre-test to the post-test. Of the 842 students whose marks increased, 106 were Economics majors, 102 were Business Management majors, 39 were Human Resource majors, 290 were Accounting Sciences majors, 149 were other BCom majors, 50 were other BA majors, and 96 were other BSc majors. When looking at *percentage within course of*

*study*, the results indicate that 78.5 per cent of Economics majors increased their marks, as did 74.5 per cent of Business Management majors, 73.6 per cent of Human Resource majors, 80.8 per cent of Accounting Sciences majors, 78.4 per cent of other B.com majors, 72.5 per cent of BA majors, and 82.8 per cent of other BSc majors. With regard to students whose marks decreased, 21.5 per cent were Economic majors, 25.5 per cent were Business Management majors, 26.4 per cent were Human Resource majors, 19.2 per cent were Accounting Sciences majors, 21.6 per cent were other BCom majors, 27.5 per cent were other BA majors, and 17.2 per cent were other BSc majors. From the results, it appears that the BSc major students improved their TUESA scores more than the other students with the other majors did. The Pearson Chi-Square test results indicated, given the sample, that there is a significant difference between the marks increasing and decreasing between majors with a  $p = 0.000$ .

**Table 7.4: Cross tabulation between course of study and TUESA marks increasing and decreasing.**

			Increase_Decrease		Total
			Marks Increased	Marks Decreased	
Course of study	Missing variables	Count	10	11	21
		% within Course of study	47.6%	52.4%	100.0%
		% within Increase_Decrease	1.2%	4.6%	1.9%
		% of Total	.9%	1.0%	1.9%
	Economics	Count	106	29	135
		% within Course of study	78.5%	21.5%	100.0%
		% within Increase_Decrease	12.6%	12.2%	12.5%
		% of Total	9.8%	2.7%	12.5%
	Business Management	Count	102	35	137
		% within Course of study	74.5%	25.5%	100.0%
		% within Increase_Decrease	12.1%	14.7%	12.7%
		% of Total	9.4%	3.2%	12.7%
	Human Resources	Count	39	14	53
		% within Course of study	73.6%	26.4%	100.0%
		% within Increase_Decrease	4.6%	5.9%	4.9%
		% of Total	3.6%	1.3%	4.9%
Accounting Sciences	Count	290	69	359	
	% within Course of study	80.8%	19.2%	100.0%	
	% within Increase_Decrease	34.4%	29.0%	33.2%	
	% of Total	26.9%	6.4%	33.2%	

*Table 7.7 continues*

	Other BCom	Count	149	41	190
		% within Course of study	78.4%	21.6%	100.0%
		% within Increase_Decrease	17.7%	17.2%	17.6%
		% of Total	13.8%	3.8%	17.6%
	Other BA	Count	50	19	69
		% within Course of study	72.5%	27.5%	100.0%
		% within Increase_Decrease	5.9%	8.0%	6.4%
		% of Total	4.6%	1.8%	6.4%
	Other BSc	Count	96	20	116
		% within Course of study	82.8%	17.2%	100.0%
		% within Increase_Decrease	11.4%	8.4%	10.7%
		% of Total	8.9%	1.9%	10.7%
Total	Count	842	238	1080	
	% within Course of study	78.0%	22.0%	100.0%	
	% within Increase_Decrease	100.0%	100.0%	100.0%	
	% of Total	78.0%	22.0%	100.0%	

To summarise, it appears that there was a significant difference between the demographic factors (gender, race, course of study and having studied economics in high school) and the increasing or decreasing of TUESA marks. From the results, it appears that female, white, Accounting Sciences students and students who did not study economics in high school had a better chance of improving their marks than the students in the other categories.

#### Analysis of Variance (ANOVA)

Analysis of variance compares the variance between different groups. In this section, the differences between the groups according to race, course of study and age will be tested.

#### ANOVA: Race

The research question for this part of the analysis is: Is there a difference between TUESA scores and race? Note that the TUESA scores represent the difference between the pre-test score and the post-test score. The results for the ANOVA are presented in *Tables 6.10* above and *6.11* above.

**Table 7.5: Analysis of variance - Race**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1279.357	4	319.839	16.396	<b>.000</b>
Within Groups	21009.321	1077	19.507		
Total	22288.677	1081			

**Table 7.6: Post Hoc Test: Multiple Comparisons – Race**

(I) Race		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Black	White	-2.183*	.281	.000	-2.95	-1.41
	Indian	.667	.846	.934	-1.64	2.98
	Coloured	-1.497	.671	.169	-3.33	.34
	Other	-1.447	1.412	.844	-5.31	2.41
White	Black	2.183*	.281	.000	1.41	2.95
	Indian	2.850*	.842	.007	.55	5.15
	Coloured	.687	.665	.840	-1.13	2.50
	Other	.737	1.409	.985	-3.11	4.59
Indian	Black	-.667	.846	.934	-2.98	1.64
	White	-2.850*	.842	.007	-5.15	-.55
	Coloured	-2.164	1.039	.228	-5.00	.67
	Other	-2.114	1.620	.688	-6.54	2.31
Coloured	Black	1.497	.671	.169	-.34	3.33
	White	-.687	.665	.840	-2.50	1.13
	Indian	2.164	1.039	.228	-.67	5.00
	Other	.050	1.535	1.000	-4.15	4.25
Other	Black	1.447	1.412	.844	-2.41	5.31
	White	-.737	1.409	.985	-4.59	3.11
	Indian	2.114	1.620	.688	-2.31	6.54
	Coloured	-.050	1.535	1.000	-4.25	4.15

\*. The mean difference is significant at the 0.05 level.

A one-way between-groups analysis of variance was conducted to explore the significance of race for the TUESA scores. Students were divided into race categories: black, white, Indian, coloured and other.

The Levene’s test for homogeneity of variances significance value was 0.381, indicating a value greater than 0.05. This value indicates that the assumption of homogeneity of variance was not violated. *Table 7.10* above indicates that there was a statistically significant difference at the  $p < 0.05$  in the TUESA scores for students in different race groups:  $F = 16.396$  with  $p = 0.000$ . Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small.

It needs to be noted that IBM SPSS does not provide effect size statistics for ANOVA output and therefore the effect size can be calculated by means of the following formula (Eta squared):

### Formula 7.2: Eta Squared

$$Eta\ Squared = \frac{Sum\ of\ squares\ between\ groups}{Total\ sum\ of\ squares}$$

The *Eta Squared* value was calculated at 0.22, indicating a value larger than 0.14. Therefore, given the *Eta Squared* value of 0.06, it can be concluded that there was a moderate effect.

The post-hoc comparisons are represented in *Table 7.11* above. The post-hoc comparisons using the Tukey HSD test indicated that the mean score for black students (Mean = 1.25 and SD = 4.574) was significantly different from white students (Mean = 3.44 and SD = 4.194). Furthermore, the mean score for white students were significantly different from Indian students (Mean = 0.59 and SD= 5.004).

To answer the research question for this part of the analysis; yes, there is a difference between TUESA scores for different race groups. The results indicated that there was a significant difference between TUESA pre-test scores and TUESA post-test scores. In addition, the Eta Squared value was calculated and the effect that race has on test scores is moderate. Furthermore, the post-hoc comparisons indicated that the scores of black students and white students are significantly different, as are the scores between white and Indian students.

### ANOVA: Age

The research question for this part of the analysis is: Is there a difference between TUESA scores and age? Note that the TUESA scores represent the difference between the pre-test score and the post-test score. The results for the ANOVA are presented in *Tables 7.12* above and *7.13* above.

**Table 7.7: Analysis of variance – Age**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	237.785	3	79.262	3.872	.009
Within Groups	22045.055	1077	20.469		
Total	22282.840	1080			

**Table 7.8: Post Hoc Test: Multiple Comparisons – Age**

(I) Age		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
18 years and younger	19 - 25 years	-.691	.388	.283	-1.69	.31
	26 - 35 years	3.500	1.639	.143	-.72	7.72
	36 - 45 years	2.042	1.881	.699	-2.80	6.88
19 - 25 years	18 years and younger	.691	.388	.283	-.31	1.69
	26 - 35 years	4.191*	1.607	.046	.06	8.32
	36 - 45 years	2.732	1.853	.453	-2.04	7.50
26 - 35 years	18 years and younger	-3.500	1.639	.143	-7.72	.72
	19 - 25 years	-4.191*	1.607	.046	-8.32	-.06
	36 - 45 years	-1.458	2.443	.933	-7.75	4.83
36 - 45 years	18 years and younger	-2.042	1.881	.699	-6.88	2.80
	19 - 25 years	-2.732	1.853	.453	-7.50	2.04
	26 - 35 years	1.458	2.443	.933	-4.83	7.75

\*. The mean difference is significant at the 0.05 level.

A one-way between-groups analysis of variance was conducted to explore the impact of age on the TUESA scores. Students were divided into age categories: 18 years and younger, 19 to 25 years, 26 to 35 years and 36 to 45 years.

The Welch's test for homogeneity of variances significance value was 0.043, indicating a value smaller than 0.05. This value indicates that the assumption of homogeneity of variance was not violated. *Table 7.13* above indicates that there was a statistically significant difference at the  $p < 0.05$  in the TUESA scores for students in different age groups:  $F = 3.872$  with  $p = 0.009$ .

It needs to be noted that IBM SPSS does not provide effect size statistics for ANOVA output and therefore the effect size can be calculated by means of *Formula 7.2* above. The *Eta*

*Squared* value was calculated at 0.01 indicating a equals to 0.01. Therefore, given the *Eta Squared* value of 0.01, it can be concluded that there was a small effect.

The post-hoc comparisons are represented in *Table 7.13* above. The post-hoc comparisons using the Tukey HSD test indicated that the mean score for students aged 19 to 25 years of age (Mean = 5.57 and SD = 4.431) was significantly different from students aged between 26 and 35 years (Mean = -1.63 and SD = 6.989).

To answer the research question for this part of the analysis; yes, there is a difference between TUESA scores and age. The results indicated that there was a significant difference between TUESA pre-test scores and TUESA post-test scores of students of different ages. In addition, the *Eta Squared* was calculated and the effect that age has on test scores is small. Furthermore, the post-hoc comparisons indicated that students aged between 19 and 25 years are significantly different from students aged between 26 and 35 years.

**ANOVA: Course of study**

The research question for this part of the analysis is: Is there a difference between TUESA scores and course of study? Note that the TUESA scores represent the difference between the pre-test score and the post-test score. The results for the ANOVA are presented in *Tables 7.14* above and *7.15* above.

**Table 7.9: Analysis of variance – Course of study**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	421.477	6	70.246	3.472	.002
Within Groups	21710.448	1073	20.233		
Total	22131.925	1079			

**Table 7.10: Post Hoc Test: Multiple Comparisons – Course of study**

(I) Course of study		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Economics	Business Management	-.190	.527	1.000	-1.75	1.37
	Human Resources	.449	.715	.996	-1.66	2.56
	Accounting Sciences	-1.017	.431	.218	-2.29	.26
	Other BCom	-.943	.486	.454	-2.38	.49
	Other BA	.571	.650	.976	-1.35	2.49
	Other BSc	-1.556	.551	.072	-3.19	.07
Business Management	Economics	.190	.527	1.000	-1.37	1.75
	Human Resources	.638	.728	.976	-1.51	2.79
	Accounting Sciences	-.827	.452	.528	-2.16	.51
	Other BCom	-.753	.504	.748	-2.24	.74
	Other BA	.761	.664	.914	-1.20	2.72
	Other BSc	-1.367	.568	.196	-3.04	.31
Human Resources	Economics	-.449	.715	.996	-2.56	1.66
	Business Management	-.638	.728	.976	-2.79	1.51
	Accounting Sciences	-1.465	.662	.289	-3.42	.49
	Other BCom	-1.392	.699	.420	-3.46	.67
	Other BA	.122	.822	1.000	-2.30	2.55
	Other BSc	-2.005	.746	.102	-4.21	.20
Accounting Sciences	Economics	1.017	.431	.218	-.26	2.29
	Business Management	.827	.452	.528	-.51	2.16
	Human Resources	1.465	.662	.289	-.49	3.42
	Other BCom	.073	.404	1.000	-1.12	1.27
	Other BA	1.588	.591	.103	-.16	3.33
	Other BSc	-.540	.480	.921	-1.96	.88
Other BCom	Economics	.943	.486	.454	-.49	2.38
	Business Management	.753	.504	.748	-.74	2.24
	Human Resources	1.392	.699	.420	-.67	3.46
	Accounting Sciences	-.073	.404	1.000	-1.27	1.12
	Other BA	1.514	.632	.202	-.35	3.38
	Other BSc	-.613	.530	.910	-2.18	.95
Other BA	Economics	-.571	.650	.976	-2.49	1.35
	Business Management	-.761	.664	.914	-2.72	1.20
	Human Resources	-.122	.822	1.000	-2.55	2.30
	Accounting Sciences	-1.588	.591	.103	-3.33	.16
	Other BCom	-1.514	.632	.202	-3.38	.35
	Other BSc	-2.127*	.684	.031	-4.15	-.11
Other BSc	Economics	1.556	.551	.072	-.07	3.19
	Business Management	1.367	.568	.196	-.31	3.04
	Human Resources	2.005	.746	.102	-.20	4.21
	Accounting Sciences	.540	.480	.921	-.88	1.96
	Other BCom	.613	.530	.910	-.95	2.18
	Other BA	2.127*	.684	.031	.11	4.15

\*. The mean difference is significant at the 0.05 level.

A one-way between-groups analysis of variance was conducted to explore the impact of course of study on the TUESA scores. Students were divided into course categories: Economics, Business Management, Human Resources, Accounting Sciences, Other BCom, Other BA and Other BSc.

The Levene's test for homogeneity of variances significance value was 0.08, indicating a value greater than 0.05. This value indicates that the assumption of homogeneity of variance was not violated. *Table 7.14* above indicates that there was a statistically significant difference at the  $p < 0.05$  in the TUESA scores for students in different course groups:  $F = 3.472$  with  $p = 0.002$ . Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small.

The *Eta Squared* can be calculated by means of *Formula 7.2* above. The *Eta Squared* value was calculated as 0.02, indicating a close to 0.01. Therefore, given the *Eta Squared* value of 0.02, it can be concluded that there was a small effect.

The post-hoc comparisons are represented in *Table 7.15* above. The post-hoc comparisons using the Tukey HSD test indicated that the mean score for students majoring in other BA degrees (Mean = 1.23 and SD = 3.412) was significantly different from students majoring in other BSc degrees (Mean = -3.412 and SD = 4.459).

To answer the research question for this part of the analysis; yes, there is a difference between TUESA scores and course of study. The results indicated that there was a significant difference between TUESA pre-test scores and TUESA post-test scores and students with different majors. In addition, the *Eta Squared* was calculated and the effect of a major has on test scores is small. Furthermore, the post-hoc comparisons indicated that students majoring in other BA degrees are significantly different from students majoring in other BSc degrees.