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## Determining the economic literacy of introductory economic students in South Africa

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Alicia Fourie\* and Waldo Krugell

North-West University, Potchefstroom Campus,  
Building E3 Room 113, 11 Hoffman Street,  
Potchefstroom, 2531, South Africa  
Email: alicia.fourie@nwu.ac.za  
Email: waldo.krugell@nwu.ac.za  
\*Corresponding author

**Abstract:** The TUCE is a test of economic literacy which is used to allow lecturers of economics to compare student performance in economics in their classes. The results of the TUCE indicated that the majority of students struggled with the questions of the TUCE. The poor economic literacy rate raised the question whether or not the TUCE is an appropriate measure of testing economic literacy in South Africa. This paper developed the Test of Understanding Economics in South Africa which is a test of economic literacy that was developed for South Africa. The TUESA was distributed to universities in South Africa to determine the economic literacy rate among introductory economics students. The significance of certain demographic factors was tested with regard to the mean literacy score and the effect of grade 12 economics on students' economic literacy score was investigated. Results indicated that the economic literacy rate for South African students was 50.3%.

**Keywords:** economic literacy; test of understanding college economics; TUCE; economic education; South Africa; introductory economics.

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**Biographical notes:** Alicia Fourie is a Lecturer at the School of Economics in Economics at the North-West University where she teaches introductory economics to undergraduate students. She received her Bachelor's degree in Law and Economics, Honours degree in Economics and Master's degree in Economics from the North-West University. As a researcher, she has a passion for economic education, and she is currently pursuing her PhD in this field. In 2012, she was appointed as a liaison for South Africa for Higher Education Teaching and Learning (HETL), representing the HETL to the global higher education community.

Waldo Krugell is a Professor in the School of Economics and NRF-rated researcher at the North-West University. He has numerous publications to his credit in the fields of geographical economics, foreign direct investment, as well as tourism economics and the link to development. He is one of the few economists in South Africa working on issues of geographical economics. In practice, this means local economic growth and development and the spatial implications of industrial policy. His current work specifically involves firm-level analysis of the importance of agglomeration for growth.

## **1 Introduction**

Everyone, everywhere, is part of the economy. People earn, spend and save in the economy, some invest and others export. All of us are influenced by global financial markets, local competition and government intervention in the market. In a similar way, as we are subject to the laws of physics, we are all bound by economics, without understanding too much of it. Nonetheless, a little economic literacy can go a long way to improve people's choices. An understanding of the basic ideas of scarcity, choice, opportunity cost, specialisation and trade, or decision-making at the margin can make a difference to one's wellbeing.

Before you start a new exercise regimen, it is best to go for a check-up – in a similar fashion, universities are considered to be the backbone of tertiary education (Pilkington and Nair, 2013), therefore, economics teachers and lecturers need to first measure economic literacy before they prescribe the reading. In the USA, the National Council of Economic Education (NCEE) has developed the test of understanding college economics (TUCE) to test the economic literacy levels of students enrolled for introductory economics courses. By testing the economic literacy levels of introductory economic students, quality of education is ensured therefore applying the human capital theory to educate and train individuals (Chanis et al., 2013). Introductory economics is lectured at most universities and aims to equip students with basic insight into the functioning of the economy. A test of economic literacy such as the TUCE is useful to measure whether students are able to grasp and apply the basic concepts and knowledge learned in an economics course. This paper reports on the development of a similar test for the South African context.

The paper is structured as follows: Section 2 provides an overview of the current literature on the definition of economic literacy as well as the measures used to test it. In Section 3, the development of the test of understanding economics in South Africa (TUESA) is discussed. Section 4 presents the data collected during a first round of testing among students at South African universities and discusses the results; the economic literacy rate is calculated and analysed in terms of differences in demographics and whether a student had economics as a subject at school. Conclusions and recommendations are presented in Section 5.

## **2 Economic literacy**

Economics education is a field within economics that focuses on the scholarship of teaching and learning economics (Becker, 2001). Research into economics education comprises an analysis of issues such as the current state of the economics curriculum and efforts to improve the material and instructional techniques used to teach economics at all levels. It also involves research into the level of economic literacy of various groups and the factors that influence it (Becker, 2001).

In the international literature, economic literacy has been widely researched. It is sometimes confused with financial literacy, but economic literacy is, in fact, a much broader concept. Financial literacy is all about money: what it is and how to invest, save and manage money. Economic literacy, on the other hand, is the ability to apply basic economic concepts to everyday life scenarios [Salemi, (2005), p.46]. Basic economic

concepts are, for example, those concepts that are outlined in the *Voluntary National Content Standards in Economics* and the *Framework of Teaching Basic Economic Concepts* developed by the NCEE. These documents outline important basic economic concepts and make suggestions on how to teach these concepts.

The objective is to enable students to understand enough about economics to make reasoned judgements about economic questions [Saunders and Gilliard, (2000), p.3]. Four main categories of concepts are identified, which include fundamental economic concepts, micro-economic concepts, macro-economic concepts and international economic concepts [Saunders and Gilliard, (2000), p.10].

The document *Voluntary National Content Standards in Economics* was published in 1997 and the standards are generalisations of basic economic principles and are the fundamental propositions of economics [Siegfried and Meszaros, (1997), p.247]. There are twenty standards and each standard is accompanied by a rationale for its inclusion. Here, a further breakdown of the basic concepts is provided and these include scarcity, decision-making, allocation, incentives, trade, specialisation, markets and prices, the role of prices, competition and market structure, institutions, money and inflation, interest rates, income, entrepreneurship, economic growth, the role of the government and market failure, government failure, economic fluctuations, unemployment and inflation, and fiscal and monetary policy.

In the USA, knowledge of these basic economic concepts is supposed to be taught to students in high school. At university or college level, in the introductory economics course, lecturers are supposed to teach students how to apply these basic concepts in order to improve their economic literacy levels [Salemi, (2005), p.46].

Institutions in the USA are on the forefront of testing economic literacy levels. The National Council on Economic Education has several tests, which include:

- the basic economics test, which is used for upper-grade levels of elementary school
- the test of economic knowledge, which is used for middle schools and lower-grade high schools
- the test of economic literacy, which used in upper-grade levels of high school
- the test of understanding in college economics, which is used for undergraduate level, primarily targeting introductory or principle level coursework in economics.

The TUCE consists of two sections, i.e., micro-economics and macro-economics. The fourth edition TUCE was distributed to a number of introductory economics students across the USA in 2005 in order to test their economic literacy levels (Walstad et al., 2007). The aim was to test the reliability and validity of the instrument for students in principles of economics courses; and to provide norming data for a large, national sample of students in introductory economics classes. The results indicated that the majority of students struggled, and economic literacy rates of 31.3% and 32.7% were reported for the micro-economic and macro-economic sections, respectively (Walstad et al., 2007).

This result (considering that the majority of the students did take high school economics as a subject) and the US-specific context of many of the test items caused doubts about whether or not the TUCE is an appropriate measure of testing economic literacy in South Africa. This led to the development of the TUESA.

### **3 Development of the TUESA**

The development of the 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 TUESA test of economic literacy is divided into three sections and consists of 41 multiple-choice questions. Section 1 elicits demographic information such as gender, age, race, course of study, level of education and whether a student had economics in high school or not. Section 2 consists of micro-economics questions. The micro-economics topics include the basic economic problem (scarcity, opportunity cost and production factors), demand, supply and elasticity, consumer theory, and theory of production. Section 3 of the test consists of macro-economic questions. These include measuring economic performance through GDP, inflation and unemployment, monetary and fiscal policy, and international economics (why countries trade and balance of payments).

### **4 Testing with the TUESA**

In February 2014, the TUESA test of economic literacy was distributed to 2,717 introductory economics students at four South African universities. The test was undertaken at the beginning of the academic year when classes started, before any instruction could take place. Students were requested to complete the questionnaire in class on multiple-choice cards and participation was voluntary. Therefore, the sample consists of those students who were in attendance and who chose to complete the questionnaire on the day it was distributed.

Table 1 shows the demographic information of the students. The majority of students were female and between the ages of 19 and 25 years. The majority of students (49.6%) were black and 42.2% of students were white. Approximately one-third of the students indicated that they were majoring in Accounting and only 13.3% of students were majoring in economics. Approximately 20% were enrolled for 'another BCom. Of the 2,717 students, only 30.3% of students had economics as subject in high school.

**Table 1** TUESA: demographic information

<i>Variables</i>		<i>Frequency</i>	<i>%</i>	<i>Cumulative %</i>
Gender	Male	1,277	47	47.4
	Female	1,418	52.2	100
Age	18 years and younger	1,096	40.3	40.6
	19–25 years	1,570	57.8	98.9
	26–35 years	27	1	99.9
	36–45 years	4	0.1	100
Race	Black	1,347	49.6	50
	White	1,147	42.2	92.5
	Indian	57	2.1	94.7
	Coloured	122	4.5	99.2
	Other	22	0.8	100
Major	Economics	355	13.1	13.2
	Business management	272	10	23.3
	Human resources	170	6.3	29.7
	Accounting sciences	815	30	60
	Other BCom	580	21.3	81.5
	Other BA	227	8.4	90
	Other BSc	269	9.9	100
Economics in grade 12	Yes	822	30.3	30.3
	No	1,887	69.5	100

The total average economic literacy score for the test was 50.8% (keeping in mind that no economics instruction had taken place). Only the 30.3% of students who had grade 12 economics in high school had some background. An analysis of the results from the micro-economics and macro-economic sections shows that students performed better in the macro-economic section of the TUESA than in the micro-economics section.

The average economic literacy score for the micro-economics section of the test was 48.2%. Students performed relatively well in some of the micro-economics questions, for example what economics is about, when a resource is considered scarce and who supplies the factors of production (questions 1, 2 and 4). Students also performed well in the question that asked them to identify a luxury good (question 10), a question about price, when supply is limited (question 13) and question 15 on the topic of production theory where they had to identify the fixed cost in the given scenario. Table 2 contains the average score for each micro-economics question.

The average economic literacy score for the macro-economic section of the test was 54.4%. Students performed relatively well in some of the macro-economic questions, especially questions on measuring economic performance, growth and inflation (questions 5, 6 and 7). Furthermore, students performed well in question 9 on the topic of money and question 13 on the topic of international trade. Table 3 contains the average score for each macro-economic question.

**Table 2** Average for each microeconomic question

<i>Question</i>	<i>Frequency</i>	<i>Valid %</i>
Question 1	1,658	61.1
Question 2	1,676	61.9
Question 3	1,447	53.8
Question 4	2,178	80.3
Question 5	433	16
Question 6	961	36.4
Question 7	794	29.2
Question 8	1,511	55.7
Question 9	1,228	45.3
Question 10	2,226	82.2
Question 11	664	24.5
Question 12	1,343	49.8
Question 13	2,281	84.3
Question 14	1,165	43.2
Question 15	2,444	90.3
Question 16	183	6.8
Question 17	1,297	49.7
Question 18	1,000	37.2
Question 19	583	21.7
Question 20	1,061	39.4

**Table 3** Average for each macroeconomic question

<i>Question</i>	<i>Frequency</i>	<i>Valid %</i>
Question 1	1996	73.8
Question 2	588	21.7
Question 3	979	36.1
Question 4	830	30.7
Question 5	1743	64.4
Question 6	1987	73.4
Question 7	1711	63.4
Question 8	1240	46
Question 9	2136	78.9
Question 10	1118	41.4
Question 11	1542	57.1
Question 12	1128	41.6
Question 13	2223	82
Question 14	1551	57.4
Question 15	1788	66.2

Cross tabulations of the economic literacy scores and each of the demographic variables can be used to examine patterns in the results. To test the relationship between two categorical variables, the Pearson’s chi-square test was used. The results of the cross tabulations are presented in Tables 4 to 8.

Table 4 indicates the results of the cross tabulation of genders and whether students passed or failed the TUESA. From a pass/fail perspective, 51.5% of those who passed are males, and 48.5% are females. When looking at the *percentage within gender*, 58.1% of males passed the TUESA, and 49.3% of females passed. The Pearson chi-square test results indicate that there is a significant difference between the pass rate of males and females with a chi-square coefficient of  $\chi^2 = 0.000$ .

**Table 4** Cross tabulation between gender and passing or failing the TUESA

		<i>PASS * FAIL</i>		
		<i>Fail</i>	<i>Pass</i>	
Gender	Male	Count	534	739
		% Within gender	41.90%	58.10%
		% Within PASS * FAIL	42.70%	51.50%
	Female	Count	717	697
		% Within gender	50.70%	49.30%
		% Within PASS * FAIL	57.30%	48.50%

Table 5 shows the results of the cross tabulations of whether students had economics as subject in grade 12, or not, and whether they passed or failed the TUESA. When looking at the *percentage within did students have economics in grade 12*, it is clear that 63% of students who did have grade 12 economics in high school passed the TUESA. Of the students who did not have grade 12 economics in high school, 49% passed the TUESA. The Pearson chi-square test results indicate that there is a significant difference between the pass rate of students who were enrolled for grade 12 economics and students who were not enrolled for grade 12 economics, with a chi-square coefficient of  $\chi^2 = 0.000$ .

**Table 5** Cross tabulation between students who were enrolled for grade 12 economics and passing or failing the TUESA

		<i>PASS * FAIL</i>		
		<i>Fail</i>	<i>Pass</i>	
Did the student have economics in grade 12	Yes	Count	303	516
		% Within did the student have economics in grade 12	37.00%	63.00%
		% Within PASS*FAIL	24.00%	35.90%
		% of Total	11.20%	19.10%
	No	Count	960	922
		% Within did the student have economics in grade 12	51.00%	49.00%
		% Within PASS*FAIL	76.00%	64.10%
		% of Total	35.50%	34.10%

Table 6 shows the cross tabulation of the different race groups and whether students passed or failed the TUESA. In terms of those who passed or failed, 42.9% of the students who passed are black and 50.5% are white. The row percentages within race groups show that 45.9% of black students passed the TUESA and 63.1% of white students passed. Furthermore, 58.9% of Indian students and 42.6% of coloured students passed the TUESA. The Pearson chi-square test results indicated, given the sample, that there is a significant difference between the different race groups and whether students passed the TUESA, with a chi-square coefficient of  $\chi^2 = 0.000$ .

**Table 6** Cross tabulation between race and passing or failing the TUESA

		<i>PASS * FAIL</i>		
		<i>Fail</i>	<i>Pass</i>	
Race	Black	Count	725	615
		% Within race	54.10%	45.90%
		% Within PASS * FAIL	57.80%	42.90%
		% of Total	27.00%	22.90%
	White	Count	423	724
		% Within race	36.90%	63.10%
		% Within PASS * FAIL	33.70%	50.50%
		% of Total	15.70%	26.90%
	Indian	Count	23	33
		% Within race	41.10%	58.90%
		% Within PASS * FAIL	1.80%	2.30%
		% of Total	0.90%	1.20%
	Coloured	Count	70	52
		% Within race	57.40%	42.60%
		% Within PASS * FAIL	5.60%	3.60%
		% of Total	2.60%	1.90%
Other	Count	13	9	
	% Within race	59.10%	40.90%	
	% Within PASS * FAIL	1.00%	0.60%	
	% of Total	0.50%	0.30%	

To further examine whether having had grade 12 economics in high school will improve a student's chance of passing the TUESA test, a logistic regression model was estimated. The model's dependent variable (PASS\_FAIL) is encoded as a dummy variable with failing the TUESA represented by a zero and passing the TUESA represented by a value of one. The model further contained one independent variable (Gr12\_Economics) and was encoded into a dummy as well with *yes* resembling a one and *no* resembling a zero.

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



**Table 7** Cross tabulation between course of study and passing or failing the TUESA

		<i>PASS * FAIL</i>		
		<i>Fail</i>	<i>Pass</i>	
Economics	Economics	Count	151	201
		% Within course of study	42.90%	57.10%
		% Within PASS * FAIL	12.10%	14.10%
		% of Total	5.60%	7.50%
	Business management	Count	138	134
		% Within course of study	50.70%	49.30%
		% Within PASS * FAIL	11.00%	9.40%
		% of total	5.10%	5.00%
	Human resource management	Count	107	62
		% Within course of study	63.30%	36.70%
		% Within PASS * FAIL	8.60%	4.30%
		% of total	4.00%	2.30%
	Accounting sciences	Count	306	507
		% Within course of study	37.60%	62.40%
		% Within PASS * FAIL	24.50%	35.50%
		% of total	11.40%	18.90%
	Other BCom	Count	284	295
		% Within course of study	49.10%	50.90%
		% Within PASS * FAIL	22.70%	20.60%
		% of total	10.60%	11.00%
Other BA	Count	132	95	
	% Within course of study	58.10%	41.90%	
	% Within PASS * FAIL	10.60%	6.60%	
	% of total	4.90%	3.50%	
Other BSc	Count	133	135	
	% Within course of study	49.60%	50.40%	
	% Within PASS * FAIL	10.60%	9.40%	
	% of total	5.00%	5.00%	

As indicated in Table 8, having taken grade 12 economics is a statistically significant determinant of passing the TUESA. Having had grade 12 economics in high school reported an odds ratio of 0.564. This indicates that students who had grade 12 economics in high school were 0.564 times more likely to pass the TUESA.

**Table 8** Logistic regression predicting likelihood of passing the TUESA

	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>Sig.</i>	<i>Exp(B)</i> <i>odds ratio</i>	<i>95% CI for EXP(B)</i>	
						<i>Lower</i>	<i>Upper</i>
Gr12_Economics(1)	-0.573	0.086	44.545	0	0.564	0.477	0.667
Constant	0.532	0.072	54.106	0	1.703		

Studies on the effect of high school economics on the performance of first-year economics students have been inconclusive for quite some time as the literature does not specify to which extent economics learning takes place at high school and whether or not the school is involved in economics education [Brasfield et al., (1993), p.99]. Palmer et al. (1979) found that students who had economics as subject in school did not have a substantially higher level of knowledge than students who 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 actually performed worse than students without high school economics. Reid (1983) explained the reason for this as follows: maybe students get a misperception of economics, and their ability to grasp economics, at the high school level and this translates negatively to their performance in economics at tertiary level. The results of this paper seem to contradict the findings of Palmer et al. (1979) and Reid (1983), in that those students who had economics in high school are more likely to pass the TUESA than students who did not have economics.

## **5 Conclusions**

The primary aim of this paper was to introduce the TUESA and the measure, for the first time, the economic literacy rate of introductory economics students in South Africa. The TUESA was developed in 2012 and administered to 2,717 students at four universities in South Africa in February 2014. The overall results indicate an economic literacy score of 50.8%, with a micro-economics literacy score of 48.8%, and a macro-economics literacy score of 54.4%.

The results of the TUESA further indicated that there are significant differences between economic literacy scores between genders, race groups, majors and students who were enrolled for grade 12 economics in high school. Results from cross tabulations and a logistic regression model indicate that students who were enrolled for grade 12 economics in high school have a better chance in passing the TUESA than students who were not enrolled for economics in high school. The findings of the significant effect of grade 12 economics on the TUESA economic literacy score open the debate on the importance of grade 12 economics for economic literacy. The next step is to do a test-retest of first-year economics students at the beginning and end of the academic year to examine the contribution that one year's economics education makes to their economic literacy.

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