

Flow of Economic Knowledge and Learning: Determinants of Child Achievement

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ABSTRACT

This paper tests the effects of participation in a school-based economics education program to children aged 9 to 13 in terms of flow of economic knowledge. Simultaneously it explores the effects of a set of socioeconomic and demographic factors instruction on the variation of knowledge. As an instrument tool, a QEL (Questionnaire of Economic Literacy) was built and applied to two groups of students, those who received instructional time and those who did not. The results obtained confirm the efficiency of the economic program targeted to students, i.e., children at this early age can be learnt and retained economic knowledge. Several demographic and socioeconomic variables are also likely to affect disparities of economic knowledge among children. The study has been conducted under the research project “Economicando” (PTDC/EGE-ECO/100923/2008), financed by FEDER funds through the Programa Operacional Fatores de Competitividade - COMPETE and by national funds through the FCT - Fundação para a Ciência e Tecnologia.

INTRODUCTION

Economic literacy can be understood as the necessary knowledge to control a certain set of tasks related to economic issues (Walstad and Soper, 1987) that everyone who is economically literate might know (Kotte and Witt, 1995). In other words, it refers to the ability of making clever decisions regarding an efficient allocation of resources, whether citizens are investors, business people, policymakers, consumers, workers or producers (Haskell and Jenkins, 2002; Stern, 2002).

If ‘economic literacy is the goal, economic education is the process or the delivery system through which economic literacy is achieved’ (Jenkins and Nelson, 2000). It has been argued that the best way to promote a society of financially and economically literate adults is to educate children (Santomero, 2003). There are, however, doubts about children interest and capacity to understand economic principles and learn economics (Berti and Bombi, 1981; Webley, 2005).

Children are exposed to economic concepts daily, as they assist to their parents’ economic transactions and the activity of exchanging money for goods becomes increasingly

familiar. Moreover, children receive money as a gift, sometimes saving it in a bank account or spending it in paying for some purchases. However, not only the daily journey contributes to the economic development of the child, every source of information, especially the media, plays an important role on the child's economic awareness. Facing so many options and due to the variety of products advertised, children are obligated to choose among from two or more different options which requires an economic way of thinking. While playing with their peers, by pretending to pay for a good or for a service, children are already able to understand economics on early childhood, arriving at kindergarten ready to learn it (Rodgers, Hawthorne, and Wheeler, 2004).

Kourilsky (1977); Hawthorne, Rodgers, and Wheeler (2003); Berti, Bombi, and De Beni (1986) and Ajello et al. (1987) are among the authors who defend early instruction in economic principles and concepts (e.g. profit and work) on the primary grade-level - kindergarten through third or fourth grades.

Hence, this article aims to contribute to the ongoing literature, by providing evidence on children's interest in Economics and how an economic program applied to the targeted group might promote the learning and the retention of economic knowledge. The main purpose of this study consists of determining the effect of a set of socioeconomic and demographic factors and, mainly, the effect of being exposed to formal economic instruction on the variation of knowledge about Economics. Along with economic education, a number of variables are likely to affect children flow of economic knowledge. For example, Heath (1989); concluded that male students have higher grades than female students. Another variable related to the individual refers to personalities. The literature makes reference to the thinking vs feeling type and the judging vs perceiving type. A feeling person makes decisions considering their personal values and gives high importance to harmony, in the meanwhile a thinking person places objectives at first place and makes decisions impersonally. Finally, flexibility is the proper word to describe the perceiving types, while the judging types like to have everything organized and well-structured in order to accomplish their goals (Ziegert, 2000). Ziegert (2000) results have suggested that thinking students outperform feeling students in exams, while judging students tend to earn higher grades in comparison to perceiving students. In terms of more recent studies, Opstad and Fallan (2010) found that personality type alone has no effect on student performance in Economics.

Other main finding is the contribution of mathematical basic skills (Lumsden and Scott, 1987; Ballard and Johnson, 2004 ; Clark, Scafidi, and Swinton, 2011). Student interest for Economics appears to be positively correlated to his performance, whilst the belief that Economics is a required discipline does contribute negatively to student attainment in Economics (Saunders, 1980). Saunders (1980) and Hahn (2006) have also analyzed the contribution of student reading habits to their performance in Economics, which among weekly news magazines, financial and business sections, only the reading of the economics section of a weekly news magazine has shown to be statistically and significantly correlated to student test score. Lawson and O'Donnell (1986) found that children from low-income families and whose parents have no college education score two points below, in Economics, than those whose parents' income is relatively high and who have college education. The author also analyzed the impact of vacation experience in children's knowledge of Economics. This variable proved to be statistically significant, by influencing positively children's economic attainment. Travelling brings implications to children's knowledge and understanding (Scoffham and David, 1999).

Finally, student previous ability to save might contribute to improve economics performance (Kristof, 2009). Logically, having a bank account and understanding the importance of saving are two of the potential determinants to promote and to develop student saving experience and reasoning. Otherwise, indirect sources of information and direct experience in the daily journey are two key elements supporting and stimulating children economic progress (Webley, 2005).

Finally, there is the need to consider the school attended (Koshal et al., 2008) and the class size (e.g. Tseng, 2010; Arias and Walker, 2004; Kokkelenberg, Dillon, and Christy (2008).

Hence, this article aims to contribute to the ongoing literature, by providing evidence on children's interest in Economics and how an economic program applied to the targeted group might promote the learning and the retention of economic knowledge. The main purpose of this study consists of determining the effect of a set of socioeconomic and demographic factors and, mainly, the effect of being exposed to formal economic instruction on the variation of knowledge about Economics.

ECONOMIC PROGRAM

Teachers from University, with previous economic formation and in-service experience, developed and administered a basic course on economic concepts to the children who participated in the program.

The course consisted upon a set of 6 activities covering a range of themes which are commonly suggested by the literature directed to children. The themes ranged from economic agents, markets, money and exchange, management of day-to-day operations, work, wages and profits, opportunity cost, consumption and savings, productivity, to wider aspects such as inflation, and International Economics (exports and competitiveness aspects: education and technology). It was used didactic games, computers, exhibitions and storybooks, as methods of interaction to complement classroom instruction. More precisely, the activity 1 is centered on a didactic computer game and the second on a game following a traditional format. The third activity consisted on an activity centered on an ICT application. For activity four we used a book, and the activity five consisted upon an exhibition of 14 posters focusing on Economics. The last activity consisted upon a didactic computer game about inflation. The different activities were implemented with students inserted in a traditional lecture format, supported by new ICT. Each activity lasted for 1h30 approximately. The course was spread over a period of 8 months.

SURVEY INSTRUMENT AND DATA COLLECTION

Thinking of economic education, the assessment existing tools are only adapted to four different educational levels, namely, the Basic Economics Test to children from 5th to 6th grades (11-12 years old), the Test of Economic Knowledge to student from 7th to 9th grades (14-15 years old), the Test of Economic Literacy to student from 11th and 12th grades and, finally, the Test of Understanding College Economics for students who are attending college principles courses. Furthermore, these tools are nationally normed assessment instruments,

capable of measuring students' economic knowledge and understanding either in pretest or protest (Bethune and Ellis, 1999).

Due to the requirement of reading comprehension in the tests mentioned above and the expectable lack of this ability in lower grades, it is understandable that there is no direct way to evaluate students' economic understanding below 5th grade (Bethune and Ellis, 1999).

To administer multiple-choice tests as an assessment tool has several advantages, more specifically, teachers are able to include a major quantity of the covered material during classes and, they can also measure with greater exactitude their students' understanding, as there is the possibility of including a set of questions regarding a single topic which, subsequently, will increase the assessment depth. Also by applying a multiple-choice test, it becomes possible to erase the possibility of existing bias, as the vagueness is scarce and both questions and answers are concrete and objective (Saunders and Walstad, 1990), cited in Bethune and Ellis (1999).

Similar to other studies, e.g., Ballard and Johnson (2005); Roos et al. (2005) and Brock (2011), and thinking of the advantages of administering a multiple-choice test, a QEL (Questionnaire of Economic Literacy) in a format of pre-implementation test and post-implementation test, and including a set of multiple-choice questions, was applied.

The pre-implementation test was implemented in the fall semester of 2010/2011 school year, in order to test children's prior knowledge of Economics. The post-implementation test, applied in the fall semester of 2011/2012 school year, intended to test children's variation of economic knowledge, before and after the completion of the economics course, as well it aimed to identify the demographic and socioeconomic variables affecting children's economics test score.

The study was applied to students attending 3rd and 4th elementary grade level from five different schools. The students were also divided into two different groups - the control group - who received formal economic instruction and the other group of students who did not. It is still important to mention that children were submitted to the exams under the supervision of their teacher and the surveys were delivered and kept at the school for 3 days.

The survey instrument contained two sections. The introductory section of the survey includes 37 multiple-choice questions, whose purpose consists of testing children's understanding and learning of basic economic concepts which, consequently, are considered to be fundamental to be economically literate. The questions can be subdivided in four distinct groups, (1) basic economic concepts; (2) microeconomics concepts; (3) macroeconomics concepts and (4) international economy concepts. In terms of microeconomics concepts, it is possible to highlight questions related to demand vs supply, market functioning, price and costs, production vs consumption; the bank and its role; macroeconomics concepts covers issues related to unemployment, the gross domestic product, inflation, public expenses, economic development; concepts of scarcity, opportunity cost, good and service concepts, resources, economic systems can be classified as basic economic concepts and, finally; the international economy concepts include questions regarding export and import matters.

The second section of the survey addresses both the student educational background and the socioeconomic characteristics of the students' parents. Questions are used to identify learning outcomes across main fields of study, gender, age, personality type and mathematical skills. Students were also asked about their parents' education level and profession, and about their perception of household income and financial difficulties. This section purpose is to

analyze, in a total of 17 questions, the impact of demographic and socioeconomic variables on students' understanding and learning of Economics.

Additionally, 12 questions were included to test students' interest and attitudes towards Economics, as well to analyze their daily economic experience, either at home, by talking to their parents or watching news, or at school by talking to their teacher about economic issues. The recognition of the importance of saving in a context of crisis, as well the familiarity with financial institutions, by having a bank account were also taking into consideration, as it reports children's economic experience and awareness.

SAMPLE

For the purpose of this study, we considered the 233 students, once the purpose was to analyze the percentage of correct answers obtained for those students who made both pre-implementation and post-implementation tests, in order to measure the flow of economic knowledge between the group of students who have been exposed to economic instruction and those who have not.

Out of these, only 84 went through the economic program.

TABLE 1
Sample Description

School	Number of Students	Sex		Year of Schooling		Class Size
		Female	Male	3 rd	4 th	
1	72	38	34	0	72	26
2	91	45	46	0	91	24
3	15	9	6	0	15	24
4	37	21	16	0	37	21
5	18	10	8	11	7	9
Total	233	123	110	11	222	104

The experiment group, i.e. the group of children who were exposed to formal economic instruction, is expected to have a higher and positive variation of economic knowledge compared to those who were not exposed to the economics program, even controlling for other factors likely to affect the flow of knowledge.

MODEL AND THE VARIABLES

In this case and considering that the purpose of the current study consists of analyzing the relationship between an endogenous (or dependent) variable, y , and a group of exogenous (or independent) variables, x_1, x_2, \dots, x_k , a multiple regression appears to be the proper solution to proceed with the estimation. The functional form of the model adopted is defined by Equation (1).

$$Flow_eknow_i = \beta_0 + \beta_1 instruction_{1i} + \beta_2 X_{2i} + u_i \quad (1)$$

The dependent variable ($Flow_eknow_i$) can be defined by Equation (2).

$$Flow_eknow_i = A_QEL_{posttest} - A_QEL_{pretest} \quad (2)$$

i.e., the flow of economic knowledge is equal to the percentage of correct answers obtained in the pre-implementation test minus the percentage of correct answers obtained in the post-implementation test.

The independent variables correspond to the factors likely to affect children's economic performance, which have been already mentioned in the section above.

In X we considered a set of demographic and socioeconomic factors likely to affect the flow of knowledge. We considered children's individual characteristics (age, gender, mathematical skills); students behavior towards Economics (interest and importance given to the subject), the household context (parent's educational level, income, the experience of travelling and owning a bank account), indirect sources of information (TV reports, talking to parents and teachers about economic matters), and classroom features (class size, class context).

Regarding the personality type, and following two leading studies on this regard, Ziegert (2000) and Borg and Stranahan (2002), in our study we considered the two dichotomies of personality type, namely, feeling versus thinking personality type; judging versus perceiving personality type. To determine students' personality type, they are indulged to choose among two distinct alternatives. Imagining that a friend invites them to go to the cinema and supposing that they have to study for the following day's exam, they have two options: a) they consider the pros and cons of going to the cinema (thinking personality type) or b) they decide to go to the cinema so that their friend will not feel sad (feeling personality type). Students, who have a feeling personality type, tend to look for harmony and make decisions based on their personal values, whilst students who have a thinking personality type make their decisions impersonally and their one priority is to achieve their own goals. The options were classified as 1 and 0 respectively, once it is expected that thinking students will outperform feeling students in Economics (Ziegert, 2000). The other two personality types selected were the perceiving and judging personality types. Here, the question is "When you have to study for an exam...", a) I like to have my notes well-structured and I organize my study time according to the time available – judging type; b) I tend to do everything at the last moment, so it is not necessary to have everything well-structured and organized – perceiving type. The options were classified as 1 and 0 respectively, once it is expected that judging students will outperform perceiving students in Economics tests (Borg and Stranahan, 2002).

The child interest and perceived importance about Economics were also included in the model.

Despite not all children have access to formal economic instruction; they are exposed to several informal forms of economic education daily. Hence, we considered the child habits in terms of reading. For the variable "reading habits" we considered the following options for the questionnaire: a) does not like to read, b) reads only academic books, c) reads academic books and infant-juvenile books, d) apart from books, the child also reads magazines or journals. From a quantitative point of view, the several options evolved from 1-4, corresponding the fourth option to a higher knowledge of Economics, supporting the idea of

learning by reading (Hahn, 2006). Children more exposed to socially mediated forms of communication, where economic issues are discussed, are expected to show a higher flow of economic knowledge.

The child ambition, and their expectations about their future, may contribute to explain their performance on tests as well. Here, we considered whether the child would like to create his/ her own enterprise in the future or if he/she intended to go to college.

Beyond individual characteristics, attitudes and ambitions, we accounted for a number of environmental factors likely to matter for our research issue. In this regard, we considered the nearest environment to the child: the household and the classroom contexts.

We also took into account the family income (using as a proxy the child’s perception), parents’ educational level, vacation experience, and the discussions of economic issues either within the family or with the teacher. To gauge parents’ educational level, four options were displayed. The options are the following: a) your father or mother studied until primary grade level; b) your father or mother completed high school; c) your father or mother studied until secondary grade level and d) your father or mother went to college.

The “father_educ” and “mother _educ” variables were transformed into three levels instead of the initial four. Those parents who went to college corresponded to level 1, those who went to high school and secondary grade levels corresponded to level 2 and finally, those who only went until primary grade level corresponded to level 3.

To conclude we also considered the school environment: the class or school attended; the classroom size and the discussion about economic matters with the teacher.

Details on the measurement of these variables are displayed in the appendix.

DESCRIPTIVE FINDINGS

Table 2 presents the flow of economic knowledge of those children who were not exposed to formal economic instruction in contrast with the control group who have received formal instruction. The flow of economic knowledge, presented in Table 2, is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

TABLE 2
Flow of economic Knowledge

	Instruction	Mean	N	Std. Deviation	Minimum	Maximum
<i>Flow_eknow</i>	Yes	0.173312	84	0.1799033	-0.4335	0.7297
	No	0.094316	149	0.2276981	-0.3607	0.7568
	Total	0.122795	233	0.2015941	-0.4335	0.7568
T statistic	2.735					
p-value	0.007					

According to the statistics reported in Table 2, 84 the flow of knowledge for those children who received formal economic instruction corresponded to 17.3%, which has shown to be greater than the result obtained by children who had no formal instruction, 9.4%. The p-value of the t-test is equal to 0.007, which is less than 5%, therefore it is possible to conclude

TABLE 3
Econometric Results

	Coefficients (Robust standard errors)			
	1st Model	2nd Model	4th Model	5th Model
C	0.094*** (0.016)	0.251 (0.175)	-0.032 (0.215)	-0.048 (0.234)
Instruction	0.079*** (0.027)	0.069*** (0.028)	0.079*** (0.03)	0.184*** (0.051)
Age		0.012 (0.017)	-0.006 (0.017)	0.001 (0.017)
GENDER		0.01 (0.027)	-0.006 (0.029)	-0.016 (0.03)
Thinking vs feeling		0.009 (0.053)	0.033 (0.055)	0.029 (0.061)
Judging vs perceiving		-0.081* (0.048)	-0.142*** (0.051)	-0.124*** (0.055)
Maths grade		0.009 (0.017)	-0.008 (0.018)	-0.013 (0.020)
int_economics			0.011 (0.045)	0.069 (0.046)
imp_economics			0.176*** (0.063)	0.091 (0.07)
News			0.029 (0.087)	0.069 (0.104)
Reading			0.023 (0.021)	0.005 (0.022)
Entrepreneur			0.037 (0.031)	0.005 (0.032)
University			0.016 (0.055)	0.008 (0.06)
father_educ				0.071** (0.028)
Income				0.046* (0.024)
Travelling				-0.008 (0.038)
bank_account				-0.021 (0.04)
Psaving				-0.008* (0.050)
Peconomics				-0.016 (0.038)
class_economics				0.094*** (0.035)
class_size				- 0.009** (0.005)

TABLE 3
(continued)

1 st Model	Coefficients (Robust standard errors)			
	2 nd Model	4 th Model	5 th Model	
b_1				-0.156*** (0.061)
c_1				-0.018 (0.052)
b_2				0.014 (0.054)
c_2				0.029 (0.061)
d_2				0.139** (0.058)
a_4				-0.127* (0.076)
a_3				-0.0697* (0.037)
<i>N</i>	233	213	192	153
<i>R</i> ²	0.036	0.048	0.134	0.401
<i>R</i> ² – Adj	0.031	0.020	0.076	0.271

***1% significance level; ** 5% significance level; *10% significance level

that the percentage of economic knowledge acquired is significantly different among both groups, after the end of the economic program.

RESULTS

Table 3 displays the econometric results. Even controlling for other factors likely to affect children achievement, the core variable instruction has shown to be statistically significant at 1% level of significance and it is positively correlated to student flow of economic knowledge. Children who received economics formal instruction had a higher variation of economic knowledge from the pre-test through the post-test compared to children who were not exposed to instructional time.

In terms of individual characteristics, the judging personality type has shown to be statistically significant and negatively correlated to children variation of economic knowledge. The father educational level and the family's income have also proved to be determinant for children's economic knowledge, once students from high-income families and whose parents have a higher educational level, had a greater difference in the retention of economic knowledge from the pre-test through the post-test, compared to those whose parents have a lower educational level and income. Talking about the importance of saving with children appears to have a negative impact on their economic progress, which is difficult to explain. However and conversely, talking about economics issues within school context increases the difference of economic knowledge after the completion of the economic program.

Class size has proved to be negatively correlated to the dependent variable thereby it is possible to conclude that smaller classes have a positive effect on students' attainment in Economics. The class attended has also proved to be significant.

CONCLUSION AND DISCUSSION

This study addresses two fundamental research issues. One is related to the efficacy of economic programs applied to children and, by doing so, it discusses also children's capacity and ability to understand and learn about economic matters. Secondly, it aims to identify the factors that, apart from economic instruction, affect children's test scores in Economics.

This study contributes to an ongoing discussion in the literature, ascertaining children's interest and capacity to understand this social science. Hence, economic programs applied at this early age can indeed be effective thereby and as reinforced by the econometric results, Economics could be included in the school curricula at primary grade level.

Earlier intervention sets an important foundation for children's ongoing receptivity to learning economics and financial issues in the future.

Primary-age children can be introduced to core foundation concepts and principles, such as opportunity cost, intertemporal decisions, markets, money, consumption and savings.

There is also in the literature the idea that understanding of basic economic concepts is more important than a heavy dose of factual knowledge. Young students should be given a conceptual framework to help them to organize their understanding of Economics.

Regarding methods to teach Economics to children, there are several alternatives to the traditional lecture-oriented approach. Games or simulations, including classroom discussions and experiments, the use of internet and computers, exhibitions and storybooks have proved to be effective methods of interaction that complement classroom instruction.

Finally, the empirical results provide data from an economy about which there is very scarce information on these matters. Indeed, the majority of studies and methods of evaluation of economic literacy have been more focused on USA, and it refers to educational levels superior to the elementary grade level. Hence, this study enriches the literature, by studying the stock and flow of economic knowledge among children from a European country.

In terms of weaknesses or barriers, the current study was applied to a small group of students. The impact of the teacher performance could also have been considered and gauged, although we did not have access to this indicator. It would also be interesting to evaluate which method of teaching was the most effective in communicating the lessons at hand and in promoting the learning retention.

Considering future implications and further investigation issues, it would be highly relevant to measure, in a near future, the retention of economic knowledge of the same students selected for the current study.

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APPENDIX

TABLE A.1

Variables Description	
Variable	Description
Dependent Variable	
Flow_eknow	The percentage of correct answers obtained in the Post test minus the percentage of correct answers obtained in the Pre test.
Independent Variables	
<u>Core Variable</u>	
INSTRUCTION	1 = if the student attended the formal instruction in economics; 0= if the student did not attend the formal instruction in economics.
<u>Individual Characteristics</u>	
AGE	Student's age.
GENDER	1 = male; 0 = female.
THINKING_VS_FEELING	1=thinking personality type; 0=feeling personality type.
JUDGING_VS_PERCEIVING	1=judging personality type; 0=perceiving personality type.
MATHS_GRADE	4=excellent; 3=good; 2=satisfactory; 1=unsatisfactory.
<u>Student Attitudes Towards Economics</u>	
INT_ECONOMICS	1 = if the student would like to know more about economics; 0 = if the student would not like to know more about economics.
IMP_ECONOMICS	1 = if the student considers that knowing economics is important to his/ her future; 0 = if the student considers that knowing economics is not relevant to his/ her future.
NEWS	1 = if the student watches television news; 0 = if the student does not watch television news.
READING	4 = if the student reads books, magazines and journals; 3 = if the student reads academic books and infant-juvenile books; 2 = if the student only reads academic books; 1 = if the student does not like to read.

TABLE A1
(continued)

Variable	Description
UNIVERSITY	1 = if the student wants to go to the university; 0 = if the student does not want to go to the university.
ENTREPRENEUR	1 = if the student wants to create his/ her own company; 0 = if the student does not want to create his/ her own company.
<u>Household Context</u>	
FATHER_EDUC	3 = high qualification; 2 = medium qualification; 1 = low qualification.
MOTHER_EDUC	3 = high qualification; 2 = medium qualification; 1 = low qualification.
INCOME	4 = the money is enough to buy EVERYTHING the family wants to; 3 = the money is enough to buy ALMOST everything the family wants to; 2 = the money only satisfies basic needs; 1 = the money is not enough to pay regular expenses.
TRAVELLING	1 = if the student have already travel abroad; 0 = otherwise.
BANK ACCOUNT	1 = if the student has a bank account; 0 = otherwise.
PECONOMICS	1 = if parents talk about economic issues with their children; 0 = if parents do not talk about economic issues with their children.
PSAVING	1 = if parents explain the importance of saving to their children; 0 = otherwise.
<u>Classroom Features</u>	
CLASS_SIZE	The average class size.
CLASS_ECONOMICS	1 = if the teacher discusses economic matters during classes; 0 = otherwise.
A_1	1 = if the student belongs to class A from school 1 ; 0 = otherwise
A_2	1 = if the student belongs to class A from school 2; 0 = otherwise
A_3	1 = if the student belongs to class A from school 3; 0 = otherwise
A_4	1 = if the student belongs to class A from school 4; 0 = otherwise
A_5	1 = if the student belongs to school 5; 0 = otherwise.
B_1	1 = if the student belongs to class B from school 1; 0 = otherwise.
B_2	1 = if the student belongs to class B from school 2; 0 = otherwise
B_4	1 = if the student belongs to class B from school 4; 0 = otherwise
C_1	1 = if the student belongs to class C from school 1; 0 = otherwise
C_2	1 = if the student belongs to class C from school 2; 0 = otherwise
C_3	1 = if the student belongs to class C from school 3; 0= otherwise
D_2	1 = if the student belongs to class D from school 2; 0 = otherwise