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Knowledge and Application toward Financial Topics in High School Students: A Parametric Study

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Abstract: The aim of the study focused on assessing the relationship between student's financial knowledge and their relationship with the use and application of financial instruments. The test designed by Garcia-Santillan, Contreras-Rodriguez and Moreno-Garcia which integrates topics on money management, savings and investment, spending, credit and budgets, was used. 333 high school students were surveyed face to face and only 305 were validated. The internal consistency Cronbach's Alpha of the scale was of α=.860 (34 items) and α=.855 (7 dimensions). For the hypothesis test, exploratory factor analysis and canonical correlational analysis were used. The main findings show the existence of three factors that explain the structure that underlies the phenomenon of financial knowledge and the use of financial techniques, and a significant relationship was found between the constructs of financial knowledge and the use and application of financial products.

AMS: 97D10

JEL: G4, G40

Keywords: *Financial education, financial literacy, financial services, students, Mexico.*

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Introduction

The Organization for Economic Co-operation and Development (OECD, 2017) states that financial education has become a priority in global policy agendas as it is a central component of people's financial empowerment. In addition, it promotes the stability of the financial system by establishing the foundations of financial inclusion.

The World Bank (WB, 2018) has a similar opinion when pointing out that having access to an account to start savings or transactions in general is the first step to greater inclusion. At present it is estimated that, in the world, 2,000 million people do not have an account and the least included are women, people with limited resources in rural areas, micro and small informal businesses.

On the issue of Financial Inclusion, the Global Partnership for Financial Inclusion (GPFI, 2010) has generated greater awareness in this regard as it points out the need for greater access to financial tools such as: savings, payment services and insurance among others. It also mentions that financial inclusion provides people with lower economic resources the ability to stabilize their savings and increase their income capacity, create assets and endure economic crises.

Furthermore, the OECD (2017) states that financial literacy is an essential skill for life. This skill can make a big difference in people's lives, in the opportunities and in the success they can achieve. In a similar way, it considers financial literacy as the basis for well-being, entrepreneurship, social mobility and inclusive growth.

To summarize, we could say that financial well-being or personal well-being is related to the level of financial education. If the population has knowledge about the services and products offered in the financial systems - global and local - then the probability of greater financial inclusion of the population would increase, since it improves their decision making when it comes to using a type of financial product.

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Besides all the mentioned above, the population's knowledge of certain financial products and services is of great interest to financial institutions, especially when diagnoses are carried out to design new products and services.

Financial markets change very rapidly. With the implementation of technology in the management of financial products, greater benefits are obtained such as: saving time in financial transactions, increasing return on investments, proper handling of credit cards and better individual decisions (Lusardi, 2019). However, financial knowledge is not only for the decisions associated with the financial market, at the micro level the study by Lusardi and Mitchell (2011), cited by Lusardi (2019), exposes the importance of people being familiar with financial basic concepts, since these can help improve everyday financial decisions.

We could mention the strategy that Hong Kong has designed, a specific case of what is being carried out worldwide, which points to the empowerment of the population from a program in financial education. The objective is to educate the population to make responsible financial decisions, which would result in financial well-being for all. Hence, they have set a goal to create enabling environments that favor quality financial education and thereby increase the level of financial education among the population, focusing the strategy on generating greater awareness in the population, advocacy and collaboration between the parties involved.

Similar cases are presented by Morgan et al. (2019) who point out the importance of the digital era and specifically the term Digital Financial Education. The development and growth of the "gig" economy suggest that individuals will be increasingly responsible for their financial planning that will lead them to the most efficient use of resources and to avoid costly mistakes related to the use of financial technology products, called Fintech.

In addition, they mention that the G20 countries must add to their agenda a standardized definition of digital financial education, the design of tools for their evaluation and strategies and programs that contribute to promote digital financial education should be developed; they should even include very specific programs for vulnerable groups of people or those with disabilities. Given these arguments, it is pertinent to question on the one hand if there is an underlying structure that explains the knowledge of financial products, as well as their use and application. Additionally, it is necessary to analyze whether the variables associated with the knowledge of financial products can be predicted with the variables that explain their use and application. For this, the following section analyzes and discusses the state of art related to the object of study.

In summary, the importance of these empirical studies about financial education phenomenon has become a worldwide priority issue, due to the concern expressed in several organizations and academic researchers. For example, the G20 has included it in its agenda as priority for all member countries (OECD, 2017), which has marked it as a priority on the political agenda. Likewise, the World Bank (2018) has expressed the importance of financially including the largest percentage of the population in global financial services. In a similar way, Lusardi and Mitchell (as cited in Lusardi, 2019) refer that the importance of the well-being of the population with financial topics will undoubtedly help the best decision-making in everything that the individual carries out where money and decisions are involved.

Similarly, the implementation of national financial education weeks in several countries has become a need. In Mexico, financial institutions such as BBVA, Banamex, Banorte among other banks, carry out these activities. In the same idea, the National Commission for the Defense of Users of Financial Services (CONDUSEF) in Mexico has pointed out the importance of financial education in young people because at that age it is adequate to give them the best tips on financial issues (Martinez- Solares, 2013).

Another argument to take into account is the result of the PISA test (OECD, 2012, 2017) on performance in mathematics, where Mexico is below the average. Furthermore, the Ministry of Public Education (SEP) in Mexico has indicated that in the new educational model proposed by the Federal Government, financial education will be included at all school levels (Ordaz & Guzman, 2019), since it is important that high school students acquire knowledge of financial tools. Therefore, the following research question, objectives and hypothesis are raised.

RQ_1: What is the structure of latent variables that underlie the explanation of knowledge of financial instruments?, RQ_2: What is the structure of latent variables that explain the use and application of financial instruments?, and RQ_3: How do the set of variables associated with the knowledge of financial instruments (X1…Xj) correlate the variables that explain the use and application of financial instruments (Y1…Yj).

Thus, the objectives of the study are:

O_1: Determine the set of variables that explain both the knowledge and the use and application of financial instruments, O_2: Analyze the multidimensional relationships between the multiple independent variables associated with the knowledge of financial instruments and the multiple dependent variables associated with the use and application of financial instruments.

Finally, the following hypotheses to be tested are:

Hi_1: There are latent structures of variables that explain knowledge toward financial tools in high school students, Hi_2: There are latent structures of variables that explain use and application toward financial tools in high school students,

And to answer RQ_3:

Hi_3: There is a correlation between the variables of the cluster X with the variables of the cluster Y

Literature Review

Financial literacy for the OECD (2012) is defined as a combination of awareness, knowledge, skill, attitude, and behavior necessary to make sound financial decisions to achieve individual financial well-being. In this idea, Huston (2010) mentions that financial literacy can be defined as the measure of how well an individual can understand and use information related to finances.

Remund (2010) in his study, after reviewing the literature, synthesizes financial literacy as a measure of the degree to which we can understand key financial concepts and possess the ability and confidence to manage personal finances through decision-making. In addition, we will have an adequate short-term, and far-reaching financial planning, while taking into account life events and changes in economic conditions.

For his part, Huston (2010) expresses that financial literacy is made up of two dimensions, knowledge of finances and the application of that knowledge. The knowledge dimension refers to the accumulation of knowledge acquired through education and / or experience, specifically related to the concepts and products of personal finance. The application dimension considers the ability and confidence to effectively apply or use knowledge related to the concepts and products of personal finance.

Moreover, Remund (2010) mentions that the lack of operational variables corresponding to the concept of financial literacy, could obstruct comparisons across and within different populations. Therefore, it proposes four operational categories that define financial literacy. These operational categories include budget, savings, loan, and investment. In addition to evaluating a broad knowledge or awareness of financial matters, these categories also seek to assess the aptitude to manage specific aspects of personal finance.

Financial literacy worldwide is very low, regardless of the economic development that financial markets have. Also, it has been determined that there is a limit between what people can learn for themselves from their financial experiences. In addition, there are differences by gender and age regarding financial literacy. Women have less financial knowledge, as do older people (Lusardi & Mitchell, 2011).

A survey to compare financial knowledge, behavior, attitude and inclusion was carried out in 21 countries by the OECD (2017). 101,596 adults between 18 and 79 years participated in the study. The results indicated that almost half of the adults (48%) were able to answer 70% of the financial literacy questions correctly. Furthermore, it is specifically pointed out that the concepts of diversification and capitalization are weak. Both concepts are basic for making financial decisions, such as the consequences on the minimum payment of credit cards and the management of retirement funds. Also, it was found that the use of products to make payments, as well as for savings and investments, are more strongly associated with a better level of financial literacy.

Similarly, Lusardi and Mitchell (2011) found that most workers have not planned or even thought about their retirement. Retirement plans are indicative of financial literacy. Those who have calculated how much they need to save for their own retirement, have up to three times more resources than those who did not.

In 2012 Huston analyzed data from the Consumer Finance Monthly survey, used to examine the effects of financial literacy on credit card and mortgage loan rates. The results of the study indicate that people with financial literacy obtain up to two times lower costs in loans for both credit cards and mortgage loans (Huston, 2012).

In this regard, Lusardi and Mitchell (2014) have reported that the conventional microeconomic approach to savings and consumption decisions suggests that a rational and informed person will consume less than his income, therefore, he will save to support consumption when income falls. It is assumed that individuals can make savings and cost reduction plans, which requires them to have the ability to execute complex calculations and have experience in dealing with financial markets.

Financial education provides people with financial knowledge that favors the ability to make better decisions (Contreras-Rodriguez et al., 2017) and creates a healthy economic environment and certainly increases the formality of financial markets. This is, a country with an unbanked population could be suffering consequences in areas such as savings, investment among others (Ambarkhane et al., 2015).

It is important to keep in mind that the management of finances in everyday life goes beyond the knowledge acquired. To strengthen personal finances and thus ensure financial well-being, it is necessary to add values, attitude and behavior as impact variables. In this regard, EVERFI (2018) points out that the application of knowledge must be carried out through the simulation of possible scenarios aligned with reality and with a view to the future, in such a way that educational plans according to age and demographic aspects are developed.

Other studies carried out in middle school students (Contreras-Rodriguez et al., 2017; Garcia-Santillan et al., 2017), have analyzed knowledge as well as behavior in relation to financial issues such as income, savings and investment,

spending and credit. The results show that the student has a very positive perspective of what his income will be, as a result of his future work. In addition, it is evidenced that the respondents think that the greater the level of studies (to have a university degree) the better his income will be.

Knowledge of financial tools

Several studies on financial education have covered diverse contexts and populations, since consumers of financial products necessarily need to know the financial tools offered by the Financial Systems, such as savings, credit, pensions, and insurance among others. The OECD has pointed out that financial education seeks to provide to the users: the tools, knowledge, and capacities that allow them to satisfy their long-term needs such as pensions, education, household support, funeral expenses, among others (Atkinson et al., 2015).

Whitebread and Bingham (2013) reported that good habits, as well as financial knowledge and behavior are learned from an early age. Moreover, they highlight the importance of financial education from childhood on. This is an important step in order to achieve what becomes as an important factor for informed decision-making, knowing what type of quality services they can demand, to be aware of the market innovation and to be efficient in risk management.

In relation to good habits on financial aspects and the importance of including them at an early age, recently Rudeloff (2019) has pointed out that parents are the main actors in the transmission of financial knowledge to their children. They can promote good habits; develop skills and attitudes, which are directly related to their own knowledge and financial literacy. These habits will be reinforced with the transmission of knowledge that they acquire as students throughout their academic life.

In this idea, Totenhagen et al. (2015) points out that despite the fact that an exact age at which financial education should begin has not yet defined, and the models have not been standardized, basic knowledge must be introduced to children long before high school. Children need to learn basic concepts such as money, savings, and other concepts associated with finance, which will allow them to engage from an early age in a real environment of everyday life with the implications of the financial world.

Undoubtedly, financial knowledge in the population is very important. Involvement at an early age in activities related to economic activity, with the financial institutions and with the support of parents within the family environment, constitutes key elements to improve basic learning in financial concepts derived from personal experience of use. These will increase knowledge in financial tools (Racanello & Herrera-Guzman, 2014).

In the educational field, a study carried out by Villagomez and Hidalgo (2017) in Mexican high school students, demonstrated a positive correlation between the level of mathematical ability and financial literacy. They conclude that skills stimulate logical thinking and the ability to solve problems, positively affecting the ability to plan. In addition, they demonstrated in their study that only 10% of students have the necessary skills to make financial decisions.

In this sense, Brown et al. (2018) relate the magnitude and the effect that culture has on financial education among young people. They describe systematic variations in different dimensions of culture towards financial management such as financial socialization, norms, and attitudes about money in French and German speaking students on the border with Switzerland.

In this regard, Cruz-Barba (2018) analyzes the empirical evidence of financial education in primary school children in a Mexican population. She suggests the need to implement formal financial education through a financial teaching-learning process to achieve economic understanding.

Currently, with the growth of technology and facilities provided by financial institutions, young people have greater access to financial tools, that is, financial products and services are more available to young people. Likewise, Rudeloff (2019) has pointed this out in a study where he investigates how informal sources include adolescent financial literacy. In his study, he showed that the learning obtained in their family from their parents, has a direct influence on the scores that the students obtain in the knowledge evaluations on financial topics.

However, the lack of a common construct and the wide range of scores make it difficult to establish the level that would be considered good or acceptable for financial literacy (Remund, 2010). With the arguments previously presented and with the purpose of carrying out an empirical study that allows answering the questions raised and achieving the objectives, Figure 1 shows the route of the model that includes the variables involved in the object of study, under which the empirical work will be carried out:

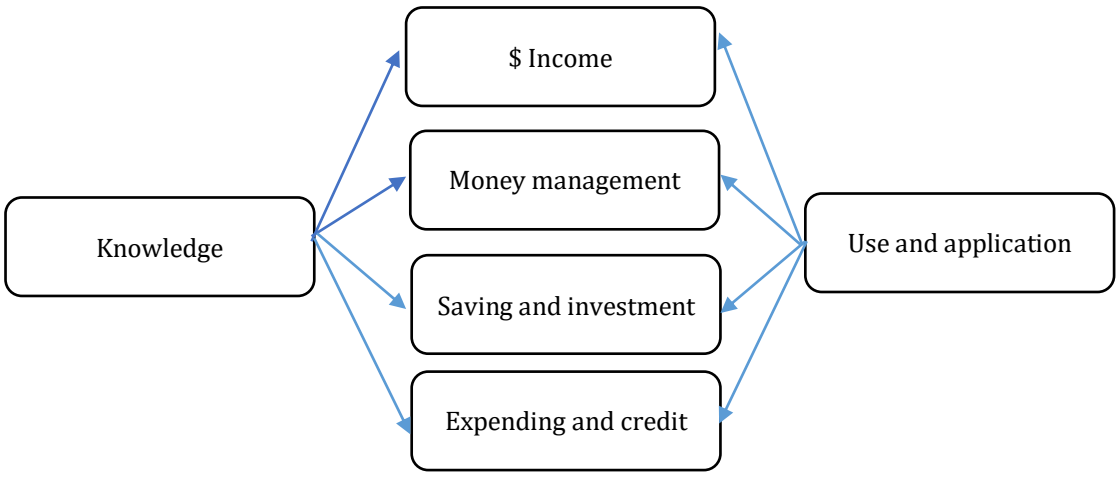

Figure 1. Model path for empirical study (source: own)

Methodology

The empirical study is of a non-experimental design since there is no manipulation of the independent variables (X) that modify the dependent effect (Y). Due to its temporality, data collection, analysis and scope, it is cross-sectional, correlational and explanatory.

Population and sample

The subject of financial education, also known as financial literacy, touches on those aspects related to the Financial System, the institutions that comprise it, as well, the type of products and services that offers. The literacy process is not only acquired in school classrooms, but also in the home itself, in the workplace and in general, in any context of human life. However, in this study we will focus on high school students.

These arguments are in accordance with the institutional lines of research on Financial Education at the UCC Business School. Therefore, the study population focuses on high school students in the Veracruz Boca del Rio metropolitan area. In addition, the interest of the UCC Business School to carry out this type of studies in high school students, allows strengthening the actions of curricular design of the university programs in the academic offerings.

In order to carry out the empirical study, it was necessary to request the support and authorization of some academic institution of the public sector in the Port of Veracruz. Once the school principal was contacted, authorization was obtained. The only condition to participate in the study was, that the survey be completely anonymous and the data be handled with absolute confidentiality.

Criterion to participate in the census: all students who agree to participate to answer the survey. Therefore, the sample is not probabilistic; we carry out a census to the population enrolled in the different semesters at the time of applying the test. 345 students were surveyed, of which only 305 were valid. The main characteristics are: 59.3% male (181) and 40.7% female (124), whose age range is from> to 15 to 20 years old with 73.4% and the rest> to 20 with 26.6%, enrolled in the first semester (28.5%), 3rd semester (20%), the 5th semester with 47.9% and the rest in others semesters, 99.3% are from the Port of Veracruz and the rest from another state. As additional data, 100% use social networks: with 35.4% using more than three social networks, 30.5% less than three, 26.9% using the internet in general and the rest, only using it for Facebook (4.9 %), YouTube (2.0%), 90.8% use networks and internet daily.

Instrument

In this study, the Financial Education Scale designed by Garcia-Santillan et al. (2017), was used (see Annex 1). The objective of the scale is to determine the perception of young people towards the financial topics of income, money management, saving and investment, spending and credit. The survey is made up of 34 items with a Likert-type scale. The response options are five (5 = strongly agree, 4 = sometimes agree, 3 = neutral, 2 = sometimes disagree, 1 = strongly disagree).

The income category includes items 1 to 7. The concept of money management is divided into two sections, knowledge (items 8-11) and use and application (items 12-15). The topic of savings and investment knowledge (items 16-19) and use and application (items 20-23). Regarding spending and credit, knowledge is integrated from items 24 to 29, and the use and application items 30 to 34 (see Table 1). The scale was applied in Spanish, face to face and at all times in anonymity. That is, the administration of the scale was done on paper and the participant responded to the items in the presence of the interviewer, without providing identification data.

Table 1. Variable, dimensions and indicators of the questionnaire

Variable	Dimension	Sub-dimension	Indicators
Financial education and Financial inclusion	Income		Item 1 to 7
	Money management	Knowledge	Item 8 to11
		Use and application	Item 12 to15
	Saving and investment	Knowledge	Item 16 to 19
		Use and application	Item 20 to 23
	Expenses and credit	Knowledge	Item 24 to 29
		Use and application	Item 30 to 34

Source: own

Statistical procedure

The exploratory factor analysis technique is used to answer the questions and test the hypotheses. For this, the instrument and the normality of the data are validated in the first place to justify the use of this multivariate technique. The criteria for the validation of the test are: Cronbach's Alpha calculation for internal consistency and Kolmorogov-Smirnov (K-S) test to identify the asymptotic significance that validates that the data matrix comes from a normal distribution. The exploratory factor analysis technique will be carried out with the statistical software SPSS v. 2. 3.

For our study, the level of significance is .01, so if the values obtained from the KS are > .01, the null hypothesis of normality cannot be rejected according to the criteria of: if Sig (p-value) > .01 we accept Ho (normal distribution) otherwise, if Sig. (P-value) < .01 we reject Ho (non-normal distribution). In addition, the relevance of the factorial technique is justified through the Bartlett test of Sphericity with KMO, the Chi^2 test with *n* degrees of freedom and significance < .01, the measures of sample adequacy for each variable (MSA) and factorial loads of .70 according to the theoretical criterion that refers that the null hypothesis Ho = 0 indicates that there is no correlation, contrary to the alternative hypothesis Hi ≠ 0 which indicates that there is a correlation. Thus the decision criterion will be: reject the null hypothesis if Chi^2 calculated is greater than Chi^2 tables.

On the other hand, to answer question RQ_3, Canonical Correlation Analysis (CCA) is used, since the purpose is to identify the relationships between the variables associated with knowledge (X), with the variables associated with the use and application (Y), with the idea of being able to explain those relationships that may exist between two groups of variables and their validity. We will remember that the hyper-canonical correlation only seeks linear relationships between the variables, to create linear combinations of the original variables from the correlation structure.

It is also important to interpret the canonical charges to determine the importance of each variable in the canonical function, since these reflect the variance that the observed variable shares with the canonical theoretical value. In this way, we seek to obtain the correlation and determination coefficient (R and R^2).

Findings

Validation of the test: To measure the internal consistency of the test, Cronbach's Alpha coefficient (CA) is used, which allows checking whether it is a reliable instrument. The CA is a squared correlation coefficient that measures the homogeneity of the questions by averaging all the correlations among all the items. Values close to 1 denote high reliability, with values of .80 being respectable (Hair et al., 1999). The CA is established as a function of the number of items and the average of the correlations between the items.

The reliability analysis was carried out for the 34 items, and for each dimension, which are income, knowledge about money management, use and application of money management, knowledge of savings and investment, use and application of savings and investment, knowledge of spending and credit, use and application of spending and credit. The reliability and internal consistency of the cases processed are shown in Table 2.

Table 2. Global reliability statistics by elements and dimensions

Cronbach's Alpha	Number of cases	%	α
Valid	305	92	.860 with 34 items Likert scale
cases Excluded	28	8	.855 with 7 dimensions
Total	333		
Grouped	333	100	

a Elimination by list based on all procedure variables.

The values of .860 (34 items) and .855 (7 dimensions) are acceptable considering the criterion $\alpha > .8$ (Hair et al., 1999), hence we can say that the scale meets the characteristics of internal consistency and reliability that confirms its validity. In addition, Table 3 analyzes whether the data matrix comes from a normal distribution that allows testing the

null hypothesis of normality, according to the criteria: if significance (P-value) > .01 we accept Ho (normal distribution), otherwise we refuse it.

Table 3. Normality test

		1	2	3	4	5	6	7
N		305	305	305	305	305	305	305
Normal parameters (a,b)	Mean	23.77	13.34	13.67	13.00	13.04	22.19	16.71
	Typical deviation	4.57	3.36	3.043	3.519	3.584	4.410	4.194
extreme plus differences	Absolut	.060	.085	.105	.090	.081	.122	.073
	Positive	.051	.076	.066	.072	.081	.050	.068
	Negative	-.060	-.085	-.105	-.090	-.071	-.122	-.073
Z de Kolmogorov-Smirnov		1.052	1.487	1.830	1.575	1.409	2.133	1.277
Sig. asintot. (bilateral)		.219	.024	.028	.014	.038	.000	.077

a The contrast distribution is Normal in p > 0.01. b They have been calculated from the data.
*1=Income, 2= Money management knowledge, 3=Use and application money management, 4= Saving and investment knowledge, 5=Use and application saving and investment, 6= Spending and credit knowledge 7= Use and application spending and credit.

As shown in Table 3, the asymptotic significance is greater than p > .01, which means that they have multivariate normality, only the dimension spending and credit knowledge does not meet that criterion, hence the decision is made to include all the variables of the study model, provided that the KMO, Chi^2, MSA and the determinant values meet the theoretical criteria to justify the factorization, based on the following model, see Figure 2.

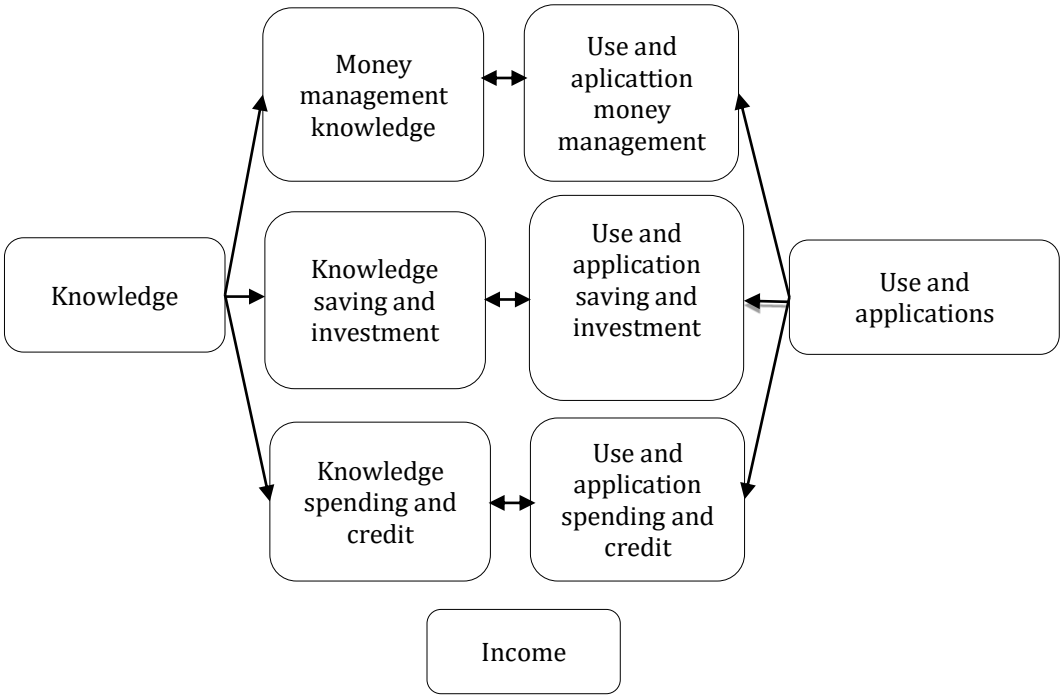

Figure 2. Re-specification of the empirical study model (source: own)

Exploratory Factor Analysis for RQ1 and RQ2 and the contrast of Ho1, Hi1 and Ho2, Hi2

The Exploratory Factor Analysis (EFA) is carried out on the data matrix to test the hypotheses of Ho_1, Hi_1 and Ho_2, Hi_2, the KMO values are calculated with Kaiser, Chi_2, with *n df*, sig. < .01, MSA and the determinant value, which are shown in Tables 4, 5 and 6.

Table 4. Barttlet test of Sphericity with KMO

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.850
Bartlett test of Sphericity	Chi^2-aprox.	1598.530
	df (21)	Sig. .000

Table 5. Correlation Matrix (a)

Correlation		**1***	**2***	**3***	**4***	**5***	**6***	**7***
Income		1						
Money management	Knowledge	.449	1					
	Use and application	.303	.332	1				
Saving and investment	Knowledge	.563	.573	.496	1			
	Use and applicattion	.591	.532	.487	.899	1		
Spending and credit	Knowledge	.232	.033	.225	.238	.296	1	
	Use and applicattion	.577	.515	.486	.860	.950	.304	1

[a] Determinant = .005

*1=Income, 2= Money management knowledge, 3=Use and application money management, 4= Saving and investment knowledge, 5=Use and application saving and investment, 6= Spending and credit knowledge 7= Use and application spending and credit.

Table 6. Anti-image matrix (Measure of Sampling Adequacy) (a)

Anti-image correlation		**1***	**2***	**3***	**4***	**5***	**6***	**7***
Income		.955[a]						
Money management	Knowledge		.907[a]					
	Use and application			.957[a]				
Saving and investment	Knowledge				.890[a]			
	Use and application					.760[a]		
Spending and credit	Knowledge						.845[a]	
	Use and application							.809[a]

*1=Income, 2= Money management knowledge, 3=Use and application money management, 4= Saving and investment knowledge, 5=Use and application saving and investment, 6= Spending and credit knowledge 7= Use and application spending and credit.

The values described in Tables 4, 5 and 6 give sufficient evidence to reject the null hypothesis according to the decision criterion that is to reject Ho if Chi^2 calculated is > to Chi^2 tables. Hence, the calculated Chi^2 value (1598.530 with 21 *df*) exceeds the value of Chi^2 tables (38.932 with 21 df). In addition, all the MSA values obtained are > at .80[a] and the determinant very close to zero (.005) and according to the theoretical criterion that establishes that the MSA values close to 1 and the value of the determinant close to 0, give evidence of high correlations and sample adequacy of the variables involved in the study.

With these data, the use of the factorial technique is pertinent, since in addition to confirming that the data matrix is not an identity matrix, RQ_1 and RQ_2 are answered, and the null hypotheses are rejected. Therefore, there is a structure that underlies the explanation towards the financial knowledge that the students possess, as well as the use and application that they give to that knowledge towards the financial topics object of this study. For this, in Table 7 the matrix of extracted components is shown and in Table 7.b the extracted components for each construct.

Table 7. Components matrix (a)

	1	**2**	**3**
Use and application saving and investment	.944		
Use and application spending and credit	.930		
Saving and investment knowledge	.921		
Income	.712		
Money management knowledge	.667		
Spending and credit knowledge		.875	
Money management use and application	.616		.724
Total variance explained		71.780%	

Extraction Method: Principal Component Analysis. [a] 2 extracted components

Table 7.b. Components matrix by construct

Knowledge Construct Variables	1	2	Use and Applications Construct Variables	1	2
Saving and investment knowledge	.921		Use and application saving and investment	.944	
Income	.712		Use and application spending and credit	.930	
Money management knowledge	.667		Money management use and application	.616	.724
Spending and credit knowledge		.875			

Extraction Method: Principal Component Analysis. [a] 2 extracted components

Canonical Correlational Analysis (CCA): To respond to RQ_3 and contrast the Ho_3, Hi_3 hypothesis, CCA is developed from the following model described in Figure 3:

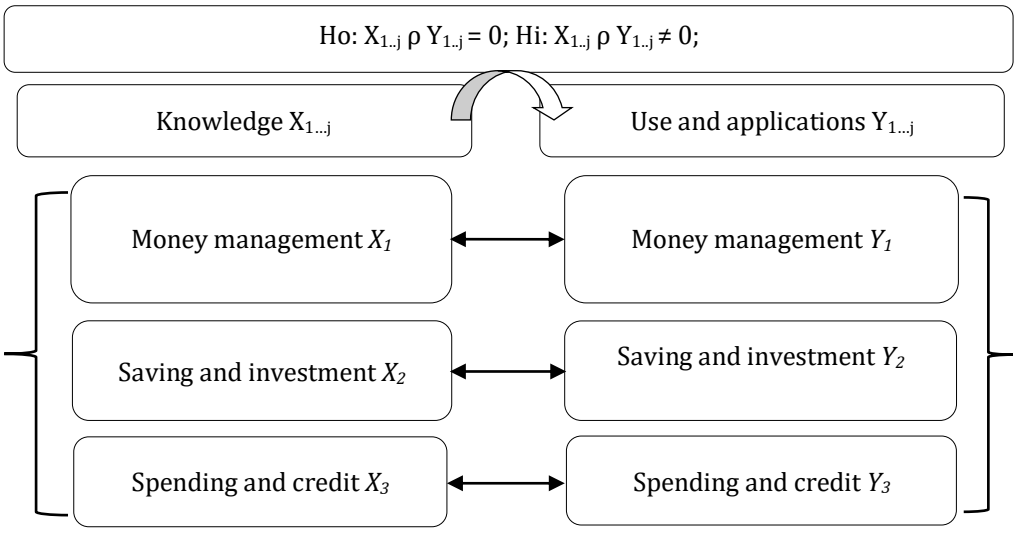

Figure 3. Re-specification of the empirical study model for CCA (source: own)

The procedure for testing the hypotheses states that Ho: ρ = 0 and Ha: ρ ≠ 0. The following data, were obtained from the Statistic V.10.0 software, as summarized in Table 8 and Table 8.b

Table 8. Canonical analysis summary

Canonical Analysis Summary: Canonical R: .90733 $Chi^2(df\,9)$=524.88 p=.0000		
	Left set	**Right set**
Number of Variables	3	3
Variance extracted	100%	100%
Total Redundancy	61.09%	40.15%
Variables: 1	Use and application about: Money management, saving and investment, spending and credit	Knowledge about: Money management, saving and investment, spending and credit

Table 8.b. Variance extracted and redundancy per variables

Variance Extracted (Proportions), right set		
	Variance	**Reddncy**
Root 1	.483899	.398373
Root 2	.229693	.003055
Root 3	.286408	.000067
	1.000000	.401495
Variance Extracted (Proportions), left set		
	Variance - extracted	**Reddncy**
Root 1	.739486	.608786
Root 2	.160071	.002129
Root 3	.100444	.000024
	1.000001	.610939

Taking into account the results in order, if Ho_1: ρ X1..j; Y1..j = 0 and HA1: ρ X1..j; Y1..j ≠ 0, then there are enough elements to reject the null hypothesis, since the canonical correlation coefficient R = .90733 and the calculated Chi^2 value (524.88) with *n-1 df* (9-1) > to Chi^2 tables (20.090), therefore Ho is rejected since the linear combinations of X and the linear combinations of Y, have a high correlation of .93589, as well as the Chi^2 contrast that is greater than that of tables, which gives sufficient evidence and with high statistical significance for the rejection of the null hypothesis.

In addition, the variance test extracted from the cluster X versus cluster Y, reaches 100% and a redundancy of 40.15% while in set Y, the linear combinations managed to extract 100% of the variance and a 61.09% redundancy (Table 8 and 8.b). As for redundancy, this is understood as the percentage that a set has with respect to the other and vice versa.

Table 9 shows the Chi^2 test with successive roots removed and the corresponding canonical correlation coefficients (R and R^2) with n degrees of freedom, p-value and Lambda Prime.

Table 9. Chi-Square test with successive roots

Roots Removed	Canonicl - R	Canonicl - R-sqr.	Chi-sqr.	df	p	Lambda - Prime
.000	.907	.823	524.876	9.000	.000	.174
1.000	.115	.013	4.0	4.000	.393	.986
2.000	.015	.000	.071	1.000	.791	1.000

The values obtained from the Chi^2 test (524.876 with 9 df), the canonical correlation coefficient R^2 (.823) and Lambda Prime (.174) with significance < .01 (.00) provides support to reject the null hypothesis that indicates that there is no correlation between the variables of the sets studied (Ho_1: ρ X1..j; Y1..j = 0), so the alternative hypothesis is accepted which suggests that there is a correlation between these variables (HA_1: ρ X1..j; Y1 ..j ≠ 0). In addition, table 10 shows the linear correlations between the variables studied, in which we can see that they all have positive correlations.

Table 10. Liner correlations

Variables	Use and application Money management	Use and application saving and investment	Use and application spending and credit
Knowledge Money management	.332	.532	.515
Knowledge saving and investment	.496	.899	.860
Knowledge spending and credit	.225	.296	.304
	Root 1	Root 2	Root 3
Eigenvalues	.8232558	.0133005	.0002347

Pearson's linear correlations have positive correlations, suggesting that there is a significant relationship between knowledge towards certain financial concepts and their use and application. To cite some examples, we can mention that knowledge towards saving and investment is associated with the use and application of these financial concepts (.899), same case with the use and application of spending and credit (.860).

Eigenvalues: The eigenvalues represent the square of the correlation, hence the square root of them, is the correlation between the canonical variables and the proportion of the variance with respect to the total variance.

Sign = $\sum \lambda_{1.....n =}$ .82325588758 + .01330059 + .0002347276 = .837 which represents the total variance and is expressed by $U_{1...}U_3$ y $V_{1...}V_3$

The contribution of each canonical variable is:

Sign = $\lambda 1 / \sum \lambda_{1.....n =}$ .8232558/ 0.837 = .98357921 = 98.36% of the total variance and is expressed by U_1 y V_1

$\lambda_{2 =}$ .0133005 Weight = .0133005/0.837 = .01589068 = 1.58% (explains the second canonical set).

$\lambda_{3 =}$ .0002347 Weight = .0002347/0.837 = .00028043 = .00% (explains the third canonical set).

Discussion

The results of this research bring evidence to expose the following: the data base shows high internal consistency (α=.860 in the 34 items and α=.855 in the 7 dimensions) and normality. Factorial analysis made it possible to identify an underlying structure that explains financial knowledge, as well as the use and implementation of those instruments (table 7.b) making it possible to answer research questions: RQ1, RQ2 and achieve objective O1.

The three components extracted explain the structure that is focused in the knowledge that students have on savings and investment, the perspective of economic incomes that they expect to get in the future and about money

management. This makes us think that students show a favorable attitude towards financial management; that is, towards their personal finances.

Component 1 involves 6 of the 7 variables (On the use and implementation about savings and investment topics, expenditures and credit, as well as money management and about the knowledge on topics related to saving and investment, the incomes expectations and managing money or personal finances). This outcome provides evidence to suppose that the knowledge and use that they give to topics related to money management, savings and investment and above all, the perception of the incomes that they expect to have in the future, are concordant with the knowledge they have acquired on these financial topics.

This structure coincides with the recommendations made by Lusardi and Mitchell (2011) on how important it is for people to become familiar with the basic concepts for improving personal finances and financial decisions. Huston (2010) says that financial education includes two dimensions, knowledge of finances and the implementation of that knowledge related to the concepts and products of personal finances. The implementation is the ability and trust to make use of or implement efficiently knowledge related to personal finance.

In addition, Remund (2010) states that the lack of operative variables on the topic of financial education may obstruct the comparison between the different populations for evaluating the knowledge on financial topics, for managing personal finances. These operative categories include the variables: budget, savings, loans and investment. About this, it is interesting to note the proposal of Remund (2010) however, the efforts that have been made in Latin populations, specifically in Mexico, have been significant. An example of this are the works by Contreras-Rodriguez et al. (2017) who worked on the variables of financial knowledge, the use and implementation of financial instruments as two dimensions of the financial education construct, and as sub variables savings and investment, income, expenditure, and credit and money management (table 1).

The second component shows specifically the use of savings and investment, which leads us to think that they are using these spaces for savings, even though the variable is called "savings and investment", we consider that it refers to the traditional savings accounts that the banks offer to the students. Besides, the expenditure variable and credit have a strong factorial weight in this component of use and implementation, followed by the use and implementation in money management, and this would mean that are carrying out some kind of expenditure in the modality of credit payment.

About this, Volpe et al. (2006), Rivera-Ochoa and Bernal-Dominguez (2018) have expressed the importance of financial knowledge, since this favors an adequate management of financial and credit topics at an early age; additionally, it allows people to plan their money in the long term. The outputs are consistent with the study of Contreras-Rodriguez et al. (2017), who demonstrated that the knowledge that prevails in the secondary and high school students has a relation with credit and expenditure and comes hand in hand with its use and implementation. Likewise, the variable on the use and implementation of savings and investment is integrated to this second component.

The third component picks up indicators from the variable on the use and implementation of money management. This implies that the student is carrying on the management of the money and suggests that at the same time that he is budgeting and planning the economic resources that he receives either from his parents or from some kind of paid activity. Together, the three extracted factors mean 71.780% of the variance that explains the underlying structure that explains the level of financial education of the studied population. This evidence permits answering the research questions RQ! And RQ", what favors achieving objective O1.

To answer research question RQ3: How is the cluster of variables on the knowledge of financial instruments (X1 … Xj) correlated with the variables that explain the use and implementation of the financial instruments (Y1 … Yj)? and was set as objective O2: Analyzing the multidimensional relations between the independent variables of knowledge of financial instruments and the dependent variables associated with the use and implementation of the financial instruments. The hypothesis establishes that Hi3: there is a correlation between the variables of cluster X with the variable of cluster Y.

The outputs show that there is a significant relation between the construct on the knowledge of the financial instruments and the variables associated with the use and implementation of such instruments. According to the coefficient of canonical correlation, the first self- evaluation of the first canonical variable represents 98% of the total variance (Sign = $\lambda 1 / \sum \lambda_{1.....n} = .8232558/ 0.837 = .98357921 = 98.36\%$ total variance and is expressed by U_1 y V_1). This means that the relation between the cluster of indicators associated to financial knowledge and the indicators of the use and implementation of financial tools show a statistically significant correlation.

The output given by the canonical correlational analysis about both clusters, allows inferring that the indicators that conform the construct on the knowledge about financial topics, is related to the use and implementation given by the students that took part of this study, the financial topics such as savings and investment, the management of their personal finances, credit and expenditure, among others.

Limits of the Research

Probably one of the limits for this kind of study is due to the fact that scales in Likert format measure emotions or feelings that people express at the moment of the survey; these answers may have bias, this is, and the survey respondent could give a different answer at other moment of the study. Nevertheless, the statistical inference made from the outputs is characteristic of quantitative methodology.

The data collection strategy, test implementation or questionnaires are carried out face to face with no pressure to the surveyed persons, since at every moment they are free to answer each question, besides respecting a total anonymity. With this considerations we seek to remark the possible bias of the statistical inference, since the conclusions are based on the analysis of the test statistics and the output is expressed with a certain degree of certainty in both statistical procedures: the factorial analysis and the canonical analysis ($\alpha = .05$), according to De Pelekais (2000).

Based on the aforementioned, we suggest broadening this kind of study where other instruments of data collection take part, such as cases to solve with calculations, a checklist for verifying the existence or not of savings accounts or investment, a checklist to verify some kind of credit that has been hired, and finally a checklist to verify if that is the case, if they carry out budgets or other kinds of financial tools.

Recommendations

Having in mind what Rudeloff (2019) points out, with respect to the access that youngsters have to financial services and products nowadays, it is worthwhile to continue investigating how informal sources may have an influence on the financial education of teenagers at school. Even though the parents' education is related to the evaluations of financial literacy, it is important to carry out more research on the strategies used by the parents and if they perform better to teach finances to their children.

Additionally, it is important to keep doing empirical studies in students at the high school level, since they are close to join their professional studies at the university, those who decide to continue, and increase the knowledge level of financial tools offered by the "glocal" -global-local- financial markets.

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Appendix 1

Student perception toward financial topics: Income, Money Management, Savings and Investments, Spending and Credit.

It would be so kind to indicate to the interviewer, your opinion towards the different concepts listed below.

Where 5.- Totally agree, 4.- sometimes agree, 3.- neutral, 2.- sometimes disagree, 1.- totally disagree).

INCOME					
	5	**4**	**3**	**2**	**1**
1.- You obtain a better income with a Bachelor´s degree than with a high-school diploma.					
2.- In a job, taking extra-curricular training courses results in earning more money because this makes you more valuable for your company.					
3.- The increase of taxes affects the stability of companies and increases the instability of employees.					
4.- One of the main income sources for adults aged 20 to 35 years old is wages, salaries and tips.					
5.- You consider that the main income source for students is given by a part-time job.					
6.- The amount of tax paid is proportional to the earned salary.					
7.- Net income is less than the total amount of money earned by the employee.					
MONEY MANAGEMENT	**5**	**4**	**3**	**2**	**1**
KNOWLEDGE					
8.- Pension is the income paid by a company to a retired employee.					
9.- There is a better life insurance coverage for women.					
10.- Health insurance is discontinued to a person who is unemployed.					
11.- You consider that the health insurance you receive comes from your parents.					
USE AND APLICATTION	**5**	**4**	**3**	**2**	**1**
12.- You consider that having car insurance reduces expenses in car accidents.					
13.- Obtained income must be distributed for transport, clothing, phone services and footwear.					
14.- A percentage of the amount earned must be destined to savings.					
15.- You consider that money management must be done since high-school.					
SAVING AND INVESTMENT	**5**	**4**	**3**	**2**	**1**
KNOWLEDGE					
16.- Saving must be made depending on the price of what will be bought.					
17.- Saving is money reserved for emergencies.					
18.- You consider that you know the financial products and services related to investment offered by financial institutions.					
19.- Operations in investment funds are made in financial institutions.					
USE AND APLICATTION					
20.- You directly or a family member at your home have made an investment in precious metals such as gold, silver and other currencies.					
21.- You use some kind of savings account from a financial institution.					
22.- You directly or a family member at your home, have made some kind of informal saving (group savings pool, worker´s savings fund, etc.)					
23.- You or in your home, a percentage of income is destined to saving.					
SPENDING AND CREDIT	**5**	**4**	**3**	**2**	**1**
KNOWLEDGE					
24.-You keep a record of the monthly expenses you spend your income on,					
25.- You have a strategy to know how to react when your expenses are higher than your income.					
26.- If a family has spare money from their income, it should be invested in the payment of their house´s installments.					
27.- The interest rate increases the total amount of the credit.					
28.- The banks and other financial institutions share the credit record of their users with others and it is likely that they know about the loan payments you have stopped making.					
29.- Your credit history can be checked once a year for free.					
USE AND APLICATTION					
30.- A record of expenses is kept at your home.					
31.- Monthly expenses are higher than your income.					
32.- You use some kind of credit provided by a financial institution.					
33.- You use some kind of credit provided by a department store.					
34- If you fall behind on your credit payments, you can go to institutions such as the National Comision for the Protection and Defense of Financial Services Users (CONDUSEF for its acronym in Spanish) to ask for financial advice.					

Appendix 2 (Spanish version)

Percepción del estudiante hacia los tópicos de: Ingreso, Administración del Dinero, Ahorro e Inversión, Gasto y Crédito.

Sería tan amable de indicarle al encuestador, el nivel que a su juicio considera, tiene hacia los diferentes conceptos que a continuación se enuncian.

Donde 5.- Totalmente de acuerdo, 4.- algunas veces de acuerdo, 3.- neutral, 2.- algunas veces en desacuerdo, 1.- totalmente en desacuerdo).

INGRESO					
	5	**4**	**3**	**2**	**1**
1.- Con un título universitario se obtienen mejores ingresos que si solo tuviera un certificado de bachillerato.					
2.- Tomar cursos de capacitación extracurriculares, en un trabajo, tiene como resultado ganar más dinero porque es más valioso para su empresa.					
3.- El incremento de impuestos, afecta la estabilidad de las empresas e incrementa la inestabilidad de los empleados.					
4.- Una de las principales fuentes de ingreso para los adultos de 20 a 35 años son los sueldos, salarios y propinas.					
5.- Considera usted que la principal fuente de ingreso de los estudiantes es proporcionada por un empleo de medio tiempo.					
6.- La cantidad que se paga de impuestos es proporcional al salario que se percibe.					
7.- El sueldo neto es inferior a la cantidad total de dinero que percibe el trabajador.					
ADMINISTRACIÓN DEL DINERO	**5**	**4**	**3**	**2**	**1**
CONOCIMIENTO					
8.- La pensión es el ingreso que paga una empresa a un empleado jubilado.					
9.- Existe mayor cobertura de seguros de vida para las mujeres.					
10.- El seguro de salud es suspendido la persona se encuentra desempleado.					
11.- Considera que el seguro de salud que recibe, es por parte de sus padres.					
USO Y APLICACIÓN	**5**	**4**	**3**	**2**	**1**
12.- Considera que contar con un seguro de automóvil, reduce los gastos en accidentes automovilísticos.					
13.- El ingreso que obtiene, debe ser distribuido para transporte, ropa, telefonía y calzado					
14.- Para ahorro se debe destinar un porcentaje de la cantidad que se percibe.					
15.- Considera que el desde la educación media superior se debe realizar una administración de su dinero.					
AHORRO E INVERSIÓN	**5**	**4**	**3**	**2**	**1**
CONOCIMIENTO					
16.- El ahorro se debe realizar dependiendo del precio que tenga lo que se comprará.					
17.- El ahorro es dinero que se reserva para urgencias.					
18.- Considera usted que conoce los productos y servicios financieros que en materia de inversiones ofrecen las Instituciones Financieras.					
19.- En las instituciones Financieras se realizan operaciones en fondos de inversión					
USO Y APLICACIÓN					
20.- Usted directamente o en su hogar algún familiar, han realizado alguna inversión en metales preciosos como el oro, la plata y otras divisas.					
21.- Utiliza algún tipo de cuenta de ahorro de una institución financiera.					
22.- Usted directamente o en su hogar algún familiar, han realizado algún tipo de ahorro, de manera informal (tandas, cajas de ahorro en el trabajo, etc.)					
23.- Usted o en su hogar, se destina un porcentaje del ingreso para ahorro.					
GASTO Y CRÉDITO	**5**	**4**	**3**	**2**	**1**
CONOCIMIENTO					
24.-Lleva un registro de los gastos mensuales en los que destina su ingreso.					
25.- Cuenta con una estrategia para saber reaccionar cuando sus gastos son mayores a sus ingresos.					
26.- Si a una familia le sobra dinero de su ingreso, lo debe invertir en el pago de las parcialidades de su casa.					
27.- La tasa de interés incrementa el importe total del crédito					
28.- Los bancos y otras instituciones financieras, comparten el historial de crédito de sus prestatarios con los demás y es probable saber de los pagos del préstamo que usted ha dejado de realizar.					
29.- Su historial de crédito se puede comprobar una vez al año de forma gratuita.					
USO Y APLICACIÓN					
30.- Dentro de su hogar, se lleva un control de gastos.					
31.- Los gastos mensuales son mayores a su ingreso.					
32.- Utiliza algún tipo de crédito proporcionado por una institución bancaria.					
33.- Utiliza algún tipo de crédito proporcionado por una tienda departamental.					
34- Si se atrasa en los pagos de su crédito, puede acudir a instituciones como la Comisión Nacional para la protección y Defensa de los Usuarios de Servicios Financieros CONDUSEF para buscar asesoría financiera.					