

Empirical Study on Personal Financial Literacy of University Students for Develop the Financial Education

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Abstract

Earlier surveys showed students inadequate knowledge of personal finances and pointed out the need to develop financial education. Researchers had stated that female students tend to display a lower level of personal financial literacy than male students as they have lower self-confidence and less interest to learn about Personal Finance. This study used the data gathered from Estonian university students (210 women, 326 men) by survey questionnaire. The study focused on gender differences in financial knowledge and the choices and opinions that may affect financial literacy. Results showed that females who had chosen the math-based academic discipline had a higher level of financial literacy than male students did. Furthermore, 79% of women had the interest to improve their knowledge in Personal Finance and their self-confidence was slightly higher than male students. The results obtained give the direction for future research and enable it to enhance financial education.

KEYWORDS: financial literacy assessment; financial education; gender differences; university student

1. Introduction

Financial literacy gives individuals the ability to make informed financial choices. ‘Just as it was not possible to contribute to and thrive in an industrialized society without basic literacy the ability to read and write so it is not possible to successfully navigate today’s world without being financially literate.’ (Lusardi 2017, 1).

JumpStart Coalition states: “Financial literacy is the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being.” (Remund 2010, 285).

The financial literacy definition used in an international study to assess the financial literacy of young people, PISA 2012¹, was following: “Financial literacy is knowledge and understanding of financial concepts and risks, and the skills, motivation, and confidence to apply such knowledge and understanding to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life.” (OECD 2014, 33).

Around the world, there are many different definitions of financial literacy, but the important component of these all is knowledge, which must be passed on to humans.

Several studies throughout the world have shown gender differences in financial knowledge. Researchers have argued that females tend to display lower level on personal financial literacy than males, among adults (Fonseca et al. 2010; Lusardi & Mitchell 2006; Monticone 2010; OECD 2012), students (Atkinson et al. 2006; Chen and Volpe 1998; Chen and Volpe 2002; Goldsmith et al. 1997; E. Goldsmith and R.E. Goldsmith 2006; Mändmaa 2019a; Mändmaa 2019b), and adolescents (Lusardi, Mitchell and Curto 2010). E. Goldsmith and R.E. Goldsmith (1997;2006) suggest that females have a lower level in financial literacy than males as their general interest in investment and personal finance is usually lower, and they are less confident in their ability to perform financial analysis. Following the same line of reasoning, Chen and Volpe (2002) found that women generally have not only less knowledge about personal finance, but also have less enthusiasm for, lower confidence in, and less willingness to learn about personal finance topics than men do. As Personal Finance is mostly a number-oriented subject it is not attractive to women, as women prefer courses with less mathematics and other number-oriented science. Chen and Volpe (2002) concluded that enthusiasm and confidence may be the contributing factors that explain

¹ Programme for International Student Assessment (PISA); PISA 2012 financial literacy assessment, was administrated to approximately 29.000 students in 13 OECD countries and economies (Australia, the Flemish Community of Belgium, the Czech Republic, Estonia, France, Israel, Italy; New Zealand, Poland, the Slovak Republic, Slovenia, Spain and United States) and five partner countries and economies (Columbia, Croatia, Latvia, the Russian Federation and Shanghai-China) (OECD 2014).



why men are more financially knowledgeable than women.

To draw conclusions and make suggestions for the promotion of financial education, it is important to assess the existing knowledge. Understanding how and why male and female students have different levels of financial literacy allows better improvement in financial education.

“Financial education is the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become aware of (financial) risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being and protection.” (OECD 2006, 118).

The objects of the current survey are students studying in higher education institutions in Estonia. University students are the future decision-makers and due to better jobs higher positions, bigger salaries - the most promising segment of using financial services. The lack of their financial knowledge may lead to catastrophically consequences not only on a personal level but affect the well-being of society as well.

The goal of this study is to assess the financial knowledge of female and male students' and the factors influencing their financial literacy level, in purpose to provide starting points for improving financial education. Since knowledge is closely tied with the individual's education, the study observes students' sources of financial education too.

1.1. Results and Conclusions of Previous Studies

PISA 2012 was the first large-scale international study to assess the financial literacy of young people. There were no remarkable differences in girls' and boys' financial literacy in any participated country but if look at the results of boys and girls in math and reading tests, then out of the students with similar scores, boys had a higher level of financial literacy in 12 of 18 countries, including in Estonia. Studies conducted among adults in some of the countries and economies that were participating in the 2012 PISA financial literacy assessment as well, reported that men perform better than women on surveys measuring financial knowledge. As argued, to some extent gender differences in adulthood are related to the different socio-economic characteristics of men and women. OECD 2014)

Various studies (Chen and Volpe 1998; Mandell 2008; Mändmaa 2019a; Mändmaa 2019b; Pires and Quelhas 2015) examined students' financial knowledge and revealed that students with an economic academic discipline or individuals attending programs in business sciences tend to exhibit a higher level in financial literacy. Lewis Mandell, who was surveying the Financial Literacy of Young American Adults, released his opinion: “Regardless of major, college students learn how to do research and solve problems. In a rapidly changing financial system, these two skills are more important to financial decision-making than understanding financial products, rules, and regulations. Knowing how to approach a problem and how to research it is key to making the best personal financial decisions.” (Mandell 2008, 29) According to the results, students who study science and engineering have the highest financial literacy scores, and those who study business or economics come next. (Mandell 2008)

The research among Portuguese students revealed that the existence of a prior experience, as credit clients or the existence of saving habits increases the financial literacy of individuals (Pires and Quelhas 2015). The survey among Estonian students showed that financial literacy and using financial services have a statistically significant connection (Mändmaa 2019b).

Financial literacy can have important implications for financial behavior. Previous research has found that people with low financial literacy are more likely to have problems with debt (Lusardi and Tufano 2009), and less likely to participate in the stock market (van Rooij, Lusardi, and Alessie 2007). Financial education improves credit scores, and dramatically reduces the probability of declaring bankruptcy, as well as increases significantly investment income and retirement savings (Cole, Paulson and Shastry 2012).

Financial literacy is an important component of sound financial decision-making. In a 2009 survey on credit card use among undergraduate students, 84 percent of students said they were interested in pursuing some areas of education to increase financial literacy, and 64 percent of them would have liked to receive information in high school and 40 percent as a college freshman (Sallie Mae 2009). In a survey that was organized among Estonian university students, to the question about “Do you want to get more information about financial services and monetary affairs planning?” 65 percent answered “yes”. Students with low financial literacy were more



interested, as 55 percent of the "yes" answers came from them. (Mändmaa 2019a).

2. Methodology and Data

This study uses a standardized survey method to assess participants' financial literacy. The questionnaire was designed to cover major aspects of personal finance and included knowledge on general personal finance, saving, borrowing, investment, and insurance. The survey participants were asked to answer multiple-choice questions. This study includes 10 questions on demographic data, 23 questions to measure financial literacy, and five questions about students' opinions and choices. The validity and clarity of the survey questions were evaluated by experts knowledgeable in personal finance.

The responses from each participant were used to calculate the median and mean percentage of correct scores, to measure the financial literacy levels and to analyze the results. Consistent with the existing literature (Chen and Volpe 1998; Mändmaa 2019a, 2019b), the mean percentage of correct scores were grouped into three categories. The first category represents a relatively high level (High-more than 80%) of knowledge, the second a medium (Medium 60% to 79%), and the third represents a relatively low level (Low-below 60%) of knowledge. The median percentage was used in the analysis to divide participants into two groups. Students with scores higher than the median were classified as students with relatively higher (More) knowledge and students with scores equal or below the median were classified as those with relatively lower (Less) knowledge.

Previous research advised that levels of financial literacy vary among subgroups of students (Chen and Volpe 1998, 2002; Mändmaa 2019a, 2019b). To provide evidence of the differences the Analysis of variance (ANOVA) was used.

Participants' choices to use financial services, opinions about their finance, and evaluation of sources of personal financial education, were explored. Cross-tabulation and Chi-Square tests were used to determine

differences between female and male participants. The differences were further analyzed by using ANOVA.

Based on previous research results, the students studying in math-based disciplines mostly engineering, were chosen as subjects of this study. To increase participation the poll was conducted during the lectures on the paper form. There were 536 students from Tallinn University of Technology (TalTech, one of the leading technological universities in the Baltic Sea region), participated in the poll. Students who studied civil engineering (82.5%) were a large part of the participants. In terms of gender, female participants accounted for about 39% of the sample, and male participants for 61%.

The characteristics of the sample by gender are presented in Table 1. There were five noticeable differences. First, most of the participants were Estonians (83%), but there was a difference between female and male participants, as there were six percent more Non-Estonians among female participants. Second, the higher proportion of male participants was at a higher level of education than female participants. About 70% of male participants were studying in Master or Integrated studies, while only about 61% of female participants were at the same level of education. Third, male participants were older than female participants. About 39% of male participants were older than 23 years, while only 32% of the female students were in these age groups. Fourth, the differences in participant's households: About 39% of male students stated that they live with parents or grandparents, which was their most preferred choice and exceeded the female students' same choice by 8 percent. About 26% of female participants lived together with the life partner, while only 14% of male participants had made the same choice. Fifth, there were differences in the background. Noteworthy was the existence of participant's mothers' higher education, which was significantly higher for both female and male students, than the existence of fathers' higher education (differences accordingly 15% and 13%).

Table 1 Characteristics of the Sample

Characteristics	Female participants		Male participants		Entire sample participants	
	Frequency	%	Frequency	%	Frequency	%
Total amount of observations	210	100	326	100	536	100
A. Education						
1. Academic discipline						
a) Civil Engineering	178	84.7	269	82.5	447	82.5
b) Other	32	15.3	57	17.5	89	17.5
Inc. Info technology	8	3.8	32	9.8	40	7.4
Mathematics	9	4.3	7	2.1	16	3.0
Economic	10	4.8	5	1.5	15	2.8
2. Level of education						
a) Bachelor studies	81	38.3	96	29.5	177	33.0
b) Master studies	36	17.2	59	18.1	95	17.8
c) Integrated Bachelor's and Master's Study	92	44.0	168	51.5	260	48.5
d) Unanswered	1	0.5	3	0.9	4	0.7
B. Experience						
1. Age groups						
a) 18-22	142	67.6	198	60.7	340	63.4
b) 23-29	55	26.2	102	31.3	157	29.3
c) 30 and up	13	6.2	26	8.0	39	7.3
2. The work experience						
a) None	67	31.9	104	31.9	171	31.9
b) Less than 2 years	81	38.6	126	38.7	207	38.6
c) 2 to 5 years	40	19.0	43	13.2	83	15.5
d) More than 5 years	16	7.6	50	15.3	66	12.3
e) Unanswered	6	2.9	3	0.9	9	1.7
C. Demographic characteristics						
1. Nationality						
a) Non-Estonian	43	20.5	48	14.7	91	17.0
b) Estonian	167	79.5	278	85.3	445	83.0
2. Gender						
a) Male	0	0	326	100	326	60.8
b) Female	210	100	0	0	210	39.2
3. Household size						
a) Live alone	54	25.7	102	31.2	156	29.1
b) Live with husband/ wife	55	26.2	45	13.8	100	18.7
c) Live with husband/ wife and children	13	6.2	27	8.3	40	7.5
d) Live with parents/grandparents	64	30.5	126	38.7	190	35.4
e) Other	24	11.4	26	8.0	50	9.3
D. Income						
1. Personal monthly net income						
a) Do not want to answer	36	17.1	61	18.7	97	18.1
b) Under 300 EURO	90	42.9	129	39.6	219	40.9
c) 301- 750 EURO	52	24.8	70	21.5	122	22.8
d) 751 EURO and over	32	15.2	66	20.2	98	18.2
E. Background						
1. Educational level of parents - existence of higher education						
a) Mother	120	57.1	207	63.5	327	61.0
b) Father	88	41.9	166	50.9	254	47.4
c) Stepparent	11	5.2	12	3.7	23	4.3
d) Grandparent	44	21.0	69	21.2	113	21.1
2. Number of books in childhood home						
a) Under 100	54	25.7	76	23.3	130	24.3
b) 101 – 500	112	53.3	176	54.0	288	53.7
c) More than 500	39	18.6	68	20.9	107	20.0
d) Unanswered	5	2.4	6	1.8	11	2.0

3. Results

The survey was conducted to evaluate the level of financial literacy and analyze the factors that influence the female and male students' financial knowledge. The

questionnaire was filled in by 536 university students (210 female and 326 male). The collected data were analyzed using the software Statistical Package for the Social Sciences (SPSS).



3.1 Differences in Personal Financial Literacy

Table 2 summarizes the survey responses and shows differences in financial literacy by gender. The results were presented by topic, followed by question numbers and a brief description. The first section was on general personal finance knowledge (9 questions) and the second on saving, borrowing, insurance, and investments (14 questions).

In Section I, if compared male and female students' knowledge the average scores were almost

equal accordingly 72.7% and 73.5%. In Section II, females performed better than males, accordingly 66.2% and 62.5%. On average, female students answered 69.1% of questions correctly, while male students had the correct answers to 66.5%. Table 2 also shows differences in answers to the questions by the level of financial literacy. Lower scores mainly concerned topics of insurance and interest formation. In total, survey results showed that participants' financial literacy was at the Medium level.

Table 2 Mean percentages of correct responses by gender and result of ANOVA

	Level of Personal Financial Literacy									Total %
	Low Below 60%			Medium 60-79%			High Over 80%			
	M	F	F test	M	F	F test	M	F	F test	
I General Personal finance knowledge										
1. Personal financial literacy				73.9	70.0	0.983				72.4
2. Asset liquidity	41.1	48.6	2.895							44.0
3. Definition of inflation				71.8	77.1	1.904				73.9
4. Time-value of money							79.4	83.3	1.250	81.0
5. Interest paid on a loan							95.7	96.2	0.076	95.9
6. Cost of apartment leasing				68.1	69.0	0.053				68.5
7. Legal requirement for apartment lease				66.9	70.0	0.574				68.1
8. Change in the purchasing power of money	59.5	50.9	3.811*							56.2
9. Discount valuation							97.8	96.7	0.705	97.4
Mean correct responses for the I section				72.7	73.5	0.332				73.0
II Saving, borrowing, insurance and investments										
10. Appropriate saving place				76.1	76.7	0.025				76.3
11. Calculation of interest plus principle							89.3	90.5	0.203	89.7
12. Compound interest				65.3	66.7	0.100				65.9
13. Purchasing power assessment							83.1	88.6	3.016	85.3
14. Monthly payments of mortgage				68.1	70.5	0.337				69.0
15. Interest of loan	53.4	56.7	0.557							54.7
16. Loan co-sing consequences				59.5	66.2	2.425				62.1
17. The interest rate evaluation							89.0	91.0	0.551	89.7
18. Understanding the content of insurance	35.6	38.6	0.489							36.7
19. Homeowners' insurance	33.1	43.3	5.737*							37.1
20. Revenue of different Interest calculation	46.9	49.5	0.343							47.9
21. Diversification				78.5	80.9	0.459				79.5
22. Risk and return							81.9	84.8	0.739	83.0
23. Interest rates changes and treasury bond price	15.3	22.9	4.860*							18.3
Mean correct responses for the II section				62.5	66.2	5.243*				63.9
Mean correct responses for the entire survey				66.5	69.1	3.683*				67.5
Median correct responses for the entire survey				69.6	73.9					69.6

Notes: "M" average score of male participants; "F" average score of female participants; F test marks F-statistics value; * significant at the 0.05 level.



3.2. Analysis of Results by Subgroups of the Sample

The ANOVA results in the previous section showed the gender differences in financial literacy, but the effects of other determining factors were not controlled. In this section, the relationship between personal financial literacy and the characteristics of the sample were examined (Table.3). The ANOVA had been used to detect if participants from various subgroups have differences in levels of financial knowledge.

Participants' educational background had a significant impact on their financial knowledge. The results for the entire survey clearly showed that students from the Civil Engineering department were more knowledgeable than students from other educational disciplines. On average, the students who studied engineering answered 71% (Female participants 73% and Male participants 71%) of the survey questions correctly, while on other disciplines the scores varied between 41% to 56%. The findings also suggested that participants from a different level of education had different levels of financial knowledge, and the students of Master studies knew more than students at Integrated studies or Bachelor studies. The testing results of ANOVA indicated that the differences in the Education area were statistically significant at the 0.01 level.

The participants from different age groups had different levels of financial knowledge. The group of youngest students (18-22) got the lowest score (67%) and the group of oldest students (30 and up) reached the highest (73%) score. These results were statistically

significant at the 0.05 level and were as expected, as knowledge grows over time. The work experience, which grows over time and broadens people's perceptions, was also a statistically significant factor (at the 0.01 level) that affected financial literacy. In the subgroup Experience, the results did not have remarkable gender differences.

Findings showed students' different demographic characteristics influenced their financial knowledge. The nationality influenced the level of financial literacy and the difference between Estonians and non-Estonians correct answers scores was 4%. The growth of the personal household size had a positive impact on financial literacy. The difference in students' financial literacy in a situation where the student lived alone (67%) or lived together with partners and children (70%) was 3%. The different scores in this subgroup were statistically significant at the 0.05 level.

The differences in financial knowledge in the subgroup, Personal monthly net income, were statistically significant at the 0.01 level and the financial literacy level rose together with income. Students' who revealed their monthly income less than 300 EURO, had the average score of correct answers 67%, and students who earned over 750 EURO per month, the score of correct answers was 72%. In the subgroup Income, the differences in results of female and male participants were similar.

Based on F-statistic values there were no significant differences in a subgroup named Background (Level of education of the parents and Number of books in childhood home).

Table 3 Characteristics of the Sample with percentage of correct answers by gender, and results of ANOVA

	Female participants %	Male participants %	Entire sample %
A. Education			
1. Academic discipline			
a) Civil engineering	72.54	70.78	71.48
b) Info technology	55.98	47.83	49.45
c) Mathematics	41.06	41.61	41.30
d) Economic	49.56	41.74	46.95
e) Other departments	55.65	46.82	49.27
F Statistic	(26.518)**	46.678**	(71.183)**
2. Level of education			
a) Bachelor studies	69.73	61.41	65.22
b) Master studies	75.97	73.32	74.32
c) Integrated Bachelor's and Master's Study	65.88	67.34	66.82
d) Unanswered	60.87	47.83	47.83
F Statistic	(4.490)**	(9.650)**	(10,066)**
B. Experience			
1. Age groups			
a) 18-22	68.83	65.22	66.73
b) 23-29	68.54	67.39	67.79
c) 30 and up	73.91	72.74	73.13
F Statistic	(0,764)	(3,013)*	(3,183)*
2. The work experience			

a) None	66.45	64.51	65.27
b) Less than 2 years	69.03	65.08	66.24
c) 2 to 5 years	72.17	69.06	70.56
d) More than 5 years	73.37	72.00	72.33
e) Unanswered	66.67	66.67	66.67
F Statistic	(1.380)	(2.632)*	(3.693)**
C. Demographic characteristics			
1. Nationality			
a) Estonian	69.28	67.66	68.26
b) Non-Estonian	68.25	59.78	63.78
F Statistic	(0,168)	(10.965)**	(6.659)*
2. Gender			
a) Male	-	-	66.50
b) Female	-	-	69.07
F Statistic	-	-	(3.683)*
3. Household size			
a) Live alone	67.79	67.01	67.28
b) Live with husband/ wife	71.70	67.34	69.74
c) Live with husband/ wife and children	70.23	69.89	70.00
d) Live with parents/grandparents	65.42	64.77	64.99
e) Other	75.00	67.89	71.30
F Statistic	(2.622)*	(0.833)	(2.953)*
D. Income			
1. Personal monthly net income			
a) Do not want to answer	65.82	59.80	62.03
b) Under 300 EURO	68.69	65.59	66.86
c) 301- 750 EURO	69.81	68.57	69.10
d) 750 EURO and over	72.55	72.27	72.36
F Statistic	(1.264)	7.939**	(8.465)**
E. Background			
1. Level of education of the parents. Higher education exists			
a) Mother	69.31	67.73	68.31
b) Father	68.38	66.58	67.20
c) Stepparent	70.75	71.74	71.27
d) Grandparent	68.67	66.29	67.22
F Statistic	(0.040)	(0,016)	(0,051)
2. Number of books in childhood home			
a) Under 100	70.21	66.30	67.93
b) 101 – 500	68.94	65.46	66.82
c) More than 500	68.34	69.88	69.32
d) Unanswered	65.22	60.87	65.84
F Statistic	(0,257)	(1.632)	(1.002)

Notes: *significant at the 0.05 level; **significant at the 0.01 level or greater.

3.3 Analysis of Results by Participants' Choices

Analysis of variance had used to detect if participants with different financial choices had different levels of financial knowledge. Based on earlier studies (Pires and Quelhas, 2015; Mändmaa 2019b) the use of financial services has an impact on students' financial literacy.

Current study results showed that financial services having a statistically significant effect were: Current Account, Debit Card, Housing loan (only on male participants'), Insurance, Investment Services, Pension fund shares, and Credit Card. To describe the users of statistically significant financial services the Cross-tabulation and Chi-square tests had run. The results are exposed in Table 4.

Students with higher levels of financial literacy used financial services more than students with lower

financial knowledge and vice versa the financial services users had higher financial literacy levels. (Table 4, columns 8 and 9). The argument had confirmed by choices made by students studying in Civil Engineering department (Table 4, columns 2 and 3), who were significantly more active users of financial services than students from other study fields (Table 3, Financial literacy scores in Civil Engineering 71-73% and Others 41-56%).

Differences in students' choices on using Debit Card were statistically significant and confirmed earlier argument, as Non-Estonian students share among debit card users was 11% smaller (Table 4, 81% of Estonians and 70% of Non-Estonians) and their financial literacy score was 4% lower (Table 3, Estonians 68% and Non-Estonians 64%).

Based on Chi-square tests there were no significant differences between female and male students'

choices (Table 4), and as the tests, statistical significance was over 0.05 these generalizations are not appropriate.

Table 4 Description about users of currently available financial services

A. Using the Current Account		CED	Other	Estonian	Non-Estonian	Male	Female	FL less	FL more
1	2	3	4	5	6	7	8	9	
Yes	Count	392	60	379	73	272	180	169	283
	% of column	87.7	67.4	85.2	80.2	83.4	85.7	72.8	93.1
No	Count	55	29	66	18	54	30	63	21
	% of column	12.3	32.6	14.8	19.8	16.6	14.3	27.2	6.9
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.6	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=23.098**		Chi-Square=1.400		Chi-Square=0.502		Chi-Square=40.817**	
B. Using the Debit Card		2	3	4	5	6	7	8	9
Yes	Count	368	57	361	64	262	163	161	26
	% of column	82.3	64.0	81.1	70.3	80.4	77.6	69.4	86.8
No	Count	79	32	84	27	64	47	71	40
	% of column	17.7	36.0	18.9	29.7	19.6	22.4	30.6	13.2
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.6	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=15.107**		Chi-Square=5.361*		Chi-Square=0.588		Chi-Square=24.388**	
C. Using the Credit Card		2	3	4	5	6	7	8	9
Yes	Count	99	12	97	14	69	42	37	74
	% of column	22.1	13.6	21.8	15.4	21.2	20.0	15.9	24.3
No	Count	301	61	299	63	215	147	155	207
	% of column	67.3	69.3	67.2	69.2	66.0	70.0	66.8	68.1
Yes, but not my own	Count	38	9	38	9	34	13	27	20
	% of column	8.5	10.2	8.5	9.9	10.4	6.2	11.6	6.6
Unanswered	Count	9	7	11	5	8	8	13	3
	% of column	2.0	6.8	2.5	5.5	2.5	3.8	5.6	1.0
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.6	16.4	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=8.913*		Chi-Square=4.016		Chi-Square=3.797		Chi-Square=17.744**	
D. Using Housing loan		2	3	4	5	6	7	8	9
Yes	Count	31	1	30	2	21	11	11	21
	% of column	6.9	1.1	6.7	2.2	6.4	5.2	4.7	6.9
No	Count	416	88	415	89	305	199	221	283
	% of column	93.1	98.9	93.3	97.8	93.6	94.8	95.3	93.1
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.9	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=4.465*		Chi-Square=2.779		Chi-Square=0.330		Chi-Square=1.100	
E. Using Insurance Services		2	3	4	5	6	7	8	9
Yes	Count	143	15	138	20	101	57	52	106
	% of column	32.0	16.9	31.0	22.0	31.0	27.1	22.4	34.9
No	Count	304	74	307	71	225	153	180	198
	% of column	68.0	83.1	69.0	78.0	69.0	72.9	77.6	65.1
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.6	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=8.181**		Chi-Square=2.966		Chi-Square=0.905		Chi-Square=9.818**	
F. Using Investment Services		2	3	4	5	6	7	8	9
Yes	Count	40	1	36	5	23	18	6	35
	% of column	8.9	1.1	8.1	5.5	7.1	8.6	2.6	11.5
No	Count	407	88	409	86	303	192	226	269
	% of column	91.1	98.9	91.9	94.5	92.9	91.4	97.4	88.5
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.6	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=6.433**		Chi-Square=0.720		Chi-Square=0.416		Chi-Square=14.844**	
G. Using Pension fund shares		2	3	4	5	6	7	8	9
Yes	Count	138	16	125	29	92	62	50	104
	% of column	30.9	18.0	28.1	31.9	28.2	29.5	21.6	34.2
No	Count	309	73	320	62	234	148	182	200
	% of column	69.1	82.0	71.9	68.1	71.8	70.5	78.4	65.8
Total	Count	447	89	445	91	326	210	232	304
	% of Total	83.4	16.6	83.0	17.0	60.8	39.2	43.3	56.7
		Chi-Square=6.027**		Chi-Square=0.527		Chi-Square=0.106		Chi-Square=10.297**	

Notes: CED- Civil Engineering department; Sig= significant at the level; *significant at the 0.05 level; **significant at the 0.01 level or greater.

3.4. Relationships between Interest, Self-assessment, Confidence and Financial Literacy

Three different samples and the answers for two questions had used to analyze this topic. The first question examined participants' interest in improving their financial literacy (results in Figure 1) and the second asked them to evaluate their financial knowledge (results in Table 5).

Figure 1 describes participants' interest in financial topics through the differences by gender and

financial literacy (FL) levels. The results showed that male students had more interested (84% of males and 79% of females), but female students had a higher level of financial literacy (females' 69% and males 66%). About 82% of all students participated in the poll admitted their interest to improve financial literacy level and only 8 % of participants found that there no need for improvement (F Statistic= 4.724 significant at 0,009 level).

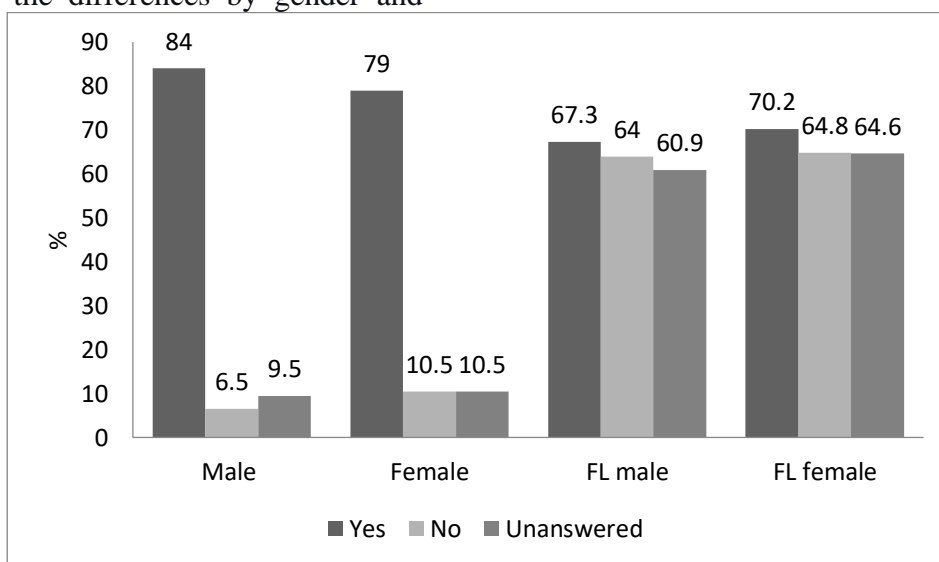


Figure 1 Students' interest about financial topics by gender and financial literacy

46% of females and 39% of male students rated their financial literacy level to "High" and only 8% of women and 9% of men rated their level to "Low". The results about the evaluation of participants' financial literacy showed that 24 % of females' and 17% of males had financial knowledge at a high level, and 24% of women and 27% of men had scored at a low level (Table 5). The level of own financial literacy had assessed rightly by 203 students, which accounted for 38% of the total number of respondents in the full sample (Table 5 A) and similar proportions were in samples "Female" (39%, Table 5 B) and "Male" (37%, Table 5 C). These results could be concluded that students had overrated their knowledge, as in full sample the 42% of students evaluated their knowledge to the high level, but only 20%

of those in the survey exceeded the high-level border (right answers 80% and over). The students who assessed their financial knowledge to the high level (225 incl. 97 female students, i.e. 46% of females and 128 male students, i.e. 39% of males) could be counted as self-confident, as well these students (55 incl. 17 female students, and 38 male students) whose financial literacy level was low but proposed own level as the medium. The differences between self-assessment and actual scores were significant for both female and male participants (Table 5, the difference at a high level 22% for both, and at low level 16% and 18%, respectively).

In questions about confidence and interest the disparities among female and male students were minor (2 to 5%).

Table 5 Differences in self- assessments

A. Self-assessment about financial knowledge?		Financial literacy level			Full sample
		Low	Medium	High	
High	Count	41	125	59	225
	% within	18.2%	55.6%	26.2%	100.0%
	% within column	29.5%	42.8%	56.2%	42.0%
Medium	Count	55	121	35	211
	% within	26.1%	57.3%	16.6%	100.0%
	% within column	39.6%	41.4%	33.3%	39.4%
Low	Count	23	20	2	45
	% within	51.1%	44.4%	4.4%	100.0%
	% within column	16.5%	6.9%	1.9%	8.4%
Hard to say	Count	20	26	9	55
	% within	36.4%	47.3%	16.3%	100.0%
	% within column	14.4%	8.9%	8.6%	10.2%
Total	Count	139	292	105	536
	% of Total	25.9%	54.5%	19.6%	100.0%
Note:		Chi-Square=12.847*			
		Sig= 0.046			
B. Self-assessment about financial knowledge?		Financial literacy level			Females sample
		Low	Medium	High	
High	Count	17	49	31	97
	% within	17.5%	50.5%	32.0%	100.0%
	% within column	34.0%	44.5%	62.0%	46.2%
Medium	Count	17	41	16	74
	% within	23.0%	55.4%	21.6%	100.0%
	% within column	34.0%	37.3%	32.0%	35.2%
Low	Count	9	6	1	16
	% within	56.3%	37.5%	6.3%	100.0%
	% within column	18.0%	5.5%	2.0%	7.6%
Hard to say	Count	7	14	2	23
	% within	30.4%	60.9%	8.7%	100.0%
	% within column	14.0%	12.7%	4.0%	11.0%
Total	Count	50	110	50	210
	% of Total	23.8%	52.4%	23.8%	100.0%
Note:		Chi-Square=17.446**			
		Sig= 0.008			
C. Self-assessment about financial knowledge?		Financial literacy level			Males sample
		Low	Medium	High	
High	Count	24	76	28	128
	% within	18.8%	59.4%	21.9%	100.0%
	% within column	27.0%	41.8%	50.9%	39.3%
Medium	Count	38	80	19	137
	% within	27.7%	54.4%	13.9%	100.0%
	% within column	42.7%	44.0%	34.5%	42.0%
Low	Count	14	14	1	29
	% within	48.3%	48.3%	3.4%	100.0%
	% within column	15.7%	7.7%	1.8%	8.9%
Hard to say	Count	13	12	7	32
	% within	40.6%	37.5%	21.9%	100.0%
	% within column	14.6%	6.6%	12.7%	9.8%
Total	Count	89	182	55	326
	% of Total	27.3%	55.8%	16.9%	100.0%
Note:		Chi-Square=19.067**			
		Sig= 0.004			

Notes: Sig = significant at the level; *significant at the 0.05 level; **significant at the 0.01 level or greater.

3.5 Students Sources of Personal Financial Education

Students asked to evaluate the importance of the financial knowledge they have acquired from different financial education providers on a scale of 1 to 5, where 1

is of little importance and 5 is especially important. Position 6 has used in cases “Cannot say” or “Unanswered”. 51% of women and 47% of men evaluated the knowledge obtained from their parents especially important (“5”), and 27% of women and 24% of men important (“4”), (Figures 2B and 2C).

Evaluation of the importance of the financial knowledge acquired from parents, family:

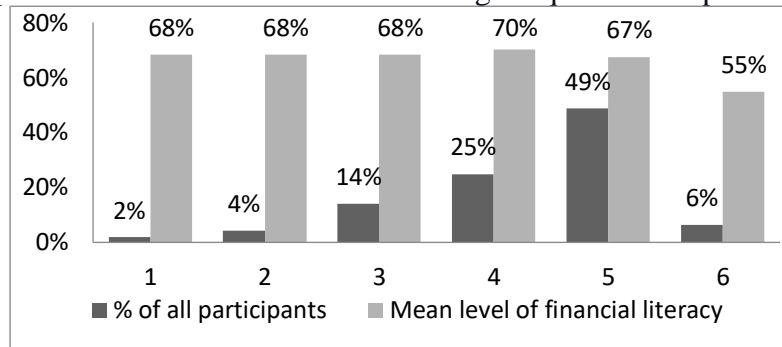


Figure 2A Entire sample
Notes: F=4.365 Sig=0.000

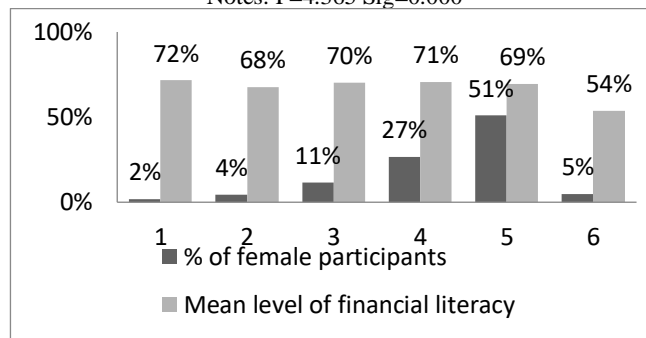


Figure 2B Sample of female students
Notes: F=2.594 Sig=0.027

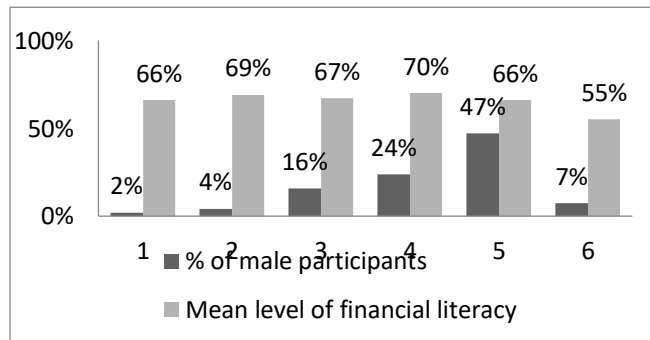


Figure 2C Sample of male students
Notes: F=3.608 Sig=0.003

The next most important financial knowledge provider was university as it was evaluated by 49% of women and 52% of men with grade "5" or "4" (Figures 3B and 3C).

Evaluation of the importance of the financial knowledge acquired from University

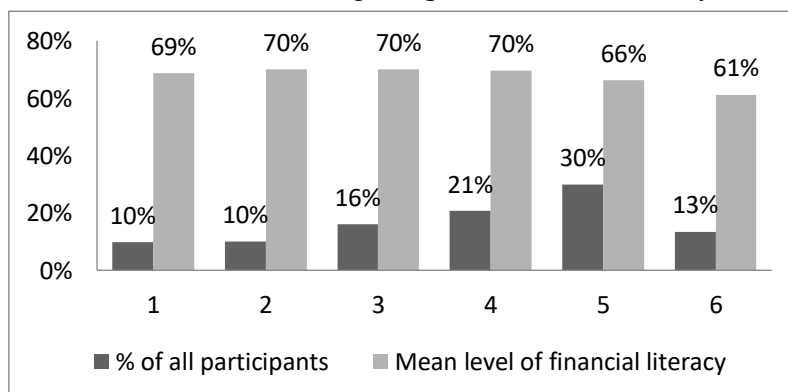


Figure 3A Entire sample
Notes: F=4.072 Sig=0.001

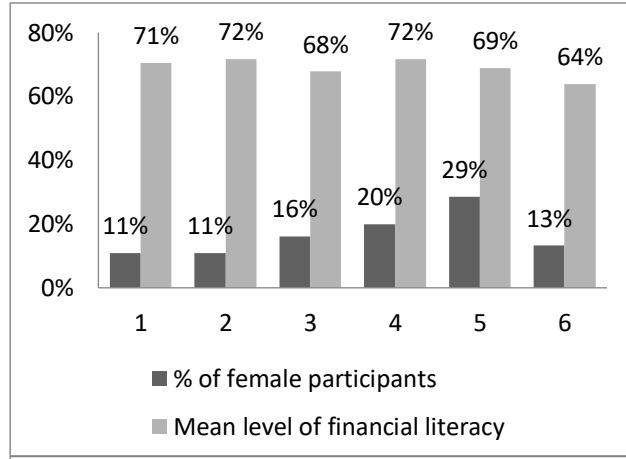


Figure 3B Sample of female students
Notes: F=1.249 Sig=0.288

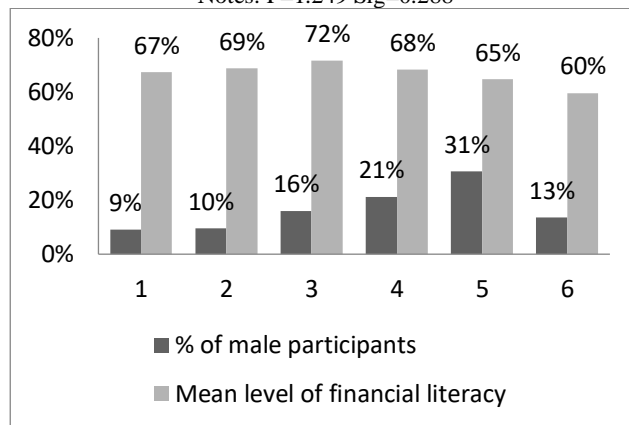


Figure 3C Sample of male students
Notes: F=3.645 Sig=0.003

The personal financial knowledge acquired from High School had rated important, as 49% of women and 50% of men evaluated it with grades "5" or "4" (Figures 4B and 4C).

Evaluation of the importance of the financial knowledge acquired from High School

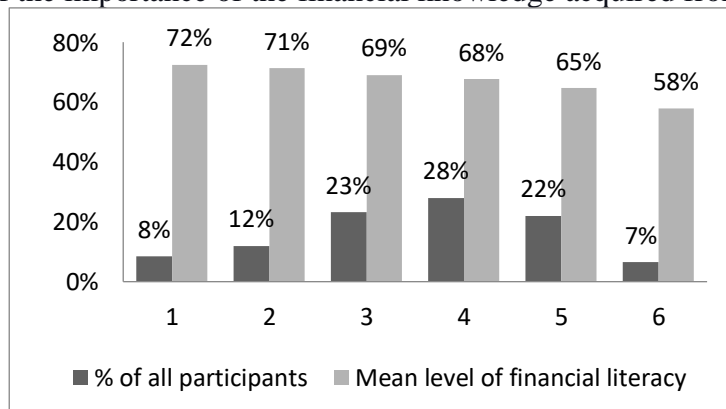


Figure 4A Entire sample
Notes: F=6.005 Sig=0.000

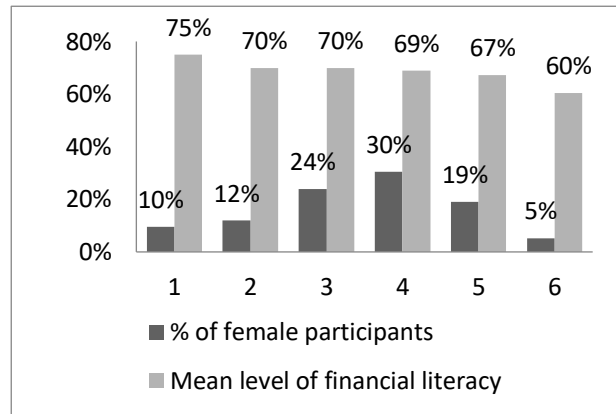


Figure 4B Sample of female students

Notes: F=1.610 Sig=0.159

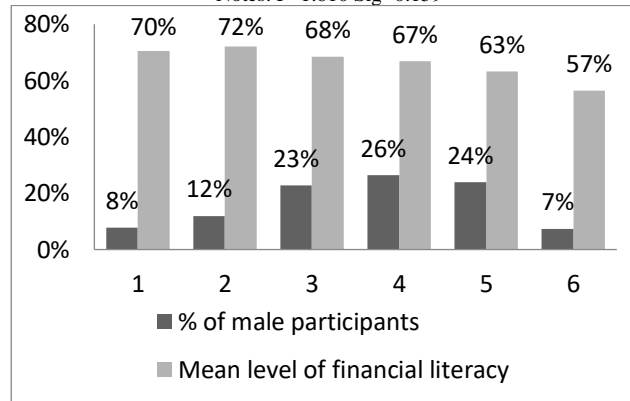


Figure 4C Sample of male students

Notes: F=4.524 Sig=0.001

The importance of the financial knowledge that had acquired from Primary School had rated as little importance. The grade “1” had given by 62% of females and by 58% of male participants (Figures 5B and 5C).

Evaluation of the importance of the financial knowledge acquired from Primary School

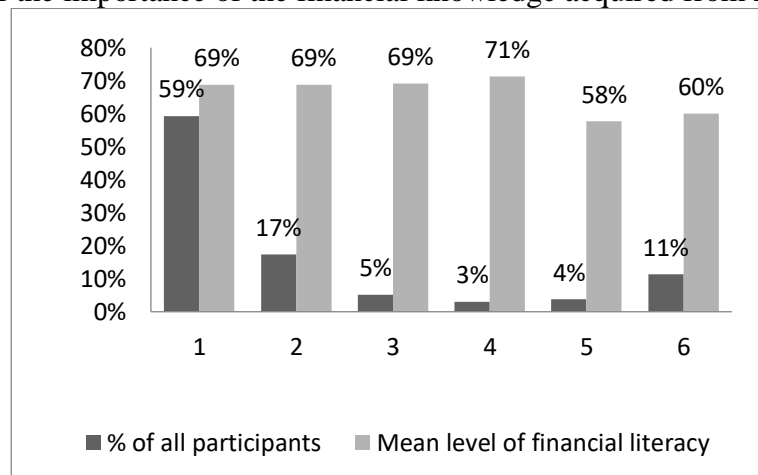


Figure 5A Entire sample

Notes: F=5.744 Sig=0.000

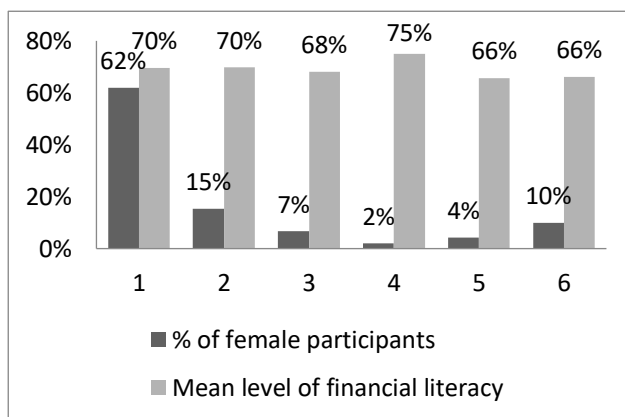


Figure 5B Sample of female students
Notes: F=0.456 Sig=0.809

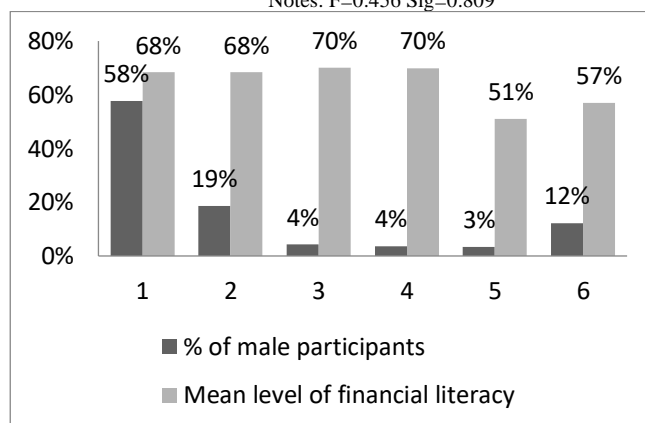


Figure 5C Sample of male students
Notes: F=6.820 Sig=0.000

F-statistic showed that there were no statistically significant differences between men's and women's results.

4. Discussion

Statistically significant results showed that on average female students know more (69.1%) about personal finance than males (66.5%). The previous study among Estonian university students (Mändmaa 2019b) revealed that men have a higher level of financial literacy than women and similar results got Atkinson et al. (2006) in interviewing UK population; Goldsmith & Goldsmith (1997;2006) and Chen & Volpe (1998;2002) while researching the US students; Lusardi et al. (2010) who examined the US youth and Monticone (2010) who studied the population of Italy. Wagland and Taylor (2009) who examined the level of financial literacy of Australian students, came to the result that gender does not affect the level of financial literacy. Altintas (2011), whose study was conducted in Turkey, and Pires and Quelhas (2015), whose study was conducted in Portugal, got similar results to the present study, that the level of female students' financial literacy is higher than males.

The important factors that affect the level of financial literacy of university students were: Educational

background academic discipline and level of education; Experience the participants' age groups and the work experience; Demographic characteristics nationality and household size and income (Table 3). There were some differences between the samples of females and males, as factors like age, work experience, nationality, and income were not statistically significant for females and household size for males. Previous study results suggested that statistically significant factors that influencing Estonian university students' financial literacy were the academic discipline, level of education, gender, age, and nationality (Mändmaa 2019a).

Based on the current research it can be argued that the higher scores in financial literacy of female students have a direct relation to the choice of academic discipline, as female students from Civil Engineering department got the higher financial literacy scores than male students or students studying in any other study field (Table 3). The results, obtained by this survey, reflect the positive impact of mathematics and other number-oriented sciences to financial literacy.



In the results of Pisa 2012, where girls and boys aged 15 were tested in financial literacy, there were no significant gender differences. The differences occurred when the results of the math and reading tests were included in the analysis, and students' with similar scores were compared. Then the results showed that boys had a higher level of financial literacy than girls. Looking more closely at the results of the PISA test of Estonian students' in mathematics, it can be seen that since 2009 there is a statistically significant difference between the levels of girls and boys, with the average score of girls being lower (points in 2009: boys 516 and girls 508; points in 2012: boys 523 and girls 518). (SA Innove 2013) The gender gap in the results of the study conducted in 2012 among Estonian university students was statistically significant and the level of financial literacy of females was lower than that of males (females 56% and males 64%). Students who studied on non-economic disciplines or other non-math-oriented specialties got weaker results, and the share of correct responses in women was 53% and in men 63%. (Mändmaa 2019a; Mändmaa 2019b)

The results of the girls' math tests and the female students' financial literacy assessments are supporting evidence of the relationship between mathematics skills and financial literacy levels.

Current study results confirm that students who use financial services have more knowledge in financial literacy (Table 4). The findings of a study conducted among Portuguese students showed that the existence of a prior experience, as credit clients or the existence of saving habits increases the financial literacy of individuals (Pires and Quelhas 2015). An earlier study conducted among Estonian university students exhibited that financial services with statistically significant effects were: Debit Card, Bank loan, Investment Services, and Insurance (Mändmaa 2019b). Present study results show that there are more financial services with statistically significant effect: Current Account; Debit Card; Credit Card, Housing loan; Insurance; Investment Services; Pension fund shares, but statistically significant gender differences have not revealed in this area (Table 4).

Previous research has found that people with low financial literacy have more likely problems with debt and less likely to participate in the stock market (Lusardi and Tufano 2009; van Rooij et al. 2007). The results of this study show that students' use of loan instruments was low, but investments were not popular either, and there were no statistically significant differences between female and male students in the use of the financial

services (Table 5). As an explanation of the current situation, it should mention the relatively short period of post-socialism, during which the habits of the population have not yet changed, and the Estonians conservative attitude towards money matters.

In the USA conducted a survey among undergraduate students, 84% of participants said they needed more education on financial management topics (Sallie Mae, 2009). In a previous study in Estonia to the question "Do you want to get more information about financial services and monetary affairs planning?" 65% of the participants answered "yes". More curiosity had students with low financial literacy levels (below the median 57.14% level). The level of interest to get additional information about financial services and monetary affairs planning among male and female students was quite similar. Male students' interest was just 5% lower. (Mändmaa, 2019b)

In the present survey the students' opinions, about needs to improve their financial literacy, showed the rising trend, as 79% of female students and 84% of male (Figure 1) students reported that they have the interest to improve their financial literacy. The level of male students' interest was 5% higher, while the level of financial literacy was higher among female students (accordingly females' 69% and males' 66%).

To evaluate students' confidence, they were asked to assess their own financial literacy level. The level was assessed rightly by 203 students, which accounted for 38% of respondents in the full sample (Table 5), including 39% of females and 37% of male students. Students who assessed their financial knowledge to the high level (225 incl. 97 female and 128 male students) could be counted self-confident, as well as those (55 incl. 17 female students and 38 male students) whose financial literacy level was low but proposed own level as the medium.

Previous studies (Goldsmith and Goldsmith 1997; Chen and Volpe 2002) observed that women have lower confidence in and less interest to personal finance than men do and pointed to those as possible reasons for gender differences in financial literacy. The results of the current study do not confirm these observations, as nearly half (46%) of female participants rated their financial knowledge to a High level, and that shows rather higher than low confidence. At the same time, the disparities between female and male students were minor, in self-assessments and in having an interest in topics of personal finances.



To evaluate the sources of personal financial knowledge, students were asked to rate the importance of the acquired financial education and knowledge providers. The highly rated source of personal financial education for female and male students was family, the University and High School were the next (Figures 2, 3 and 4). Primary School (Figure 5) was marked of little importance for 56% of students (female 62% and male 58%).

The discussion can be concluded by agreeing with earlier researchers' opinions that further development of financial education in university is important, as students have expressed interest and the results of the students' financial literacy assessment show the need for improvement. In addition, students will be soon the founders of the family themselves, and the parents' financial knowledge and ability to manage resources efficiently are important factors in the development of the next generation's financial well-being.

5. Conclusion

This study analyzed the responses collected from Estonian university students by the survey questionnaire, in order to evaluate students' financial literacy in purpose to develop personal financial education. 536 students, 210 women, and 326 men participated in the survey and by the results their financial literacy level was Medium. The study showed statistically significant gender differences in financial literacy. On average, female students answered correctly to 69.1% of questions, while male students had the correct answers of 66.5%. Lower scores mainly concerned topics of insurance and interest formation. The important factors that affected the level of financial literacy of women and men were: Participants' Education academic discipline and level of education; Experience participants age group and work experience; Demographic characteristics - nationality and household size; Income; and the use of Financial services (Current Account, Debit Card, Credit Card, Home Loan, Insurance, Investment Services, Pension Funds Shares). 82% of all participants (84% of males and 79% of females) admitted their interest to improve the financial literacy level. The highly-rated source of personal finance education for female and male students was family, and the university was the next.

Several previous studies have shown that men have a higher level of financial literacy than women and a few studies have referred to the low interest of female students about financial topics and mathematics or other number-oriented subjects as reasons. The results of this

study showed that female students' financial literacy results may be higher than male students' if the selected academic discipline is linked with mathematics. So, it could be stated that the existence of an interest in mathematics, as a numerical and logical subject, supports the orientation in financial systems and helps to improve one's personal as well more broadly social financial well-being.

Unfortunately, this study could not give the full answers about what boosts the math interest, not either why are there gender differences in financial literacy or how to manage them. There are myths and gender roles having their effects. The myths that girls are weaker in mathematics or science could hinder their advancement, as these may occur some aversion to the subject. To reverse the situation the education system is in a privileged position as several studies show that students are successful in the subjects they like.

Students' financial literacy, choices, and opinions were assessed for the purpose to find the need and gaps in students' knowledge to develop personal financial education. The survey gave a great overview but for better outcomes, the study should be continued as there are still a lot of open questions.

This study found out that the form of a questionnaire is good for evaluation but not particularly enough for improvement in the courses.

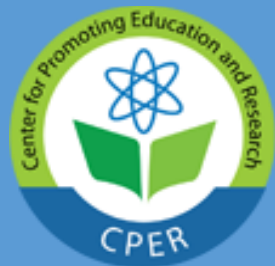
The current study had its limits, as the questionnaire was anonymous, there was no ability to contact participants later. For better outcomes there should be added the question about participant's contact data - phone number or e-mail address, to clarify their views and let them express their perspectives on, for example about the inclusion of the necessary topics, explanations, etc.

Nowadays financial literacy is essential as in a society much of the financial responsibility has shifted from governments to the individual. Further development of financial education in universities is important, as students' financial literacy assessment shows the need for improvement, and students will be our next financially active generation leaders, family founders, parents, etc.

This study provides sound evidence for researchers and will be useful for politicians and educators in the purpose to develop financial education.

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