

Financial Literacy of Engineering Students - Waiting for PISA 2018 Results in Serbia

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Abstract: *Financial literacy is one of the necessary skills for all professionals in 21st century. Engineering students who are finishing their undergraduate studies are expected to be the leaders of development of every country, so it is important to investigate their level of financial literacy. The main goal of this research is to examine financial literacy of university students at engineering study programs using PISA methodology. The sample consisted of 71 engineering students of Faculty of technical sciences in Čačak, Serbia. The questionnaire consisted of examples of PISA financial literacy assessment questions described in detail in PISA 2015 Results; it consisted of 11 tasks, measuring five proficiency levels of financial literacy. The results show that majority of engineering students perform at Level 4 of financial literacy. Regarding the content of financial literacy the results suggest that money and transactions as well as planning and managing finances are the content categories that are more familiar to engineering students, while risk and reward and financial landscape are more challenging to them. Limitations and further educational implications of this research are discussed.*

Keywords: *Financial literacy; engineering students; PISA research.*

1. FINANCIAL LITERACY

1.1. Financial literacy as an essential skill for 21ST century

Financial literacy is not a skill owned by economists, accountants, financial managers only, but necessary for all professionals in order to make good financial decisions, in personal and business life also. Alongside the specific skills and key competencies of each profession, the importance of financial literacy is increasing all the time [1].

Living in 21st century, in which we meet new technologies and financial instruments every day, means that each individual, since early age has sufficiently developed competencies for using it. Many young people are already consumers of financial services; individuals make financial decisions for themselves at all ages: from children deciding how to spend their pocket money to teenagers entering the world of work, from young adults purchasing their first home to older adults managing their retirement savings. Globalization and digital technologies have made financial services and products more widely accessible and at the same time more challenging. As financial markets continue to evolve, individuals are faced with a wide variety of products, many of which are not easy to understand. Decisions made and outcomes experienced are not important only at the household level, but also for the economy as a whole [2, 3].

Financial literacy was the subject studied around the world by governments, financial entities and academic studies [4]. The first studies measuring

financial literacy came out more than a decade ago [5], and the results revealed lack of financial knowledge worldwide. Since then numerous studies were done, but the results shows that little has changed.

1.2. Financial literacy in education

Financial literacy training can arm individuals with the financial knowledge necessary to create household budgets, initiate savings plans, manage debt, make strategic investment decisions for their retirement or their children's education and maintain financial security through tax and insurance planning [6].

Youth faces very early with significant financial challenges, responsibilities and decision and that is why financial education has become necessary for successful functioning. Education has a vital role to play in developing the knowledge, skills, attitudes and values that enable people to contribute to and benefit from an inclusive and sustainable future. Education needs to aim to do more than prepare young people for the world of work; it needs to equip students with the skills they need to become active, responsible and engaged citizens [7]. Financial literacy should be recognized as a skill essential for participation in today's economy [8, 9]. Many studies found that financial education has significant positive impact on financial literacy [10, 11, 12]. Providing financial education for children and youth is an important component in the transition from childhood to adulthood and the development of financially responsible citizens [13, 9]. Introducing financial literacy in schools' programs will create good financial habits at an

early age and likely bring benefits to schooling, employment, and standards of living throughout adulthood [4].

Individuals who have participated in a financial education class or program - provided in high school or college, in the workplace, or by a community organization - had higher financial literacy than those who have not received financial education [2, 20].

Many governments are aware and agree that in order to reach financial stability within their countries; they should raise the financial literacy level of their citizens [3]. There are numerous initiatives in the world created with the goal to improve financial literacy, because research showed that even the most developed countries in the world have low level of financial literacy [16].

Global Financial Literacy Excellence Center (GFLEC), founded by Anamaria Lusardi, an early contributor to financial literacy as a field of study, develops personal finance education material for schools and the workplace and builds initiatives to advance financial literacy [17]. European banking associations, together with the European Banking Federation, organized the European Money Quiz, in order to make learning about money and finance more fun. The quiz took place for the first time in March 2018, as a Europe-wide competition, where thousands of kids from 30 countries were involved. Throughout one week in March each year, hundreds of activities are held in 20+ countries to promote financial literacy in Europe [18]. The Association of Serbian Banks will enable the realization of this project in Serbia, with support from the Ministry of Education, Science and Technological Development of Serbia. Programs for financial education did not exist earlier in Serbia, so Ministry of Education, Science and Technological Development with the support of VISA company, began a pilot project for systematic inclusion of financial literacy in education system, including all children, from preschool age to secondary school. FinPis project implies teaching through creating an environment for the development of functional knowledge in this field, as well as programs/subjects through which financial literacy, as a multidisciplinary competence, can be engaged and developed [19].

1.3. PISA framework of financial literacy

OECD in their PISA research defined financial literacy as *knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order 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* [14]. Financial literacy was tested for the first time worldwide in 2012. That year 18 countries/regions took part in the PISA test on financial literacy [14], while the second PISA assessment of financial

literacy in 2015 covered 15 countries and economies [15].

The PISA 2015 financial literacy assessment included items in the four content categories, the four processes and the four contexts [15]. The **content** categories comprise the areas of knowledge and understanding that are essential for financial literacy. The four content areas are: money and transactions; planning and managing finances; risk and reward; and the financial landscape. The **process** categories relate to cognitive processes. They describe students' ability to recognize and apply concepts relevant to the domain, and to understand, analyze, reason about, evaluate and suggest solutions. In PISA financial literacy, four process categories have been defined in no particular hierarchical order: identify financial information; analyze information in a financial context; evaluate financial issues; and apply financial knowledge and understanding. Finally, the **context** categories refer to the situations in which the financial knowledge, skills and understandings are applied, ranging from the personal to the global. The contexts identified for the PISA financial literacy assessment include: education and work; home and family; individual; and societal.

The single continuous scale of financial literacy constructed for the PISA 2012 assessment was divided into five proficiency levels in PISA 2015 [15]. Students proficient at **Level 1** display basic financial literacy skills. They can identify common financial products and terms, and interpret information relating to basic financial concepts, such as recognizing the purpose of an invoice. **Level 2** can be considered the baseline level of proficiency in financial literacy that is required to participate in society; students are expected to begin to apply their knowledge to make financial decisions in contexts that are immediately relevant to them. Students proficient at **Level 3** can apply their knowledge to commonly used financial concepts, terms and products to situations that are relevant to them. Students proficient at **Level 4** on the financial literacy scale can apply their knowledge of less-common financial concepts and terms to contexts that will be relevant to them as they move towards adulthood. Finally, students at **Level 5** on the PISA financial literacy scale can analyze complex financial products and take into account features of financial documents that are significant but unstated or not immediately evident. At each level, students are also expected to be proficient at the preceding level.

Results show that China outperforms all other participating countries/economies in financial literacy. The Flemish Community of Belgium, the participating Canadian provinces, the Russian Federation, the Netherlands and Australia have mean scores above the OECD average, in descending order of mean performance [15]. United States and Poland are at OECD average, while Italy, Spain, Lithuania, Slovak Republic, Chile, Brazil and Peru have mean scores below the OECD average. From ex-Yugoslav countries only Slovenia and Croatia participated in PISA 2012

testing and the results show that 15 year-olds in these two countries have significantly lower mean scores than the OECD average [14]. Both countries, as well as Serbia, skipped financial literacy assessment in 2015, so there are no comparable findings so far.

PISA 2018 is the third overall assessment of financial literacy and the first one in which Serbia will participate. 15 year olds in our country will be tested in financial literacy during April and May 2018 and the first results are expected in December 2019.

3. RESEARCH METHODOLOGY

The main goal of this research is to examine financial literacy of university students at engineering study programs using PISA methodology. Students who are finishing their undergraduate studies are soon to be the leading working force in the economy of every country, so it is important to investigate their level of financial literacy. Students at engineering study programs were chosen because financial education was not a part of their official curricula. Also engineering professions are often in the focus in the context of innovations and development.

The questionnaire consists of examples of PISA financial literacy assessment questions described in detail in PISA 2015 Results [15, pp. 52-63] and version in Serbian [21, pp. 11-19]. The questionnaire consists of 11 tasks, measuring five proficiency levels of financial literacy (level 5 is the highest and level 1 is the lowest, described in detail in previous section). Scoring table was developed for the purposes of this research (presented in Table 1).

Table 1. Score range of financial literacy proficiency levels

Proficiency levels	Score range
Level 1	0-36
Level 2	37-72
Level 3	73-108
Level 4	109-144
Level 5	145-180

Research question 1: What is the distribution of proficiency levels in financial literacy among engineering students?

Research question 2: In which content categories engineering students achieve better results and which one are the most difficult for them?

SPSS program was used for Statistical data analysis.

The sample consisted of 71 engineering students of Faculty of technical sciences in Čačak, Serbia. All students were in their final year of studies. Students' participation in this research was

anonymous and at voluntary basis. The research was conducted during April of 2018.

4. RESEARCH RESULTS AND DISCUSSION

Descriptive statistics in financial literacy score show that Mean value is 107, Median 115, Mode 125, all indicating that the test was not too difficult for participating engineering students. They show above average proficiency levels in financial literacy. Frequency distribution in percentages across all five proficiency levels is presented in Figure 1 and Figure 2.

The results show that majority of engineering students (40%) preforms at Level 4 of financial literacy. 26% of engineering students preforms at level 3, while 17% preforms at level 2. Only 3% of engineering students preforms at Level 1, which is far better than average score across OECD countries and economies with 22% of students perform at or below Level 1.

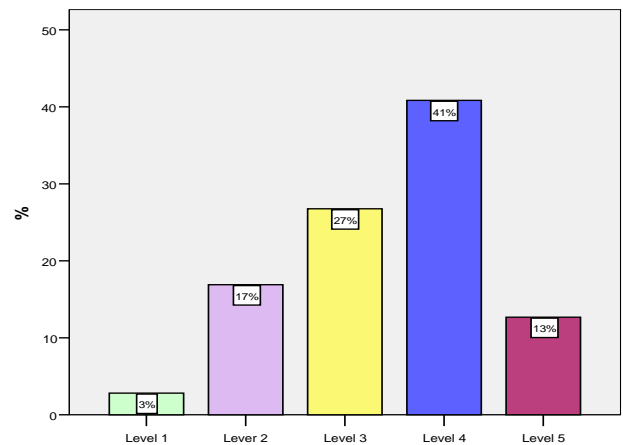


Figure 1. Levels of financial literacy of engineering students

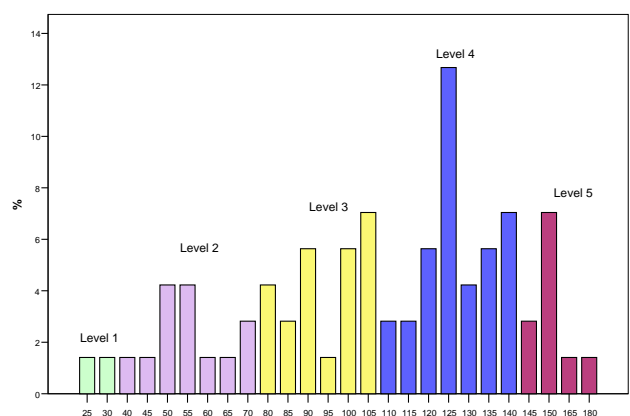


Figure 2. Score frequencies in financial literacy of engineering students

When it comes to top performers, 13% of engineering students preforms at highest level of financial literacy proficiency. These results are in line with PISA 2015 findings that show that 12% of students across OECD countries and economies are top performers in financial literacy (proficient at Level 5). These students can analyze complex

financial products and solve non-routine financial problems; they show an understanding of the wider financial landscape, such as the implication of income-tax brackets and can explain the financial advantages of different types of investments [15].

The OECD also conducted an International Survey of Adult Financial Literacy Competencies [22]. They emphasize, however, that comparisons with PISA findings should be made with caution, as the evidence is drawn from different measurement tools and on different sets of countries; but the different country rankings across adults and young people might suggest a considerable generational divide in some countries. For instance, students in Russia perform relatively well at the international level, while adults in that country perform relatively poorly compared to adults in other countries [15]. Researching financial literacy of adults using PISA framework was done recently in Croatia, with sample of 900 people age 18 to 65 [23].

In Europe studies done in 2017 also revealed that people age 15–34 have the lowest financial literacy [5, 8]. Several studies showed that the level of financial literacy of students was low [1, 4, 26]. Research done in Slovak and Czech with student of different faculties showed that students' personal financial knowledge can benefit from the financial education [1]. It emphasizes the necessity to invest in financial literacy programs.

Table 3. The content categories of financial literacy across tasks

The content categories	Incorrect answers f (%)	Correct answers f (%)
Money & transactions	105 (25)	321 (75)
At the market tasks	36 (25)	106 (75)
Invoice tasks	43 (20)	170 (80)
Pay slip tasks	26 (37)	45 (63)
Planning and managing finances	49 (35)	93 (65)
New offer task 1	17 (24)	54 (76)
New offer task 2	32 (45)	39 (55)
Risk and reward	39 (55)	32 (45)
Motorbike insurance task		
Financial landscape	47 (66)	24 (34)
Bank error task		

To answer the second research question, the content categories of financial literacy were analyzed (Table 3). The results show that *money and transactions* is the area of financial literacy in which the engineering students are the most knowledgeable at. *Planning and managing finances* is also the content that students show a solid percentage of correct answers.

The students were less successful in answering *risk and reward* task, while they were the least successful in answering the question regarding *financial landscape*. This is also a task that requires

a process of evaluation of financial issues. However, it appears that it is not the complexity of cognitive process the one that can explain this result, since the same process, at similarly high proficiency level, is required for task *New offer* and two thirds of students are successful in this task. It can be hypothesized that financial landscape in societal context is less familiar to engineering students than planning and managing finances in individual context.

5. CONCLUSION

Financial literacy is becoming more like reading and writing; as it was not possible in the past to participate in society without being able to read and write, so it is not possible to thrive in today's society without being financially literate [24]. Financial literacy is going to become one of the necessary skills for engineers, giving that the role of engineering profession is changing. Engineering is seen as an evolving profession that must adapt to suit its context and the needs of the community [25]. It is stated that it is necessary that engineering professions throws off the image of having a narrow technical focus and disinterest in how society works [25]. Professional engineers play a central role in developing, operating and managing technological enterprises, systems and projects; Engineers must be expected to lead and drive change across the entire innovation spectrum from setting policy to implementation and ongoing operations [25].

Overall, the results presented in this paper suggest that engineering students who participated in this research have above average proficiency levels in financial literacy. However, generalization should be done with caution, giving the two major limitations of this research - small sample size and a small items pool (i.e. our questionnaire consisted of 11 items while total of 43 items were used in 2015 PISA testing of financial literacy). It is more useful to consider this research as a pilot research in investigating financial literacy in adults in Serbia, one that can provide complementary data to PISA findings. Similar research are important because in order to create and implement financial literacy national policy it is important to conduct national measurement of financial literacy and to develop national strategies for financial education based on those results [23].

A growing number of countries is developing and implementing national strategies for financial education [27]. The experience of other countries shows that there should be founded an institution which would involve and coordinate the work of all stakeholders, especially in the field of introducing the financial education as regular educational content and its promotion; in Serbia that should be the Ministry of Education, Science and Technological Development with all institutional partners involved in implementation of financial literacy evaluation in Serbia as part of PISA 2018

[28]. Special attention should be paid on teachers, who are the central figures in introducing financial education, so it is necessary to raise awareness of teachers about the importance of developing financial literacy through formal education system. Teachers should be adequately trained and resourced, made aware of the importance of financial literacy and relevant pedagogical methods, and they should receive continuous support and training to teach financial literacy [29].

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