

OUTREACH EFFORTS TO ENHANCE STATISTICAL EDUCATION AND STATISTICAL LITERACY IN HUNGARY

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In order to improve statistical literacy, the institutions in the tertiary education have three target groups: students, academic staff, and external actors (citizens, secondary school students, etc.). I intend to focus on the Hungarian activities and open events for developing statistical literacy and statistical education within the framework of the International Statistical Literacy Project (ISLP), as well as the possibilities of a combined development of statistical and financial literacy for secondary school students. I emphasize how important it is for students to develop positive attitudes toward statistics and to develop the motivation of the teachers. I also review my own efforts to enhance statistic education at the tertiary level: rethink the content and the outcomes of the courses, the teaching methods, the IT tools, knowledge of students.

INTRODUCTION

In everyday life and in our work we need a certain extent of statistical literacy. Obviously different levels are required of a housekeeper and a decision-maker. Statistical literacy contains both general and professional terms. In order to be a full member of the society, to understand the meaning of data in the news, to make sense of statistical data and to reason with statistical data basic statistical literacy, statistical thinking and their improvement are needed. In addition to them, as a part of literacy, knowing the values of key data (population, unemployment rate, average salary, etc.) should be expected. Thus, statistical literacy contains (Gal, 2002):

- knowledge of basic statistical key figures,
- understanding concepts describing society
- basic information about research methods
- basic information about visualization
- knowledge about data sources and the ability to evaluate the used data sources.

Questions arise how statistical literacy and thinking could be developed. Can we solve it only with the help of blogs and webpages? Whose task is it to promote statistical literacy and to develop tools improving it? In this article I present the role of tertiary education in developing statistical literacy via my activities within the framework of International Statistical Literacy Project (ISLP).

INTERNATIONAL STATISTICAL LITERACY PROJECT (ISLP)

I think the improvement of statistical literacy is a task of all international statistical associations, statistical offices and educational institutes as organizations, and a task of statisticians, researchers, educators, politicians and decision-makers. It would be very important that the actors and institutions help and strengthen each other.

There are several initiations to promote statistical literacy. One of them is the ISLP, which works under the umbrella of IASE. The project started in 1994 under the name *World Numeracy Program*. In 2002 the name was changed to *International Statistical Literacy Project*. The aim of the project is to promote statistical literacy, support and create activities which tend to improve statistical literacy. The best known event of the project is the ISLP poster competition. This international competition is organized in every two years for secondary and primary school students. The activities of the project are based on the volunteer work of the country coordinators and the executive of the project (Sanchez et al., 2011, Forbes et al., 2013).

HUNGARIAN PROMOTERS OF STATISTICAL LITERACY

In Hungary in order to improve statistical literacy various programs are organized by the Hungarian Central Statistical Office (HCSO), the Hungarian Statistical Association (HSA), the Statistical Scientific Committee of the Hungarian Academy of Science (HAS), and within the framework of ISLP by the University of Szeged, Faculty of Economics and Business Administration.

The Hungarian Central Statistical Office (HCSO), The Hungarian Statistical Association (HSA) and the Budapest Business School organized the second season of statistical lectures for college students where Hungarian experts held lectures on various statistical topics, for example on labour force statistics (2011), statistical literacy (2011), and online statistical databases and publications (2012).

The Hungarian Central Statistical Office organizes ever year so called “open days”, when everybody can go to the centre of the HCSO and get to know how the institution works. In addition to a secondary school competition, the HCSO yearly organizes statistical pools. Furthermore, this year a Wikipedia statistical entry writing competition was also organized. In 2013 a video made by the HCSO in order to promote statistical literacy won the first prize in the non-English language category of “That is What We are” competition organized by Wiley-Blackwell.

In October 2013, in the meeting of the Statistical Scientific Committee of HAS, statistical literacy was a discussed issue.

MY ACTIVITIES TO PROMOTE STATISTICAL LITERACY UNDER THE ISLP

When we improve statistical literacy, the target person plays a very significant role: since different individuals need different levels of statistical literacy, it is also a very important factor that the person wants to develop his or her own statistical literacy. Two things are necessary to achieve this. Firstly, the person has to have a positive attitude toward statistics. Psychological and educational research has proven that a positive attitude results in applying a certain skill more gladly and more frequently; furthermore, according to studies on financial literacy, a positive attitude goes together with a higher level of literacy (Vaatstra & De Vries, 2007). Secondly, statistics, statistical issues and backgrounds can be revealed in real life contexts. It indicates a necessity of developing activities in which the target person is not alone and isolated, but may receive help when needed. Realizing the various expected levels of statistical literacy, the ISLP identified different target groups (Forbes et al., 2013):

- Citizens and the Media
- Educational institutions (secondary school and upper secondary school age students)
- Universities and research institutions
- Decision-makers
- Libraries
- National statistical agencies.

In 2012 the ISLP set up workgroups in line with the identified target groups. The main tasks of the workgroups were to examine the relationship between the target groups and statistical literacy, to suggest activities to improve the statistical literacy in the target groups. I take part in the work of the *Universities and research institutes* workgroup as a chair.

When universities and statistical literacy are mentioned in the same context we mostly think of students’ statistical literacy. In fact, universities as a context involve three target groups:

- Students
- Academic staff (educators, researchers)
- External actors (primary and secondary school students, citizens, decision-makers, media, etc.).

The first two target groups are evident, but the third is not. The tertiary institutes live in symbiosis with their environment, so as a third mission these institutes should have effect on the people in the environment.

Statistical literacy must be improved with contents and methodologies adjusted to the target group. In case of each target group we have to find the most effective way to promote statistical literacy. For example, the X-Y-Z generation has special characteristic (Wolberg & Pokrywczynski, 2001) and can be efficiently taught with different methods (Nimon, 2007), IT tools are familiar to this generation, thus the usage of the IT tools, the Internet and visualization would be effective (Garfield & Ben-Zvi, 2007). Regarding the target groups in the following chapters I focus on activities to develop statistical literacy and statistical education.

External actors

Currently as external actors we mainly concentrate on secondary school students, teachers and citizens. During the programs I try to develop positive attitude toward statistics in students. It is crucial that we should see in particular data not only the numbers, but also the story of the data (Forbes et al., 2011), and we should not be led by negative attitudes toward numbers and numeracy. Several mistakes and misinterpretations are not caused by statistics itself, but rather by the misusage of statistics.

The main occasion when there is an opportunity to develop adults' statistical literacy is the Researchers' Night. In each September the universities organize the Researchers' Night, where the universities open their gate to the public and researchers hold lectures. At the University of Szeged, every year I speak about the importance of statistical literacy, data quality and the correct interpretation of the data. Furthermore, statistical quotes and interesting statistical problems, mistakes and funny statistical data are also mentioned. People are interested in the data from the news (for example data of wages, unemployment, national debt, poverty, etc.) and the stories in the background. The program is interactive which does not only mean the possibility to ask questions any time. First of all, I ask the audience's opinion, for example: How much do you think the value of the average net salary is in Hungary? Is it possible or is it an incorrect data? What is poverty? How many people live under the poverty threshold? I provide the correct value of the data and the meaning of the data after a discussion, which is very useful, because a communication gap could be found between the citizens and statisticians: we cannot understand each other, partly due to the lack of statistical literacy. The main problem is the unsuitable communication of the data, so when the way or the message of the communication is not adjusted to the target group. During this discussion the reason for misunderstanding statistical data may be revealed.

The expansive improvement of statistical literacy comes on several snags:

- political and education political decision-makers can not realize the importance of statistical literacy and its development,
- statistics is considered as a part of mathematics, which indicates a negative attitude toward statistics,
- statistics curricula in public education except some special training programs are a part of math courses, thus instead of statisticians mainly mathematicians influence the content of statistics modules. Several times it results in the detriment of the practical side of statistics. For example, few years ago one task in the school-leaving math exam was the computation of a sections' central angle on a pie chart.

In this situation the development of statistical literacy parallel to other literacies seems to be a good idea. Watson (2002) clarifies that in real life several (for example statistical, IT, financial) literacies are needed simultaneously, thus the combined development of various literacies is also necessary.

The financial crisis indicated a low level of financial literacy whose development is extremely important, also promoted by different governments. My research team examines 14-20 year-old students' financial literacy in Hungary since 2012 at a suit of our partners. The sample size was 5700 in 2011, 10500 in 2012 and 12000 in 2013. In this research we also examine financial attitude and knowledge. Our complex research model contains six dimensions:

- bank services,
- saves and investments,

- loans,
- pensions and insurances,
- world of labour,
- general economic knowledge: inflation, taxes, CDS.

During these surveys we asked the students about the key data (ratio of national debt to GDP, the average gross incomes) of Hungary. The respondents could choose the correct answer from four given alternatives. The results show that 70 percent of the Hungarian youngsters are interested in financial news, but only half of them consider themselves aware, and 75 percent of the students know nothing about the correct value of the key data.

First of all, according to our results three issues were dedicated to the Hungarian educational government. One of them is that the use of statistical data and the development of statistical literacy are also very important during the teaching of financial subjects and definitions. Secondly, we give feedbacks about the result to the teachers, students and school leaders.

We organize thematic days and a week-long summer camp to develop financial literacy, which programs are based on the results of the survey. These days and camps contain programs to develop statistical literacy. We work with the students in parallel small groups (20-25 students). The playful programs are interactive. In the statistics program we discuss some key data of Hungary. Firstly, the students guess the value of the data and try to explain what the data mean to them. For example:

- What is the population size of Hungary?
- Is there any difference between the minimum wage, the subsistence level and the poverty threshold?
- What is the ratio of the English and Hungarian minimum wage?
- How many percent of the Hungarians and the EU citizens live under the poverty threshold?
- What is the value of the average net and gross wage?
- What is the value of the national net debt per capita?
- What is the ratio of the national net debt to GDP in Hungary?
- What is the value of the unemployment rate in Hungary?
- What is the value of the consumer price index in Hungary?

After the discussion I provide the correct value and the meaning of the data. We speak about the different values of poverty threshold and about the subsistence level between different types of households, the ratio of the national net debt to GDP in Hungary, in Greece and in Italy.

In 2014 we plan to organize more statistical lectures and games in the Researchers' Night and a full statistical day for secondary school students in Szeged.

Since 2011 we also organize the ISLP poster competition. In 2011, in addition to the two age brackets of the competition we experimentally organized a third category for higher education students. In this category the posters were based on professional data collections and surveys. The higher education category winner team made a poster about the polluting effects of disposable diapers. The creative spirit of the team appears in the diaper-shaped poster.

After the external actors I focus on the second target group.

Students

In tertiary education not all of the students learn statistics, but the development of basic statistical literacy would be important. We can achieve it by showing the main related data and data sources in different subjects. Furthermore, we should develop a new subject in which we improve the various (financial, statistical, IT) literacies. We try to develop one together with HCSO.

When we teach statistics, in addition to the professional content of the courses, it is very important to develop positive attitudes toward statistics in students, which would be successful if we:

- go through the required outcomes of the course,
- consider the properties of the students,
- adjust our teaching method to the students,
- usually develop the course according to our experiences and the students' feedbacks,
- teach more practical things,
- use IT tools,
- and according to Verhoeven (2009) the educators are motivated.

Since 2006 we have faced these issues every year in our introductory courses which are taught in business programs on the bachelor level. The introductory course is a two semester long course with a double lecture and a double seminar a week. The number of the students in the lectures is 350 and 30 in each seminar. In the lectures after a short theoretical introduction we examine real problems and exercises, and in the seminars we examine real problems both on paper and with computers, because our aim is to teach statistical thinking and not a platform. We use Excel and SPSS and statistical databases (HCSO, EUROSTAT). The seminars are uniformed.

As a course material we prepare videos with Camtasia Studio, which records the screen and we can explain the solutions of the computer based exercises. The videos are very popular, but a disadvantage of them is that the students tend to follow the video without thinking.

At the end of the course we examine the satisfaction of the students and each year we build in the course the previous experiences.

Earlier the statistics course was not so popular, but a result of these activities this course is now one of the five most popular courses. The Hungarian universities and the statistical education have a new challenge. The government has altered the financing system of the tertiary education, one effect of which is that the number of students with a public grant has significantly decreased, thus the required entrance points of the students decreased from 400 to 250.

CONCLUSIONS

The educators and the universities play a very important role in developing statistical literacy. There may be intercultural differences, the knowledge about international efforts and the combination of various solutions should contribute to the successful improvement of statistical literacy. In this article I introduced some solutions applied in Hungary in order to promote statistics and develop statistical education and literacy.

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