STATISTICS ARE INTERESTING – HOW DO WE GET YOUNGSTERS INSPIRED?

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There is a lot of information available nowadays, and statistics are a very effective way to share information. The big challenge is to motivate especially young people to utilise statistics as a source of knowledge. Some very good ways to motivate are the speaker to be interested in the topic; showing examples listeners can relate to; letting them do things themselves and showing how the information can be used. The first step is to get students interested and then they will want to learn more and will find the data!

1. Introduction

Statistical literacy can nowadays be seen as a basic skill. There is plenty of statistical information around us, in tables as well as in figures and written in texts. A very important thing – and a challenge – is to promote statistical literacy especially among young people, so that they will learn to use statistics as part of decision making as well. Schools are perhaps the most relevant place for young people to learn statistical literacy, and the use of statistics can be included in different subjects, such as social studies, history, sports, languages and mathematics. Part of statistical literacy is also the ability to be critical, to question the sources and the results.

Motivated students usually learn more easily and better, and the teacher can have a high impact on students' motivation. If the teacher is not interested in the topic, it is very difficult for students to be interested either. Anyone is more likely to be interested when he or she can relate to the topic somehow, so teachers should always try to use examples that their students can relate to. Many people learn better if they can actually do something instead of just listening, so having suitable exercises is usually also a good idea. There are many fascinating statistics about different topics in the world, but if the student has no personal interest in a particular topic, it is much more difficult for him or her to get excited.

The aim of this paper is to share best practices with teachers about how to motivate students to use statistics. This paper looks at motivating students to increase statistical literary especially from the point of view of economic statistics.

2. Statistical literacy

There is no agreed explicit definition for statistical literacy. In many definitions it is emphasized that it includes some understanding about basic statistical concepts and procedures as well as the ability to be critical about the given information. Statistical literacy also embraces appreciation and use of statistical thinking in our everyday life. (Gal 2002; Schield 2010). In 2002, Gal presented a model where statistical literacy has been divided into a knowledge component and a dispositional component, both being necessary. According to him, the knowledge component of statistical literacy includes literacy skills, statistical, mathematical and context knowledge and critical questions, and the dispositional component consitutes of beliefs and attitudes and critical stance (Gal 2002).

Statistical information is nowadays everywhere and statistical literacy can be regarded as a basic skill. You need that skill when reading newspapers, following news broadcasts or surfing on the Internet to be able to separate relevant information from irrelevant one and to evaluate the quality of the information. Such things as population growth, crime rates, employment rates and price of housing are usually shown using statistics in some way. In many workplaces the results of production or the made mistakes and changes in them are also presented nowadays as statistics. Statistics are also utilized in situations where you might not consider it, as your search results in Google (Davidian 2013). Statistics can be shown through texts, numbers and symbols and graphical or tabular displays (Gal 2002). New technology gives great possibilities for showing statistical data, for example, in videos or by new software, as the Swedish medical doctor and statistician Hans Rosling is doing. It is important that the producers of statistical information remember their responsibility and do not deliberately mislead readers.

Statistics can be seen as a method of learning from data as well as measuring and communicating uncertainty (Davidian 2013). Since the amount of data and datasources is increasing all the time, the most important thing is not to be able to remember certain details, but to be able to find out the needed information and to be able to consider that critically.

3. Motivation

Motivation can be defined as "a reason or reasons for acting or behaving in a particular way" or "a desire or willingness to do something (enthusiasm)". Motivation influences what, how and when we learn. Besides motivation, attitude also affects people's way of thinking and acting. One way to define attitude is to see it the way an individual is feeling and acting. Attitude can be seen in almost everything we do and usually it changes quite slowly, while motivation is usually quite short-term, and is related to one situation at a time. Attitude usually influences more the quality and motivation the eagerness of actions. (Ruohotie 1998.) Besides motivation and attitude, we can also talk about interest as a component affecting learning (Sefton-Green 2013).

Earlier experiences have an impact on our attitude, motivation and interest, although they can have a very different impact: failure can discourage or make one try more, depending on the person (Pintrich & Schunk 2002). The planning of teaching is easier if the teacher can start by asking the students about their experiences and feelings, but this is not always possible. From repeated situations, we can try to find the most functioning methods to be used in the future, as well. The relationship between motivation and learning goes both ways: motivation has an effect on learning and, on the other hand, learning on motivation. (Pintrich & Schunk 2002.)

In learning situations, the learning environment includes the actual place, space and equipment but also other students and the atmosphere (Antikainen 1999). The teacher cannot always influence all of them, but it is important to realize the existence of all those and the possible limitations that need to be taken into consideration. Sometimes the teacher can affect the motivation in very simple ways, like taking care that everybody can see and hear, and that the given material is well planned and produced and it is functioning with the existing equipment. If the material is hastily made and has many errors, the listeners feel that they are not appreciated and that even the teacher does not regard the topic as interesting. The teacher should pay attention to the material – is it made for that situation or just copied from somewhere; could the handout and the presented material be partly different, would that make the topic clearer or more interesting?

In addition, the attitude and the language used by the teacher can influence the motivation of students – if the teacher does not seem to be interested in the topic, why would somebody else be? Moreover, if the teacher does not even try to help the listeners to understand, for example, by talking unclearly or using specific terms

without explaining them, the teacher cannot really expect the listeners to be interested and motivated.

It is hard for a teacher to be excited about all the topics covered during courses, but there might be a possibility to ask somebody else – for example, another teacher or an expert – to come over and give a lecture about a certain topic. For instance, in connection with the World Statistics Day on 20 October 2010, Statistics Finland offered schools the possibility to have a statistical expert come over and lecture about statistics according to the pupils' age. I personally visited, for example, 5th grade, 9th grade and high school students in different cities. The year 2013 is the International Year of Statistics, and there are informational and educational resources as well as videos available on the http://www.statistics2013.org/ website. Using materials available on the Internet is one possibility for the teacher. For example, the Swedish medical doctor and statistician Hans Rosling is very well known for his inspiring and clarifying presentations using statistics. Hans Rosling has been involved in producing a computer program called Trendalyzer for visualizing statistics, and the results are amazing.
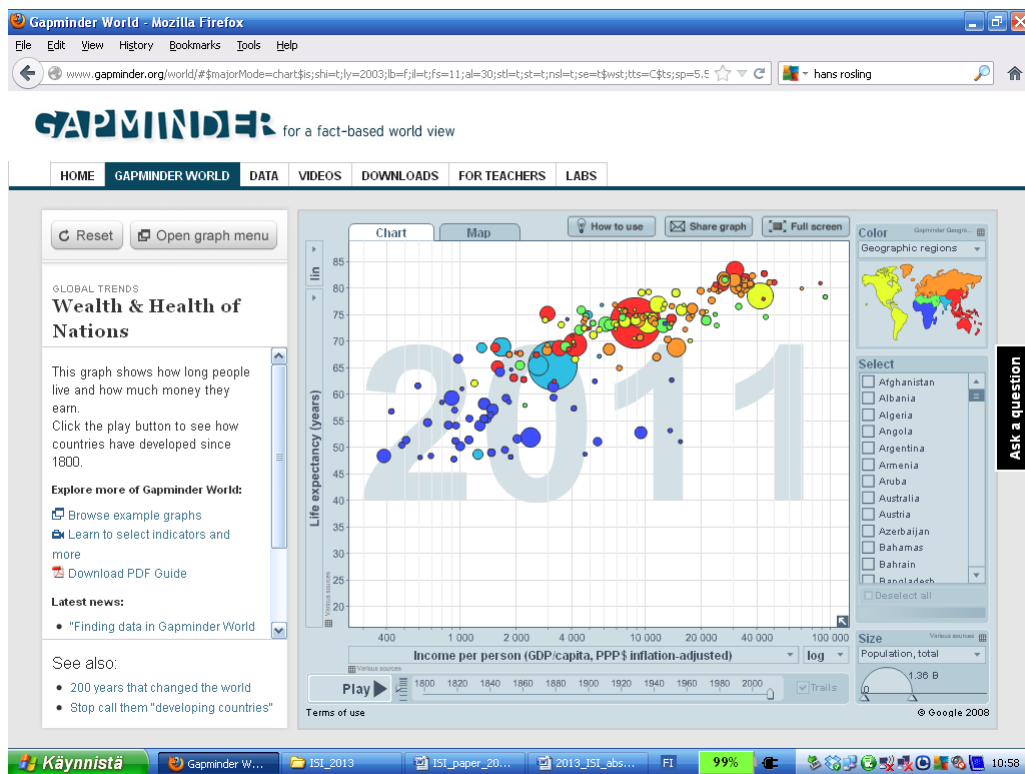

Figure 1. An example of visualizing statistics by Hans Rosling

A teacher cannot cover everything during one course, so the goal is to get the students so interested in the topic that they continue on their own. Especially with younger students, it might be challenging to find statistical examples they can relate to and exercises they can do themselves, but it is possible. One way to strengthen learning and motivation to learn is to offer responsibility, challenges and independence, for example, by giving the students assignments, which they find out themselves, instead of just listening somebody explain them (Auvinen 2008).

4. How to motivate students to use economic statistics

In a very simplified way, economic statistics can be defined as being statistics describing prices, quantities or values. Economic statistics cover such as data on salaries, prices, companies, structure of the economy and the changes in them. In

addition, statistics about the economic aspects of households, like disposable income, loans and savings, consumption, rent level and so on are economic statistics. The division between economic and social statistics is sometimes theoretical and even unnecessary – the same statistics can serve both views, like when we follow, for example, alcohol consumption or medical support to households.

Much of economic statistics are produced according to internationally agreed rules, so the figures are comparable between years and countries. This gives a very good possibility to evaluate changes over time or between countries. For example, for topics in social studies, economics, mathematics and language studies there are plenty of suitable data for evaluation and learning through school lessons.

To help students to relate to my topic, I try to use concrete examples. For example, when talking about money and prices, I emphasize that the amount of money is not the only thing that matters; the main point is what you get with your money. To clarify this I take an example – with university students it can be the price of beer, with high school students the price of a movie ticket and with primary pupils the price of a candy bar. As an example, I can explain that if your weekly allowance is, for example, EUR 20 and a movie ticket costs EUR 10, you get two tickets with your money. At the same time, somebody from another country might have a weekly allowance of EUR 10, but if a movie ticket costs only EUR 2, they get five tickets with their money – so they get more with less money, since the price level is lower.

There are international price comparisons both on the aggregated level as well as on a more detailed level of products, based both on price level indices as well as on purchasing power parities. Both national statistical offices and the Statistical Office of the European Union, Eurostat are publishing this kind of data. For example, pupils interested in travelling might find such data interesting, and familiarizing with it might be possible as part of language studies, too.
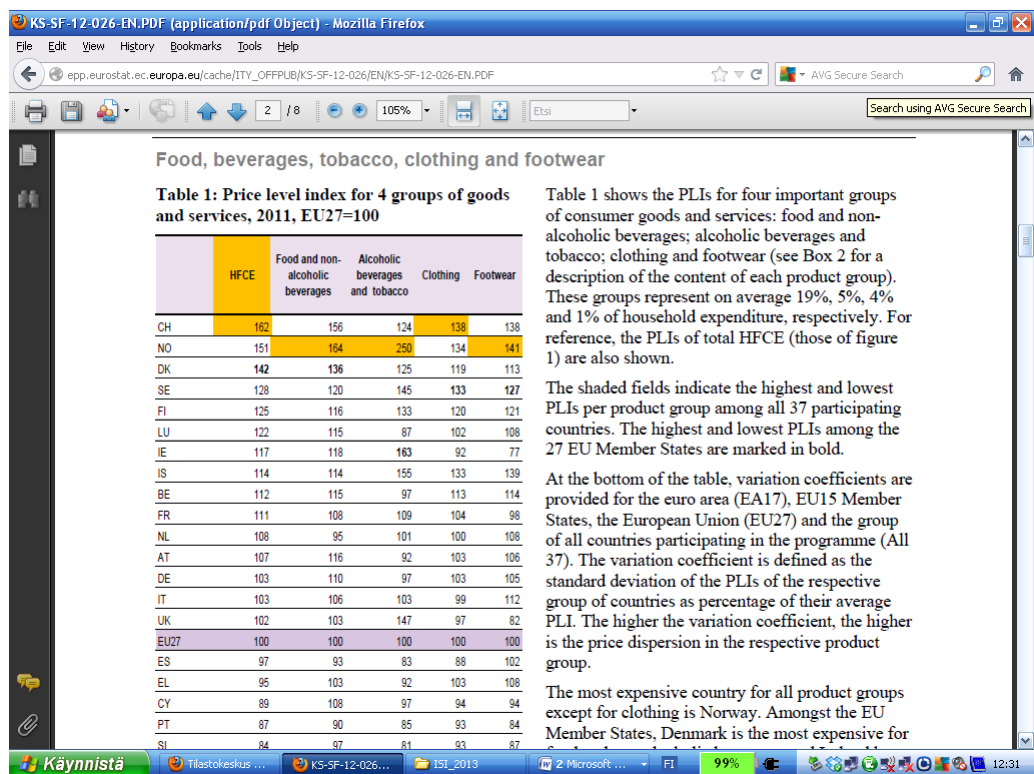

Figure 2. An example of Price Level Indeces of household final consumption expenditure (HFCE) in EU countries in 2011 by Eurostat

Often a chance to try yourself – for example, by having exercises – is a very concrete and useful way to motivate and to show usefulness. The challenge is to give

exercises and examples that are challenging, interesting and varying without being too easy or too difficult. Action offers real experience, which can lead to actual learning.

Concepts and their definitions are very important in statistics, especially when we want to compare things in time or between countries. The concepts usually have a very specific meaning in statistics, and they might differ from how quite similar terms are used in everyday life. Knowing the meaning of a statistical concept and being able to understand that in relation to real life is very important, and this is one of the situations where we can offer the student the possibility do something themselves. If possible, I try to have exercises during my lectures. For example, when we talk about the production boundary in National Accounts, the official definition says that production is "an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital and goods and services to produce outputs of goods and services". This definition includes four demands, so that 1) the action is active (happens under control and responsibility), 2) of a certain, known actor (an institutional unit), and 3) it uses labour, capital, goods and services (or at least some of those), 4) to produce goods or services. After going through this definition, we move over to an exercise so that students can try to figure out by common discussion if certain actions are production or not in the National Accounts calculations.

Figure 3. An example of an exercise at the National Accounts course

In addition, a very good way to motivate is to show how the information describes the reality or how it can be used in real life. Knowledge that can be used widely is usually more useful and motivating than details, and if the teacher can show that the same issue can be used in different situations, the students are more likely to pay more attention to it (Ruohotie 1998). For example, the Time Use Survey and the Household Budget Survey give interesting information about everyday life both in your own country as well as in other countries, and you can quite easily compare that information to your own knowledge and view of situations.

5. Conclusions

Statistics do not offer any direct solutions to problems, but they can help in decision making when used wisely. More and more information is nowadays available in statistical format, and the ability to use that can be seen as a basic skill. We should make sure that especially young people – the future decision-makers – learn to utilize statistics. Using statistics wisely also includes critically reviewing and questioning the results and sources: even with the most reliable statistics, it is a good practice to check and evaluate the sources and to compare the results with the results of a related topic, if possible.

With young people, the importance of the teacher and the teacher's ability to motivate is huge. The teacher can influence motivation with his or her own example as well as in some very simple ways, like making sure that everybody can see and hear, using materials that are well done and terms that are understandable. In addition, it really helps if the speaker is interested in the topic; if the teacher does not feel that way, it might be a good idea to invite a visitor, for example, somebody from the statistical office or a university or an interested colleague to talk about the topic.

Also, showing how and where the information can be used is usually a good way to motivate. Using examples listeners can relate to – for example, costs, salaries, families and pets – helps people to understand statistics: listeners can be asked how they think something is (bigger, smaller, more popular, less used...) and then show the statistics about that topic. In addition, a good way to motivate is the possibility to talk with listeners, letting them ask questions and also helping them to try to find answers to those questions. Also, the chance to do something oneself instead of just listening usually motivates people – with good exercises the listeners can really learn the point.

It is always possible to show data in traditional ways – as in text, tables and figures – but the new technology also offers the possibility to present data in more modern ways, like using videos, moving figures and databases where you can choose the data you wish to use. Since many young people are flexible with the new technological equipment, modern modes of showing statistics are an optimal way to get them interested.

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