



Statistical Literacy Competencies as Post-modern Basic Civic Skills

Jukka Hoffrén

Society needs today more than ever different skill levels in statistical literacy and use of statistics embedded with understanding of social phenomena. National Statistical Institutes and educational institutions must identify these so that statistical and societal thinking are understood as comprehensively as possible in different sectors of society. Statistics are one of the most important sources of reliable social information. For individual citizens important skills include the capabilities and skills to actively seek and apply for reliable statistical information, to identify their use and the ability to apply their data contents into practical use. Widely used concept statistical literacy is insufficient term to describe all aspects of these skills. In this paper, I review and analyze the statistical literacy competencies that are expected to be provided by education system to new generations. I also present four more detailed ways to describe the competencies and skills that should be taught to sovereign citizens. The art of reading statistics representing the ultimate level of statistical literacy competency.

Keywords: Statistical Literacy, Civic skill, Education, Democracy.

Current information revolution is one the most significant changes in the history of humanity. Information society means that the rigid knowledge and skills structures of industrial society are replaced by new flexible and information-based ways of working and thinking. Citizens are now required to have the abilities and competencies to actively and self-steered to seek and apply new knowledge as solutions to new challenges. This shift in thinking and activities have a profound effect to whole society and democratic system. The importance of discussions and direct participation is emphasized.

Information societies become more pluralistic as information technology evolves and disseminates. Also the communality of individuals takes new forms. Self-sufficiency, independency and subjectivity become important features and people tend to commit themselves to things in which they are able to participate in some way. Discussions and dialogues e.g. in social media are even more important to them. New forms of citizenship include dialogue in form of posts, grouping and grouping of like-minded people. Virtual community of like-minded people replaces the actual society. Important features are the space for presenting and justifying one's own opinions and interaction in general.

Transformative competencies and literacies

Education became an area of great interest in politics and economics in the late 1990s and early 2000s as information was raised to the most important factor of production in information societies. Several international organizations such as the OECD and the EU started to advocate for development of education and learning towards a provider of potential working life skills. This shift towards developing specific competencies and skills that benefit especially business sector have been seen as an important competitive factor in the global economy and information societies.

Previously, general learning or “learning for it’s own sake” was seen as a prerequisite for a good functioning of democratic society. This idea originates from Classical Athenians who thought that for a smooth functioning of democracy the citizens, who voted in the Assembly under direct democracy procedures, had to be educated. This ideal is still a fundamental guiding principle of university education in western democracies.

However, in post-modern information societies, universities are transforming education to respond business life demands and steering education on sciences and subjects that create maximum value for society. Different literacies are competencies are conditions of employment that educational institutes provide to the students. Literacy means especially functional literacy: the ability to review, interpret, analyse and evaluate written materials and to detect errors and flaws therein (Schield 2002). Statistical literacy is one of many literacies that modern day individuals need an order to survive in information society.

According to the OECD Learning Compass 2030 students need to feel that they can help shape a world where well-being and sustainability to meet the challenges of the 21st century. OECD identifies three “transformative competencies” that students need to acquire in order to contribute to our world and shape a better future: creating new value, reconciling tensions and dilemmas, and taking responsibility. When students create new value, they ask questions, collaborate with others and try to think “outside the box” in order to find innovative solutions. This blends a sense of purpose with critical thinking and creativity. In an interdependent world, students need to be able to balance contradictory or seemingly incompatible logics and demands and become comfortable with complexity and ambiguity. This requires empathy and respect. Students who have the capacity to take responsibility for their actions have a strong moral compass that allows for considered reflection, working with others and respecting the planet.

Statistical Literacy

For National Statistical Institutes (NSIs) fostering statistical literacy has become one of the key objectives as statistical literacy it is seen becoming fundamental for citizens living in a full democracy (Biggeri&Zuliani 1999). Developing statistical literacy means transforming passive receiver of information into an active actor, who can search and identify reliable sources of information, critically assess different statistics, apply the relevant results and make their own conclusions based on the facts (Gal 2002; Rumsey 2002). This transformative learning aims to achieve a fundamental change in a person's relationship to the surrounding reality. Transformation is a renewal of thinking at the individual level and the purpose of transformative education is to empower learners to see the social world differently so that they will challenge and change the status quo as agents of change.

The NSIs have been challenged by new information-producing institutions, conventional enterprises utilizing more and more ICT-technologies and new companies providing digital services or establishing the business model on internet services. Social media also makes it also possible to measure and depict subjective information from users. This epistemological transformation has shifted us from probability-based and structured data of conventional statistics to social media’s “Random” Data.

Consequently, also a new data analyst profession has emerged to compete and challenge the traditional statisticians about the right to analyse and make interpretations of the data. Knowledge and understanding of information technology and social phenomena are important data scientist competencies that are required to contribute to the development of society and the solution of its problems. However, data analysts are not supposed to theorize, criticize or develop the data management also their interpretation of social phenomena often remains fragmented or superficial.

Different statistical literacy skills

Information revolution has challenged traditional NSIs, but it has not made them unnecessary. The motivation comes from four main points: 1. All decisions must be based on facts. For example, EU decision-making is based on “evidence-based decision making”, 2. views and policy proposals for action must be justified with facts, 3. these facts should be provided by generally accepted scientific theories or by verified empirical findings from real life and 4. statistics provide these verified facts about living life and thus views,

interpretations and predictions can be based on them. Today traditional statistics must be supplemented with new kind of understanding in order to process and combine statistics and other information. Existing statistics and data can be used to generate new knowledge and understanding as well as perspectives.

Different statistical literacy skills needed to use and understand statistics can be separated (see Melkas & Simpura 2013):

- Numeracy
- Statistical literacy
- Data literacy
- The Art of Reading Statistics.

Numeracy is about understanding the magnitudes of the figures and understanding the basic relationships between the figures. This applies especially the understanding of terms percentages, differences and magnitudes of change. Numeracy literacy refers to people's ability to cope with the numbers and calculations that are part of their daily lives. Some problems can be observed in the way the media use statistics in particular cases.

Data literacy term refers to the ability to read, create and transmit data as information and it comes quite close to data scientist thinking. Older definitions were quite close to the definition of statistical literacy for numeracy and processed outputs. Newer definitions are closer to the data itself. This can also be interpreted as the individual's ability to formulate questions and answer them using data as part of evidence-based thinking.

The art of reading statistics is about mastering the basics of statistical thinking including simple mean values , the importance of random variation, skills in interpreting and evaluating statistical representations, understanding the meaning and limitations of concepts and definitions of target phenomena in statistics, knowledge of the data production process and impact assessment (including data acquisition, editing and analysis) and knowledge of statistical data sources and their critical evaluation. The current data flood highlights the importance of art of reading statistics compared to the narrower literacies related to statistics.

The objective in statistical literacy is to transform passive receiver of information into an actor, an active citizen, who can search and identify reliable sources of information, critically assess different statistics, apply the relevant results and make their own conclusions based on the facts. The art of reading statistics meets these needs of individuals. Instead of previously used information transmission technique and surface learning, we need to move towards achieving conceptual changes in students' minds and enable citizens to construct their own knowledge of statistics.

Conclusions

Instead of just producing statistics, the focus of National Statistical Institutes (NSIs) is today on the dissemination, communication and proper use of statistical information. While emphasis is on the customer perspective, the fostering statistical literacy is today one of the key objectives. As information has become more and more relative and authorities, statistics must take further steps to secure their position as reliable source of knowledge. NSIs need to be transformed into active actors and communicators who participate in the social media debates and assist citizens to interpret statistical information.

In education, the new needs of citizens must be taken into account and students must be offered literacy in statistics at all levels of educational system. Numeracy skills and basis of statistical and data literacy skills should be provided at schools. The art of reading statistics is a competence that is mainly offered at university level and a skill where NSIs should active provider of competencies and skills. In addition, informal

competencies can be fostered by taking active role i.e. taking part and sharing interpretations and insights in selected debates of social media.

Priorities in fostering the art of reading statistics increase the capabilities of citizens to critically assess reliability and usefulness of statistical media for each purpose as well as capabilities to apply and use statistical information to specific problem-solving situations. Thus, representatives of NSIs should include dialogues on statistics in social media to their every-day tasks. Statistics Finland has also appointed specific influencer agents or phenomenon experts to engage in dialogue on statistics in media.

Sources

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