

64th ISI World Statistics
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Statistical Literacy and Quality: two sides of the same coin?

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Research in Statistics Education

Research in statistics education has focused on learning and literacy approaches, such as:

- **SOLO taxonomy** - Structure of the Observed Learning Outcome – that classifies student learning outcomes from any classroom activity, unit or programme (Biggs and Collis, 1982);
- the **Learn by Doing in Statistics** (Smith, 1998), who advocates that statistical reasoning should be developed by incorporating active-learning strategies that allow students to supplement what they have heard and read about statistics by actually



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Research in Statistics Education

Research in statistics education has focused on learning and literacy approaches, such as (cont.):

- the **Profile of Statistical Understanding** (Reading, 2002), which is aimed at providing a tool to assist educators to identify what 'can be' expected of students rather than what 'should be' (Reading, 2002);
- The models of **adult statistical literacy** (Gal, 2002, 2003), who argues that statistically literate behavior is predicated on the joint activation of five interrelated knowledge bases (literacy, statistical, mathematical, context, and critical), together with a cluster of supporting dispositions and enabling beliefs.



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Research in Statistics Education

Research in statistics education has focused on learning and literacy approaches, such as (cont.):

- ...other approaches, such as **Data Literacy** (Gould, 2017), **Statistical Reasoning** (Sabbag, Garfield and Ziefller, 2018)
 - **but few or none take into consideration the link with quality aspects, especially when literacy is viewed from the perspective of official statistics.**



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What is Quality?

Quality of statistics

- Is the degree to which the **characteristics** of statistics fulfil the requirements of users of statistical information.
- The product quality dimensions defined by Eurostat in the European Statistics Code of Practice (Eurostat, 2011) principles covering statistical output include **Relevance, Accuracy, Reliability, Timeliness, Punctuality, Coherence, Comparability, and Clarity.**



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Quality of Literacy ? or Literacy on Quality?

Literacy on Quality of Statistics... definitely!



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Literacy on Quality of statistics

- The principles mentioned above, all or some of them, should be part of **statistical literacy**, as there is no point in thinking about literacy without thinking about quality.
- On the other hand, quality only makes sense if stakeholders are literate..



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How to develop literacy on Quality?

- Users must be demanding!
 - They must ask for:
 - **Relevance**
 - **Accuracy**
 - **Reliability**



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How to develop literacy on Quality?

- Users must be demanding!
 - They must ask for:
 - **Timeliness**
 - **Punctuality**
 - **Coherence**
 - **Comparability**
 - **Clarity**



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How to develop literacy on Quality?

- According to Gal (2002, 2003), statistically literate behavior is based on the joint activation of five interrelated knowledge bases (literacy, statistical, mathematical, context, and critical), together with a cluster of **supporting dispositions** and **enabling beliefs**



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Accuracy, Reliability...

Fake News



More than ever, people need to be data literate and check the accuracy – and context – of data that they read and see, especially in the news. Yet people seldom evaluate and select authoritative data sources.



ASA understood that another competitor's brand was recommended almost as much as the Colgate brand by the dentists surveyed, and concluded that the claim misleadingly implied 80 percent of dentists recommend Colgate toothpaste in preference to all other brands



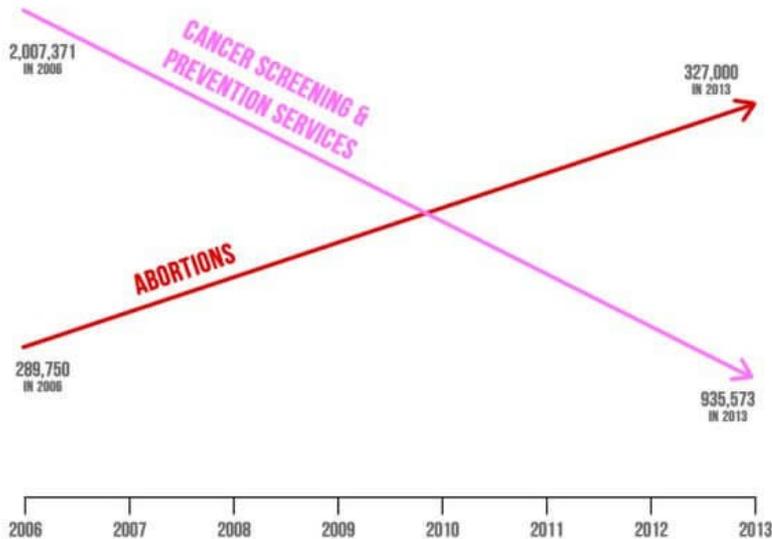
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Accuracy, Reliability...

Fake News



PLANNED PARENTHOOD FEDERATION OF AMERICA: ABORTIONS UP – LIFE-SAVING PROCEDURES DOWN



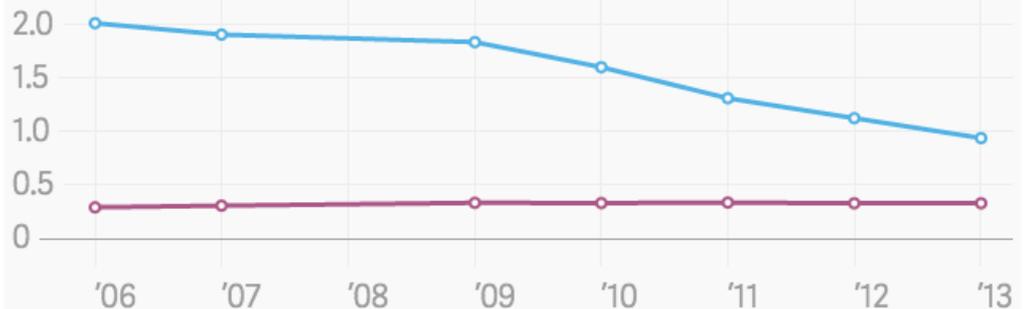
SOURCE: AMERICANS UNITED FOR LIFE

Planned Parenthood services

■ Abortion procedures

■ Cancer screening / preventative services

2.5 million



ATLAS | Data: Politifact



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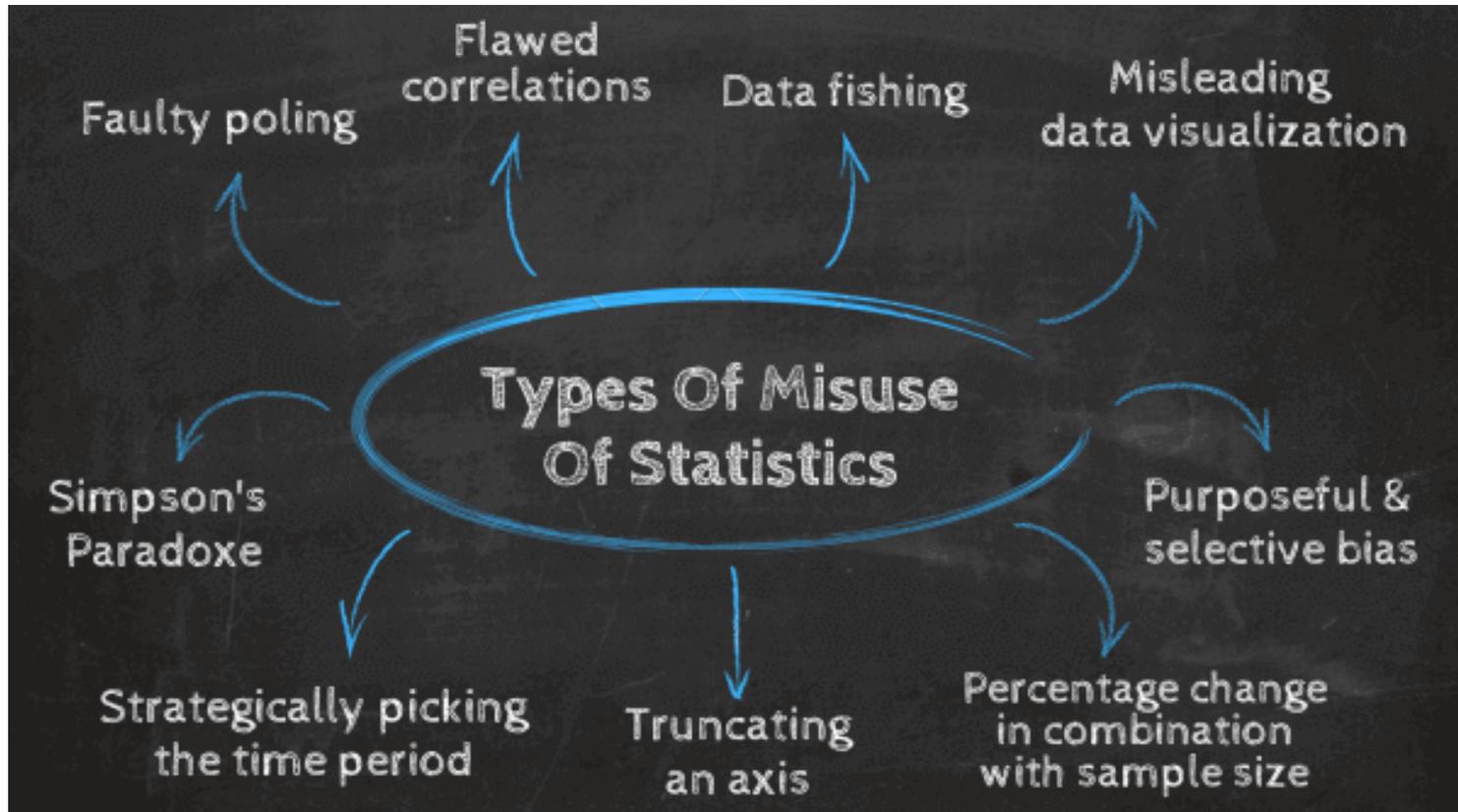
Rate the examples

	Colgate	Cancer vs Abortions
Relevance	V	V
Accuracy	V	V
Reliability	V	V
Timeliness		V
Punctuality		
Coherence	V	V
Comparability		V
Clarity	V	V



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Quality, Quality...



How Can Statistics Be Misleading

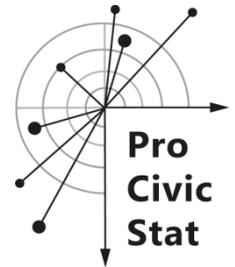
<https://www.datapine.com/blog/misleading-statistics-and-data/>



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Statistical Literacy skills for quality

ProCivicStat (Engel et al. 2016) has analyzed the cognitive demands of texts and displays in publications of official statistics providers, news media, and other stakeholders, and is developing a new framework regarding skills and attitudes needed to understand civic statistics and related teaching resources





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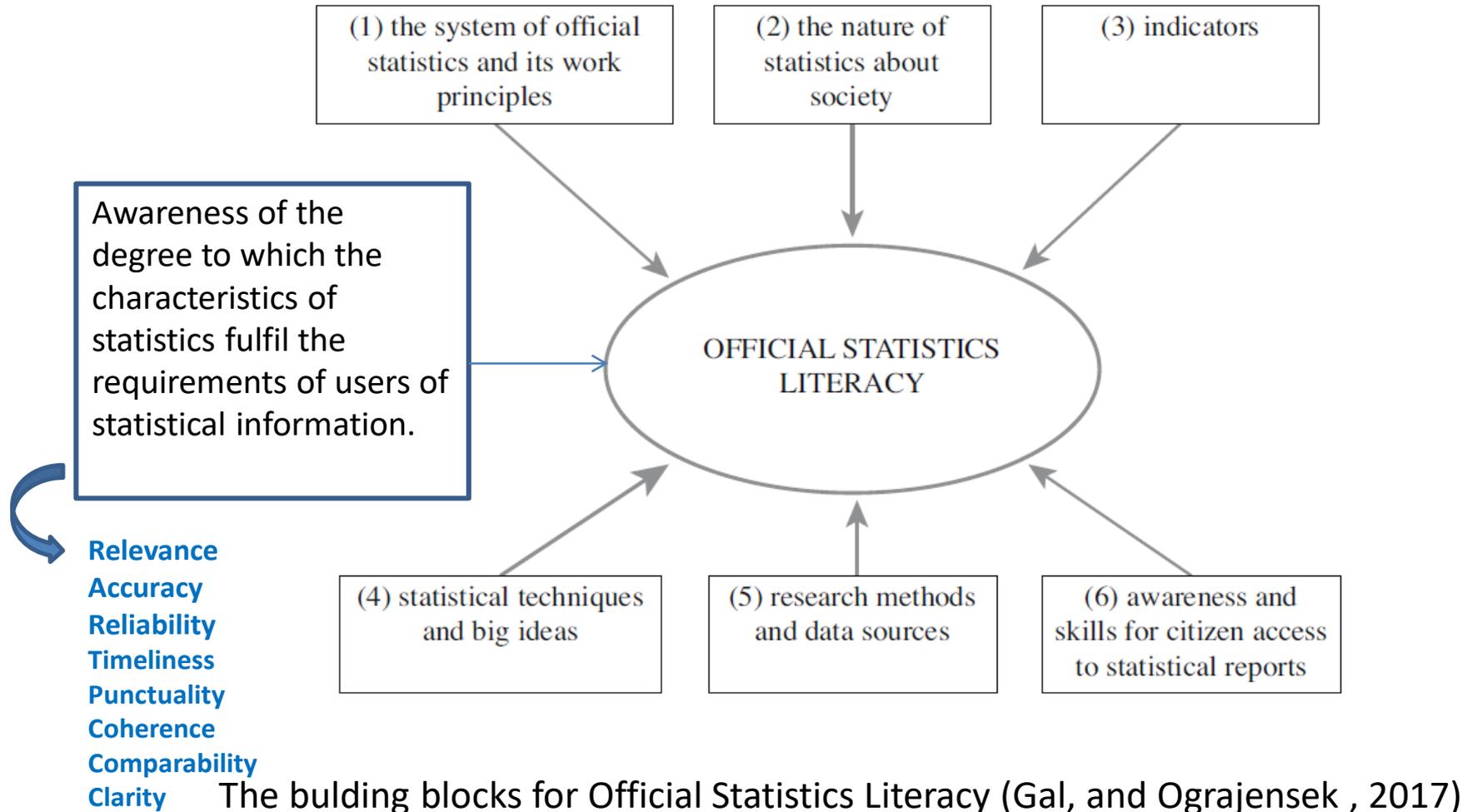
Statistical Literacy skills for quality

Gal and Ograjensek (2017) identify six elements related to official statistics about which non-specialist adult users should possess knowledge in order to be considered literate in official statistics



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Developing Statistical Literacy skills for quality





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Developing Statistical Literacy skills for **quality**



- Train the Media
- Training for Schools
- ESTP Courses (European Statistical Training Program)
- EMOS – European Master in Official Statistics