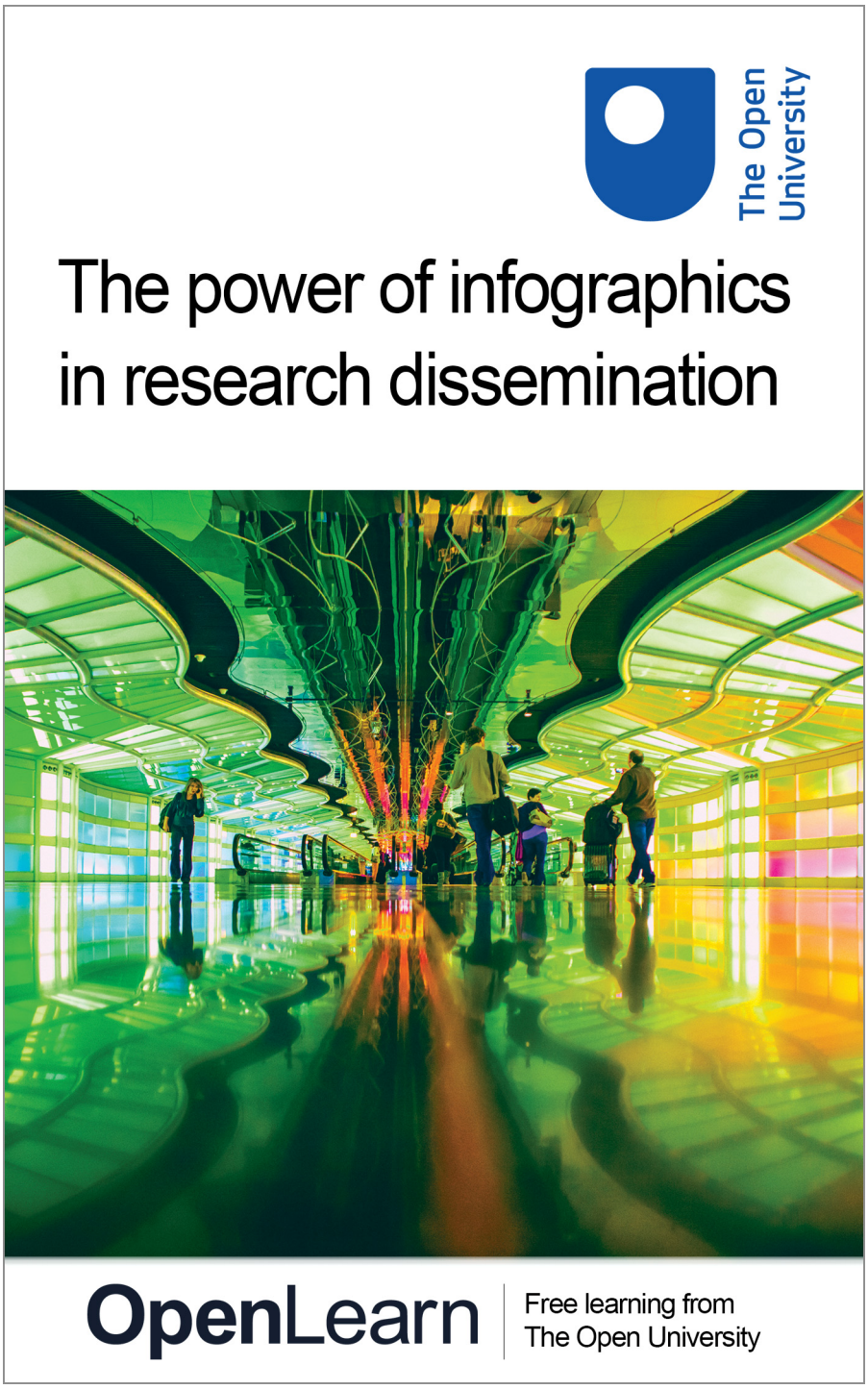
OpenLearn

The Open University

The power of infographics in research dissemination



This item contains selected online content. It is for use alongside, not as a replacement for the module website, which is the primary study format and contains activities and resources that cannot be replicated in the printed versions.

About this free course

This free course is an adapted extract from the Open University course H819 *The critical researcher: educational technology in practice*.

This version of the content may include video, images and interactive content that may not be optimised for your device.

You can experience this free course as it was originally designed on OpenLearn, the home of free learning from The Open University – http://www.open.edu/openlearn/education-development/disseminating-research-and-evaluating-info-graphics/content-section-0.

There you'll also be able to track your progress via your activity record, which you can use to demonstrate your learning.

Contents

Introduction 5
Learning Outcomes 6
1 Getting noticed in an age of information overload 7
2 Visualising data 9
2.1 Introduction to data visualisation 9
3 The power of infographics 12
4 Evaluating infographics 14
4.1 Assessing the quality of infographics 14
4.2 Compiling your own infographics – evaluation checklist 16
4.3 Applying the evaluation checklist 17
End-of-course quiz 19
Conclusion 20
Keep on learning 21
References 21
Acknowledgements 23

Introduction

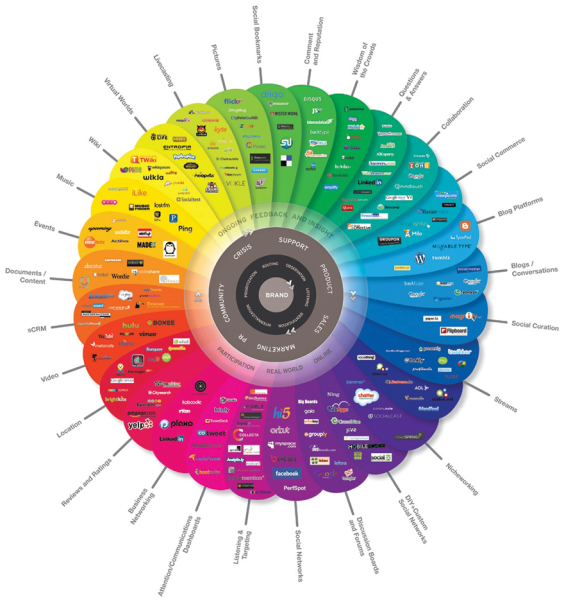


Figure 1 The conversation prism by Brian Solis and JESS3, The Conversation Prism 2.0. This file is licensed under the Creative Commons Attribution 2.5 Licence https://creativecommons.org/licenses/by/2.5/deed.en

Infographics are becoming an essential tool in data representation, sense-making and research communication. In this free course, *The power of infographics in research dissemination*, you will explore when and how infographics can be useful to your work. You will look at some good and bad practice in making and using infographics and will learn how to evaluate infographics that appear to be presenting research evidence. The course concludes by introducing you to free resources that can help you produce effective infographics of your own and to critically evaluate the infographics of others. A key focus of this course – and the postgraduate Open University module on which the course content is based – is developing your skills and understanding as a critical researcher.

This OpenLearn course is an adapted extract from the Open University course H819 *The critical researcher: educational technology in practice*.

Learning Outcomes

After studying this course, you should be able to:

- demonstrate an understanding of the ways in which infographics can be used to present research findings
- recognise the strengths and weaknesses of infographics as a method of displaying information
- demonstrate skills in critically evaluating infographics used for disseminating research.

1 Getting noticed in an age of information overload

> Our brains are busier than ever before. We're assaulted with facts, pseudo facts, jibber-jabber, and rumour, all posing as information. Trying to figure out what you need to know and what you can ignore is exhausting.
>
> (Levitin, 2015)

The sentiments expressed by Levitin in this quote are widespread. They neatly capture the phenomenon of information overload – a phrase popularised way back in the 1970s by Alvin Toffler (1970), who characterised it as 'the difficulty a person faces when taking a decision in the presence of excessive information'. By 2002, Eppler and Menjis were identifying five causes of information overload:

- multiple sources of information
- too much information
- difficult-to-manage information
- irrelevance or unimportance of information
- lack of time to understand information.

As we speed through the twenty-first century, the data and information landscape, especially online, is growing without precedent. By January 2017 it was estimated that there were 4.6 billion pages on the World Wide Web (WorldWideWebSize, 2017). This plethora of information ranges from commercially generated websites and adverts intended to sell us things (or persuade us to believe things) through to information that may be relevant, valuable and deeply interesting to the researcher but which may be obscured by more attention-grabbing web pages. Tim Wu's *The Attention Merchants*, reviewed in the article '
Tim Wu: "The internet is like the classic story of the party that went sour"' (Naughton, 2017), gives a particularly critical account of this situation.

As a consequence, it is ever more challenging for researchers to get their research findings noticed in the face of a staggering amount of competition. But for anyone interested in reading about the latest developments in a particular field, it is essential to question and critically engage with the information available. A further complication lies in the fact that, as already mentioned, there are few filters online and it is extremely easy to share information via the internet, irrespective of its quality or accuracy. 2016 and 2017 saw a rapid increase in the scale of 'fake news', indicating how easy it is to deceive and misinform online.

When presentating and disseminating research findings, we have to consider how to create precisely the right message to have maximum reach and impact upon our intended audience. There may need to be several different messages for different audiences. Imagine a medical researcher who has developed a novel technique for treating a particular condition. They may:

- publish a full presentation of their work in a medical journal

- publish a ‘lighter’ version with less technical jargon and fewer of the details in a more general ‘popular’ science magazine
- write a short piece with no technical language for national news media
- produce posters or infographics for grabbing people’s attention at conferences, in hospitals or on the web.

Each of these potential dissemination routes would require a slightly different message, different focus, different wording and different method of presentation. In this short course you’ll focus on just one of these methods – infographics.

2 Visualising data

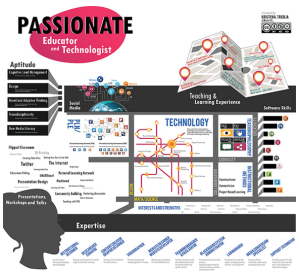


Figure 2 Paths in my ed tech landscape by Kristen A Treglia. This file is licensed under the Creative Commons Attribution-Non-commercial-Share Alike Licence http://creativecommons.org/licenses/by-nc-sa/2.0

Infographics – graphical representations of abstract data – can serve two purposes:

- data analysis and sense-making
- communication.

Infographics can be fabulous, beautiful, powerful fusions of art and data that are well suited for disseminating through social-media channels, such as Facebook and Twitter, where images work particularly well. They also get some terrible press. The article ‘Ending the infographic plague’ gives examples of some of the ‘terrible, lying infographics, which have become endemic in the blogosphere, and constantly threaten to break out into epidemic or even pandemic status’ (McArdle, 2011).

In this short course, you will encounter the good, the bad and the absolutely stunning in the world of infographics. You will explore ways to evaluate the accuracy and effectiveness of infographics that are being used to present research data, as well as investigate good and bad practice in infographic design.

2.1 Introduction to data visualisation

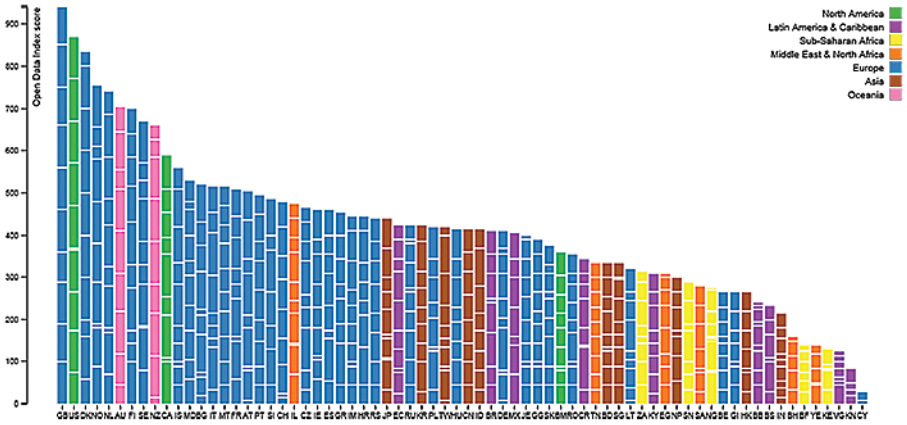


Figure 3 Open data index data visualisation. Open Knowledge International. This file is licensed under the Creative Commons Attribution-Non-commercial Licence http://creativecommons.org/licenses/by-nc/3.0/

In the following activity you'll watch a TED Talk by infographics celebrity David McCandless, which will give you an overview of how such representations of data can be used. Please note that in the TED Talk, David McCandless uses the term 'data visualisation' a lot, in addition to the terms 'infographic' and 'visualisation'. Infographics are closely related to, but not quite the same as, data visualisations – the latter being 'tool [s] to interactively explore data' (Cairo, 2014), while the former tend to be static representations of data. However, it's worth noting that the terms 'infographic' and 'data visualisation' are often used interchangeably. You'll read more about the distinction between the two later.

Activity 1 Strengths and weaknesses

Allow about 45 minutes.

1. Watch infographics celebrity David McCandless's TED Talk (2010), which introduces data visualisation. The video lasts 18 minutes.
2. As you watch the video, make notes in the box below about the strengths and weaknesses of infographics and data visualisations.

View at: youtube:5Zg-C8AAIGg

Provide your answer...

It is clear from the David McCandless TED Talk that infographics and data visualisations can be beautiful and engaging ways to present research, as demonstrated by Figure 4 (which has a marketing, rather than an educational research, focus).

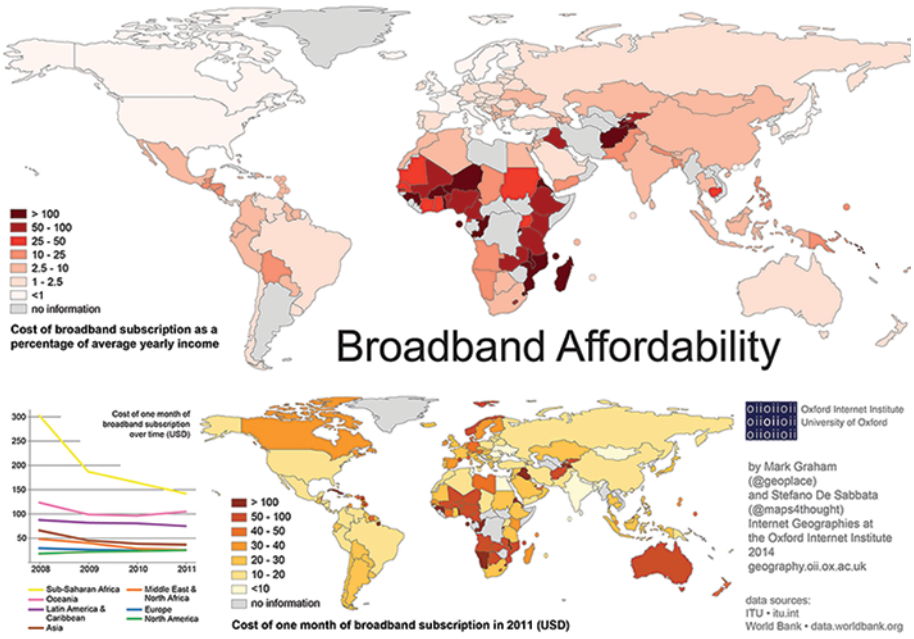


Figure 4 Broadband affordability. Oxford Internet Institute

In the next section you'll investigate how the expressive power of infographics can be realised to help researchers compete for attention when disseminating research results. You'll also study the ways in which the power of infographics can be harnessed to mislead, either intentionally or unintentionally.

3 The power of infographics

Infographics can be more eye-catching than the printed word, using images and colour to attract the reader's attention. For example:

- the brain can see images that last for just 13 milliseconds (Trafton, 2014)
- our eyes can register 36,000 visual messages per hour (Jensen, 2008, p. 55)
- we can get the sense of a visual scene in less than one-tenth of a second (Semetko and Scammell, 2012)
- 90 per cent of information transmitted to the brain is visual (Hyerle, 2000).

Another enormous strength of infographics, especially those for complex datasets, is that it is easier to experience them non-linearly than with text. The viewer's gaze can shift from point to point, or rescale from overall view to a narrow focus.

Infographics have the potential to create an immediate and lasting impact in communicating research results. They can also aid comprehension of a message, for example, by presenting statistical analyses in a format accessible to non-specialists (if accurately compiled). Perhaps, just as importantly, infographics draw on the techniques of visual artists in their use of colour, shape and figurative content. As a visual art form, they have the potential to affect our emotions in the same way that visual art can, heightening the impact of the message they are intended to convey.

Finally, as already mentioned, infographics are very easy to share via social media. Figure 5, an infographic depicting the plot lines of best-selling novels, shows that it's possible to create infographics out of almost any type of data. You can click to see a larger version below, or on the Slow Journalism website.

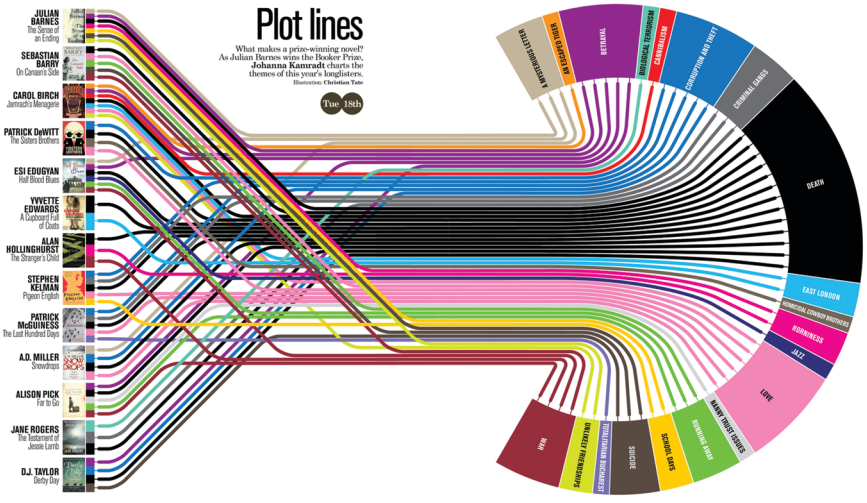


Figure 5 Plot lines infographic. Christian Tate, www.christiantate.co.uk

We've already noted that infographics are closely related to, but not quite the same as, data visualisations, and that the terms 'infographic' and 'data visualisation' are often used interchangeably. While infographics present a static view of data, data visualisations are designed to allow the viewer to apply filters to explore a subset of the available data. For example, the 'World inequality database on education' (UNESCO, n.d.) shows the

powerful influence of circumstances such as wealth, gender, ethnicity and location on people's education and life opportunities. The visualisation draws on data from the *Global Education Monitoring Report* (UNESCO, n.d.) and allows filtering by several indicators, including by country. In addition, data visualisations sometimes allow chronological changes to be tracked – for example, changes in primary-school attendance over time.

Infographics can achieve their expressive power through combinations of many different elements. These two resources give an overview of the various components that can appear in infographics and data visualisations.

- *Periodic Table of Data Visualization Methods* (Visual Literacy, n.d.)
- *Introduction to Data Visualization: Visualization Types* (Duke University Libraries, 2017)

In the next section you'll explore ways of assessing the quality of infographics.

4 Evaluating infographics

While infographics can be an extremely effective research communication tool, the communicative power of infographics can also be deliberately harnessed to deceive; for example, by presenting a selective view of a dataset, designed to obscure or over-amplify key research findings. The competition for attention that exists on the web often means that research reporting – especially by journalists, but also by researchers seeking to enhance their professional reputation – tends towards simple, dramatic stories.

The disadvantage of infographics mirrors their advantage – that they present a quickly comprehensible picture of a subject, distanced not only from the raw data but also (perhaps more importantly) from the process of inference/analysis by which that picture is generated. This is why, when looking at any infographic, it is important to interrogate the data interpretation process, which the infographic actually makes it harder to see.

In addition, even when a researcher is intending to accurately represent their research, a disadvantage of infographics is that, although it is fairly easy to produce them, it is not so easy to produce them well. As a consequence, the internet is replete with some truly awful infographics masquerading as research reports – awful due to poor design, lack of background information, inadequate explanation and deceptive or inaccurate representation of numerical research data.

The critical researcher therefore needs a suitable strategy for evaluating infographics – a strategy that combines techniques for analysing any research with techniques more commonly used when engaging with visual art.

In his article, ‘
The many-faced infographic: Brooklyn, elephants, and the visualization of data’, data visualisation guru Alberto Cairo tells us that:

> One of the keys to designing effective information graphics is to accept that function constrains form. This means that, if your goal is to communicate well, the visual shape you make your data adopt is not primarily a matter of aesthetic preferences, but should depend on the questions readers may want to get answered, or on the tasks they may wish to complete.
>
> (Cairo, 2013)

4.1 Assessing the quality of infographics

A quick Google search will return many rubrics and checklists for assessing the quality of an infographic. Common among them are the following evaluation criteria:

- Relevance of the infographic to any related research reports.
- The authority/credibility of the infographic author, or of any connected institution.
- Accuracy of the data. It is important that sources are listed for any data or knowledge claims referred to in an infographic that reports research, as this allows you to cross reference with the original data.
- Apparent purpose of the infographic and whether this is realised in its design.
- Tone of the infographic (e.g. humorous, cynical, neutral, serious) and whether this is appropriate to its apparent purpose.

- Content of the infographic, including the use of charts, colour, text and images.
- Clarity of the infographic layout. Is it easy to follow? Typically, a good infographic might start with broader claims or statements and present data that gradually narrows in focus and adds more detail.
- Aesthetic considerations. How does the infographic present information? Is it visually pleasing? Does it achieve an emotional effect that complements the message being conveyed? Does the emotional effect actually contradict the apparent message?

Natalia Karbasova, a student on Alberto Cairo's Introduction to Infographics and Data Visualization MOOC (which is no longer available for study), has published some useful notes on the topic in her blog post 'How to evaluate infographics'. Drawing on Cairo's MOOC, Karbasova suggests asking:

> - Is this infographic really 'functional' in the sense of facilitating basic, predictable tasks (comparing, relating variables, etc.)? If not, how could it be improved?
> - Does it tell a story? What are the most important or surprising points in the data? Can we highlight them somehow? What do the data mean? What kind of headlines, intro copy, and labels could it include to make it meaningful for a broad audience?
> - What other variables (if any) should be gathered/analyzed if we want to give an accurate portrait of the topic the graphic covers? Could we go beyond what is currently presented? Can we provide a better context for the data?
>
> (Karbasova, 2013)

The Junk Charts Trifecta Checkup (Fung, n.d.) offers a rather different way to critically engage with infographics and data visualisations (Figure 6). It involves three evaluation queries, for which the author, Kaiser Fung, proposes the answers should be one and the same:

- What is the question?
- What does the data say?
- What does the visual say?

Figure 6 Junk charts: recycling chart junk as junk art. Kaiser Fung, http://junkcharts.typepad.com/junk_charts/. This file is licensed under the Creative Commons Attribution NonCommercial ShareAlike 3.0 Licence http://creativecommons.org/licenses/by-nc-sa/3.0/us/

4.2 Compiling your own infographics – evaluation checklist

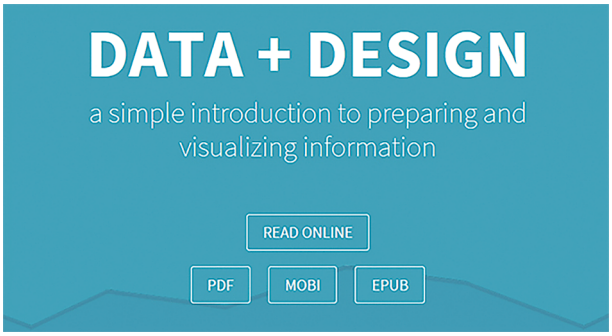


Figure 7 Data + design. © Infoactive. eBook licensed under the Creative Commons Attribution NonCommercial Share Alike 4.0 Licence https://creativecommons.org/licenses/by-nc-sa/4.0/

In the following activity you will explore *Data + Design*(Infoactive and Donald W. Reynolds Institute, n.d.) – a Creative Commons-licensed, downloadable, remixable and shareable online textbook that is a great resource for advice on creating and evaluating infographics and data visualisations. It is a collaborative work written by more than 50 authors and includes chapters by the aforementioned Alberto Cairo.

Activity 2 Creating effective visualisations

Allow about 1 hour.

Read Chapter 17 'Perception deception' (Djukic, n.d., pp. 217–40) and Chapter 18 'Common visualization mistakes' (Chang et al., pp. 242–61) of *Data + Design*. These chapters can be found in the 'Visualising data' section of the book.

As you read, note:

- some of the ways in which an infographic can be made more impactful
- common errors to watch out for when consuming and preparing infographics and data visualisations.

Provide your answer...

In the next activity you'll draw on your reading of Data + Design to compile a checklist to use when evaluating the accuracy and effectiveness of infographics and data visualisations.

Activity 3 Devising your checklist

Allow about 30 minutes.

Spend about 30 minutes devising your own infographics–evaluation checklist. Base it on the notes you made for Activity 2, and on your reading of the resources already mentioned. Do feel free to include additional criteria of your own.

Feedback

You should now have a useful checklist to use when evaluating any infographics you encounter, and when creating your own. If you'd like to read more about the design principles applied to creating infographics, Kibar and Akkoyunlu's paper 'Fostering and assessing infographic design for learning: the development of infographic design criteria' is a good place to start.

In the next activity you'll use the checklist you produced in Activity 3 as the basis for evaluating an infographic of your choice.

4.3 Applying the evaluation checklist

For this activity you'll apply some of the skills needed by the 'critical researcher' when you use the evaluation checklist that you developed in Activity 3. First though, you'll search for examples of great (and not so great) infographics related to educational-technology research.

Activity 4 Being a critical researcher

Allow about 1 hour 30 minutes.

1. Conduct an internet search either for 'educational technology infographics' or for infographics covering an education or training sector in which you're interested. .
2. As you search, note any infographics that appear to be particularly effective or appealing, and any that seem to be particularly poor. (You can record the web addresses for all of these examples in the box below.)
3. Select *one* infographic on which to conduct an evaluation, either an example you think is particularly effective or an infographic that you feel is flawed in some way.
4. Using your evaluation checklist from Activity 3, evaluate your chosen infographic by giving it a score against each of your criteria. You should divide the total score by the number of criteria to achieve a mean score for the infographic. You may find it useful to look again at the two resources mentioned in section 3, which list some of the typical components of infographics.

Provide your answer...

Feedback

The final score for your infographic will obviously depend on which infographic you've chosen, and which criteria you applied in your evaluation. However, an infographic scoring 5 across all criteria is likely to be a very successful one. An infographic scoring

3–4 is likely to be fairly effective but lacking in a few important areas. An infographic scoring lower than this is likely to have some substantial defects.

End-of-course quiz

You'll end your study of this short course with an End-of-course quiz designed to assess your knowledge of some of the concepts covered.

Conclusion

By now, you should have an appreciation of some of the key things to look out for when evaluating infographics, and will have used your own checklist to critically assess an infographic of your choice for its accuracy and effectiveness. The evaluation skills you've developed should help you as a critical researcher to navigate the plethora of infographics claiming to present research findings. They are also good preparation for creating your own infographics.

At the time of writing, free tools for creating infographics included Easel.ly, Google Charts, Infogr.am, Piktochart, Venngage, Visual.ly, and Vizualize.me, among others.

We can't be certain these tools will still exist by the time you study this course. However, a quick web search for 'free infographics tools' will help you to find up-to-date tools that are available.

We hope you've enjoyed this short course and soon find an opportunity to apply the knowledge and skills you've gained.

This free course is an adapted extract from the Open University course H819 *The critical researcher: educational technology in practice*.

Keep on learning

Study another free course

There are more than **800 courses on OpenLearn** for you to choose from on a range of subjects.

Find out more about all our free courses.

Take your studies further

Find out more about studying with The Open University by visiting our online prospectus.

If you are new to university study, you may be interested in our Access Courses or Certificates.

What's new from OpenLearn?

Sign up to our newsletter or view a sample.

For reference, full URLs to pages listed above:

OpenLearn – www.open.edu/openlearn/free-courses

Visiting our online prospectus – www.open.ac.uk/courses

Access Courses – www.open.ac.uk/courses/do-it/access

Certificates – www.open.ac.uk/courses/certificates-he

Newsletter – www.open.edu/openlearn/about-openlearn/subscribe-the-openlearn-newsletter

References

Cairo, A. (2013) 'The many-faced infographic: Brooklyn, elephants, and the visualization of data', *Peachpit*, 25 November [Blog]. Available at www.peachpit.com/ articles/ article.aspx?p=2153471 (Accessed 13 September 2016).

Cairo, A. (2014) 'Infographics to explain, data visualizations to explore', *The Functional Art*, 16 March [Blog]. Available at

www.thefunctionalart.com/ 2014/ 03/ infographics-to-reveal-visualizations.html (Accessed 8 March 2016).

Chang, K., Eyler-Werve, K. and Cairo, A. (n.d.) 'Common visualization mistakes', in Infoactive and Donald W. Reynolds Institute (eds) *Data + Design: A Simple Introduction to Preparing and Visualizing Information* [Online]. Available at https://orm-atlas2-prod.s3.amazonaws.com/pdf/13a07b19e01a397d8855c0463d52f454.pdf (Accessed 11 January 2017), pp. 242–61.

Djukic, M. (n.d.) 'Perception deception', in Infoactive and Donald W. Reynolds Institute (eds) *Data + Design: A Simple Introduction to Preparing and Visualizing Information* [Online]. Available at https://orm-atlas2-prod.s3.amazonaws.com/pdf/13a07b19e01a397d8855c0463d52f454.pdf (Accessed 11 January 2017), pp. 217–40.

Duke University Libraries (2017) *Data Visualization: Visualization Types* [Online]. Available at https://guides.library.duke.edu/datavis/vis_types (Accessed 13 October 2017).

Eppler, M. and Menjis, J. (2002) 'The concept of information overload: a review of literature from organization science, accounting, marketing, MIS and related disciplines', *Information Society*, vol. 2, no. 5, pp. 325–44.

Fung, K. (n.d.) 'Junk charts trifecta checkup: the definitive guide', *Junk Charts* [Blog]. Available at http://junkcharts.typepad.com/ junk_charts/ junk-charts-trifecta-checkup-the-definitive-guide.html (Accessed 11 January 2017).

Hyerle, D. (2000) *A Field Guide to Using Visual Tools*, Alexandra, VA, Association for Supervision and Curriculum Development.

Infoactive and Donald W. Reynolds Institute (n.d.) *Data + Design: A Simple Introduction to Preparing and Visualizing Information* [Online]. Available at https://orm-atlas2-prod.s3.amazonaws.com/pdf/13a07b19e01a397d8855c0463d52f454.pdf (Accessed 11 January 2017).

Jensen, E. (2008) *Brain-based Learning*, 2nd edn, Thousand Oaks, CA, Corwin Press.

Karbasova, N. (2013) 'How to evaluate infographics', *Mediakar*, 22 March [Blog]. Available at https://mediakar.wordpress.com/2013/03/22/how-to-evaluate-infographics/ (Accessed 13 September 2016).

Levitin, D. (2015) 'Why the modern world is bad for your brain', *Guardian*, 18 January [Online]. Available at www.theguardian.com/ science/ 2015/ jan/ 18/ modern-world-bad-for-brain-daniel-j-levitin-organized-mind-information-overload (Accessed 11 January 2017).

McArdle, M. (2011) 'Ending the infographic plague', *Atlantic*, 23 December [Online]. Available at www.theatlantic.com/ business/ archive/ 2011/ 12/ ending-the-infographic-plague/ 250474/ (Accessed 11 January 2017).

McCandless, D. (2010) *The Beauty of Data Visualization* [TED Talk]. Available at www.ted.com/ talks/ david_mccandless_the_beauty_of_data_visualization (Accessed 13 September 2016).

Naughton, J. (2017) 'Tim Wu: "the internet is like the classic story of the party that went sour"', *Guardian*, 8 January. Available at www.theguardian.com/ technology/ 2017/ jan/ 08/ tim-wu-interview-internet-classic-party-went-sour-attention-merchants (Accessed 24 March 2017).

Semetko, H. and Scammell, M. (2012) *The SAGE Handbook of Political Communication*, Thousand Oaks, CA, SAGE Publications.

Slow Journalism Company (n.d.) 'Booker Prize infographic: plot lines', *Slow Journalism* [Online]. Available at https://www.slow-journalism.com/infographics/culture/plot-lines (Accessed 12 April 2017).

Toffler, A. (1970) *Future Shock*, New York, NY, Bantam Books.

Trafton, A. (2014) 'In the blink of an eye: MIT neuroscientists find the brain can identify images seen for as little as 13 milliseconds', *MIT News*, 16 January [Online]. Available at http://news.mit.edu/ 2014/ in-the-blink-of-an-eye-0116 (Accessed 12 April 2017).

UNESCO (n.d.) 'World inequality database on education', *Global Education Monitoring Report*, UNESCO [Online]. Available at www.education-inequalities.org/ (Accessed 12 April 2017).

Visual Literacy (n.d.) *A Periodic Table of Visualization Methods* [Online]. Available at www.visual-literacy.org/periodic_table/periodic_table.html (Accessed 13 October 2017).

WorldWideWebSize.com (2017) *The Size of the World Wide Web (The Internet)* [Online]. Available at www.worldwidewebsize.com/ (Accessed 12 April 2017).

Acknowledgements

This free course was written by Leigh-Anne Perryman and reworked for OpenLearn by Simon Ball.

Figure 6: Kaiser Fung, http://junkcharts.typepad.com/junk_charts/. This file is licensed under the Creative Commons Attribution NonCommercial ShareAlike 3.0 Licence http://creativecommons.org/licenses/by-nc-sa/3.0/us/

Figure 7: © Infoactive. eBook licensed under the Creative Commons Attribution NonCommercial Share Alike 4.0 Licence https://creativecommons.org/licenses/by-nc-sa/4.0/

Quiz:

Question 5: Hyerle, D. (2000) 'Thinking maps: Visual tools for activating habits of mind', in Costa, A. L. and Kallick, B. (eds) *Activating and engaging habits of mind*, Alexandria, VA, Association for Supervision and Curriculum Development, pp. 46–58.

Don't miss out

If reading this text has inspired you to learn more, you may be interested in joining the millions of people who discover our free learning resources and qualifications by visiting The Open University – www.open.edu/openlearn/free-courses.