





# From Science to Freedom of Speech. Addressing Controversial Issues (in the classroom)

# **MODULE REFERENCES**

Barendt, E. M. (2005) Freedom of speech. Oxford: Oxford Univ. Press.

Brossard, D. and Lewenstein, B. V. (2010) A Critical Appraisal of Models of Public Understanding of Science, Using Practice to Inform Theory. In: Kahlor, L. and Stout, P. (eds.), Communicating Science, New Agendas in Communication, New York: Routledge, pp. 11-39, <a href="doi:10.4324/9780203867631">doi:10.4324/9780203867631</a>.

Brüggemann, M. and Engesser, S. (2017) Beyond false balance: How interpretive journalism shapes media coverage of climate change. Global Environmental Change, Vol. 42, pp. 58-67. doi:10.1016/j.qloenvcha.2016.11.004.

Cowan, P. (ed.) (2012) Teaching controversial issues in the classroom. Key issues and debates. London: Continuum.

Council of Europe (2017) Managing controversy – Developing a strategy for handling controversy and teaching controversial issues in schools, https://www.europeansources.info/record/managing-controversy-developing-a-strategy-for-handling-controversy-and-teaching-controversial-issues-in-schools/, accessed 12 January 2022.

Council of Europe (2016): Living with Controversy. Teaching Controversial Issues through Education for Democratic Citizenship and Human Rights (EDC/HRE). Training Pack for Teachers., http://www.demokratiezentrum.org/fileadmin/media/pdf/Materialien/Teaching Controversial issues - professional development pack for teachers EN.pdf, accessed 12 January 2022.

Fasce, A. and Picó, A. (2019) Science as a Vaccine. The Relation between Scientific Literacy and Unwarranted Beliefs. Science & Education, 28, pp. 109-125. doi:10.1007/s11191-018-00022-0.

Hendriks, F. and Kienhues, D. (2019) 2. Science understanding between scientific literacy and trust: contributions from psychological and educational research". In: Leßmöllmann, A., Dascal, M. and Gloning, T. (eds.), Science Communication, Berlin, Boston: De Gruyter Mouton, pp. 29-50. doi:10.1515/9783110255522-002.

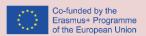
Hodson, D. (2010) Science Education as a Call to Action, Canadian Journal of Science, Mathematics and Technology Education; 10:3, pp. 197-206, doi:10.1080/14926156.2010.504478.

Howell, E. and Brossard, D. (2021) (Mis)informed about what? What it means to be a science-literate citizen in a digital world. Proceedings of the National Academy of Sciences. 118. e1912436117. doi:10.1073/pnas.1912436117.

Lewenstein, B. V. (2003) Models of public communication of science and technology. Proceedings of the National Academy of Sciences. 118. e1912436117. doi:10.1073/pnas.1912436117.







Momina Khan, Ch. (2019) WHEN DOES FREE SPEECH BECOME OFFENSIVE SPEECH? Teaching Controversial Issues in Classrooms: Information Age Publishing. In: Curriculum and teaching dialogue Vol.21 (1-2/2019), p.35-161.

National Academies of Sciences, Engineering, and Medicine (2017) Communicating Science Effectively: A Research Agenda. Washington, DC: The National Academies Press. Doi: 10.17226/23674.

Petersen, A.M., Vincent, E.M. and Westerling, A.L. (2019) Discrepancy in scientific authority and media visibility of climate change scientists and contrarians. Nat Commun, 10, 3502. doi: 10.1038/s41467-019-09959-4

Roberts, D. (2007) Scientific literacy/science literacy. In: Abell, S. and Lederman, N. (eds.): Handbook of research on science education, Mahwah: Lawrence Erlbaum Associates, pp. 729-780.

Scheufele, D.A. and Krause, Nicole M. (2019) ,Science audiences, misinformation, and fake news', PNAS 116 (16), pp. 7662-7669. doi: 10.1073/pnas.1805871115.

Schmid-Petri, H. and Bürger, M. (2020) 5 Modeling science communication: from linear to more complex models. In: Leßmöllmann, A., Dascal, M. and Gloning, T. (eds.), Science Communication, Berlin, Boston: De Gruyter Mouton, pp. 105-121. doi:10.1515/9783110255522-002.

Siarova, H., Sternadel, D. and Szőnyi, E. (2019) Science and scientific literacy as an educational challenge. Research for CULT Committee. Directorate-General for Internal Policies of the Union (European Parliament). doi:10.2861/2088

Sjöström, J. and & Eilks, I. (2018) Reconsidering Different Visions of Scientific Literacy and Science Education Based on the Concept of Bildung. doi:10.1007/978-3-319-66659-4\_4.

<u>UNESCO</u> (2013) Freedom of expression toolkit: a guide for students, https://unesdoc.unesco.org/ark:/48223/pf0000218618, accessed 12 January 2022.







# WEB-BASED REFERENCES

Amnesty International (2015): Freedom of Expression

https://www.youtube.com/watch?v=geMOuJZ20Ic, accessed 9 August 2021.

Civics Academy SA (2019): What is Freedom of Expression and what is hate speech? <a href="https://www.youtube.com/watch?v=BZBP8JZOLSU">https://www.youtube.com/watch?v=BZBP8JZOLSU</a>, accessed 9 August 2021.

Council of Europe (2015) Teaching Controversial Issues, <u>https://rm.coe.int/16806948b6</u>, accessed 12 January 2022.

CrashCourse (2015): Freedom of Speech: Crash Course Government and Politics #25 <a href="https://www.youtube.com/watch?v=Zeeq0qaEaLw">https://www.youtube.com/watch?v=Zeeq0qaEaLw</a>, accessed 9 August 2021.

Dickson, D. (2005) The Case for a 'deficit model' of science communication. Science and Development Network, <a href="https://www.scidev.net/global/editorials/the-case-for-a-deficit-model-of-science-communic/">https://www.scidev.net/global/editorials/the-case-for-a-deficit-model-of-science-communic/</a>, accessed 9 August 2021.

Ellerton, P. (2014) The problem of false balance when reporting on science. The Conversation, 16 July, <a href="https://theconversation.com/the-problem-of-false-balance-when-reporting-on-science-29077">https://theconversation.com/the-problem-of-false-balance-when-reporting-on-science-29077</a>, accessed 18 August 2021.

Empower Malaysia (2020): What is Freedom of Expression (FoE)? https://www.youtube.com/watch?v=EXeT58KAhYo, accessed 9 August 2021.

<u>explainitychannel</u> (2014): Freedom of Expression explained (explainity® explainer video): <u>https://www.youtube.com/watch?v=FEaFp0a60-U</u>, accessed 9 August 2021.

First Draft (2020) The psychology of misinformation. First Draft, 27 August, <a href="https://firstdraftnews.org/long-form-article/the-psychology-of-misinformation/">https://firstdraftnews.org/long-form-article/the-psychology-of-misinformation/</a>, accessed 19 August 2021.

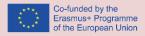
McGlynn, T. (2020) The deficit model of science communication. Small Pond Science, <a href="https://smallpondscience.com/2020/01/18/the-deficit-model-of-science-communication/">https://smallpondscience.com/2020/01/18/the-deficit-model-of-science-communication/</a>, accessed 9 August 2021.

McGlynn, T. (2015) People are irrational. Small Pond Science, https://smallpondscience.com/2015/06/22/people-are-irrational/, accessed 9 August 2021.

OECD (2017) How does PISA for Development measure scientific literacy? PISA for Development Brief 10, <a href="https://www.oecd.org/pisa/pisa-for-development/10-How-PISA-D-measures-science-literacy.pdf">https://www.oecd.org/pisa/pisa-for-development/10-How-PISA-D-measures-science-literacy.pdf</a>, accessed 3 August 2021







## **FURTHER LITERATURE**

ALLEA (2021) Fact or Fake? Tackling Science Disinformation. ALLEA Discussion Paper, 5. Berlin. doi: 10.26356/fact-or-fake

Cook, J., Lewandowsky, S. and Ecker, U.K.H. (2017) Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. PLoS ONE 12(5): e0175799. doi: 10.1371/journal.pone.0175799

Davies, S.R., Halpern, M., Horst, M., Kirby, D.A. and Lewenstein, B. (2019) Science stories as culture: experience, identity, narrative and emotion in public communication of science. Journal of Science Communication 18(05), doi: 10.22323/2.18050201

Drummond, C. and Fischhoff, B. (2017) Individuals with greater science literacy and education have more polarized beliefs on controversial science topics, PNAS 114(36), pp. 9587-9592, doi: 10.1073/pnas.1704882114

Fooladi, E.C. (2020) Between Education and Opinion-Making. Dialogue between Didactic/Didaktik Models from Science Education and Science Communication in the Times of a Pandemic, Science & Education 29, pp. 1117-1138, doi: 10.1007/s11191-020-00156-0

Hendriks, F., Mayweg-Paus, E., Felton, M., Iordanou, K., Jucks, R. and Zimmermann, M. (2020) Contraints and Affordances of Online Engagement With Scientific Information – A Literature Review, Front. Psychol. 11:572744. doi: 10.3389/fpsyg.2020.572744

Holbrook, J. and Rannikmae, M. (2009) The Meaning of Scientific Literacy, International Journal of Environmental & Science Education 4(3), pp. 275-288. doi:

Kahan, D.M., Landrum, A., Carpenter, K., Helft, L. and Hall Jamieson, K. (2017) Science Curiosity and Political Information Processing, Advances in Political Psychology 38(Suppl. 1), pp. 179-199, doi: 10.1111/pops.12396

Krajcik, J.S. and Sutherland L.M. (2010) Supporting Students in Developing Literacy in Science, Science 328(5977), pp. 456-459, doi: 10.1126/science.1182593

Lewenstein, B.V. (2014) Identifying What Matters: Science Education, Science Communication, and Democracy, Journal of Research in Science Teaching 52(2), pp. 253-262, doi: 10.1002/tea.21201

Littledyke, M. (2008) Science education for environmental awareness: approaches to integrating cognitive and affective domains, Environmental Education Research 14(1), pp. 1-17, doi: 10.1080/13504620701843301

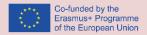
Martinez-Conde, S. and Macknik, S. L. (2017) Finding the plot in science storytelling in hopes of enhancing science communication, PNAS 114(31), pp. 8127-8129, doi: 10.1073/pnas.1711790114

Michalovich, A. and Hershkovitz, A. (2020) Assessing YouTube science news' credibility: The impact of websearch on the role of video, source, and user attributes, Public Understanding of Science 29(4), pp. 376-391, doi: 10.1177/0963662520905466

Millar, R. (2006) Twenty First Century Science: Insights from the Design and Implementation of a Scientific Literacy Approach in School Science, International Journal of Science Education 28(13), pp. 1499-1521, doi: 10.1080/09500690600718344







Osborne, J. (2010) Arguing to Learn in Science: The Role of Collaborative, Critical Discourse, Science 328(5977), pp. 463-466. doi: 10.1126/science.1183944

Owens, D.C., Sadler, T.D. and Zeidler, D.L. (2017) Controversial issues in the science classroom. Phi Delta Kappan 99 (4), pp. 45-49.

Santos, W. (2008) Scientific Literacy: A Freirean Perspective as a Radical View of Humanistic Science Education. Science Education, 93(2), 361-382. doi: 10.1002/sce.20301

Sengul, O. (2019) Linking Scientific Literacy, Scientific Argumentation, and Democratic Citizenship, Universal Journal of Educational Research 7(4), pp. 1090-1098, doi: 10.13189/ujer.2019.070421

Sinatra, G.M. and Lombardi, D. (2020) Evaluating sources of scientific evidence and claims in the post-truth era may require reappraising plausibility judgments, Educational Psychologist 55(3), doi: 10.1080/00461520.2020.1730181

Taddicken, M. and Wolff, L. (2020) 'Fake News' in Science Communication: Emotions and Strategies of Coping with Dissonance Online, Media and Communication 8(1), pp. 206-217, doi: 10.17645/mac.v8i1.2495

Taylor, A. (2014) Teach the Controversy, Thought and Awe, <a href="https://www.thoughtandawe.net/education/teach-the-controversy/">https://www.thoughtandawe.net/education/teach-the-controversy/</a>

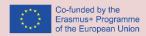
Tseng, A.S. (2018) Students and evaluation of web-based misinformation about vaccination: critical reading or passive acceptance of claims? International Journal of Science Education, Part B Vol. 8 (3), pp. 250-265. doi: 10.1080/21548455.2018.1479800

Vohland, K., Land-Zandstra, A., Ceccaroni, L., Lemmens, R., Perelló, J., Ponti, M., Samson, R. and Wagenknecht, K. (2021) The Science of Citizen Science. Cham: Springer.

*Yacoubian, H.A.* (2018) Scientific literacy for democratic decision-making. International Journal of Science Education 40(3), pp. 308-327. doi: 10.1080/09500693.2017.1420266







# RESOURCES FOR TEACHING CONTROVERSIAL ISSUES

Association for Science Education: Resources for teaching controversial issues: <a href="https://www.ase.org.uk/resources/teaching-controversial-issues">https://www.ase.org.uk/resources/teaching-controversial-issues</a>

CLEAN: Controversy in the Classroom: Strategies for managing climate change discourse: <a href="https://cleanet.org/clean/literacy/tools/controversy.html">https://cleanet.org/clean/literacy/tools/controversy.html</a>

Council of Europe (2015) Teaching Controversial Issues, <a href="https://rm.coe.int/16806948b6">https://rm.coe.int/16806948b6</a>

Council of Europe (2017) Managing controversy – Developing a strategy for handling controversy and teaching controversial issues in schools, <a href="https://www.europeansources.info/record/managing-controversy-developing-a-strategy-for-handling-controversy-and-teaching-controversial-issues-in-schools/">https://www.europeansources.info/record/managing-controversy-developing-a-strategy-for-handling-controversy-and-teaching-controversial-issues-in-schools/</a>

Council of Europe (2016) Living with Controversy. Teaching Controversial Issues through Education for Democratic Citizenship and Human Rights (EDC/HRE). Training Pack for Teachers., <a href="http://www.demokratiezentrum.org/fileadmin/media/pdf/Materialien/Teaching Controversial issues-professional\_development\_pack\_for\_teachers\_EN.pdf">http://www.demokratiezentrum.org/fileadmin/media/pdf/Materialien/Teaching Controversial issues-professional\_development\_pack\_for\_teachers\_EN.pdf</a>

European Wergeland Centre: Resources for teaching controversial issues <a href="https://theewc.org/resources/teaching-controversial-issues/">https://theewc.org/resources/teaching-controversial-issues/</a>

Grey Ellis, M. (2019) The Influencer Scientists Debunking Online Misinformation, WIRED, <a href="https://www.wired.com/story/youtube-misinformation-scientists/">https://www.wired.com/story/youtube-misinformation-scientists/</a>

Kahn, S. (2019) It's Still Debatable! Using Socioscientific Issues to Develop Scientific Literacy, K-5, Arlington, Virginia: NSTA press.

ProCon.org: How to Discuss Controversial issues in Class: Reflective Structured Dialogue Lesson Plan Idea, <a href="https://www.procon.org/background-resources/how-to-discuss-controversial-issues-in-class-reflective-structured-dialogue-lesson-plan-idea/">https://www.procon.org/background-resources/how-to-discuss-controversial-issues-in-class-reflective-structured-dialogue-lesson-plan-idea/</a>

ProCon.org: Project Citizen: Transforming Research into Action – Lesson Plan Idea, <a href="https://www.procon.org/background-resources/project-citizen-transforming-research-into-action-lesson-plan-idea/">https://www.procon.org/background-resources/project-citizen-transforming-research-into-action-lesson-plan-idea/</a>

STEM Teaching Tools: Addressing controversial science topics in the K-12 classroom, http://stemteachingtools.org/brief/44

Thompson, E. (2021) 25 Controversial Topics: Position Paper Guide, <a href="https://thebestschools.org/magazine/controversial-topics-research-starter/#global-climate-change">https://thebestschools.org/magazine/controversial-topics-research-starter/#global-climate-change</a>

UNESCO (2013) Freedom of expression toolkit: a guide for students, https://unesdoc.unesco.org/ark:/48223/pf0000218618

Yale Poorvu Center for Teaching and Learning: Teaching Controversial Topics: <a href="https://poorvucenter.yale.edu/teaching/ideas-teaching/teaching-controversial-topics">https://poorvucenter.yale.edu/teaching/ideas-teaching/teaching-controversial-topics</a>

Zucker, A., Noyce, P. and McCullough, A. (2020) Just say No! Teaching Students to resist Scientific Misinformation. The Science Teacher, <a href="https://www.nsta.org/science-teacher/science-teacher-january-2020/just-say-no">https://www.nsta.org/science-teacher/science-teacher-january-2020/just-say-no</a>





