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# Demystifying the Academic Research Enterprise

## Becoming a Successful Scholar in a Complex and Competitive Environment

By: Kelvin K. Droegemeier

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## References

- Alberts, B., Cicerone, R. J., Fienberg, S. E., Kamb, A., McNutt, A., Nerem, R. M., Schekman, R., Shiffrin, R., Stodden, V., Suresh, S., et al. (2015). Self-correction in science at work. *Science*, 348(6242), 1420–1422. <https://www.science.org/doi/10.1126/science.aab3847>
- Alberts, B., Hanson, B., & Kelner, K. L. (2008). Reviewing peer review. *Science*, 231(5885), 15. <https://www.science.org/doi/pdf/10.1126/science.1162115>
- American Academy of Arts and Sciences (2014). *Restoring the foundation: The vital role of research in preserving the American Dream*. Cambridge, MA: American Academy of Arts and Sciences. [https://www.amacad.org/multimedia/pdfs/publications/researchpapersmonographs/AmericanAcad\\_RestoringtheFoundation.pdf](https://www.amacad.org/multimedia/pdfs/publications/researchpapersmonographs/AmericanAcad_RestoringtheFoundation.pdf)
- American Academy of Arts and Sciences (2020). *The perils of complacency: America at a tipping point in science and engineering*. [https://www.amacad.org/sites/default/files/publication/downloads/Perils-of-Complacency\\_Report-Brief\\_4.pdf](https://www.amacad.org/sites/default/files/publication/downloads/Perils-of-Complacency_Report-Brief_4.pdf)
- American Association for the Advancement of Science (2018). *Historical trends in federal R&D*. <https://www.aaas.org/page/historical-trends-federal-rd>
- American Association for the Advancement of Science (2020, October 22). *A snapshot of U.S. R&D competitiveness: 2020 update*. <https://www.aaas.org/news/snapshot-us-rd-competitiveness-2020-update>
- American Society for Quality (n.d.). Learn about quality. Retrieved June 27, 2022, from <http://asq.org/learn-about-quality/quality-assurance-quality-control/overview/overview.html>
- Anania, F. A. (2015). Universities and sponsored research: Indirect cost recovery and the law of diminishing return. *Hepatology*, 61(6), 1776–1778. <https://doi.org/10.1002/hep.27776>
- Arthur, B. (2017, April 17). *The difference between quality assurance and quality control*. Open Dialog, Dialog Information Technology. <https://www.dialog.com.au/open-dialog/the-difference-between-quality-assurance-and-quality-control/>
- Arti (2014). *Development of education as a discipline—An analytical study*. Doctoral thesis, University of Lucknow. INFLIBNET Centre. <http://hdl.handle.net/10603/70652>
- Association of American Medical Colleges (n.d.). *Regulatory burden provisions in the 21st century cures*. Retrieved June 27, 2022, from <https://www.aamc.org/download/479546/data/regulatoryburdenprovision.pdf>
- Association of American Universities (2017a). *Breaking down the costs of federal research at universities*. [https://www.aau.edu/sites/default/files/files/Costs-University-Research-Background-Brief\\_3-2017.pdf](https://www.aau.edu/sites/default/files/files/Costs-University-Research-Background-Brief_3-2017.pdf)
- Association of American Universities (2017b). *Frequently asked questions about facilities and administrative (F&A) costs of federally sponsored university research*. <https://www.aau.edu/key-issues/frequently-asked-questions-about-facilities-and-administrative-fa-costs-federally>
- Association of American Universities (n.d.). *Reducing regulatory burden*. Retrieved June 27, 2022, from <https://www.aau.edu/issues/reducing-regulatory-burden>

- Association of Public & Land-grant Universities (2016). *A guide to implementing a safety culture*. <http://www.aplu.org/library/safety-culture/file>
- Association of University Technology Managers (n.d.-a). *AUTM licensing activity survey*. Retrieved June 27, 2022, from <https://autm.net/surveys-and-tools/surveys/licensing-survey/2019-licensing-survey/disclosures>
- Association of University Technology Managers (n.d.-b). *Driving the innovation economy: Academic technology transfer numbers*. Retrieved June 27, 2022, from <https://autm.net/AUTM/media/Surveys-Tools/Documents/FY20-Infographic.pdf>
- Balietti, S., Goldstone, R. L., & Helbing, D. (2016). Peer review and competition in the art exhibition game. *PNAS*, *113*(30), 8414–8419. <http://www.pnas.org/cgi/doi/10.1073/pnas.1603723113>
- Batterbee, R. (2017). Research papers, gender bias and peer review. *Biology Letters*, *13*. <https://doi.org/10.1098/rsbl.2017.0424>
- Beall, J. (2013). Unethical practices in scholarly, open-access publishing. *Journal of Information Ethics*, *22*(1), 11–22.
- Bennett, L. M., & Gadlin, H. (2012). Collaboration and team science—from theory to practice. *Journal of Investigative Medicine*, *60*(5), 768–775. <https://jim.bmj.com/content/60/5/768>
- Bennett L. M., & Gadlin, H. (2019). Conflict prevention and management in science teams. In K. Hall, A. Vogel, & R. Croyle (Eds.), *Strategies for team science success*. Springer. [https://doi.org/10.1007/978-3-030-20992-6\\_22](https://doi.org/10.1007/978-3-030-20992-6_22)
- Bias (n.d.-a). *Cambridge English Dictionary*. Retrieved June 27, 2022, from <https://dictionary.cambridge.org/us/dictionary/english/bias>
- Bias (n.d.-b). *Oxford English Dictionary*. Retrieved June 27, 2022, from <https://www.oed.com/view/Entry/18564?rsk=UQAvts&result=1#eid>
- Bienenstock, A. (2000). Some thoughts on cost sharing. *Research Management Review*, *11*(1), 5–8.
- Bjork, B-C. (2011). A Study of innovative features in scholarly open access journals. *Journal of Medical Internet Research*, *13*(4). <https://www.jmir.org/2011/4/e115/>
- Blakeslee, W. D. (2004). *Fundamentals of intellectual property for institutional research*. The Johns Hopkins University. <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiv-rO4bjyAhXIWc0KHXXJCA8QFnoECBQQAAQ&url=https%3A%2F%2Fwww.highered.compliance.org%2Fwp-content%2Fuploads%2F2018%2F10%2Fxfviii-04-11-4.doc&usq=AOvVaw2tAJWsSIntS0PG1LnZD6mU>
- Bohannon, J. (2013). Who's afraid of peer review? *Science*, *342*(6154), 60–65. [https://www.science.org/doi/10.1126/science.2013.342.6154.342\\_60](https://www.science.org/doi/10.1126/science.2013.342.6154.342_60)
- Bornmann, L. (2013). Research misconduct—definitions, manifestations and extent. *Publications*, *1*, 87–98. <https://doi.org/10.3390/publications1030087>
- Brabin, D. W. (2004). *Pioneering research: A risk worth taking*. Hoboken, NJ: Wiley-Interscience.
- Bradley, S. H., Devito, N. J., Lloyd, K. E., Richards, G. C., Romby, T., Wayant, C., & Gill, P. J. (2020). Reducing bias and improving transparency in medical research: A critical overview of the problems, progress and suggested next steps. *Journal of the Royal Society of Medicine*, *113*(11), 433–443. <https://doi.org/10.1177%2F0141076820956799>
- Bulmer, E. (Ed.) (2003). *Sociological research methods* (2nd ed.). New York: Transaction Publishers.
- Burney, S. M. A., & Saleem, H., (2008, March 6). Inductive & deductive research approach [PowerPoint slides]. Lecture delivered at the University of Karachi, Pakistan. [https://www.researchgate.net/profile/Hussain-Saleem/publication/331330927\\_Inductive\\_and\\_Deductive\\_Research\\_Approach/links/5d0749d492851c900442deb7/Inductive-and-Deductive-Research-Approach.pdf](https://www.researchgate.net/profile/Hussain-Saleem/publication/331330927_Inductive_and_Deductive_Research_Approach/links/5d0749d492851c900442deb7/Inductive-and-Deductive-Research-Approach.pdf)
- Burroughs Wellcome Fund & Howard Hughes Medical Institute (2006). *Making the right moves: A practical guide to scientific management for postdocs and new faculty* (2nd ed.). <https://www.hhmi.org/science-education/programs/resources/making-right-moves>
- Bush, V. (1945). *Science, the endless frontier*. Washington, DC: US Government Printing Office. <https://www.nsf.gov/about/history/nsf50/vbush1945.jsp>

- Callen, T. (2020, February 24). *Gross domestic product: An economy's all*. International Monetary Fund. <https://www.imf.org/external/pubs/ft/fandd/basics/gdp.htm>
- Canadian Institutes of Health Research (n.d.). *Unconscious bias training module*. Retrieved June 27, 2022, from <http://www.chairs-chaires.gc.ca/program-programme/equity-equite/bias/module-eng.aspx?pedisable=false>
- Cantu, R. (n.d.). *In fraud we trust: Top 5 cases of misconduct in university research*. University of Houston. Retrieved June 27, 2022, from <https://research.uh.edu/the-big-idea/university-research-explained/five-cases-of-research-fraud/>
- Carey, S. S. (2011). *A beginner's guide to the scientific method* (4th ed.). Boston: Wadsworth, Cengage Learning.
- CEBM (n.d.). *Catalog of bias*. University of Oxford. Retrieved June 27, 2022, from <https://catalogofbias.org/biases/>
- Christensen, L. B., Johnson R. B., & Turner, L. A. (2014). *Research methods, design and analysis* (12th ed.). Upper Saddle River, NJ: Pearson.
- Cisak, A., Formanowicz, M., & Saguy, T. (2018). Bias against research on gender bias. *Scientometrics*, 115, 189–200. <https://doi.org/10.1007/s11192-018-2667-0>
- CITI Program (n.d.). *Responsible conduct of research*. Retrieved June 27, 2022, from <https://about.citiprogram.org/series/responsible-conduct-of-research-rcr/>
- Cohen, E., & Lloyd, S. (2014). Disciplinary evolution and the rise of the transdiscipline. *Informing Science: The International Journal of an Emerging Transdiscipline*, 17, 189–215. <http://www.inform.nu/Articles/Vol17/ISJv17p189-215Cohen0702.pdf>
- Colby, S. L., & Ortman, J. M. (2015). *Projections of the size and composition of the U.S. population: 2014 to 2060*. <https://census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf>
- Collins, F. (2018, August 23). *Statement on protecting the integrity of U.S. biomedical research*. National Institutes of Health. <https://www.nih.gov/about-nih/who-we-are/nih-director/statements/statement-protecting-integrity-usbiomedical-research>
- Comrie, A. C. (2021). *Like nobody's business: An insider's guide to how U.S. university finances really work*. Open Book Publishers. <https://doi.org/10.11647/OBP.0240>
- Congressional Research Service (2020a). *Department of Defense research, development, test, and evaluation (RDT&E) appropriations structure*. Report R44711. <https://fas.org/sgp/crs/natsec/R44711.pdf>
- Congressional Research Service (2020b). *Federal research and development (R&D) funding: FY2020*. Report R45715. <https://fas.org/sgp/crs/misc/R45715.pdf>
- Congressional Research Service (2020c). *The U.S. export control system and the export control reform initiative*. Report R41916. <https://sgp.fas.org/crs/natsec/R41916.pdf>
- Congressional Research Service (2021a). *Defense Primer: RDT&E*. Report IF10553. <https://crsreports.congress.gov/product/pdf/IF/IF10553>
- Congressional Research Service (2021b). *Earmark disclosure rules in the House: Member and committee requirements*. Report RS22866. <https://sgp.fas.org/crs/misc/RS22866.pdf>
- Cooper, C. (2014, January 3). Drugs companies “routinely withhold results of medical trials” from doctors, researchers, and patients. *Independent*. <http://www.independent.co.uk/life-style/health-and-families/health-news/drugs-firms-routinely-withhold-results-of-medical-trials-from-doctors-researchers-and-patients-9035740.html>
- Council on Governmental Relations (2019). *Excellence in research: The funding model, F&A reimbursement, and why the system works*. [https://www.cogr.edu/sites/default/files/ExcellenceInResearch4\\_12\\_19\\_0.pdf](https://www.cogr.edu/sites/default/files/ExcellenceInResearch4_12_19_0.pdf)
- Council on Governmental Relations (2021, April 10). *Federal regulatory changes, since 1991*. [https://www.cogr.edu/sites/default/files/RegChangesSince1991\\_Updated%20January%202021%20Draft%20clean.pdf](https://www.cogr.edu/sites/default/files/RegChangesSince1991_Updated%20January%202021%20Draft%20clean.pdf)
- Council on Governmental Relations (2022). *Excellence in research: Technology transfer in U.S. research universities: Dispelling common myths*. [https://www.cogr.edu/sites/default/files/Myths\\_Final%2008-01-22.pdf](https://www.cogr.edu/sites/default/files/Myths_Final%2008-01-22.pdf)

- Coursera (n.d.). *Reproducible research*. Retrieved June 27, 2022, from <https://www.coursera.org/course/repdata>
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). Los Angeles: Sage Publications.
- Crowther, D., & Lancaster, G. (2008). *Research methods*. New York: Routledge.
- DeCoursey, T. E. (2006). The pros and cons of open peer review. *Nature*. <https://doi.org/10.1038/nature04991>
- Denning, P. J. (1997). A new social contract for research. *Communications of the ACM*, 40(2), 132–134. <https://dl.acm.org/doi/10.1145/253671.253755>
- Desilver, D. (2018). *Congress has long struggled to pass spending bills on time*. Pew Research Center. <https://www.pewresearch.org/fact-tank/2018/01/16/congress-has-long-struggled-to-pass-spending-bills-on-time/>
- Diamond, L., & Schell, O. (Eds.) (2019). *China's influence & American interests: Promoting constructive vigilance*. <https://www.hoover.org/research/chinas-influence-american-interests-promoting-constructive-vigilance>
- Dizikes, P. (2011, February 22). When the butterfly effect took flight. *MIT Technology Review*. <https://www.technologyreview.com/s/422809/when-the-butterfly-effect-took-flight/>
- Doyle, M. (2018, January 9). U.S. Interior Department to put academic, nonprofit grants through political review. *ScienceInsider*. <http://www.sciencemag.org/news/2018/01/us-interior-department-put-academic-nonprofit-grants-through-political-review>
- Drawson, A. S., Toombs, E., & Mushquash, C. J. (2017). Indigenous research methods: A systematic review. *International Indigenous Policy Journal*, 8(2). <https://ir.lib.uwo.ca/iipj/vol8/iss2/5>
- Droegemeier, K. (2020, August 19). Harnessing the power of science to fight the Coronavirus. *Washington Examiner*. <https://www.washingtonexaminer.com/opinion/op-eds/harnessing-the-power-of-science-to-fight-the-coronavirus>
- Droegemeier, K. K. (2017, October 24). *Written testimony provided for a hearing before the United States House of Representatives Sub-Committee on Labor, Health and Human Services, Education and Related Agencies titled "The Role of Facilities and Administrative Costs in Supporting NIH-Funded Research."* <https://docs.house.gov/meetings/AP/AP07/20171024/106525/HHRG-115-AP07-Wstate-DroegemeierK-20171024.pdf>
- Droegemeier, K. K. (2018, May 30). Direct costs, indirect costs, overhead, G&A, and F&A: Clearing up the confusion. [http://kkd.ou.edu/Overhead\\_G&A\\_and\\_F&A.pdf](http://kkd.ou.edu/Overhead_G&A_and_F&A.pdf)
- Droegemeier, K. K., Snyder, L. A., Knoedler, A., Taylor, W., Litwiller, B., Whitacre, C., Gobstein, H., Keller, C., Hinds, T. L., & Dwyer, N. (2017). The roles of chief research officers at American research universities: A current profile and challenges for the future. *Journal of Research Administration*, 48(1), 26–64. <https://files.eric.ed.gov/fulltext/EJ1152287.pdf>
- DuBois, J. M., Anderson, E. E., Chibnall, J., Carroll, K., Gibb, T., & Ogbuka, C. (2013). Understanding research misconduct: A comparative analysis of 120 cases of professional wrongdoing. *Accountability in Research*, 20(5–6), 320–338. <https://doi.org/10.1080/08989621.2013.822248>
- Earhart, A. E., Risam, R., & Bruno, M. (2021). Citational politics: Quantifying the influence of gender on citation. *Digital Scholarship in the Humanities*, 36(3), 581–594. <https://doi.org/10.1093/lhc/fqaa011>
- Editor (1996). The Bulletin interviews Professor Edward N. Lorenz. *WMO Bulletin*, 45(2), 127–137. [https://eapsweb.mit.edu/sites/default/files/Bul\\_interview.pdf](https://eapsweb.mit.edu/sites/default/files/Bul_interview.pdf)
- Editor (2014). Journals unite for reproducibility. *Nature*, 515(7). <https://www.nature.com/articles/515007a.pdf>
- Eisinger, D. (2013, August 8). The biggest accidental art discoveries of all time. *Complex*. <https://www.complex.com/style/2013/08/found-art/>
- Elmore, K. L., Flamig, Z. L., Lakshmanan, V., Kaney, B. T., Farmer, V., Reeves, H. D., & Rothfus, L. P. (2013). MPING: Crowd-sourcing weather reports for research. *Bulletin of the American Meteorological Society*, 95(9), 1335–1342. <https://doi.org/10.1175/BAMS-D-13-00014.1>

- Elmore, S. A., & Weston, E. H. (2020). Predatory journals: What are they and how to avoid them. *Toxicologic Pathology*, 48(4), 607–610. <https://doi.org/10.1177/0192623320920209>
- Elsevier (n.d.). *What is peer review?* Retrieved June 27, 2022, from <https://www.elsevier.com/reviewers/what-is-peer-review>
- EPSCoR/IDEA Foundation (n.d.). *Program history*. Retrieved June 27, 2022, from <https://www.epscorideafoundation.org/about/overview>
- Esarey, J. (2017). Does peer review identify the best papers? A simulation study of editors, reviewers, and the scientific publication process. *PS: Political Science & Politics*, 50(4), 963–969. <https://doi.org/10.1017/S1049096517001081>
- European Commission (n.d.). *Horizon Europe: Research and innovation funding programme until 2027*. [https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en)
- Farthing, M. J. G. (2013). Research misconduct: A grand global challenge for the 21st century. *Gastroenterology and Hepatology*, 29, 422–427. <https://doi.org/10.1111/jgh.12500>
- Federal Bureau of Investigation (2019). *China: The risk to academia*. <https://www.fbi.gov/file-repository/china-risk-to-academia-2019.pdf/view/>
- Federal Demonstration Partnership. (2014). *2012 Faculty workload survey research report*. [https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pgga\\_087667.pdf](https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pgga_087667.pdf)
- Feilden, T. (2017, February 22). Most scientists “can’t replicate studies by their peers.” *BBC News*. <https://www.bbc.com/news/science-environment-39054778>
- Feller, I. (2000a). The remainder of the cost sharing policy agenda. *Research Management Review*, 11(1), 31–39.
- Feller, I. (2000b). Social contracts and the impact of matching fund requirements on American research universities. *Educational Evaluation and Policy Analysis*, 22(1), 91–98.
- Femi, O., Jayawickrama, U., Arakpogun, E. O., Suklan, J., & Liu, S. (2022). Fake news on social media: The impact on society. *Information Systems Frontiers*. <https://doi.org/10.1007/s10796-022-10242-z>
- Fitzpatrick, N. (2018). Media manipulation 2.0: The impact of social media on news, competition, and accuracy. *Athens Journal of Mass Media and Communications*, 4(1), 45–62. <https://doi.org/10.30958/ajmmc.4.1.3>
- Flake, J. (2015, January 1). *Wastebook: The farce awakens December 2015*. <https://www.amazon.com/Wastebook-Farce-Awakens-December-2015/dp/B06Y4Y63JT>
- Flake, J. (2017, July 19). *Senator Jeff Flake presents Wastebook Porkemon Go January 2017*. [https://www.amazon.com/Senator-Presents-Wastebook-Porkemon-January/dp/1973708094/ref=tmm\\_pap\\_swatch\\_0?\\_encoding=UTF8&qid=&sr=](https://www.amazon.com/Senator-Presents-Wastebook-Porkemon-January/dp/1973708094/ref=tmm_pap_swatch_0?_encoding=UTF8&qid=&sr=)
- Fort, D., Herr, T., Shaw, P., Gutzman, K., & Starren, J. (2017). Mapping the evolving definitions of translational research. *Journal of Clinical and Translational Science*, 1(1), 60–66. <https://doi.org/10.1017/cts.2016.10>
- Gauch, H. G., Jr. (2003). *Scientific method in practice*. Cambridge: Cambridge University Press.
- Getting started with research: Is it a primary or secondary source?* (n.d.). Brooklyn College. Retrieved June 27, 2022, from <https://libguides.brooklyn.cuny.edu/startingresearch/primaryorsecondary>
- Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., & Kington, R. (2011). Race, ethnicity, and NIH research awards. *Science*, 333(6045), 1015–1019. <https://doi.org/10.1126/science.1196783>
- Godin, B. (2006). The linear model of innovation: The historical construction of an analytical framework. *Science, Technology, & Human Values*, 31(6), 639–667. <http://journals.sagepub.com/doi/abs/10.1177/0162243906291865>
- Goodman, J., Chandna, A., & Roe, K. (2015). Trends in animal use at US research facilities. *Journal of Medical Ethics*, 41, 567–569. <https://doi.org/10.1136/medethics-2014-102404>

- Grants.gov (n.d.). *Grant-making agencies*. Retrieved June 27, 2022, from <https://www.grants.gov/web/grants/learn-grants/grant-making-agencies.html>
- Gray, F. D. (1998). *The Tuskegee syphilis study*. Montgomery, AL: New South Books.
- Groat, L., & Wang, D. (2013). *Architectural research methods* (2nd ed). Hoboken, NJ: Wiley.
- Gunsalis, C. K., McNutt, M. K., Martinson, B. C., Faulkner, L. R., & Nerem, R. M. (2019). Overdue: A U.S. advisory board for research integrity. *Nature*, *566*, 173–175. <https://media.nature.com/original/magazine-assets/d41586-019-00519-w/d41586-019-00519-w.pdf>
- Hammond, C., Gifford, W., Thomas, R., Rabaa, S., Thomas, O., & Domecq, M. C. (2018). Arts-based research methods with indigenous peoples: An international scoping review. *AlterNative*, *14*(3), 260–276. <https://doi.org/10.1177%2F1177180118796870>
- Hannas, W., Mulvernon, J., & Puglisi, A. B. (2013). *Chinese industrial espionage: Technology acquisition and military modernization*. Abingdon, UK: Routledge.
- Hardy, R. B. (2000). Cost sharing—past, present and future. *Research Management Review*, *11*(1), 9–19.
- He, A. (2021, April 20). What do China's high patent numbers really mean? Center for International Governance Innovation. <https://www.cigionline.org/articles/what-do-chinas-high-patent-numbers-really-mean/>
- Heaser, J. (2009). Pulled Pork: The three part attack on non-statutory earmarks. *Journal of Legislation*, *35*(1), 32–47. <https://heinonline.org/HOL/Page?handle=hein.journals/jleg35&id=34&collection=journals&index=>
- Heifetz, R. A. (1998). *Leadership without easy answers*. Cambridge, MA: Harvard University Press.
- Heifetz, R. A., Grashow, A., & Linsky, M. (2009). *The practice of adaptive leadership*. Boston: Harvard Business Press.
- Heifetz, R. A., & Linsky, M. (2017). *Leadership on the line*. Boston: Harvard Business Review Press.
- Henderson, C., Connolly, M., Dolan, E. L., Finkelstein, N., Franklin, S., Malcom, S., Rasmussen, C., Redd, K., & St. John, K. (2017). Towards the STEM DBER alliance: Why we need a discipline-based STEM education research community. *International Journal of STEM Education*, *4*(14). <https://doi.org/10.1186/s40594-017-0076-1>
- Hey, T., & Payne, M. C. (2015). Open science decoded. *Nature Physics*, *11*, 367–369. <https://doi.org/10.1038/nphys3313>
- Hey, T., Tansley, S., & Tolle, K. (Eds.) (2009). *The fourth paradigm: data-intensive scientific discovery*. Redmond, WA: Microsoft Research.
- Higher Education Compliance Alliance (n.d.). Retrieved June 27, 2022, from <https://www.higheredcompliance.org/>
- Hill, C. T. (2012, February 23). Competitiveness and the university [PowerPoint slides]. Presentation to Council on Governmental Relations. <https://www.cogr.edu/COGR/files/ccLibraryFiles/File/000000000237/151893.pdf>
- Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *PNAS*, *102*(46), 16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- Hourihan, M. (2018, September 19). Federal R&D budget environment outlook. [PowerPoint slides]. [https://www.aaas.org/sites/default/files/2018-10/20180919%20-%20AMO.pptx?adobe\\_mc=MC MID%3D40522210760460580204225267699253626644%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1655220435](https://www.aaas.org/sites/default/files/2018-10/20180919%20-%20AMO.pptx?adobe_mc=MC MID%3D40522210760460580204225267699253626644%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1655220435)
- Hourihan, M. (2021, June 14). The federal R&D budget process 101. [PowerPoint slides]. [https://www.aaas.org/sites/default/files/2021-08/20210614%20-%20GWU.pptx?adobe\\_mc=MC MID%3D26151662485914633473805786764882636500%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1646329089](https://www.aaas.org/sites/default/files/2021-08/20210614%20-%20GWU.pptx?adobe_mc=MC MID%3D26151662485914633473805786764882636500%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7CTS%3D1646329089)
- Hourihan, M., & Parkes, D. (2016, March 22). *Guide to the President's R&D budget: Research & development FY 2017*. <https://www.aaas.org/news/guide-presidents-budget-research-and-development-fy-2017>

- Hourihan, M., & Parkes, D. (2019). *Federal R&D budget trends—A short summary*. American Association for the Advancement of Science. [https://www.aaas.org/sites/default/files/2019-01/AAAS%20RD%20Primer%202019\\_2.pdf](https://www.aaas.org/sites/default/files/2019-01/AAAS%20RD%20Primer%202019_2.pdf)
- Hourihan, M., & Zimmermann, A. (2022, May 10). *US R&D innovation in a global context: 2022 update*. <https://www.aaas.org/sites/default/files/2022-05/AAAS%20Global%20R%26D%20Update%20May%202022.pdf>
- How to deal with criticism (n.d.). In Wikihow. Retrieved June 27, 2022, from <https://www.wikihow.com/Deal-With-Criticism>
- Hsu, J. (2010, June 24). *Dark side of medical research: Widespread bias and omissions*. LiveScience. <https://www.livescience.com/8365-dark-side-medical-research-widespread-bias-omissions.html>
- Hunter, D., & Russ, M. (1996). Peer assessment in performance studies. *British Journal of Music Education*, 13(1), 67–78. <https://doi.org/10.1017/S0265051700002953>
- Hurston, Z. N. (1942). *Dust tracks on a road: An autobiography*. Philadelphia, PA: J. B. Lippincott.
- Hvistendahl, M. (2019, April 19). Major U.S. cancer center ousts “Asian” researchers after NIH flags their foreign ties. *ScienceInsider*. <https://www.sciencemag.org/news/2019/04/exclusive-major-us-cancer-center-ousts-asian-researchers-after-nih-flags-their-foreign>
- Institute of Medicine and National Research Council (2013). *Perspectives on research with H5N1 avian influenza: Scientific inquiry, communication, controversy: Summary of a workshop*. Washington, DC: National Academies Press. <https://doi.org/10.17226/18255>
- Interesting Literature (n.d.). *A short history of the word serendipity*. Retrieved June 27, 2022, from <https://interestingliterature.com/2015/01/28/a-short-history-of-the-word-serendipity/>
- Ioannidis, J. P. A., Munafò, M. R., Fusar-Poli, P., Nosek, B. A., & David, S. P. (2014). Publication and other reporting biases in cognitive sciences: Detection, prevalence and prevention. *Trends in Cognitive Sciences*, 18(5), 235–241. <https://doi.org/10.1016/j.tics.2014.02.010>
- Jacobson, R. (2015, October 21). Many antidepressant studies found tainted by pharma company influence. *Scientific American Health*. <https://www.scientificamerican.com/article/many-antidepressant-studies-found-tainted-by-pharma-company-influence/>
- Jane Elliott (n.d.). In Wikipedia. Retrieved June 27, 2022, from [https://en.wikipedia.org/wiki/Jane\\_Elliott](https://en.wikipedia.org/wiki/Jane_Elliott)
- Jasny, B. R., Wigginton, N., McNutt, M., Bubela, T., Buck, S., Cook-Deegan, R., Gardner, T., Hanson, B., Hustad, C., Kiermer, V., et al. (2017). Fostering reproducibility in industry-academia research. *Science*, 357(6353), 759–761. <https://www.science.org/doi/10.1126/science.aan4906>
- JASON (2019). *Fundamental research security*. Report JSR-19-21. <https://irp.fas.org/agency/dod/jason/fundamental.pdf>
- Jefferson, T., Alderson, P., Wager, E., & Davidoff, F. (2002). Effects of editorial peer review: A systematic review. *Journal of the American Medical Association*, 287(21), 2784–2786. <https://doi.org/10.1001/jama.287.21.2784>
- Jeffres, L. W., Neuendorf, K., & Atkin, D. J. (2012). Acquiring knowledge from the media in the Internet age. *Communication Quarterly*, 60(1), 59–79. <https://doi.org/10.1080/01463373.2012.641835>
- Jennings, C. (2006). Quality and value: The true purpose of peer review. *Nature*. <https://doi.org/10.1038/nature05032>
- Jhangiani, R. S., & Biswas-Diener, R. (Eds.) (2017). *Open: The philosophy and practices that are revolutionizing education and science*. London: Ubiquity Press. <https://doi.org/10.5334/bbc>
- John F. Kennedy Library (n.d.). Cuban missile crisis. Retrieved September 10, 2022, from <https://www.jfklibrary.org/learn/about-jfk/jfk-in-history/cuban-missile-crisis>
- Kaatz, A., Gutierrez, B., & Carnes, M. (2014). Threats to objectivity in peer review: The case of gender. *Trends in Pharmacological Sciences*, 35(8), 371–373. <https://doi.org/10.1016/j.tips.2014.06.005>



- Kaiser, J. (2018, May 31). Applicant's race or gender doesn't appear to influence NIH peer reviewers. *ScienceInsider*. <https://doi.org/10.1126/science.aau3472>
- Kalichman, M. (2020). Survey study of research integrity officers' perceptions of research practices associated with instances of research misconduct. *Research Integrity and Peer Review*, 5(17). <https://doi.org/10.1186/s41073-020-00103-1>
- Kamerer, J., & Wasserman, S. (2000). Cost sharing and effort reporting: Breaking the juggernaut. *Research Management Review*, 11(1), 41–44.
- Kaplan-Liss, E., Lantz-Gefroh, V., Bass, E., Killebrew, D., Ponzio, N. M., Savi, C., & O'Connell, C. (2018). Teaching medical students to communicate with empathy and clarity with improvisation. *Academic Medicine*, 93(3), 440–443. <https://doi.org/10.1097/ACM.0000000000002031>
- Kaufman, C. (n.d.). *The history of higher education in the United States*. Retrieved June 25, 2022, from <https://www.coursehero.com/file/34770681/The-History-of-Higher-Education-in-the-United-Statesdocx/>
- Kays, J., & Phillips-Han, A. (n.d.). *Gatorade: The idea that launched an industry*. Retrieved June 25, 2022, from <https://research.ufl.edu/publications/explore/v08n1/gatorade.html>
- Kelly, J., Sadeghieh, T., & Adeli, K. (2014). Peer review in scientific publications: Benefits, critiques, & a survival guide. *Journal of the International Federation of Clinical Chemistry and Laboratory Practice*, 25(3), 227–243. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4975196/pdf/ejifcc-25-227.pdf>
- Kennedy, D., & Overholser, G. (Eds.) (2010). *Science and the media*. Cambridge, MA: American Academy of Arts and Sciences.
- Kezar, A. J., & Lester, J. (2009). *Organizing higher education for collaboration*. San Francisco: Jossey-Bass.
- Khaldi, K. (2017). Quantitative, qualitative, or mixed research: Which paradigm to use? *Journal of Educational and Social Research*, 7(2), 15–24. <https://www.mcser.org/journal/index.php/jesr/article/view/9915>
- King, S. R. F. (2017). Peer review: Consultative review is worth the wait. *eLife*, 6. <https://doi.org/10.7554/eLife.32012>
- Kligyte, V., Marcy, R. T., Waples, E. P., Sevier, S. T., Godfrey, E. S., Mumford, M. D., & Houggen, D. F. (2007). Application of a sensemaking approach to ethics training in the physical sciences and engineering. *Science and Engineering Ethics*, 14(2), 251–278. <https://doi.org/10.1007/s11948-007-9048-z>
- Knezo, G. J. (1994). *Indirect costs for R&D at higher education institutions: Annotated chronology of major federal policies*. Updated January 24, 1995.
- Knezo, G. J. (1999). *Indirect costs at academic institutions: Background and controversy—Issue Brief*. Congressional Research Service, updated February 3.
- Kuehn, B. M. (2017). Peer Review: Rooting out bias. *eLife*, 6. <https://doi.org/10.7554/eLife.32014>
- Lankford, J. (2017). *Federal fumbles: 100 ways the government dropped the ball*. [https://www.lankford.senate.gov/imo/media/doc/Federal\\_Fumbles\\_2017.pdf](https://www.lankford.senate.gov/imo/media/doc/Federal_Fumbles_2017.pdf)
- Lauer, M., & Amero, S. (2019). *Breaches of peer review integrity*. National Institutes of Health. <https://nexus.od.nih.gov/all/2019/06/25/breaches-of-peer-reviewintegrity/>
- Ledford, H. (2014). Indirect costs: Keeping the lights on. *Nature*, 515, 326–329. [https://www.nature.com/news/polopoly\\_fs/1.16376!/menu/main/topColumns/topLeftColumn/pdf/515326a.pdf](https://www.nature.com/news/polopoly_fs/1.16376!/menu/main/topColumns/topLeftColumn/pdf/515326a.pdf)
- Lee, C. J. (2015). Commensuration bias in peer review. *Philosophy of Science*, 82, 1272–1283. <https://doi.org/10.1086/683652>
- Lee, C. J., & Moher, D. (2017). Promote scientific integrity via journal peer review data. *Science*, 357(6348), 256–257. <https://www.science.org/doi/10.1126/science.aan4141>
- Lee, C. J., Sugimoto, C. R., Zhang, G., & Cronin, B. (2013). Bias in peer review. *Journal of the Association for Information Science and Technology*, 64(1), 2–17. <https://doi.org/10.1002/asi.22784>
- Lerch, A., Arthur, C., Pati, A., & Gururani, S. (2020). An interdisciplinary review of music performance analysis. *Transactions of the International Society for Music Information Retrieval*, 3(1), 221–245. <https://doi.org/10.5334/tismir.53>

- Leshner, A. (2008). Reduce administrative burden. *Science*, 322(5908), 1609. <https://www.science.org/doi/10.1126/science.1168345>
- Levenberg, L., Neilson, T., & Rheams, D. (Eds.) (2018). *Research methods for the digital humanities*. Cham, Switzerland: Palgrave Macmillan.
- Lewis, D. (2020). Australia's plan to end foreign interference in science: Did it work? *Nature*, 584, 178–179. <https://media.nature.com/original/magazine-assets/d41586-020-02188-6/d41586-020-02188-6.pdf>
- Lewis, D. W. (2012). The inevitability of open access. *College & Research Libraries*, 73(5), 493–506. <https://doi.org/10.5860/crl-299>
- Lewis, M. K. (2021). Criminalizing China. *Journal of Criminal Law and Criminology*, 111(1), 145–225. <https://scholarlycommons.law.northwestern.edu/jclc/vol111/iss1/3>
- Leyser, O., Kingsley, D., & Grange, J. (2017, March 15). The science “reproducibility crisis”—and what can be done about it. *Phys.org*. <https://phys.org/news/2017-03-science-crisis.html>
- Liar! Liar! (2009, June 4). *The Economist*. <http://www.economist.com/node/13776974>
- Lim, G. B. (2017). Warfarin: From rat poison to clinical use. *Nature Reviews Cardiology*. Epub ahead of print. <https://doi.org/10.1038/nrcardio.2017.172>
- Litosseliti, L. (2018). *Research methods in linguistics* (2nd ed.). Bedford Square, UK: Bloomsbury Academic.
- Long, J. W., Lake, F. K., & Goode, R. W. (2021). The importance of Indigenous cultural burning in forested regions of the Pacific West, USA. *Forest Ecology and Management*, 500, 119597. <https://doi.org/10.1016/j.foreco.2021.119597>
- Lu Wang, L., Lo, K., Chandrasekhar, Y., Reas, R., Yang, J., Eide, D., Funk, K., Kinney, R., Liu, Z., Merrill, W., et al. (2020). *CORD-19: The Covid-19 open research dataset*. Preprint, ArXiv, arXiv:2004.10706v2.
- Lyall, C., Bruce, A., Tait, J., & Meagher, L. (2011). *Interdisciplinary research journeys: Practical strategies for capturing creativity*. London: Bloomsbury Academic. <https://doi.org/10.5040/9781849661782>
- Lyall, C., & Meagher, L. R. (2007). *A short guide to building and managing interdisciplinary research teams*. Edinburgh Research Explorer ISSTI Briefing Note No. 3. [https://www.pure.ed.ac.uk/ws/portalfiles/portal/14926368/A\\_Short\\_Guide\\_to\\_Building\\_and\\_Managing\\_Interdisciplinary\\_Research\\_Teams.pdf](https://www.pure.ed.ac.uk/ws/portalfiles/portal/14926368/A_Short_Guide_to_Building_and_Managing_Interdisciplinary_Research_Teams.pdf)
- Lyall, C., & Meagher, L. R. (2012). A masterclass in interdisciplinarity: Research into practice in training the next generation of interdisciplinary researchers. *Futures*, 44(6), 608–617. <https://doi.org/10.1016/j.futures.2012.03.011>
- Mahoney, M. (1977). Publication prejudices: An experimental study of confirmatory bias in the peer review system. *Cognitive Therapy and Research*, 1(2), 161–175. <https://doi.org/10.1007/BF01173636>
- Mandal, J., Acharya, S., & Parija, S. C. (2011). Ethics in human research. *Tropical Parasitology*, 1(1), 2–3. <https://doi.org/10.4103/2229-5070.72105>
- Markel, H. (2013, September 27). The real story behind penicillin. *PBS News Hour*. <https://www.pbs.org/newshour/health/the-real-story-behind-the-worlds-first-antibiotic>
- Marsh, H. W., Jayasinghe, U. W., & Bond, N. W. (2008). Improving the peer-review process for grant applications: Reliability, validity, bias and generalizability. *American Psychologist*, 63(3), 160–168. <https://doi.org/10.1037/0003-066X.63.3.160>
- Martinson, B. C., Anderson, M. S., & de Vries, R. (2005). Scientists behaving badly. *Nature*, 435, 737–738. <https://doi.org/10.1038/435737a>
- McAuliff, M. (2013, May 1). Lamar Smith: Science peer review process would “improve” with political oversight. *Huffpost*. [https://www.huffingtonpost.com/2013/04/30/lamar-smith-science-peer-review\\_n\\_3189107.html](https://www.huffingtonpost.com/2013/04/30/lamar-smith-science-peer-review_n_3189107.html)
- McClellan, J. E., III. (2005). Accident, luck, and serendipity in historical research. *Proceedings of the American Philosophical Society*, 149(1), 1–21.
- McCullagh, C. B. (1984). *Justifying historical descriptions*. Cambridge: Cambridge University Press.

- McElreavy, C., Tobin, V., Martin, T., Bea Damon, M., Crate N., Godines, A., & Bennett, K. (n.d.). The history of the academy and the disciplines. In R. Derosa (Ed.), *Interdisciplinary Studies: A Connected Learning Approach* (chapter 25). Retrieved June 27, 2022, from <https://press.rebus.community/idsconnect/>
- McNutt, M. (2014). Journals unite for reproducibility. *Nature*, *346*(6210), 679. <https://www.science.org/doi/pdf/10.1126/science.aal1724>
- McNutt, M. (2019). “Plan S” falls short for society publishers—and for the researchers they serve. *PNAS*, *116*(7), 2400–2403. <https://www.pnas.org/cgi/doi/10.1073/pnas.1900359116>
- Mehrotra, K., & Welch, D. (2017). *Why much of the car industry is under scrutiny for cheating*. Bloomberg. <https://www.bloomberg.com/news/articles/2017-08-02/why-it-seems-like-open-season-on-car-companies-quicktake-q-a>
- Mehta, D. (2019, October 4). Highlight negative results to improve science. *Nature*. <https://doi.org/10.1038/d41586-019-02960-3>
- Mervis, J. (2015, October 8). NSF peer review remains target for Congress. *ScienceInsider*. <http://www.sciencemag.org/news/2015/10/nsf-peer-review-remains-target-congress>
- Miller, W. (1955, May 2). Death of a genius. *Life Magazine*, *38*(18), 61–64.
- Mintz, S. (2012, March 2). *The 10 greatest cases of fraud in university research*. <https://www.workplaceethicsadvice.com/2012/03/the-10-greatest-cases-of-fraud-in-university-research.html>
- Mligo, E. S. (2016). *Introduction to research methods and report writing: A practical guide for students and researchers in social sciences and the humanities*. Eugene, OR: Resource Publications.
- Montaigne, M. (1958). Of experience. In D. M. Frame (Trans.), *The complete essays of Montaigne* (pp. 815–857). Stanford, CA: Stanford University Press.
- Moore, J. C. (2019). *A brief history of universities*. Cham, Switzerland: Palgrave Macmillan. <https://link.springer.com/book/10.1007/978-3-030-01319-6>
- Moran, J. (2010). *Interdisciplinarity* (2nd ed.). Abingdon, UK: Routledge. <https://www.routledge.com/Interdisciplinarity/Moran/p/book/9780415560078>
- Munafo, M. R., Nosek, B. A., Bishop, D. V. M., Button, K. S., Chambers, C. D., Percie du Sert, N., Simonsohn, U., Wagenmakers, E.-J., Ware, J. J., & Ioannidis, J. P. A. (2017). A manifesto for reproducible science. *Nature Human Behavior*, *1*. <https://doi.org/10.1038/s41562-016-0021>
- National Academies of Sciences, Engineering, and Medicine (2016). *Optimizing the nation's investment in academic research: A new regulatory framework for the 21st century*. Washington, DC: National Academies Press. <https://doi.org/10.17226/21824>
- National Academies of Sciences, Engineering, and Medicine (2017a). *Communicating science effectively: A research agenda*. Washington, DC: National Academies Press. <https://doi.org/10.17226/23674>
- National Academies of Sciences, Engineering, and Medicine (2017b). *Fostering integrity in research*. Washington, DC: National Academies Press. <https://doi.org/10.17226/21896>
- National Academies of Sciences, Engineering, and Medicine (2018). *Open science by design: Realizing a vision for 21st century research*. Washington, DC: National Academies Press. <https://doi.org/10.17226/25116>
- National Academies of Sciences, Engineering, and Medicine (2019). *Reproducibility and replicability in science*. Washington, DC: National Academies Press. <https://doi.org/10.17226/25303>
- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, DC: National Academies Press. <https://www.nap.edu/catalog/11463/rising-above-the-gathering-storm-energizing-and-employing-america-for>
- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2009). *On being a scientist: A guide to responsible conduct in research*. Washington, DC: National Academies Press. <https://doi.org/10.17226/12192>

- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2010). *Rising above the gathering storm, revisited: Rapidly approaching category 5*. Washington, DC: National Academies Press. <https://www.nap.edu/catalog/12999/rising-above-the-gathering-storm-revisited-rapidly-approaching-category-5>
- National Archives and Records Administration (2022, October 6). *Title 2 of Code of Federal Regulations*. <https://www.ecfr.gov/current/title-2/subtitle-A/chapter-II/part-200?toc=1>
- National Archives and Records Administration (n.d.). *NSDD 189: National policy on transfer of scientific, technical and engineering information*. Retrieved June 28, 2022, from <https://catalog.archives.gov/id/6879779>
- National Bureau of Asian Research (2017). *The theft of American intellectual property: Reassessments of the challenge and United States policy*. [https://www.nbr.org/wp-content/uploads/pdfs/publications/IP\\_Commission\\_Report\\_Update.pdf](https://www.nbr.org/wp-content/uploads/pdfs/publications/IP_Commission_Report_Update.pdf)
- National Center for Education Statistics (2017). *Status and trends in the education of racial and ethnic groups*. <https://nces.ed.gov/programs/raceindicators/index.asp>
- National Center for Education Statistics (2019, February). *Status and trends in the education of racial and ethnic groups*. [https://nces.ed.gov/programs/raceindicators/indicator\\_reg.asp](https://nces.ed.gov/programs/raceindicators/indicator_reg.asp)
- National Center for Science and Engineering Statistics (2022). Universities report largest growth in federally funded R&D expenditures since FY 2011. NSF 23-303. Alexandria VA: National Science Foundation. <https://nces.nsf.gov/pubs/nsf23303#:~:text=Research%20and%20development%20spending%20by,billion%20of%20the%20total%20increase>
- National Endowment for the Arts (2021). *About the National Endowment for the Arts*. <https://www.arts.gov/about>
- National Endowment for the Arts (n.d.). *Grant review process*. Retrieved September 12, 2022, from <https://www.arts.gov/grants/grant-review-process>
- National Endowment for the Humanities (2021). *About the National Endowment for the Humanities*. <https://www.neh.gov/about>
- National Institutes of Health (2021). *History*. <https://www.nih.gov/about-nih/who-we-are/history>
- National Institutes of Health (n.d.-a). *Ethical conduct*. Retrieved June 28, 2022, from <https://oir.nih.gov/sourcebook/ethical-conduct>
- National Institutes of Health (n.d.-b). *The IACUC*. Office of Laboratory Animal Welfare. Retrieved June 27, 2022, from <https://olaw.nih.gov/resources/tutorial/iacuc.htm>
- National Institutes of Health (n.d.-c). *Peer review*. Retrieved September 12, 2022, from <https://grants.nih.gov/grants/peer-review.htm>
- National Institutes of Health (n.d.-d). *Racial disparities in NIH funding*. Retrieved September 12, 2022, from <https://diversity.nih.gov/building-evidence/racial-disparities-nih-funding>
- National Institutes of Health (n.d.-e). *Responsible conduct of research training*. Retrieved June 28, 2022, from <https://oir.nih.gov/sourcebook/ethical-conduct/responsible-conduct-research-training>
- National Institutes of Health (n.d.-f). *Rigor and reproducibility*. Retrieved June 27, 2022, from <https://www.nih.gov/research-training/rigor-reproducibility>
- National Oceanic and Atmospheric Administration (n.d.). *Cooperative observer network (COOP)*. Retrieved June 27, 2022, from <https://www.ncei.noaa.gov/products/land-based-station/cooperative-observer-network>
- National Research Council (1983). Chapter 6, Cost sharing and indirect costs, and Appendix B, History of indirect costs and cost sharing. In *Strengthening the government-university partnership in science*, pp. 117–145 and 220–223. Washington, DC: National Academies Press. <https://doi.org/10.17226/19442>
- National Research Council (2004). *SBIR program diversity and assessment challenges: Report of a symposium*. Washington, DC: National Academies Press. <https://doi.org/10.17226/11082>
- National Research Council (2007). *Science and security in the post 9/11 world: A report based on regional discussions between science and security communities*. Washington, DC: National Academies Press. <https://doi.org/10.17226/12013>

- National Research Council (2009). *Beyond fortress America: National security controls on science and technology in a globalized world*. Washington, DC: National Academies Press. <https://doi.org/10.17226/12567>
- National Research Council (2011). *Guide for the care and use of laboratory animals* (8th ed.). Washington, DC: National Academies Press. <https://grants.nih.gov/grants/olaw/guide-for-the-care-and-use-of-laboratory-animals.pdf>
- National Research Council (2012a). *Discipline-based education research: Understanding and improving learning in undergraduate science and engineering*. Washington, DC: National Academies Press. <https://doi.org/10.17226/13362>
- National Research Council (2012b). *Research universities and the future of America: Ten breakthrough actions vital to our nation's prosperity and security*. Washington, DC: National Academies Press. <https://www.nap.edu/catalog/13396/research-universities-and-the-future-of-america-ten-breakthrough-actions>
- National Research Council (2014). *Convergence: Facilitating transdisciplinary integration of life sciences, physical sciences, engineering, and beyond*. Washington, DC: National Academies Press. <https://doi.org/10.17226/18722>
- National Research Council (2015). *Enhancing the effectiveness of team science*. Washington, DC: National Academies Press. <https://doi.org/10.17226/19007>
- National Research Council (2012). *Research and human resources development funding opportunities of the NRF*. <http://slideplayer.com/slide/7287570/24/images/2/Research+-+Innovation+System+Value+Chain+National+Research+Facilities.jpg>
- National Science and Technology Council (2019). Summary of the 2019 White House summit of the joint committee on the research environment (JCORE). <https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/11/Summary-of-JCORE-Summit-November-2019.pdf>
- National Science and Technology Council (2021). *Recommended practices for strengthening the security and integrity of America's science and technology research enterprise*. <https://trumpwhitehouse.archives.gov/wp-content/uploads/2021/01/NSTC-Research-Security-Best-Practices-Jan2021.pdf>
- National Science and Technology Council (2022a). *Guidance for implementing National Security Presidential Memorandum 33 (NSPM-33) on National Security Strategy for United States Government-Supported Research and Development*. <https://www.whitehouse.gov/wp-content/uploads/2022/01/010422-NSPM-33-Implementation-Guidance.pdf>
- National Science and Technology Council (2022b). *Protecting the integrity of government science*. [https://www.whitehouse.gov/wp-content/uploads/2022/01/01-22-Protecting\\_the\\_Integrity\\_of\\_Government\\_Science.pdf](https://www.whitehouse.gov/wp-content/uploads/2022/01/01-22-Protecting_the_Integrity_of_Government_Science.pdf)
- National Science Board (2007). *Enhancing support of transformative research at the National Science Foundation*. Report NSB-07-32. [https://www.nsf.gov/nsb/documents/2007/tr\\_report.pdf](https://www.nsf.gov/nsb/documents/2007/tr_report.pdf)
- National Science Board (2009). *Investing in the future: NSF cost sharing policies for a robust federal research enterprise*. Report NSB 09-20. <https://www.nsf.gov/pubs/2009/nsb0920/nsb0920.pdf>
- National Science Board (2012). *Diminishing funding and rising expectations: Trends and challenges for public research universities*. Report NSB-12-45. <https://www.nsf.gov/nsb/sei/companion2/files/nsb1245.pdf>
- National Science Board (2014). *Reducing investigators' administrative workload for federally funded research*. Report NSB-14-18. <https://www.nsf.gov/pubs/2014/nsb1418/nsb1418.pdf>
- National Science Board (2015). *Revisiting the STEM workforce*. Report NSB-2015-10. <https://www.nsf.gov/pubs/2015/nsb201510/nsb201510.pdf>
- National Science Board (2016a). Patent activity index of selected technologies for the United States, the EU, and Japan: 2012–2014. *Science and engineering indicators*. <https://www.nsf.gov/statistics/2016/nsb20161/uploads/1/9/fig06-28.pdf>
- National Science Board (2016b). *Science and engineering indicators 2016*. <https://www.nsf.gov/statistics/2016/nsb20161/uploads/1/nsb20161.pdf>

- National Science Board (2016c). USPTO patents granted, by selected U.S. industry, 2012. *Science and engineering indicators*. <https://www.nsf.gov/statistics/2016/nsb20161/uploads/1/9/fig06-25.pdf>
- National Science Board (2016d). Venture capital investment, by selected region/country/economy: 2005–2014. *Science and engineering indicators*. <https://www.nsf.gov/statistics/2016/nsb20161/uploads/1/9/fig06-33.pdf>
- National Science Board (2016e). Venture capital investment in the United States and the rest of the world: 2005–2014. *Science and engineering indicators*. <https://www.nsf.gov/statistics/2016/nsb20161/uploads/1/9/fig06-32.pdf>
- National Science Board (2018a). Invention: United States and comparative global trends. In *Science and engineering indicators 2018*, chapter 8: Invention, knowledge transfer and innovation. <https://www.nsf.gov/statistics/2018/nsb20181/report/sections/invention-knowledge-transfer-and-innovation/invention-united-states-and-comparative-global-trends>
- National Science Board (2018b). *Science and engineering indicators 2018*. Figure 2-11. <https://www.nsf.gov/statistics/2018/nsb20181/figures/fig02-11>
- National Science Board (2018c). *Science and engineering indicators 2018*. Report NSB-2020-1. <https://www.nsf.gov/statistics/2018/nsb20181/assets/nsb20181.pdf>
- National Science Board (2019a). *Higher education in science and engineering*. Report NSB-2019-7. <https://files.eric.ed.gov/fulltext/ED599398.pdf>
- National Science Board (2019b). *The skilled technical workforce: Crafting America's science & engineering enterprise*. Report NSB-2019-23. <https://www.nsf.gov/nsb/publications/2019/nsb201923.pdf>
- National Science Board (2020a). Cost components of academic R&D. *Science and engineering indicators*. <https://nces.nsf.gov/pubs/nsb20202/academic-r-d-in-the-united-states#cost-components-of-academic-r-d>
- National Science Board (2020b). *Merit review process: Fiscal year 2020 digest*. Report NSB-2021-45. [https://www.nsf.gov/nsb/publications/2021/merit\\_review/FY-2020/nsb202145.pdf](https://www.nsf.gov/nsb/publications/2021/merit_review/FY-2020/nsb202145.pdf)
- National Science Board (2020c). Publications output: U.S. trends and international comparisons. *Science and engineering indicators*. Figure 5a-3. <https://nces.nsf.gov/pubs/nsb20206/figure/5a-3>
- National Science Board (2020d). Research and development: U.S. trends and international comparisons. *Science and engineering indicators*. Figure 4-7. <https://nces.nsf.gov/pubs/nsb20203/figure/4-7>
- National Science Board (2020e). Research and development: U.S. trends and international comparisons. *Science and engineering indicators*. Figure 4-8. <https://nces.nsf.gov/pubs/nsb20203/figure/4-8>
- National Science Board (2020f). *Science and engineering indicators 2020*. <https://nces.nsf.gov/pubs/nsb20201/u-s-r-d-performance-and-funding>
- National Science Board (2020g). Science and technology: Public attitudes, knowledge, and interest. *Science and engineering indicators*. <https://nces.nsf.gov/pubs/nsb20207/public-attitudes-about-s-t-in-general>
- National Science Board (2020h). The state of U.S. science and engineering 2020. *Science and engineering indicators*. Figure 3. <https://nces.nsf.gov/pubs/nsb20201/figure/3>
- National Science Board (2020i). The state of U.S. science and engineering 2020. *Science and engineering indicators*. Figure 18. <https://nces.nsf.gov/pubs/nsb20201/u-s-r-d-performance-and-funding>
- National Science Board (2020j). *Vision 2030*. Report NSB-2020-15. <https://www.nsf.gov/nsb/publications/2020/nsb202015.pdf>
- National Science Board (2021a). *Merit review process—Fiscal year 2020 digest*. Report NSB-2021-45. [https://www.nsf.gov/nsb/publications/2021/merit\\_review/FY-2020/nsb202145.pdf](https://www.nsf.gov/nsb/publications/2021/merit_review/FY-2020/nsb202145.pdf)
- National Science Board (2021b). *NSB statement on training to improve peer reviewing and address unconscious biases in the merit review process*. Publication NSB-2021-8. <https://www.nsf.gov/nsb/publications/2021/nsb20218.pdf>

- National Science Board (2022a). Higher education in science and engineering. *Science and engineering indicators*. <https://nces.nsf.gov/pubs/nsb20223/figure/HED-29>
- National Science Board (2022b). *Science and engineering indicators 2020*. Report NSB-2020-1. <https://nces.nsf.gov/pubs/nsb20201>
- National Science Foundation (2013a, May 28). *Long-term Federal investments improve severe weather prediction*. <https://beta.nsf.gov/news/long-term-federal-investments-improve-severe>
- National Science Foundation (2013b). *Revised NSF merit review criteria*. [https://www.nsf.gov/bfa/dias/policy/merit\\_review/overview.pdf](https://www.nsf.gov/bfa/dias/policy/merit_review/overview.pdf)
- National Science Foundation (2014). *Survey of federal funds for research and development: Fiscal years 2012–2014*. <https://www.nsf.gov/statistics/srvyfedfunds/#tabs-2>
- National Science Foundation (2016). *Survey of federal funds for research and development: Fiscal years 2014–2016*. <https://www.nsf.gov/statistics/srvyfedfunds/#tabs-2>
- National Science Foundation (2017a). *Higher education R&D*. <https://ncesdata.nsf.gov/herd/2016/>
- National Science Foundation (2017b). *National patterns of R&D resources*. <https://www.nsf.gov/statistics/2017/nsf17311/>
- National Science Foundation (2021a). *A timeline of NSF history*. <https://www.nsf.gov/about/history/overview-50.jsp>
- National Science Foundation (2021b). *U.S. R&D investments*. Report NCSES 21-203. <https://www.nsf.gov/statistics/natlpatterns/us-r-and-d-investments.pdf>
- National Science Foundation (2022). *The art and science of reviewing proposals*. <https://tipsforreviewers.nsf.gov/>
- National Science Foundation (n.d.-a). *ADVANCE: Organizational change for gender equity in STEM academic professions (ADVANCE)*. Retrieved June 27, 2022, from [https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5383](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383)
- National Science Foundation (n.d.-b). *Merit review*. Retrieved June 28, 2022, from [https://www.nsf.gov/bfa/dias/policy/merit\\_review/](https://www.nsf.gov/bfa/dias/policy/merit_review/)
- National Science Foundation (n.d.-c). Response to Senator Flake’s “Wastebook: The Farce Awakens.” Retrieved June 27, 2022, from <https://www.nsf.gov/about/congress/reports/responsefederalflake.pdf>
- National Science Foundation (n.d.-d). Response to Senator Lankford’s “Federal Fumbles, Vol. 3.” Retrieved June 27, 2022, from <https://www.nsf.gov/about/congress/reports/responsefederalfumbles.pdf>
- National Science Foundation (n.d.-e). *Responsible and ethical conduct of research*. Retrieved June 28, 2022, from <https://www.nsf.gov/bfa/dias/policy/rcr.jsp>
- Newton, I., & Hooke, R. (1675). Isaac Newton, letter to Robert Hooke. Historical Society of Pennsylvania. Retrieved June 27, 2022, from <https://discover.hsp.org/Record/dc-9792>
- Northwestern Office of the Provost (n.d.). *Resources on unconscious bias*. Retrieved June 27, 2022, from <https://www.northwestern.edu/provost/policies-procedures/faculty-searches/resources/unconscious-bias.html>
- Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., Buck, S., Chambers, C. D., Chin, G., Christensen, G., et al. (2015). Promoting an open research culture. *Science*, 348(6242), 1422–1425. <https://www.science.org/doi/10.1126/science.aab2374>
- Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *PNAS*, 115(11), 2600–2606. <https://www.pnas.org/doi/pdf/10.1073/pnas.1708274114>
- Nuzzo, R. (2014). Scientific method: Statistical errors. *Nature*, 506, 150–152. <https://www.nature.com/news/scientific-method-statistical-errors-1.14700>
- Oestreicher, C. (2007). A history of chaos theory. *Dialogues in Clinical Neuroscience*, 9(3), 279–289. <https://www.tandfonline.com/doi/full/10.31887/DCNS.2007.9.3/coestreicher>
- Office of Human Research Protections (n.d.). *45 CFR 46*. Retrieved June 27, 2022 from <https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/index.html>

- Office of Management and Budget (2018a). *Analytical perspectives budget of the U.S. government fiscal year 2018*. <https://www.govinfo.gov/content/pkg/BUDGET-2018-PER/pdf/BUDGET-2018-PER.pdf>
- Office of Management and Budget (2018b). *Budget of the United States government FY 2018*. <https://www.whitehouse.gov/wp-content/uploads/2017/11/budget.pdf>
- Office of Research Integrity (n.d.-a). *Definition of research misconduct*. Retrieved June 27, 2022, from <https://ori.hhs.gov/definition-misconduct>
- Office of Research Integrity (n.d.-b). *Federal policies*. Retrieved June 27, 2022, from <https://ori.hhs.gov/content/chapter-2-research-misconduct-federal-policies#:~:text=To%20be%20considered%20research%20misconduct,by%20a%20preponderance%20of%20evidence.%E2%80%9D>
- Office of Research Services (n.d.). *History of research ethics*. University of Missouri–Kansas City. Retrieved June 27, 2022, from <https://ors.umkc.edu/services/compliance/irb/history-of-research-ethics.html>
- Office of Science and Technology Policy (2013). *Increasing access to the results of federally funded scientific research*. [https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp\\_public\\_access\\_memo\\_2013.pdf](https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf)
- Office of Science and Technology Policy (2015). *Fact sheet: Empowering students and others through citizen science and crowdsourcing*. [https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/citizen\\_science\\_backgrounder\\_03-23-15.pdf](https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/citizen_science_backgrounder_03-23-15.pdf)
- Office of Science and Technology Policy (2022). *Ensuring free, immediate and equitable access to federally funded research*. <https://www.whitehouse.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Memo.pdf>
- O’Flaherty, W. (2018). *The misquotable C. S. Lewis: What he didn’t say, what he actually said, and why it matters*. Eugene, OR: Wipf & Stock.
- Online Ethics Center for Engineering and Science (n.d.). Retrieved June 27, 2022, from <https://onlineethics.org/>
- Open Access (2022, June 22). In Wikipedia. [https://en.wikipedia.org/wiki/Open\\_access](https://en.wikipedia.org/wiki/Open_access)
- Open Science Collaboration (2015). Estimating the reproducibility of psychological science. *Science*, 349(6251). <https://www.science.org/doi/10.1126/science.aac4716>
- Organisation for Economic Co-operation and Development (2017). *Main science and technology indicators*. <http://www.oecd.org/sti/msti.htm>
- Organisation for Economic Co-operation and Development (n.d.). Purchasing power parities—frequently asked questions (FAQs). Retrieved June 27, 2022, from <https://www.oecd.org/sdd/prices-ppp/purchasingpowerparities-frequentlyaskedquestionsfaqs.htm>
- Pannucci, C. J., & Wilkins, E. G. (2010). Identifying and avoiding bias in research. *Plastic and Reconstructive Surgery*, 126(2), 619–625. <https://doi.org/10.1097/PRS.0b013e3181de24bc>
- Paoletti, C. R. (2000). Cost sharing—Just when I thought I knew all the answers. *Research Management Review*, 11(1), 21–29.
- Patten, M. L., & Newhart, M. (2017). *Understanding research methods: An overview of the essentials* (10th ed.). New York: Routledge. <https://doi.org/10.4324/9781315213033>
- Peck, M. S. (1978). *The road less traveled: A new psychology of love, traditional values, and spiritual growth*. New York: Simon & Schuster.
- Peels, R. (2019). Replicability and replication in the humanities. *Research Integrity and Peer Review*, 4(2). <https://doi.org/10.1186/s41073-018-0060-4>
- Peer review and fraud. (2006). *Nature*, 444(7122), 971–972. <https://doi.org/10.1038/444971b>
- Peterson, H. (Ed.) (1954). *A treasury of the world’s great speeches*. New York: Grolier.
- Pettinger, T. (n.d.). 7 effective ways to deal with criticism. Retrieved June 27, 2022, from <http://www.lifehack.org/articles/features/7-effective-ways-to-deal-with-criticism.html>
- Pew Research Center (2015). *Public and scientists’ views on science and society*. [http://assets.pewresearch.org/wp-content/uploads/sites/14/2015/01/PI\\_ScienceandSociety\\_Report\\_012915.pdf](http://assets.pewresearch.org/wp-content/uploads/sites/14/2015/01/PI_ScienceandSociety_Report_012915.pdf)



- Pickard, A. J. (2013). *Research methods in information* (2nd ed.). London: Facet Publishing.
- Pinholster, G. (2016). Journals and funders confront implicit bias in peer review. *Science*, 352(6289), 1067–1068. <https://www.science.org/doi/10.1126/science.352.6289.1067>
- Plan S (n.d.). Retrieved June 27, 2022, from <https://www.coalition-s.org/>
- Poling, C. (2022, August 10). *Math error: A new study overturns 100-year-old understanding of color perception*. Los Alamos National Laboratory. <https://discover.lanl.gov/news/0810-color-perception>
- President's Council of Advisors on Science and Technology (2021). *Industries of the future institutes: A new model for American science and technology leadership*. [https://science.osti.gov/-/media/\\_pdf/about/pcast/202012/PCAST---IOTFI-FINAL-Report.pdf](https://science.osti.gov/-/media/_pdf/about/pcast/202012/PCAST---IOTFI-FINAL-Report.pdf)
- Primary sources: A research guide* (n.d.). University of Massachusetts/Boston. Retrieved June 27, 2022, from <https://umb.libguides.com/PrimarySources/secondary>
- Punch, K. F., & Oancea, A. (2014). *Introduction to research methods in education* (2nd ed.). Los Angeles: Sage Publications.
- Quacquarelli Symonds (n.d.). *QS world university rankings 2022*. Retrieved June 27, 2022, from <https://www.topuniversities.com/university-rankings/world-university-rankings/2022>
- Quitoriano, V., & Wald, D. J. (2020). USGS “Did You Feel It?”—Science and lessons from 20 years of citizen science-based macroseismology. *Frontiers in Earth Science*, 8, Article 120. <https://doi.org/10.3389/feart.2020.00120>
- Rabesandratana, T. (2019). The world debates open-access mandates. *Science*, 363(6422), 11–12. <https://www.science.org/doi/10.1126/science.363.6422.11>
- Redman, B. K. (2018). *Research misconduct policy in biomedicine: Beyond the bad-apple approach*. Cambridge, MA: MIT Press.
- Repko, A. F., Szostak, R., & Buchberger, M. P. (2020). The rise of the modern disciplines and interdisciplinarity. In *Introduction to interdisciplinary studies*, 3rd ed. Los Angeles: Sage Publications. Retrieved June 27, 2022, from [https://us.sagepub.com/sites/default/files/upm-assets/109628\\_book\\_item\\_109628.pdf](https://us.sagepub.com/sites/default/files/upm-assets/109628_book_item_109628.pdf)
- Research (n.d.). *Merriam-Webster Dictionary*. Retrieved June 27, 2022, from <https://www.merriam-webster.com/dictionary/research>
- Research techniques (2015). Retrieved February 21, 2023 from <http://danahollowayfilmmandtv.blogspot.com/2015/12/deductive-and-inductive-research.html>
- Resnik, D. B. (2015). *What is ethics in research & why is it important?* National Institute of Environmental Health Sciences. <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Resnik, D. B. (2020, December 23). *What is ethics in research & why is it important?* <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Resnik, D. B. (n.d.) *Research ethics timeline*. National Institute of Environmental Health Sciences. Retrieved June 27, 2022, from <https://www.niehs.nih.gov/research/resources/bioethics/timeline/index.cfm>
- Roberts, L. (2001). Timeline: History of the human genome project. *Science*, 291(5), 1195–1200.
- Rockwell, S. (2009). The FDP faculty burden survey. *Research Management Review*, 16(2), 29–44.
- Rodgers, P. (2017). Peer review: Decisions, decisions. *eLife*, 6. <https://doi.org/10.7554/eLife.32011>
- Rojon, C., & Saunders, M. N. K. (2015). Dealing with reviewer's comments in the publication process. *Coaching: An International Journal of Theory, Research and Practice*, 8(2), 169–180. <https://doi.org/10.1080/17521882.2015.1047463>
- Roper, R. L. (2019). Does gender bias still affect women in science? *Microbiology and Molecular Biology Reviews*, 83(3). <https://doi.org/10.1128/MMBR.00018-19>
- Rosenzeig, R. M. (1998). The politics of indirect costs. *Journal of Papers—Council on Government Relations*. <https://www.nmt.edu/policies/docs/cost-accounting-office/The%20Politics-IDC.pdf>

- Roth, J. H. (1995). *Arthur Anderson study of indirect costs across sectors. Report to the Government-University-Industry Research Roundtable*. <https://www.aau.edu/sites/default/files/AAU%20Files/Key%20Issues/Research%20Administration%20%26%20Regulation/Arthur-Andersen-Study-of-Indirect-Costs-Across-Sectors.pdf>
- Rovell, D. (2015, October 1). Royalties for Gatorade trust surpass \$1 billion: “Can’t let it spoil us.” ESPN. [http://www.espn.com/college-football/story/\\_/id/13789009/royalties-gatorade-inventors-surpass-1-billion](http://www.espn.com/college-football/story/_/id/13789009/royalties-gatorade-inventors-surpass-1-billion)
- Roy E. Disney Quotes. (n.d.). BrainyQuote. Retrieved June 4, 2023, from [https://www.brainyquote.com/quotes/roy\\_e\\_disney\\_183365](https://www.brainyquote.com/quotes/roy_e_disney_183365)
- Royster, P. (2016, March 15). *A brief history of open access* [PowerPoint slides]. University of Nebraska-Lincoln. [https://digitalcommons.unl.edu/library\\_talks/123/](https://digitalcommons.unl.edu/library_talks/123/)
- Rubio, D. M., Schoenbaum, E. E., Lee, L. S., Schteingart, D. E., Marantz, P. R., Anderson, K. E., Platt, L. D., Baez, A., & Esposito, K. (2010). Defining translational research: Implications for training. *Academic Medicine*, 85(3), 470–475. <https://doi.org/10.1097/ACM.0b013e3181ccd618>
- Ryder, C., Mackean, T., Coombs, J., Williams, H., Hunter, K., Holland, A. J. A., & Ivers, R. Q. (2020). Indigenous research methodology—weaving a research interface. *International Journal of Social Research Methodology*, 23(3), 255–267. <https://doi.org/10.1080/13645579.2019.1669923>
- Sandewall, E. (2006). Systems: Opening up the process. *Nature*. <https://doi.org/10.1038/nature04994>
- Sarniak, R. (2015, August). 9 types of research bias and how to avoid them. Quirk’s Media, Article 20150825-2. <https://www.quirks.com/articles/9-types-of-research-bias-and-how-to-avoid-them>
- Schneider, S. L. (2020). *2018 faculty workload survey research report: Primary findings*. <https://thefdp.org/default/assets/File/Documents/FDP%20FWS%202018%20Primary%20Report.pdf>
- Schwab, S., Janiaud, P., Dayan, M., Amrhein, V., Panczak, R., Palagi, P. M., Hemkens, L. G., Ramon, M., Rothen, N., Senn, S., et al. (2022). Ten simple rules for good research practice. *PLOS Computational Biology*, 18(6). <https://doi.org/10.1371/journal.pcbi.1010139>
- Schwecherl, L. (2020, February 26). How to handle criticism like a pro. Greatist. <https://greatist.com/happiness/how-handle-criticism-pro>
- The scientific method as an ongoing process. (2015, August 7). In Wikipedia. [https://commons.wikimedia.org/wiki/File:The\\_Scientific\\_Method\\_as\\_an\\_Ongoing\\_Process.svg](https://commons.wikimedia.org/wiki/File:The_Scientific_Method_as_an_Ongoing_Process.svg)
- Schneider, S. L. (2019). *Results of the 2018 FDP faculty workload survey: Input for optimizing time on active research* [PowerPoint slides]. Federal Demonstration Partnership. <http://thefdp.org/default/assets/File/Presentations/Schneider%20FDP%20FWS3%20Results%20Plenary%20Jan19.pdf>
- Schneider, S. L., Ness, K. K., Rockwell, S., & Brutkiewicz, R. (2014). *2012 faculty workload survey research report*. Federal Demonstration Partnership. [https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pga\\_087667.pdf](https://sites.nationalacademies.org/cs/groups/pgasite/documents/webpage/pga_087667.pdf)
- Scholarly Publishing and Academic Resources Coalition (n.d.). Open access. Retrieved June 27, 2022, from <https://sparcopen.org/open-access/>
- Science Europe (2021). *The OA diamond journals study*. [https://scienceeurope.org/media/yejfasey/20210309\\_coalitions\\_diamond\\_study\\_final.pdf](https://scienceeurope.org/media/yejfasey/20210309_coalitions_diamond_study_final.pdf)
- Science Europe (2022). Open access. <https://www.scienceeurope.org/our-priorities/open-access>.
- Scoles, S. (2017, May 23). A brief history of SETI@Home. *The Atlantic*. <https://www.theatlantic.com/science/archive/2017/05/aliens-on-your-packard-bell/527445/>. See also <https://www.seti.org/>
- Sedwick, S. (2009). Facilities and administrative issues: Paying for administration while under the cap, maximizing recovery, and communicating value. *Research Management Review*, 16(2), 22–28.
- Seligman, R. P. (2000). An introduction to cost sharing: Why no good deed goes unpunished. *Research Management Review*, 11(1), 1–4.
- Serendipity (2018). *Oxford University English Dictionary*. Retrieved June 27, 2022, from <https://en.oxforddictionaries.com/definition/serendipity>
- Shamoo, A., & Resnik, D. (2015). *Responsible conduct of research* (3rd ed.). Oxford: Oxford University Press.

- Shuster, E. (1997). Fifty years later: The significance of the Nuremberg Code. *New England Journal of Medicine*, 337, 1436–1440. <https://www.nejm.org/doi/full/10.1056/nejm199711133372006>
- Sidik, S. M. (2022). Weaving Indigenous knowledge into the scientific method. *Nature*, 601(7892), 285–287. <https://www.nature.com/articles/d41586-022-00029-2>
- Simundic, A.-M. (2013). Bias in research. *Biochemia Medica*, 23(1), 12–15. <https://doi.org/10.11613/BM.2013.003>
- Singer, S., & Smith, K. A. (2013). Discipline-based education research: Understanding and improving learning in undergraduate science and engineering. *Journal of Engineering Education*, 102(4), 468–471. <http://doi.org/10.1002/jee.20030>
- Smith, H., & Dean, R. T. (Eds.) (2009). *Practice-led research, research-led practice in the creative arts*. Edinburgh: Edinburgh University Press.
- Smith, J., & Noble, H. (2014). Bias in research. *Evidence Based Nursing*, 17(4), 100–101. <https://doi.org/10.1136/eb-2014-101946>
- Smith, L. T. (1999). *Decolonizing methodologies: Research and indigenous peoples*. London: Zed Books.
- Smith, R. (2006). Peer review: A flawed process at the heart of science and journals. *Journal of the Royal Society of Medicine*, 99(4), 178–182. <https://doi.org/10.1258/jrsm.99.4.178>
- Smith, T. L., Trapani, J., Decrappeo, A., & Kennedy, D. (2011). Reforming regulation of research universities. *Issues in Science and Technology*, 27(4), 57–64.
- Snow, K. C., Hays, D. G., Caliwagan, G., Ford, D. J., Jr., Mariotti, D., Mwendwa, J. W., & Scott, W. E. (2016). Guiding principles for indigenous research practices. *Action Research*, 14(4), 357–375. <https://doi.org/10.1177/1476750315622542>
- Soderberg, C. K., Errington, T. M., Schiavone, S. R., Bottesini, J., Thorn, F. S., Vazire, S., Esterling, K. M., & Nosek, B. A. (2021). Initial evidence of research quality of registered reports compared with the standard publishing model. *Nature Human Behavior*, 5, 990–997. <https://doi.org/10.1038/s41562-021-01142-4>
- Sorokanich, B. (2016, May 25). The facts behind every major automaker emissions cheating scandal since VW. *Road & Track*. <http://www.roadandtrack.com/new-cars/car-technology/a29293/vehicle-emissions-testing-scandal-cheating/>
- Spill, H., & Mason, D. (2014). Management models in the NZ software industry. *Journal of Applied Computing and Information Technology*, 18(1). [https://ndhadeliver.natlib.govt.nz/delivery/DeliveryManagerServlet?dps\\_pid=FL21848094](https://ndhadeliver.natlib.govt.nz/delivery/DeliveryManagerServlet?dps_pid=FL21848094)
- Stark, J., & Tiffert, G. (2021). *Eyes wide open: Ethical risks in research collaboration with China*. The Hoover Institution. [https://www.hoover.org/sites/default/files/research/docs/stoff-tiffert\\_eyes\\_wideopen\\_web\\_revised.pdf](https://www.hoover.org/sites/default/files/research/docs/stoff-tiffert_eyes_wideopen_web_revised.pdf)
- Steneck, N. H. (2006). Fostering integrity in research: Definitions, current knowledge, and future directions. *Science and Engineering Ethics*, 12(1), 53–74. <https://doi.org/10.1007/pl00022268>
- Sterne, L. (1759). *The life and opinions of Tristram Shandy, gentleman*. Edited and with an introduction and notes by I. C. Ross. Oxford: Oxford University Press, 1983.
- Stokols, D., Hall, K. L., Taylor, B. K., & Moser, R. P. (2008). The science of team science. *American Journal of Preventative Medicine*, 35(2), S77–S89. <https://doi.org/10.1016/j.amepre.2008.05.002>
- Suk, W. (2006). Can peer review police fraud? *Nature Neuroscience*, 9(2), 149. <https://doi.org/10.1038/nn0206-149>
- Tamborini, C. R., Kim, C., & Sakamoto, A. (2015). Education and lifetime earnings in the United States. *Demography*, 52(4), 1383–1407. <https://doi.org/10.1007/s13524-015-0407-0>
- Tennant, J. P. (2018). The state of the art in peer review. *FEMS Microbiology Letters*, 365(19). <https://doi.org/10.1093/femsle/fny204>
- Thibault, M. (2000). Cost sharing: A time to be traditional or a time for change? *Research Management Review*, 11(1), 45–49.

- Times Higher Education (n.d.). *World university rankings 2021*. Retrieved June 27, 2022, from [https://www.timeshighereducation.com/world-university-rankings/2021/world-ranking#!/page/0/length/25/sort\\_by/rank/sort\\_order/asc/cols/stats](https://www.timeshighereducation.com/world-university-rankings/2021/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats)
- Tricco, A. C., Thomas, S. M., Antony, J., Rios, P., Robson, R., Pattani, R., Ghassemi, M., Sullivan, S., Sevlaratnam, I., Tannenbaum, C., et al. (2017). Strategies to prevent or reduce gender bias in peer review of research grants. A rapid scoping review. *PLOS One*. <https://doi.org/10.1371/journal.pone.0169718>
- Trochim, W. M. K. (n.d.). *Research methods knowledge base*. Retrieved June 27, 2022, from <https://conjointly.com/kb/>
- Unreliable research: Trouble at the lab (2013, October 19). *The Economist*. <https://www.economist.com/briefing/2013/10/18/trouble-at-the-lab>
- US Congress (2007). *Public Law 110-69—America COMPETES Act*. <https://www.congress.gov/110/plaws/publ69/PLAW-110publ69.pdf>
- US Congress (2015). *H.R. 1806—America COMPETES Reauthorization Act of 2015*. <https://www.congress.gov/bill/114th-congress/house-bill/1806>
- US Department of Health, Education and Welfare (1979). *The Belmont Report*. [https://www.hhs.gov/ohrp/sites/default/files/the-belmont-report-508c\\_FINAL.pdf](https://www.hhs.gov/ohrp/sites/default/files/the-belmont-report-508c_FINAL.pdf)
- US Department of Justice (2020a). Former Emory University professor and Chinese “Thousand Talents” participant convicted and sentenced for filing a false tax return. <https://www.justice.gov/opa/pr/former-emory-university-professor-and-chinese-thousand-talents-participant-convicted-and>
- US Department of Justice (2020b). Harvard University professor and two Chinese nationals charged in three separate China related cases. <https://www.justice.gov/opa/pr/harvard-university-professor-and-two-chinese-nationals-charged-three-separate-china-related>
- US Department of Justice (2020c). University of Arkansas professor indicted for wire fraud and passport fraud. <https://www.justice.gov/opa/pr/university-arkansas-professor-indicted-wire-fraud-and-passport-fraud>
- US Department of State (n.d.). Overview of the U.S. export control system. Retrieved June 27, 2022, from <https://2009-2017.state.gov/strategictrade/overview/index.htm>
- US Department of the Interior (2020, November 9). Embracing Indigenous knowledge to address the wildfire crisis. <https://www.doi.gov/wildlandfire/embracing-indigenous-knowledge-address-wildfire-crisis>
- US Food and Drug Administration (n.d.). Institutional review boards frequently asked questions. Retrieved June 27, 2022, from <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/institutional-review-boards-frequently-asked-questions>
- US General Accounting Office (1978). *Technology transfer: Administration of the Bayh-Dole Act by research universities*. Publication RCED-98-126. <https://www.gao.gov/assets/rced-98-126.pdf>
- US General Accounting Office (1995). *University research: Effect of indirect cost revisions and options for future changes*. Publication RCED-95-74. <https://www.gao.gov/products/RCED-95-74>
- US Geological Survey (n.d.-a). Did you feel it? Retrieved June 27, 2022, from <https://earthquake.usgs.gov/data/dyfi/>
- US Geological Survey (n.d.-b). Manage quality. Accessed September 20, 2022, from <https://www.usgs.gov/data-management/manage-quality>
- US Government Accountability Office (2013). *Biomedical research: NIH should assess the impact of growth in indirect costs on its mission*. Publication GAO-13-760. <https://www.gao.gov/products/GAO-13-760>
- US Government Accountability Office (2014). *Grants management: Programs at HHS and HUD collect administrative cost information but differences in cost caps and definitions create challenges*. Publication GAO-15-118. <https://www.gao.gov/assets/gao-15-118.pdf>
- US Government Accountability Office (2017). *National Science Foundation: Preliminary observations on indirect costs for research*. Publication GAO-17-576T. <https://www.gao.gov/products/GAO-17-576T>

- US Government Accountability Office (2019). *Federal research: Additional actions needed to improve public access to research results*. Publication GAO-20-81. <https://www.gao.gov/products/gao-20-81>
- US Government Accountability Office (2020). *Open data: Agencies need guidance to establish comprehensive data inventories; Information on their progress is limited*. Publication GAO-21-29. <https://www.gao.gov/products/gao-21-29>
- US Government Accountability Office (2022). *Research reliability: Federal actions needed to promote stronger research practices*. Publication GAO-22-104441. <https://www.gao.gov/products/gao-22-104411>
- US House of Representatives (n.d.). *U.S. Code Chapter 18—Patent rights in inventions made with federal assistance*. Retrieved October 8, 2022, from <https://uscode.house.gov/view.xhtml?path=/prelim@title35/part2/chapter18&edition=prelim>
- U.S. News and World Report (n.d.). *2022 Best global universities rankings*. Retrieved June 27, 2022, from <https://www.usnews.com/education/best-global-universities/rankings>
- US Patent and Trademark Office (n.d.). General information concerning patents. Retrieved July 27, 2022. <https://www.uspto.gov/patents/basics/general-information-patents>
- US Senate (2019). *Threats to the U.S. research enterprise: China's talent recruitment plans*. <https://www.hsdl.org/?abstract&did=831878>
- Validating key experimental results via independent replication (n.d.). *Science Exchange*. Retrieved June 27, 2022, from <http://validation.scienceexchange.com/#/>
- Van Dusen, V. (2013). Intellectual property and higher education: Challenges and conflicts. *Administrative Issues Journal: Education, Practice, & Research*, 3(2), 1–13. <https://files.eric.ed.gov/fulltext/EJ1057074.pdf>
- van Peer, W., Hakemulder, F., & Zyngier, S. (2012). *Scientific methods for the humanities*. Amsterdam: John Benjamins.
- Vespa, J., Medina, L., & Armstrong, D. M. (2020). *Demographic turning points for the United States: Population projections for 2020 to 2060*. <https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf>
- Walliman, N. (2010). *Research methods: The basics* (2nd ed.). London: Routledge. <https://doi.org/10.4324/9780203836071>
- Walsh, D. (2013, May 6). Not safe for funding: The N.S.F. and the economics of science. *New Yorker*. <https://www.newyorker.com/tech/elements/not-safe-for-funding-the-n-s-f-and-the-economics-of-science>
- Walt Disney Archives (n.d.). *Walt's quotes*. Retrieved June 27, 2022. <https://d23.com/section/walt-disney-archives/walts-quotes/>
- Ward, A. (2015, May 2). 24 unintended scientific discoveries. Mental Floss. <http://mentalfloss.com/article/53646/24-unintended-scientific-discoveries-happened-accident>
- Ware, M. (2008). Peer review: Benefits, perceptions and alternatives. *Publishing Research Consortium Summary Papers*, 4, 4–20.
- Welter, B., & Egmon, J. (2005). *The prepared mind of a leader: Eight skills leaders use to innovate, make decisions, and solve problems*. San Francisco: Jossey-Bass.
- White, K. S., & Carney, J. P. (2011). *Working with Congress: A scientist's guide to policy*. Washington, DC: American Association for the Advancement of Science. [https://www.aaas.org/sites/default/files/AAAS\\_Working\\_with\\_Congress.pdf](https://www.aaas.org/sites/default/files/AAAS_Working_with_Congress.pdf)
- White, T. L., & McBurney, D. H. (2013). *Research methods* (9th ed.). Belmont, CA: Wadsworth Cengage Learning.
- White House (2021). *Presidential Memorandum on United States Government-supported research and development national security policy*. *National Security Presidential Memorandum 33*. <https://trumpwhitehouse.archives.gov/presidential-actions/presidential-memorandum-united-states-government-supported-research-development-national-security-policy/>

- Williams, C. (2007). Research methods. *Journal of Business and Economic Research*, 5(3), 65–70. <https://doi.org/10.19030/jber.v5i3.2532>
- Willinsky, J. (2006). *The access principle: The case for open access to research and scholarship*. Cambridge, MA: MIT Press.
- Wilson, S. (2001). What is an Indigenous research methodology? *Canadian Journal of Native Education*, 25(2), 175–179.
- Wilson, S. (2008). *Research is ceremony: Indigenous research methods*. Halifax, NS: Fernwood Publishing.
- Wisconsin Historical Society (n.d.). Golden Fleece Awards, 1975–1987. Retrieved June 27, 2022, from <https://content.wisconsinhistory.org/digital/collection/tp/id/70852/>
- Wolf, J. (2015, August 7). How effective leaders handle criticism. *Fast Company*. <https://www.fastcompany.com/3049410/how-effective-leaders-handle-criticism>
- Woollaston, V. (2014, May 28). Hilarious graphics reveal how statistics can create false connections. *Daily Mail*. <https://www.dailymail.co.uk/sciencetech/article-2640550/Does-sour-cream-cause-bike-accidents-No-looks-like-does-Graphs-reveal-statistics-produce-false-connections.html>
- World Intellectual Property Organization (2020). *What is intellectual property?* [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_450\\_2020.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_450_2020.pdf)
- Wulff, D. (2010). Unquestioned answers: A review of research is ceremony: Indigenous research methods. *The Qualitative Report*, 15(5), 1290–1295. <https://doi.org/10.46743/2160-3715/2010.1345>



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