

## DAFTAR PUSTAKA

- Aditomo, A. (2022). *Capaian Pembelajaran pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah pada Kurikulum Merdeka*.
- Alhamdani, W. A. (2016). Teaching Cryptography Using Design Thinking Approach. *Journal of Applied Security Research*, 11(1), 78–89. <https://doi.org/10.1080/19361610.2015.1069646>
- Amalia, Y., Sukarmin, & Suharno. (2020). Analysis of student's creative thinking skills profiles on work and energy topics. *AIP Conference Proceedings*, 2296. <https://doi.org/10.1063/5.0030396>
- Amelia, R., Aripin, U., Hidayani, N., Siliwangi, I., Terusan, J., Sudirman, J., Cimahi, J., & Barat, I. (2018). Analisis Kemampuan Berpikir Kreatif Matematik Siswa Smp Pada Materi Segitiga Dan Segiempat. *Jurnal Pembelajaran Matematika Inovatif*, 1(6).
- Anand, A., Mishra, S., Deep, A., & Alse, K. (2016). Generation of Educational Technology Research Problems Using Design Thinking Framework. *Proceedings - IEEE 7th International Conference on Technology for Education, T4E 2015*, 69–72. <https://doi.org/10.1109/T4E.2015.28>
- Anderson, G., Herr, K., & Nihlen, A. (2014). Studying Your Own School: An Educator's Guide to Practitioner Action Research. In *Studying Your Own School: An Educator's Guide to Practitioner Action Research*. Corwin Press. <https://doi.org/10.4135/9781483329574>
- Aris, N. M., Dayana, N., Halim, A., Ali, S., Rusli, N. H., Nabila, M., Suratin, M., & Hassan, C. (2021). *Evaluating The Academic Trends On Design Thinking Research: A Bibliometric Analysis From 2000 to 2021 Technical and Implementation Barriers to Adapt Digital Game-Based Learning in Remedial Education: A Needs Analysis View project Online Formative Assessment in Higher Education STEM: A Systematic Literature Review View project Evaluating The Academic Trends On Design Thinking Research: A Bibliometric Analysis From 2000 to 2021* (Vol. 6, Issue 4). <http://journalppw.com>
- Arnbjerg, J., Khataee, A., Breitenbach, T., Thøgersen, J., Christiansen, S., Gavlshøj Mortensen, H., Bilde, M., Fröhlich Hougaard, R., & Bentien, A. (2019). Battery Concepts in Physical Chemistry: Making Your Own Organic-Inorganic Battery. *Journal of Chemical Education*, 96(7), 1465–1471. <https://doi.org/10.1021/acs.jchemed.9b00090>
- Asmar, J.-P. El, & Mady, C. (2013). A Constructivist Approach to Design Teaching at the Postgraduate Level: The Case of an Interdisciplinary Design Programme at FAAD, NDU, Lebanon. *Procedia - Social and Behavioral Sciences*, 93, 531–538. <https://doi.org/10.1016/j.sbspro.2013.09.234>

- Asyhari, A., & Sifa'i, M. (2021). Problem-Based Learning to Improve Problem-Solving Skill: Is it Effective Enough? *Indonesian Journal of Science and Mathematics Education*, 4(1), 78–88. <https://doi.org/10.24042/ijjsme.v4i1.8674>
- Atchia, S. M. C. (2021). Integration of ‘design thinking’ in a reflection model to enhance the teaching of biology. *Journal of Biological Education*. <https://doi.org/10.1080/00219266.2021.1909642>
- Auernhammer, J., & Roth, B. (2021). The origin and evolution of Stanford University’s design thinking: From product design to design thinking in innovation management. *Journal of Product Innovation* .... <https://doi.org/10.1111/jpim.12594>
- Badan Pusat Statistik. (2023, July 8). *Listrik yang Didistribusikan Menurut Provinsi (GWh) (GWh)*, 2019-2021. Source Url: <Https://Www.Bps.Go.Id/Indicator/7/859/1/Listrik-Yang-Didistribusikan-Menurut-Provinsi-Gwh-.Html>; Access Time: July 8, 2023, 10:38 Am.
- Bariyyah, K. (2021a). Problem solving skills: essential skills challenges for the 21st century graduates. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, 7(1), 71. <https://doi.org/10.29210/120212843>
- Bariyyah, K. (2021b). Problem solving skills: essential skills challenges for the 21st century graduates. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, 7(1), 71. <https://doi.org/10.29210/120212843>
- Barron, F. (1955). The disposition toward originality. *The Journal of Abnormal and Social Psychology*, 51(3), 478–485.
- Basso, A., Chiorri, C., Bracco, F., Carnasciali, M. M., Alloisio, M., & Grotti, M. (2018). Improving the interest of high-school students toward chemistry by crime scene investigation. *Chemistry Education Research and Practice*, 19(2), 558–566. <https://doi.org/10.1039/c7rp00232g>
- Beckman, S. L., & Barry, M. (2007). Innovation as a learning process: Embedding design thinking. *California Management Review*. <https://doi.org/10.2307/41166415>
- Beghetto, R. A., & Kaufman, J. C. (2007). Toward a broader conception of creativity: A case for “mini-c” creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 1(2), 73–79. <https://doi.org/10.1037/1931-3896.1.2.73>
- Beksultanova, A. I., Dzhankhotova, P. M., & Shardan, S. K. (2022). Renewable and alternative energy sources. Green energy. *IOP Conference Series: Earth and Environmental Science*, 1045(1). <https://doi.org/10.1088/1755-1315/1045/1/012134>
- Belu, R. G., Ionel, L., Belu, R., & Chiou, R. (n.d.). *Embedding Renewable Energy Concepts into Engineering Curriculum Embedding Renewable Energy and Sustainability Concepts into Engineering and Technology Curriculum*.
- Bialik, M., Fadel, C., Trilling, B., Nilsson, P., & Groff, J. (2015a). *Skills for the 21 st Century: What Should Students Learn?* Center for Curriculum Redesign. [www.curriculumredesign.org](http://www.curriculumredesign.org)

- Bialik, M., Fadel, C., Trilling, B., Nilsson, P., & Groff, J. (2015b). *Skills for the 21 st Century: What Should Students Learn?* Center for Curriculum Redesign. www.curriculumredesign.org
- Bodner, G. M., & Dudley Herron, J. (2002). *PROBLEM-SOLVING IN CHEMISTRY*.
- Bresser, D., Buchholz, D., Moretti, A., Varzi, A., & Passerini, S. (2018). Alternative binders for sustainable electrochemical energy storage-the transition to aqueous electrode processing and bio-derived polymers. *Energy and Environmental Science*, 11(11), 3096–3127. <https://doi.org/10.1039/c8ee00640g>
- Brown, T. (2008). Design Thinking. *Harvard Business Review*. www.hbr.org
- Buckingham, D., Banaji, S., & Burn, A. (2010). *The rhetorics of creativity: A literature review Creativity, Culture and Education Series The rhetorics of creativity: a literature review 2nd Edition*. <https://www.researchgate.net/publication/41539436>
- Buhl, A., Schmidt-Keilich, M., Muster, V., Blazejewski, S., Schrader, U., Harrach, C., Schäfer, M., & Süßbauer, E. (2019). Design thinking for sustainability: Why and how design thinking can foster sustainability-oriented innovation development. *Journal of Cleaner Production*, 231, 1248–1257. <https://doi.org/10.1016/j.jclepro.2019.05.259>
- Cahn, P. S., Bzowyckyj, A., Collins, L., Dow, A., & ... (2016). A design thinking approach to evaluating interprofessional education. *Journal of* .... <https://doi.org/10.3109/13561820.2015.1122582>
- Çalışkan, O. (2012). Design thinking in urbanism: Learning from the designers. *Urban Design International*, 17(4), 272–296. <https://doi.org/10.1057/udi.2012.21>
- Camacho, M. (2016). David Kelley: From Design to Design Thinking at Stanford and IDEO. In *She Ji* (Vol. 2, Issue 1, pp. 88–101). Tongji University Press. <https://doi.org/10.1016/j.sheji.2016.01.009>
- Cardellini, L. (2006). *Fostering creative problem solving in chemistry through group work*.
- Carlgren, L. (2013). *Design thinking as an enabler of innovation: Exploring the concept and its relation to building innovation capabilities*. search.proquest.com. <https://search.proquest.com/openview/6769ae187a32859d148b70889f6214e1/1?pq-origsite=gscholar&cbl=51922&diss=y>
- Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., & Hornstein, M. (2010). *37 Destination, Imagination and the Fires Within: Design Thinking in a Middle School Classroom*.
- Carson, J. (2007). A Problem With Problem Solving: Teaching Thinking Without Teaching Knowledge. In *The Mathematics Educator* (Vol. 17, Issue 2).
- Caughron, J. J., Peterson, D. R., & Mumford, M. D. (2011). Creativity Training. In *Encyclopedia of Creativity* (pp. 311–317). Elsevier. <https://doi.org/10.1016/b978-0-12-375038-9.00226-0>
- Chang, Raymond. (2010). *Chemistry*. McGraw-Hill.

- Chiang, C. L., & Lee, H. (2016). The Effect of Project-Based Learning on Learning Motivation and Problem-Solving Ability of Vocational High School Students. *International Journal of Information and Education Technology*, 6(9), 709–712. <https://doi.org/10.7763/IJIET.2016.V6.779>
- Choi, B., & Young, M. F. (2021). TPACK-L: teachers' pedagogical design thinking for the wise integration of technology. *Technology, Pedagogy and Education*, 30(2), 217–234. <https://doi.org/10.1080/1475939X.2021.1906312>
- Clemente, V., Tschimmel, K., & Vieira, R. (2017). Why a Logbook? A backpack journey as a metaphor for product design education. *Design Journal*, 20(sup1), S1530–S1542. <https://doi.org/10.1080/14606925.2017.1352677>
- Cortés Loyola, C., Adlerstein Grimberg, C., & Bravo Colomer, Ú. (2020). Early childhood teachers making multiliterate learning environments: The emergence of a spatial design thinking process. *Thinking Skills and Creativity*, 36. <https://doi.org/10.1016/j.tsc.2020.100655>
- Creswell, J. W. (2016). *Research Design Pendekatan Kualitatif, Kuantitatif, dan Mixed*. Pustaka Pelajar.
- Cross, N. (2011). *Design thinking: Understanding how designers think and work*. books.google.com.  
<https://books.google.com/books?hl=en&lr=&id=F4SUVT1XCCwC&oi=fnd&pg=PT5&dq=design+thinking+in+learning&ots=7QXwzWPxZq&sig=yvHAA5xV4PMR0DAd0r59HNC2Nil>
- Cutumisu, M., Schwartz, D. L., & Lou, N. M. (2020). The relation between academic achievement and the spontaneous use of design-thinking strategies. *Computers and Education*, 149. <https://doi.org/10.1016/j.compedu.2020.103806>
- Deaner, K., & McCreery-Kellert, H. (2018). Cultivating peace through design thinking: Problem solving with PAST foundation. *Childhood Education*, 94(1), 26–31. <https://doi.org/10.1080/00094056.2018.1420360>
- Dorst, K. (2011). The core of “design thinking” and its application. *Design Studies*, 32(6), 521–532. <https://doi.org/10.1016/j.destud.2011.07.006>
- Dostál, J. (2015). Theory of Problem Solving. *Procedia - Social and Behavioral Sciences*, 174, 2798–2805. <https://doi.org/10.1016/j.sbspro.2015.01.970>
- Du, K., Wang, Y., Ma, X., Luo, Z., Wang, L., & Shi, B. (2020). Achievement goals and creativity: the mediating role of creative self-efficacy. *Educational Psychology*, 40(10), 1249–1269. <https://doi.org/10.1080/01443410.2020.1806210>
- Duffy, T. M., & Cunningham, D. J. (1996). *Constructivism: Implications for the Design and Delivery of Instruction*. In D. H. Jonassen (Ed.), *Handbook of Research for Educational Communications and Technology*. Macmillan Library Reference USA.
- Eagen, W., Aspevig, K., Cukier, W., & ... (2012). Embedding "Design Thinking" in Business School Curriculum. ... *Journal of the Arts* .... <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrl=18331866&AN=91821628&h=EIGCHFYAVI%2F>

- 8QoBQFhak69jY5LeXmQyf4DpNJcnjKHA<sup>b</sup>1Ty1t4pQO92Jh%2BrzIbTvV%2FfePlhyIF%2F81ox4tlTvg%3D%3D&crl=c
- Elfrida, E., Hadinugrahaningsih, T., & Rahmawati, Y. (2017). Studi Pendekatan Dilemmas Stories pada Materi Hidrolisis Garam dengan Metode Thinking Aloud Pair Problem Solving (TAPPS). *JRPK: Jurnal Riset Pendidikan Kimia*, 7(2), 91–100. <https://doi.org/10.21009/jrpk.072.02>
- Elsbach, K. D., & Stigliani, I. (2018a). Design Thinking and Organizational Culture: A Review and Framework for Future Research. *Journal of Management*, 44(6), 2274–2306. <https://doi.org/10.1177/0149206317744252>
- Elsbach, K. D., & Stigliani, I. (2018b). Design Thinking and Organizational Culture: A Review and Framework for Future Research. *Journal of Management*, 44(6), 2274–2306. <https://doi.org/10.1177/0149206317744252>
- Evans, M. (2012). Design Thinking: Understanding How Designers Think and Work by Nigel Cross . *The Design Journal*, 15(1), 141–143. <https://doi.org/10.2752/175630612x13192035508741>
- Faiqatul Himmah, E., Koes Handayanto, S., Kusairi, S., & Artikel Abstrak, I. (2021). Potensi Berpikir Kreatif Siswa SMA. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 6(1), 50–54. <http://journal.um.ac.id/index.php/jptpp/>
- Fasko, D. (2001). Education and creativity. *Creativity Research Journal*, 13(3–4), 317–327. [https://doi.org/10.1207/s15326934crj1334\\_09](https://doi.org/10.1207/s15326934crj1334_09)
- Febriyanti, C., & Irawan, A. (2017). *Delta-Pi: Jurnal Matematika dan Pendidikan Matematika Meningkatkan Kemampuan Pemecahan Masalah Dengan Pembelajaran Matematika Realistik*. 6(1).
- Fischer, M. (2015). Design it! Solving sustainability problems by applying design thinking. *GAIA-Ecological Perspectives for Science and ...* <https://www.ingentaconnect.com/content/oekom/gaia/2015/00000024/0000003/art00010>
- Foster, N., & Schleicher, A. (2022). Assessing Creative Skills. *Creative Education*, 13(01), 1–29. <https://doi.org/10.4236/ce.2022.131001>
- Frontana-Uribe, B. A., Little, R. D., Ibanez, J. G., Palma, A., & Vasquez-Medrano, R. (2010). Organic electrosynthesis: A promising green methodology in organic chemistry. *Green Chemistry*, 12(12), 2099–2119. <https://doi.org/10.1039/c0gc00382d>
- Fülöp, É. (2021). Developing Problem-Solving Abilities by Learning Problem-Solving Strategies: An Exploration of Teaching Intervention in Authentic Mathematics Classes. *Scandinavian Journal of Educational Research*, 65(7), 1309–1326. <https://doi.org/10.1080/00313831.2020.1869070>
- Georgiev, G. v. (2012). Design Thinking: An Overview (< Special Issue> Design Thinking). ... *Issue of Japanese Society for the Science of Design*. [https://www.jstage.jst.go.jp/article/jssds/20/1/20\\_KJ00008612408/\\_article/-char/ja/](https://www.jstage.jst.go.jp/article/jssds/20/1/20_KJ00008612408/_article/-char/ja/)
- Ghufrooni, R., Darwis, Z., & Kurniadewi, F. (2019). Analisis Minat Belajar Kimia Siswa melalui Penerapan Model Pembelajaran Learning Cycle 5E

- menggunakan Cerita Misteri pada Materi Asam Basa. *JRPK: Jurnal Riset Pendidikan Kimia*, 9(2), 80–86. <https://doi.org/10.21009/jrpk.092.04>
- Grammenos, D., & Antona, M. (2018a). Future designers: Introducing creativity, design thinking & design to children. *International Journal of Child-Computer Interaction*, 16, 16–24. <https://doi.org/10.1016/j.ijcci.2017.10.002>
- Grammenos, D., & Antona, M. (2018b). Future designers: Introducing creativity, design thinking & design to children. *International Journal of Child-Computer Interaction*, 16, 16–24. <https://doi.org/10.1016/j.ijcci.2017.10.002>
- Greiff, S., Wüstenberg, S., Csapó, B., Demetriou, A., Hautamäki, J., Graesser, A. C., & Martin, R. (2014). Domain-general problem solving skills and education in the 21st century. In *Educational Research Review* (Vol. 13, pp. 74–83). Elsevier Ltd. <https://doi.org/10.1016/j.edurev.2014.10.002>
- Grey, S., & Morris, P. (2022). Capturing the spark: PISA, twenty-first century skills and the reconstruction of creativity. *Globalisation, Societies and Education*. <https://doi.org/10.1080/14767724.2022.2100981>
- Grigorenko, E. L. (2019). Creativity: a challenge for contemporary education. *Comparative Education*, 55(1), 116–132. <https://doi.org/10.1080/03050068.2018.1541665>
- Guaman-Quintanilla, S., Everaert, P., Chiluiza, K., & Valcke, M. (2022a). Impact of design thinking in higher education: a multi-actor perspective on problem solving and creativity. *International Journal of Technology and Design Education*. <https://doi.org/10.1007/s10798-021-09724-z>
- Guaman-Quintanilla, S., Everaert, P., Chiluiza, K., & Valcke, M. (2022b). Impact of design thinking in higher education: a multi-actor perspective on problem solving and creativity. *International Journal of Technology and Design Education*. <https://doi.org/10.1007/s10798-021-09724-z>
- Guaman-Quintanilla, S., Everaert, P., Chiluiza, K., & Valcke, M. (2022c). Impact of design thinking in higher education: a multi-actor perspective on problem solving and creativity. *International Journal of Technology and Design Education*. <https://doi.org/10.1007/s10798-021-09724-z>
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5, 444–454.
- Hacker, W., Sachse, P., & Schroda, F. (1998). Design thinking-Possible ways to successful solutions in product development. *Designers*. [https://doi.org/10.1007/978-1-4471-1268-6\\_20](https://doi.org/10.1007/978-1-4471-1268-6_20)
- Hawthorne, G., Saggar, M., Quintin, E. M., Bott, N., & ... (2016). Designing a creativity assessment tool for the twenty-first century: Preliminary results and insights from developing a design-thinking based assessment of creative .... *Design Thinking* .... [https://doi.org/10.1007/978-3-319-19641-1\\_8](https://doi.org/10.1007/978-3-319-19641-1_8)
- Hayes, J. R. (1981). *The Complete Problem Solver*. Philadelphia. The Franklin Institute Press.
- Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, 61, 569–598. <https://doi.org/10.1146/annurev.psych.093008.100416>

- Henriksen, D. (2017). Creating STEAM with Design Thinking: Beyond STEM and Arts Integration. *STEAM*, 3(1), 1–11. <https://doi.org/10.5642/steam.20170301.11>
- Henriksen, D., Gretter, S., & Richardson, C. (2020a). Design thinking and the practicing teacher: addressing problems of practice in teacher education. *Teaching Education*, 31(2), 209–229. <https://doi.org/10.1080/10476210.2018.1531841>
- Henriksen, D., Gretter, S., & Richardson, C. (2020b). Design thinking and the practicing teacher: addressing problems of practice in teacher education. *Teaching Education*, 31(2), 209–229. <https://doi.org/10.1080/10476210.2018.1531841>
- Henriksen, D., Richardson, C., & Mehta, R. (2017). Design thinking: A creative approach to educational problems of practice. *Thinking Skills and Creativity*. <https://www.sciencedirect.com/science/article/pii/S1871187117300597>
- Hernández-Ramos, J., Pernaa, J., Cáceres-Jensen, L., & Rodríguez-Becerra, J. (2021). The effects of using socio-scientific issues and technology in problem-based learning: A systematic review. In *Education Sciences* (Vol. 11, Issue 10). MDPI. <https://doi.org/10.3390/educsci11100640>
- Hetherington, L., Chappell, K., Ruck Keene, H., Wren, H., Cukurova, M., Hathaway, C., Sotiriou, S., & Bogner, F. (2020). International educators' perspectives on the purpose of science education and the relationship between school science and creativity. *Research in Science and Technological Education*, 38(1), 19–41. <https://doi.org/10.1080/02635143.2019.1575803>
- Higgins, J. M. (1994). *101 creative problem solving techniques : the handbook of new ideas for business*. New Management Pub. Co.
- Ho, C. H. (2001). Some phenomena of problem decomposition strategy for design thinking: differences between novices and experts. *Design Studies*. <https://www.sciencedirect.com/science/article/pii/S0142694X99000307>
- Howard, Z., & Davis, K. (2011). From solving puzzles to designing solutions: Integrating design thinking into evidence based practice. *Evidence Based Library and Information ....* <https://eprints.qut.edu.au/61297/>
- Hrovatin, J., Machtig, S., & Prekrat, S. (2008). Design thinking - Multidisciplinary ways of solving problems in wood industry. In I. Grbac & V. Jirous-Rajkovic (Eds.), *19th International Scientific Conference: Wood is Good - Properties, Technology, Valorisation, Application* (pp. 71–75). University of Zagreb, Faculty of Forestry. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84946706522&partnerID=40&md5=d20969a2254b3fa5eeee166d4fbe4fcc>
- IESR. (2019). *Indonesia-Coal-Dynamics\_Toward-a-Just-Energy-Transition* (1st ed.). Institute for Essential Services Reform (IESR).
- Jeffrey, B., & Craft, A. (2004). Teaching creatively and teaching for creativity: Distinctions and relationships. *Educational Studies*, 30(1), 77–87. <https://doi.org/10.1080/0305569032000159750>

- Johnson, B. T., & Acabchuk, R. L. (2018). What are the keys to a longer, happier life? Answers from five decades of health psychology research. *Social Science and Medicine*, 196, 218–226. <https://doi.org/10.1016/j.socscimed.2017.11.001>
- Jonassen, D. (1997). Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes. *Educational Technology Research and Development*, 45(1), 65–94.
- Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and Computer-Mediated Communication in Distance Education. *American Journal of Distance Education*, 9(2), 7–26. <https://doi.org/10.1080/08923649509526885>
- Jonassen, D. H. (n.d.). *Instructional Design Models for Well-Structured and Ill-Structured Problem-Solving Learning Outcomes*.
- Kahney, H. (1986). *Problem Solving: a cognitive approach*. Open University.
- Kale, U., & Akcaoglu, M. (2020). Problem Solving and Teaching How to Solve Problems in Technology-Rich Contexts. *Peabody Journal of Education*, 95(2), 127–138. <https://doi.org/10.1080/0161956X.2020.1745612>
- Kamonjo, F., & Wachanga, S. (2019). *Creativity Level in Chemistry Education by Gender Among Secondary School Students in Kenya*. 10. <https://doi.org/10.7176/JEP>
- Kanselaar, G. (2002). *Constructivism and socio-constructivism Multimodal representations in collaborative history learning* View project. <https://www.researchgate.net/publication/27690037>
- Karaduman, C. I. (2014). *GLOBAL CHALLENGES FOR THE WORLD*. [https://docs.unocha.org/sites/dms/Documents/Global\\_Challenges\\_Policy\\_Brief\\_Jan10.pdf](https://docs.unocha.org/sites/dms/Documents/Global_Challenges_Policy_Brief_Jan10.pdf)
- Kaufman, J. C., & Beghetto, R. A. (2009a). Beyond Big and Little: The Four C Model of Creativity. *Review of General Psychology*, 13(1), 1–12. <https://doi.org/10.1037/a0013688>
- Kaufman, J. C., & Beghetto, R. A. (2009b). Beyond Big and Little: The Four C Model of Creativity. *Review of General Psychology*, 13(1), 1–12. <https://doi.org/10.1037/a0013688>
- Kelter, P. B., Carr, J. D., Johnson, T., & Mauricio Castro-Acuña, C. (1996). In the Classroom The Chemical and Educational Appeal of the Orange Juice Clock. In *Journal of Chemical Education* (Vol. 73, Issue 12).
- Kemdikbudristek. (2022). *CP2022\_Kimia SMA*.
- Kiener, M., Green, P., & Ahuna, K. (2014). *Using the Comfortability-in-Learning Scale to Enhance Positive Classroom Learning Environments*.
- Kijima, R., & Sun, K. L. (2021). ‘Females Don’t Need to be Reluctant’: Employing Design Thinking to Harness Creative Confidence and Interest in STEAM. *International Journal of Art and Design Education*, 40(1), 66–81. <https://doi.org/10.1111/jade.12307>
- Kijima, R., Yang-Yoshihara, M., & Maekawa, M. S. (2021a). Using design thinking to cultivate the next generation of female STEAM thinkers. *International*

- Journal of STEM Education*, 8(1). <https://doi.org/10.1186/s40594-021-00271-6>
- Kijima, R., Yang-Yoshihara, M., & Maekawa, M. S. (2021b). Using design thinking to cultivate the next generation of female STEAM thinkers. *International Journal of STEM Education*, 8(1). <https://doi.org/10.1186/s40594-021-00271-6>
- Kim, K. H. (2019). Demystifying Creativity: What Creativity Isn't and Is? *Roeper Review*, 41(2), 119–128. <https://doi.org/10.1080/02783193.2019.1585397>
- Koh, J. H. L., Chai, C. S., Wong, B., & Hong, H. Y. (2015). Design thinking and 21st century skills. *Design Thinking for Education*. [https://doi.org/10.1007/978-981-287-444-3\\_3](https://doi.org/10.1007/978-981-287-444-3_3)
- Kopparla, M., Bicer, A., Vela, K., Lee, Y., Bevan, D., Kwon, H., Caldwell, C., Capraro, M. M., & Capraro, R. M. (2019). The effects of problem-posing intervention types on elementary students' problem-solving. *Educational Studies*, 45(6), 708–725. <https://doi.org/10.1080/03055698.2018.1509785>
- Kostrzewski, M. (2018). One design issue—many solutions. Different perspectives of design thinking—case study. *International Conference on Knowledge Management* .... [https://doi.org/10.1007/978-3-319-95204-8\\_16](https://doi.org/10.1007/978-3-319-95204-8_16)
- Kozbelt, A., Beghetto, R. A., & Runco, M. A. (2010). Theories of Creativity. In *The Cambridge Handbook of Creativity* (pp. 20–47). Cambridge University Press. <https://doi.org/10.1017/CBO9780511763205.004>
- Kumar Shah, R. (2019). Effective Constructivist Teaching Learning in the Classroom. *Shanlax International Journal of Education*, 7(4), 1–13. <https://doi.org/10.34293/education.v7i4.600>
- Lambert, A. (2019). Developing skills through creative problem-solving. *Childhood Education*, 95(4), 24–29. <https://doi.org/10.1080/00094056.2019.1638709>
- Lammi, M., & Becker, K. (2013). Engineering Design Thinking. *Journal of Technology Education*. <https://eric.ed.gov/?id=EJ1005688>
- LaPensee, E., Doshi, A., Salem, B., Jazdzyk, D., Steen, K., Cantrell, M., & Somers, E. (2021). Mobilizing cross-disciplinary teams to advance translational research using design thinking methods. *Journal of Clinical and Translational Science*, 5(1). <https://doi.org/10.1017/cts.2021.823>
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.
- Lee, J. H. (2022). Building creative confidence through an interdisciplinary creativity course: Changes in creative challenges and creative personal identity. *Innovations in Education and Teaching International*, 59(3), 316–325. <https://doi.org/10.1080/14703297.2020.1835689>
- Leifer, L., & Meinel, C. (2019). Looking further: Design thinking beyond solution-fixation. *Design Thinking Research*. [https://doi.org/10.1007/978-3-319-97082-0\\_1](https://doi.org/10.1007/978-3-319-97082-0_1)
- Leifer, L., Plattner, H., & Meinel, C. (2013). *Design thinking research: Building innovation eco-systems*. books.google.com. <https://books.google.com/books?hl=en&lr=&id=lhe4BAAAQBAJ&oi=fnd&pg=>

- PR5&dq=design+thinking+in+learning&ots=hCTwv3U4SF&sig=p6E\_7WBoQf8yX-waj6DJmXhGVwA
- Liedtka, J. (2014). Innovative ways companies are using design thinking. *Strategy & Leadership*. <https://doi.org/10.1108/sl-01-2014-0004>
- Lim, B. K. (2014). The Theme Park Experience of Teaching Science from the Constructivist Paradigm. *Procedia - Social and Behavioral Sciences*, 123, 12–19. <https://doi.org/10.1016/j.sbspro.2014.01.1392>
- Lin, L., Shadiev, R., Hwang, W. Y., & Shen, S. (2020). From knowledge and skills to digital works: An application of design thinking in the information technology course. *Thinking Skills and Creativity*, 36. <https://doi.org/10.1016/j.tsc.2020.100646>
- Lindberg, T., Köppen, E., Rauth, I., & Meinel, C. (2012). On the perception, adoption and implementation of design thinking in the IT industry. *Design Thinking Research*. [https://doi.org/10.1007/978-3-642-21643-5\\_13](https://doi.org/10.1007/978-3-642-21643-5_13)
- Lindberg, T., Meinel, C., & Wagner, R. (2011). Design thinking: A fruitful concept for it development? *Design Thinking*. [https://doi.org/10.1007/978-3-642-13757-0\\_1](https://doi.org/10.1007/978-3-642-13757-0_1)
- Ling, D. (2015). *COMPLETE DESIGN THINKING GUIDE For Successful Professionals*.
- Lowery Bretz, S. (2001). Novak's Theory of Education: Human Constructivism and Meaningful Learning. In *Journal of Chemical Education* (Vol. 78).
- Lugmayr, A. (2011). Applying "design thinking" as a method for teaching in media education. *Proceedings of the 15th International Academic ....* <https://doi.org/10.1145/2181037.2181100>
- Lumsdaine, E., & Lumsdaine, Monika. (1995). *Creative Problem Solving, Thinking Skills For A Changing World*. McGraw Hill, Inc.,
- MacLeod, S., Dodd, J., & Duncan, T. (2015). New museum design cultures: harnessing the potential of design and 'design thinking' in museums. *Museum Management and ....* <https://doi.org/10.1080/09647775.2015.1042513>
- Madani, I., Yamtinah, S., & Utomo, S. B. (2019). Profile of Creative Thinking Skills on Junior High School Students in Science Learning by Gender. *Scientiae Educatia*, 8(2), 119. <https://doi.org/10.24235/sc.educatia.v8i2.5315>
- Mahanal, S., Zubaidah, S., Setiawan, D., Maghfiroh, H., & Muhamimin, F. G. (2022). Empowering College Students' Problem-Solving Skills through RICOSRE. *Education Sciences*, 12(3). <https://doi.org/10.3390/educsci12030196>
- Mammino, L. (2022). Computational chemistry and green chemistry: Familiarizing chemistry students with the modes and benefits of promising synergies, Sustainable Chemistry and Pharmacy,. *Sustainable Chemistry and Pharmacy*, 29(100743), 2352–5541.
- Markus, S. (2019). *The Programme for International Student Assessment (PISA) Results from PISA 2018*.
- Martins, G. M., Zimmer, G. C., Mendes, S. R., & Ahmed, N. (2020). Electrifying green synthesis: recent advances in electrochemical annulation reactions. In

- Green Chemistry* (Vol. 22, Issue 15, pp. 4849–4870). Royal Society of Chemistry. <https://doi.org/10.1039/d0gc01324b>
- Meyer, M. W., & Norman, D. (2020). Changing Design Education for the 21st Century. *She Ji*, 6(1), 13–49. <https://doi.org/10.1016/j.sheji.2019.12.002>
- Micheli, P., Wilner, S. J. S., Bhatti, S. H., Mura, M., & Beverland, M. B. (2019). Doing Design Thinking: Conceptual Review, Synthesis, and Research Agenda. *Journal of Product Innovation Management*, 36(2), 124–148. <https://doi.org/10.1111/jpim.12466>
- Miles, M. B., Huberman, M. A., & Saldana, J. (2014). *Qualitative Data Analysis. Qualitative Data Analysis* (M. B. Miles (ed.); Third).
- Murphy, E. (1997). *Constructivism: From Philosophy to Practice*.
- Muske, K. R., Nigh, C. W., & Weinstein, R. D. (2007). A Lemon Cell Battery for High-Power Applications. In *In the Classroom www.JCE.DivCHED.org* • (Vol. 84, Issue 4). [www.JCE.DivCHED.org](http://www.JCE.DivCHED.org)
- Nakonečný, M. (1998). *Základy psychologie*.
- Natalya, E., Rahmawati, Y., & Erdawati, E. (2021). Integration dilemmas stories in STEAM project of colloid. *Journal of Physics: Conference Series*, 1869(1). <https://doi.org/10.1088/1742-6596/1869/1/012046>
- Noweski, C., Scheer, A., Büttner, N., Thienen, J., & ... (2012). Towards a paradigm shift in education practice: Developing twenty-first century skills with design thinking. *Design Thinking* .... [https://doi.org/10.1007/978-3-642-31991-4\\_5](https://doi.org/10.1007/978-3-642-31991-4_5)
- Nurhamidah, D., Masykuri, M., & Dwiaستuti, S. (2018). Profile of senior high school students' creative thinking skills on biology material in low, medium, and high academic perspective. *Journal of Physics: Conference Series*, 1006(1). <https://doi.org/10.1088/1742-6596/1006/1/012035>
- Ocares-Cunyarachi, L., & Andrade-Arenas, L. (2022). Mobile Application Prototype: Learning in the Programming Course in Computer Engineering Students. *International Journal of Advanced Computer Science and Applications*, 13(7), 783–791. <https://doi.org/10.14569/IJACSA.2022.0130791>
- Ohly, S., Plückthun, L., & Kissel, D. (2017). Developing students' creative self-efficacy based on design-thinking: Evaluation of an elective university course. *Psychology Learning &* .... <https://doi.org/10.1177/1475725716681714>
- Olsen, N. V. (2015). Design thinking and food innovation. *Trends in Food Science & Technology*. <https://www.sciencedirect.com/science/article/pii/S0924224414002143>
- Pande, M., & Bharathi, S. V. (2020). Theoretical foundations of design thinking – A constructivism learning approach to design thinking. *Thinking Skills and Creativity*, 36. <https://doi.org/10.1016/j.tsc.2020.100637>
- Parker Siburt, C. J., Bissell, A. N., & MacPhail, R. A. (2011). Developing metacognitive and problem-solving skills through problem manipulation. *Journal of Chemical Education*, 88(11), 1489–1495. <https://doi.org/10.1021/ed100891s>

- Partnership 21. (2008). *21 century skills, education, and competitiveness*. [www.21stcenturyskills.org](http://www.21stcenturyskills.org).
- Piirto, J. (2014). *Creativity for 21st Century Skills: How to Embed Creativity Into the Classroom*. <https://www.researchgate.net/publication/263374102>
- Piotrowska, D. (2015). Problem based learning vs. design thinking-clash of best teaching practices. *ICERI2015 Proceedings*. <https://library.iated.org/download/PIOTROWSKA2015PRO>
- PISA 2012 Results: Creative Problem Solving (Volume V)*. (2014). OECD. <https://doi.org/10.1787/9789264208070-en>
- Pittarello, F., Pellegrini, T., & Rome, S. U. of. (2015). Designing and evaluating interfaces for domestic eco-feedback: A blended educational experience. *11th Biannual Conference of the ACM SIGCHI Italian Chapter, CHItaly 2015*, 28, 18–25. <https://doi.org/10.1145/2808435.2808463>
- Plattner, H., Meinel, C., & Leifer, L. (2010). *Design thinking: understand-improve-apply*. <https://books.google.com/books?hl=en&lr=&id=LAblwOwHz1MC&oi=fnd&pg=PR3&dq=design+thinking+in+learning&ots=2O18nB1SpH&sig=TDLbpyY231cE75X3bI3sG9avalQ>
- Plattner, H., Meinel, C., & Leifer, L. (2012). *Design thinking research*. Springer. <https://doi.org/10.1007/978-3-319-60967-6>
- Polya, G. (1945). *How to Solve It A New Aspect of Mathematical Method*.
- Polya, G. (1973). *How To Solve It , A New Aspect of Mathematical Method*. Stanford Univesity.
- PPPTK IPA. (2017). *Modul Pengembangan Keprofesian Berkelanjutan KIMIA SMA Terintegrasi Penguatan Pendidikan Karakter. Kelompok Kompetensi B*.
- Pressman, A. (2018). *Design thinking: A guide to creative problem solving for everyone*. taylorfrancis.com. <https://doi.org/10.4324/9781315561936>
- Przybilla, L., Klinker, K., Wiesche, M., & ... (2018). A human-centric approach to digital innovation projects in health care: Learnings from applying design thinking. *22nd Pacific Asia* .... <https://mediatum.ub.tum.de/1446328>
- Purwati, S., & Alberida, H. (2022). Profile of Students' Creative Thinking Skills in High School. *Thinking Skills and Creativity Journal*, 5(1), 22–27. <https://doi.org/10.23887/tscj.v5i1.45432>
- Pusat Kajian AKN Badan Keahlian DPR RI. (2021). *analisis-ringkas-cepat-public-21*.
- Putra, A. A. I. A., Aminah, N. S., Marjuki, A., & Pamungkas, Z. S. (2020). The profile of student's problem solving skill using analytical problem solving test (apst) on the topic of thermodynamic. *Journal of Physics: Conference Series*, 1567(3). <https://doi.org/10.1088/1742-6596/1567/3/032082>
- Rahayu, I. D., Permanasari, A., & Heliawati, L. (2022). The Effectiveness of Socioscientific Issue-Based Petroleum Materials Integrated with The Elsmawar Website on Students' Scientific Literacy. *Journal of Innovation in Educational and Cultural Research*, 3(2), 279–286. <https://doi.org/10.46843/jiecr.v3i2.118>

- Rahayu, S. (2019). Socio-scientific Issues (SSI) in Chemistry Education: Enhancing Both Students' Chemical Literacy & Transferable Skills. *Journal of Physics: Conference Series*, 1227(1). <https://doi.org/10.1088/1742-6596/1227/1/012008>
- Rahayu, S., Astarina, A. D., Setyaningsih, A., & Noor Fathi, M. (2018). High school students' attitudes about socioscientific issues contextualized in inquiry-based chemistry instruction. *ACM International Conference Proceeding Series*, 80–84. <https://doi.org/10.1145/3206129.3239436>
- Rahmawati, Y., & Nurbait, M. (2014). Ce-16 Engaging Students In Social Emotional Learning: The Role Of Dilemma Stories In Chemistry Learning.
- Rao, H., Puranam, P., & Singh, J. (2022). Does design thinking training increase creativity? Results from a field experiment with middle-school students. *Innovation: Organization and Management*, 24(2), 315–332. <https://doi.org/10.1080/14479338.2021.1897468>
- Redante, R. C., de Medeiros, J. F., Vidor, G., Cruz, C. M. L., & Ribeiro, J. L. D. (2019). Creative approaches and green product development: Using design thinking to promote stakeholders' engagement. *Sustainable Production and Consumption*, 19, 247–256. <https://doi.org/10.1016/j.spc.2019.04.006>
- Redante, R. C., Medeiros, J. F. de, Vidor, G., & ... (2019). Creative approaches and green product development: Using design thinking to promote stakeholders' engagement. *Sustainable Production* .... <https://www.sciencedirect.com/science/article/pii/S2352550919300430>
- Reid, N., & Yang, M. J. (2002). The solving of problems in chemistry: The more open-ended problems. *Research in Science and Technological Education*, 20(1), 83–98. <https://doi.org/10.1080/02635140220130948>
- Rivera, A. M., Lugo, J. E., & Division, C. and I. in E. D. D. E. (2020). Exploration of the timing of introduction of design heuristic cards to early design brainstorming sessions by interdisciplinary student teams. *ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC-CIE 2020*, 3. <https://doi.org/10.1115/DETC2020-22477>
- Rodgers, P. A., & Winton, E. (2010). "Design Thinking" - A critical analysis. *12th International Conference on Engineering and Product Design Education: When Design Education and Design Research Meet ., E and PDE 2010*, 42–47. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84859260003&partnerID=40&md5=d6116a944b108d8db91a99d3af37b7c3>
- Runco, M. A., & Acar, S. (2012). Divergent Thinking as an Indicator of Creative Potential. In *Creativity Research Journal* (Vol. 24, Issue 1, pp. 66–75). <https://doi.org/10.1080/10400419.2012.652929>
- Runco, M. A., & Jaeger, G. J. (2012). The Standard Definition of Creativity. *Creativity Research Journal*, 24(1), 92–96. <https://doi.org/10.1080/10400419.2012.650092>
- Saeed, S. (2014). *21 st Century Skills Promoting Creativity and Innovation in The Classroom*. <http://www.thoughtfullearning.com/resources/what-are-21st->

- Salna, L. (2012). *Digital Commons at Buffalo State Creative Studies Graduate Student Master's Projects International Center for Studies in Creativity*. Creativity as a 21st Century Skill: Training Teachers to Take it Beyond the Arts.  
[http://creativity.buffalostate.edu/.Followthisandadditionalworksat:<http://digitalcommons.buffalostate.edu/creativeprojectshttp://digitalcommons.buffalostate.edu/creativeprojects/158>](http://creativity.buffalostate.edu/.Followthisandadditionalworksat:http://digitalcommons.buffalostate.edu/creativeprojectshttp://digitalcommons.buffalostate.edu/creativeprojects/158)
- Sancar-Tokmak, H., & Dogusoy, B. (2020). Novices' instructional design problem-solving processes: Second Life as a problem-based learning environment. *Interactive Learning Environments*.  
<https://doi.org/10.1080/10494820.2020.1799025>
- Sari, D. K., Permanasari, A., & Supriyanti, F. M. T. (2017). Profile of students' creative thinking skills on quantitative project-based protein testing using local materials. *Jurnal Pendidikan IPA Indonesia*, 6(1), 71–75.  
<https://doi.org/10.15294/jpii.v6i1.9516>
- Sari, R. M., & Wiyarsi, A. (2021). *Inquiry Learning Using Local Socio-Scientific Issues as Context to Improve Students' Chemical Literacy*.
- Sarsani, M. R. (2005). Creativity: Definition and approaches. *Creativity in Education*, 1–7.
- Schlögl, R. (2016). Sustainable Energy Systems: The Strategic Role of Chemical Energy Conversion. *Topics in Catalysis*, 59(8–9), 772–786.  
<https://doi.org/10.1007/s11244-016-0551-9>
- Schönhals, A., Hepp, T., & Gipp, B. (2018). Design thinking using the blockchain: enable traceability of intellectual property in problem-solving processes for open innovation. *Proceedings of the 1st Workshop on ....*  
<https://doi.org/10.1145/3211933.3211952>
- Shan, X., Neo, V. Z. Y., & Yang, E. H. (2021a). Mobile app-aided design thinking approach to promote upcycling in Singapore. *Journal of Cleaner Production*, 317. <https://doi.org/10.1016/j.jclepro.2021.128502>
- Shan, X., Neo, V. Z. Y., & Yang, E. H. (2021b). Mobile app-aided design thinking approach to promote upcycling in Singapore. *Journal of Cleaner Production*, 317. <https://doi.org/10.1016/j.jclepro.2021.128502>
- Shure, M. B. (1993). I can problem solve (ICPS): Interpersonal cognitive problem solving for young children. *Early Child Development and Care*, 96(1), 49–64.  
<https://doi.org/10.1080/0300443930960106>
- Simon, H. A. (Herbert A. (1969). *The sciences of the artificial*. MIT Press.
- Sinsel, S. R., Riemke, R. L., & Hoffmann, V. H. (2020). Challenges and solution technologies for the integration of variable renewable energy sources—a review. In *Renewable Energy* (Vol. 145, pp. 2271–2285). Elsevier Ltd.  
<https://doi.org/10.1016/j.renene.2019.06.147>
- Sipayung, T. N., & Anzelina, D. (2019). An analysis of students problem solving skills using a realistic mathematics approach on integers materials. *Journal of Physics: Conference Series*, 1211(1). <https://doi.org/10.1088/1742-6596/1211/1/012083>

- Stanford, J., Siminoff, E. T., O'Neill, M., & Mailhot, J. (2017). *What is design thinking?* matthewemay.com. <https://matthewemay.com/wp-content/uploads/2018/01/Innovation2018.pdf>
- Strothotte, C., & Zwick, C. (2006). The challenges of functional prototypes: Trans-disciplinary projects in interaction design. *8th International Conference on Engineering and Product Design Education, E and DPE*, 291–298.
- Susan M.Brookhart. (2013). *How to Create and Use Rubrics for Formative Assessment and Grading*. ASCD.
- Taajamaa, V., Kirjavainen, S., Repokari, L., & ... (2013). Dancing with Ambiguity Design thinking in interdisciplinary engineering education. ... *International Design* .... <https://ieeexplore.ieee.org/abstract/document/6981258/>
- Terrel L. Rhodes. (2010). *Assessing Outcomes and Improving Achievement: Tips and tools for Using Rubrics*. Association of American Colleges and Universities.
- Thienen, J., Meinel, C., & Nicolai, C. (2014). How design thinking tools help to solve wicked problems. *Design Thinking Research*. [https://doi.org/10.1007/978-3-319-01303-9\\_7](https://doi.org/10.1007/978-3-319-01303-9_7)
- Thienen, J., Noweski, C., Meinel, C., & Rauth, I. (2011). The co-evolution of theory and practice in design thinking—or—"mind the oddness trap!" *Design Thinking*. [https://doi.org/10.1007/978-3-642-13757-0\\_5](https://doi.org/10.1007/978-3-642-13757-0_5)
- Torrance, E. P. (1974a). *The Torrance Tests of Creative Thinking: Norms-Technical Manual*. Personal Press.
- Torrance, E. P. (1974b). *Torrance Tests of Creative Thinking*. Personnel Press.
- Treagust, D. F., Chittleborough, G., & Mamiala, T. L. (2003). The role of submicroscopic and symbolic representations in chemical explanations. *International Journal of Science Education*, 25(11), 1353–1368. <https://doi.org/10.1080/0950069032000070306>
- Trilling, Bernie & Fadel, & Charles. (2009). *21st Century Skills Learning for Life in Our Times (Bernie Trilling, Charles Fadel)* (z-lib.org). Joessey-Bass.
- Trisnayanti, Y., Khoiri, A., Miterianifa, & Ayu, H. D. (2019). Development of Torrance test creativity thinking (TTCT) instrument in science learning. *AIP Conference Proceedings*, 2194. <https://doi.org/10.1063/1.5139861>
- Tse-Kian, K. N. (2003). Using multimedia in a constructivist learning environment in the Malaysian classroom. In *Australian Journal of Educational Technology* (Vol. 19, Issue 3).
- Turner, C. (2015). Review of Chemistry of Sustainable Energy . *Journal of Chemical Education*, 92(4), 601–602. <https://doi.org/10.1021/ed5008298>
- Urbani, J. M., Rosenthal, S., & Michaels, R. (2017). *Developing and Modeling 21st-Century Skills with Preservice Teachers*.
- van Mechelen, M., Laenen, A., Zaman, B., Willems, B., & Abeele, V. vanden. (2019). Collaborative Design Thinking (CoDeT): A co-design approach for high child-to-adult ratios. *International Journal of Human Computer Studies*, 130, 179–195. <https://doi.org/10.1016/j.ijhcs.2019.06.013>

- Vanada, D. I. (2014). Practically creative: The role of design thinking as an improved paradigm for 21st century art education. *Techne Serien-Forskning i Slöjdpedagogik* ... Och .... <https://journals.oslomet.no/index.php/techneA/article/view/1262>
- VanGundy, Arthur. (2005). *101 Activities for Teaching Creativity and Problem Solving*. Pfeiffer.
- Veflen, N., & Gonera, A. (2023a). Perceived usefulness of design thinking activities for transforming research to impact. *Food Control*, 143, 109264. <https://doi.org/10.1016/j.foodcont.2022.109264>
- Veflen, N., & Gonera, A. (2023b). Perceived usefulness of design thinking activities for transforming research to impact. *Food Control*, 143, 109264. <https://doi.org/10.1016/j.foodcont.2022.109264>
- Vetterli, C., Hoffmann, F., Brenner, W., Eppler, M. J., & ... (2012). *Designing innovation: Prototypes and team performance in design thinking*. alexandria.unisg.ch. <https://www.alexandria.unisg.ch/publications/218901>
- Voss, J. F., & Post, T. A. (1988). On the solving of ill-structured problems. *The Nature of Expertise*, 261–285.
- Webb, J. A., & Karatjas, A. G. (2018). Grade perceptions of students in chemistry coursework at all levels. *Chemistry Education Research and Practice*, 19(2), 491–499. <https://doi.org/10.1039/c7rp00168a>
- Wolcott, M. D., & McLaughlin, J. E. (2020a). Promoting creative problem-solving in schools of pharmacy with the use of design thinking. *American Journal of Pharmaceutical Education*. <https://www.ajpe.org/content/84/10/ajpe8065.abstract>
- Wolcott, M. D., & McLaughlin, J. E. (2020b). Promoting creative problem-solving in schools of pharmacy with the use of design thinking. *American Journal of Pharmaceutical Education*, 84(10), 1271–1276. <https://doi.org/10.5688/ajpe8065>
- Wolcott, M. D., McLaughlin, J. E., Hubbard, D. K., Rider, T. R., & Umstead, K. (2021). Twelve tips to stimulate creative problem-solving with design thinking. *Medical Teacher*, 43(5), 501–508. <https://doi.org/10.1080/0142159X.2020.1807483>
- Woods, D. R., Hrymak, A. N., Marshall, R. R., Wood, P. E., Crowe, C. M., Hoffman, T. W., Wright, J. D., Taylor, P. A., Woodhouse, K. A., & Bouchard, C. G. K. (1997). Developing problem solving skills: The McMaster problem solving program. *Journal of Engineering Education*, 86(2), 75–91. <https://doi.org/10.1002/j.2168-9830.1997.tb00270.x>
- World Economic Forum. (2016). *The Future of Jobs Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*.
- Yalçın, V., & Erden. (2021a). The Effect of STEM Activities Prepared According to the Design Thinking Model on Preschool Children's Creativity and Problem-Solving Skills. *Thinking Skills and Creativity*, 41. <https://doi.org/10.1016/j.tsc.2021.100864>

- Yalçın, V., & Erden, Ş. (2021b). The Effect of STEM Activities Prepared According to the Design Thinking Model on Preschool Children's Creativity and Problem-Solving Skills. *Thinking Skills and Creativity*, 41. <https://doi.org/10.1016/j.tsc.2021.100864>
- Yang, C. M. (2018). Applying Design Thinking as a Method for Teaching Packaging Design. *Journal of Education and Learning*. <https://eric.ed.gov/?id=EJ1182736>
- York, R. (2012). Do alternative energy sources displace fossil fuels? *Nature Climate Change*, 2(6), 441–443. <https://doi.org/10.1038/nclimate1451>
- Zebua, D., Kolago, D., Adi, Y., Wijaya, C., Alif, Y., & Utama, K. (2019). Desain dan Pembuatan Pembangkit Listrik Tenaga Air Hujan Menggunakan Piezoelectric Disk. *TECNOSCIENZA*, 4(1).
- Zumdahl, S. S., & Zumdahl, S. A. (2007). *Chemistry*. Houghton Mifflin.

