

DAFTAR PUSTAKA

- Ametller, J. & Pinto, R. (2002). Students reading of innovative images of energy at secondary school level. *Internasional Journal of Science Education*, 24 (3), hlm 85-312.
- Anderson J. R., Kline, P, J. & Beasley, C. M. (1979). A general learning theory and its application to schema abstraction. *The Psychology of Learning and motivation*, 13, hlm. 277-318.
- Anderson L. W., Sensibough, C. A., Osgood, M. P. & Mitchell, S. M. (2011). What really matters; assessing individual problem-solving performance in the context of biological science. *International Journal for the Scholarship of Teaching and Learning*, 5 (1), hlm. 1-20.
- Anderson, J. R. (2015). *Cognitive psychology and its implication*. (edisi kedelapan). United States of America: Worth Publisher.
- Arentze, T. A., Dellaert, C. G. C. & Timmermans, H. J. P. (2008). Modeling and measuring individuals' mental representation of complex spatio-temporal decision problems. *Environment and Behaviour*, 40(6), hlm. 843-869.
- Arikunto, S. (2014). *Prosedur penelitian, suatu pendekatan praktik*. Jakarta: PT Rineka Cipta.
- Arikunto, S. (2009). *Dasar-dasar evaluasi pendidikan*. Jakarta: Bumi Aksara.
- Brito, P. Q. (2011). Teen conceptualization of digital technologies. *New Media & Society*, 14 (3), hlm. 513–532.
- Broers, N. J. (2002). Selection and use of propositional knowledge in statistical problem solving. *Learning and Instruction*, 12 (3), hlm. 323-344.
- Butler, K. M., Arrington, C. M. & Weywadt, C. (2011). Working memory capacity modulates task performance but has little influence on task choice. *Memory & Cognition*, 39 (4), hlm 708-724.
- Campbell, N. A., Race, J. B. & Mitchell, L. G. (2008). *Biologi Jilid III*. (edisi delapan). Jakarta: Erlangga.
- Cheng, M. & Gilbert, J. (2015). Students' visualization of diagrams representing the human circulatory system: the use of spatial isomorphism and representational conventions. *International Journal of Science Education*, 37 (1), hlm. 136-161.

- Cho, H. Y. & Jonassen, D. H. (2012). Learning by self explaining causal diagrams in high-school biology. *Asia Pacific Education Review*, 13 (1), hlm. 171-184.
- Cook, M. P. (2006). Visual representations in science education: The influence of prior knowledge and cognitive load theory on instructional design principles. *Science Education*, 90 (6), hlm. 1073-1091.
- Cook, M. (2011). Teachers' use visual representations in the science classroom. *Science Education International*, 22 (3), hlm. 175-184.
- Creswell, J. W. (2012). *Educational research planning, conducting, and evaluating quantitative and qualitative research*. (edisi keempat). Boston: Pearson Education.
- Cromley, J. G., Sunder-Hogan, L. E. & Luciw-Dubas, U. A. (2010). Cognitive activities in complex science text and diagrams. *Contemporary Educational Psychology*, 35 (1), hlm. 59-74.
- Dahar, R.W. (2011). *Teori-teori belajar & pembelajaran*. Jakarta: Erlangga
- D'aloisi, D. & Castelfranchi, C. (1993). Propositional and terminological knowledge representations. *Journal of Experimental & Theoretical Artificial Intelligence*, 5 (2-3), hlm. 149-166.
- Eppler, M. J. (2006). A comparison between concept maps, mind maps, conceptual diagrams, and visual metaphors as complementary tools for knowledge construction and sharing. *Information Visualization*, 5 (3), hlm. 202-210.
- Garderen, D. V., Scheuermann, A. & Jackson, C. (2012). Examining how students with diverse abilities use diagram to solve mathematics word problems. *Learning Disability Quarterly* 36 (3), hlm.145-160.
- Garderen, D. V & Scheuermann, A. M. (2015). Diagramming word problems: A strategic approach for instruction. *Intervention in School and Clinic*, 50 (5), hlm. 282-290.
- Ganong, W. H. (2008). *Buku ajar fisiologi kedokteran*. (Edisi 22). Jakarta: EGC
- Gilbert, J.K. (2010). The role of visual representations in the learning and teaching in science. *Asia-Pacific Forum on Science Learning and Teaching*, 11 (1), hlm. 1-19.
- Gobert, J. D. & Clement, J. J. (1999). Effects of student-generated diagrams versus student-generated summaries on conceptual understanding of causal

- and dynamic knowledge in plate tectonics. *Journal of Research in Science Teaching*, 36 (1), hlm. 39–53.
- Greene, B. A., Lubin, I. A., Slater, J. L. & Walden, S. E. (2013). Mapping changes in science teachers' content knowledge:concept maps and authentic professional development. *Journals Science Education Technology*, 22 (3), hlm. 287–299
- Hegarty, M. (2011). The cognitive science of visual-spatial displays: implications for design. *Topics in Cognitive Science*, 30 (3), hlm. 446-474.
- Hegarty, M., Stieff, M. & Dixon, B. L. (2013). Cognitive change in mental models with experience in the domain of organic chemistry. *Journal of Cognitive Psychology*, 25 (2), hlm. 220-228.
- Heiser, J. & Tversky, B. (2006). Arrows in comprehending and producing mechanical diagrams. *Cognitive Science*, 30 (3), hlm. 581–592.
- Hoskinson, A. M., Caballero, M. D. & Knight, J. K. (2013). How can we improve problem solving in undergraduate biology? applying lessons from 30 years of physics education research. *CBE—Life Sciences Education*, 12 (2), hlm. 153–161.
- Hurley, S. M. & Novick, L. R. (2010). Solving problems using matrix, network, and hierarchy diagrams: The consequences of violating construction conventions. *The Quarterly Journal of Experimental Psychology*, 63(2), hlm. 275-290.
- Hwang, G., Yang, L & Wang, S. (2013). A concept map-embedded educational computer game for improving students' learning performance in natural science courses. *Computers & Education* 69, hlm. 121-130.
- Hwang, G., Kuo, F., Chen, N. & Ho, H. (2014). Effects of an integrated concept mapping and web-based problem solving approach on students' learning achievements, perceptions and cognitive loads. *Computers & Education* 71, hlm. 77–86.
- Ibrahim, B., & Rebello, N. S. (2013). Role of mental representations in problem solving: Students' approaches to nondirected tasks. *Physical Review Special Topics-Physics Education Research*, 9 (2), hlm. 1-12.
- Ito, S. (2016). Information thermodynamics on causal networks and its application to biochemical signal transduction. *Springer Theses*. Singapore: Springer Singapore.

- Kalyuga, S. (2008). Relative effectiveness of animated and static diagrams: An effect of learner prior knowledge. *Computers in Human Behavior*, 24 (3), hlm. 852-861.
- Kalyuga, S. (2009). Knowledge elaboration: A cognitive load perspective. *Learning and Instruction*, 19(5), hlm. 402-410.
- Kementerian Pendidikan dan Kebudayaan. (2013). *Permendikbud nomor 65 tahun 2013 tentang kompetensi dasar*. Jakarta: Kemedikbud.
- Khan, S., Hafeez, A., & Saeed, M. (2012). The impact of problem solving skill of heads' on students' academic achievement. *Interdisciplinary Journal of Contemporary Research in Business*, 4(1), hlm. 316-321.
- Kirschner, F., Paas, F., Kirschner, P. A., & Janssen, J. (2011). Differential effects of problem-solving demands on individual and collaborative learning outcomes. *Learning and Instruction*, 21(4), hlm. 587-599.
- Koentjaningrat. (1990). *Metode-metode penelitian kemasyarakatan*. Jakarta; Gramedia Pustaka
- Kragten, M., Admiraal, W., & Rijlaarsdam, G. (2014). Students' ability to solve process-diagram problems in secondary Biology education. *Journal of Biological Education*, 49 (1), hlm. 91-103.
- Kragten, M., Admiraal, W., & Rijlaarsdam, G. (2015). Students' learning activities while studying biological process diagrams. *International Journal of Science Education*, 37(12), hlm. 1915-1937.
- Kuswana, W. S. (2011). *Taksonomi berpikir*. Bandung: PT Remaja Rosdakarya.
- Ladue, N. D., Libarkin, J. C. & Thomas, S. R. (2015). Visual representations on high school biology, chemistry, earth science, and physics assesments. *Science Education*, 24 (6). hlm. 818-834.
- Lazarowitz, R. & Penso S. (1992). High school student's difficulties in learning biology concepts. *Journal of Biological Education*, 26 (3), hlm. 215-223.
- Leopold, C. & Leutner, S. (2012). Science text comprehension: Drawing, main idea selection, and summarizing as learning strategies. *Learning and Instruction*, 22 (1), hlm. 16-26.
- Ling, J. & Catling, J. (2012). *Psikologi kognitif*. Jakarta: Erlangga
- Liu, L., & Hmelo- Silver, C. E. (2009). Promoting complex systems learning through the use of conceptual representations in hypermedia. *Journal of Research in Science Teaching*, 46(9), hlm. 1023-1040.

- Liu, C., Hou, I & Treagust, D. F. (2014). An exploration of secondary students' mental states when learning about acids and bases. *Research in Science Education* 44 (1), hlm. 133-154.
- Long, D. L., Baynes, K., & Prat, C. S. (2005). The propositional structure of discourse in the two cerebral hemispheres. *Brain and language*, 95(3), hlm. 383-394.
- Longo, P. J., Anderson O.R. & Wicht, P. (2002). Visual thinking networking promotes problem solving achievement for 9th grade earth science students. *Electronic Journal of Science Education*, 71(1), hlm. 1-51.
- Marzano, R.J., Pickering D. & McTigheJ. (1993). *Assessing student outcomes, performance assessment using the dimension of learning*. Alexandria: Association for Supervision and Curriculum Development.
- Mathai, S., & Ramadas, J. (2009). Visuals and visualisation of human body systems. *International Journal of Science Education*, 31(3), hlm. 439-458.
- Mayer, R. E & Moreno, R. (2003). Nine was to reduce cognitive load in multimedia learning. *Educational Psychologist*, 38 (1), hlm. 43-52.
- McCradden, M. T., Schraw, G., Lehman, S. & Poliquin, A. (2007). The effect of causal diagrams on text learning. *Contemporary Educational Psychology*, 32 (3), hlm. 367–388.
- Melinda, D. A. (2016). *Analisis strategi guru dalam mengembangkan metakognisi siswa dan kemampuan berpikir kritis siswa kelas XI SMA/MA pada pembelajaran konsep sistem koordinasi*. (Tesis). Sekolah Pascasarjana, Universita Pendidikan Indonesia, Bandung.
- Mitchel, C. J., Houwer, J.D & Lovibond, P. F. (2009). The propositional nature of human associative learning, *Behavioral and Brain Science* 32 (2), hlm. 183-246.
- Moreno, R., Ozogul, G., & Reisslein, M. (2011). Teaching with concrete and abstract visual representations: Effects on students' problem solving, problem representations, and learning perceptions. *Journal of Educational Psychology*, 103(1), hlm. 32-47.
- Muhibbudin. (2013). Penerapan Peta Konsep Sebagai Bentuk Asesmen Formatif dalam Meningkatkan Hasil Belajar Mahasiswa Pada Mata Kuliah Struktur dan Perkembangan Tumbuhan. *Jurnal Biologi Edukasi Edisi 11 5* (2), hlm. 85-91.

- Nadkarni, S. & Shenoy, P. P. (2004). A causal mapping approach to constructing bayesian networks'. *Appeared in Decision Support Systems*, 38 (2), pp. 259-281.
- Nguyen, N., Mulia, A., Nelson, A. J. & Wilson, T. D. (2013). Visuospatial anatomical comprehension: The role of spatial visualization ability and problem-solving strategies. *Anatomical Sciences Education*, 7 (4), hlm. 280-288.
- Novick, L. R., & Catley, K. M. (2014). When relationships depicted diagrammatically conflict with prior knowledge: An investigation of students' interpretations of evolutionary trees. *Science Education*, 98 (2), hlm. 269-304.
- Paivio, A. (1990). *Mental representation: a dual coding approach 9th edition*. New York: Oxford University Press, Inc.
- Patrick, M. D., Carter, G. & Wiebe, E. N. (2005). Visual representations of DNA replication: middle grades students' perceptions and interpretations. *Journal of Science Education and Technology*, 14 (3). hlm. 453-463.
- Pearsall, N. R., Skipper, J. E. J. & Mintzes, J. J. (1997). Knowledge restructuring in the life sciences: a longitudinal study of conceptual change in biology. *Science Education*, 81 (2), hlm. 721-733.
- Perini, L. (2005). Explanation in two dimensions: Diagrams and biological explanation. *Biology and Philosophy*, 20(2-3), hlm. 257-269.
- Pinkas, G. (1995). Reasoning, nonmonotonicity and learning in connectionist networks that capture propositional knowledge. *Artificial Intelligence* 77 (2), hlm.203-247.
- Quillin, K & Thomas, S. (2015). Drawing-to-Learn: A Framework for Using Drawings to Promote Model-Based Reasoning in Biology. *CBE-Life Science Education*, 14 (1), hlm. 1-16.
- Rahmat, A., Riandi, Solihat, R., Wuyung, W., Zaputra, R. & Feranoza, S. (2014). Peta kompetensi guru biologi di sma kota bandung berdasarkan analisis kesesuaian proses pembelajaran di kelas dengan tuntutan kompetensi dasar. *Jurnal Pengajaran MIPA*, 19(2), Hlm. 179-187.
- Rahmat, A., Soesilawati, S. A. & Nuraeni, E. (2016). Studi beban kognitif siswa SMA dalam pembelajaran biologi: representasi mental siswa ketika dihadapkan pada diagram isnomorfisme spasial dan representasi konvensi. *Laporan Penelitian Pengukuran Kompetensi*. Bandung: Universitas Pendidikan Indonesia.

- Reed, S. K. (2011). *Kognisi :teori dan aplikasi*. (edisi ketujuh). Jakarta: Penerbit Salemba Humanika.
- Reid, D. J. & Miller, G. J. A. (1980). Pupils' perception of biological pictures and its implications for readability studies of biology textbooks. *Journal of Biological Education*, 14 (1), hlm. 59-69.
- Riduwan. (2013). Skala pengukuran variabel-variabel penelitian. Bandung: Alfabeta.
- Rockstroh, B. & Elbert, T. (2010). Traces of fear in the neural web-magnetoencephalographic responding to arousing pictorial stimuli. *International Journal Of Psychophysiology* 78 (1), hlm. 14–19
- Santrock, J. W. (2011). *Psikologi pendidikan Jilid 3*. (edisi ketiga). Jakarta: Salemba Humanika
- Santrock, J. W. (2014). *Psikologi pendidikan Jilid 1*. (edisi kelima). Jakarta: Salemba Humanika.
- Scherer, R., Greiff, S. & Hautamaki, J. (2015). Exploring the relation between time on task and ability in complex problem solving. *Intelligence*, 48, hlm. 37–50.
- Schnotz, W & Bannert, M. (2003). Construction and interference in learning from multiple representation. *Learning and Instruction*, 13 (2), hlm. 141–156.
- Schonborn, K. J., Anderson, T. R., & Grayson, D. J. (2002). Student difficulties with the interpretation of a textbook diagram of immunoglobulin G (IgG). *Biochemistry and Molecular Biology Education*, 30(2), hlm. 93-97.
- Schwamborn, A., Thillmann, H., Opfermann, M & Leutner, D. (2011). Cognitive load and instructionally supported learning with provided and learner-generated visualizations. *Computer in Human Behaviour* 27(1), hlm. 89-93
- Sima, J. K., Schultheis, H. & Barkowsky, T. (2013). Difference between spatial and visual mental representations. *Frontiers in Psychology*, 4 (240), hlm. 1-15.
- Sherwood, L. (2010). *Fisiologi manusia dari sel ke sistem*. (edisi kedelapan). Jakarta: Penerbit buku kedokteran EGC
- Soewolo. (2005). *Fisiologi manusia*. Malang: UM Press.
- Solaz-Portales, J. J. & Lopez, V. S. (2007). Representations in problem soving in science: directions for practice. *Asia-Pacific on Science Learning and Teaching*, 8 (2), hlm. 1-17.

- Stenberg, R. J. (2008). *Psikologi kognitif*. (edisi keempat). Yogyakarta: Pustaka Pelajar.
- Stylianou, D. A. (2002). On the interaction of visualization and analysis: the negotiation of a visual representation in expert problem solving. *Journal of Mathematical Behavior*, 21(3), hlm. 303–317.
- Sweller, J. (2010). Cognitive load theory: recent theoretical advances. Dalam Plass, J. L., Moreno, R., & Bruken, R. (eds), *Cognitive Load Theory* (hlm 29-47). Cambridge: Cambridge University Press.
- Tsai, M. J., Hou, H. T., Lai, M. L., Liu, W. Y., & Yang, F. Y. (2012). Visual attention for solving multiple-choice science problem: An eye-tracking analysis. *Computers & Education*, 58(1), hlm. 375-385.
- Turns, J., Atman, C. J. & Adams, R. (2000). Concept Maps for Engineering Education: A Cognitively Motivated Tool Supporting Varied Assessment Functions. *Ieee Transactions on Education*, 43 (2), hlm. 164-173.
- Vinisha, K. & Ramadas, J. (2013). Visual representations of the water cycle in science textbooks. *Contemporary Education Dialogue*, 10(1), hlm. 7-36.
- Walker, G.H., Stanton, N.A., Stewart, R., Jenkins, D., Wells, L., Salmon, P. & Baber, C. (2009). Using an integrated methods approach to analyse the emergent properties of military command and control. *Applied Ergonomics* 40 (4), hlm. 636–647.
- Won, M., Yoon H. & Treagust, D. F. (2014). Students' learning strategies with a multiple representations: explanations of the human breathing mechanism. *Science Education*, 98 (5), hlm. 840–866.
- Zahner, D., & Corter, J. E. (2010). The process of probability problem solving: Use of external visual representations. *Mathematical Thinking and Learning*, 12(2), hlm. 177-204.