Move2Learn

New to embodied learning?   Start here for a quick dive!

Clough, S. and Hilverman, C. (2018). *Hand Gestures and How They Help Children Learn*. Published on Frontiers for Young Minds, June 26, 2018. https://kids.frontiersin.org/article/10.3389/frym.2018.00029

Dewar, G. (2019). *The science of gestures: We learn faster when we talk with our hands.* Published on Parenting Science: https://www.parentingscience.com/gestures.html

Manches, A. (2017).*Three Ways Hand Gestures Can Influence How We Learn.* https://vimeo.com/160639180

McNerney, S. (2011). *A Brief Guide to Embodied Cognition: Why You Are Not Your Brain.* Scientific American, Guest Blog, Nov 4, 2011. https://blogs.scientificamerican.com/guest-blog/a-brief-guide-to-embodied-cognition-why-you-are-not-your-brain/#

Schwartz, K. (2015). *Why Kids Need to Move, Touch and Experience to Learn.* MindShift KQED News, March 26, 2015. https://www.kqed.org/mindshift/39684/why-kids-need-to-move-touch-and-experience-to-learn

Publications

Embodied Learning/Embodied Cognition

Abrahamson, D., & Lindgren, R. (2014). *Embodiment and embodied design.* In R. K. Sawyer (Ed.), The Cambridge handbook of the learning sciences (2nd edition). Cambridge, UK: Cambridge University Press. https://edrl.berkeley.edu/publications/abrahamson-d-lindgren-r-2014-embodiment-and-embodied-design/

Abramova, E., Slors, M. (2018). *Mechanistic explanation for enactive sociality.* Phenomenology and the Cognitive Sciences, 18,401–424 (2018). https://doi.org/10.1007/s11097-018-9577-8

Amin, T. et al (2015). *Conceptual Metaphor and Embodied Cognition in Science Learning: Introduction to special issue.* International Journal of Science Education, 37:5-6, 745-758. https://doi.org/10.1080/09500693.2015.1025245

Claxton, G. (2015). *Intelligence in the Flesh: Why Your Mind Needs Your Body Much More Than It Thinks.* Yale University Press, Aug 25, 2015.

Dackermann, T., Fischer, U., Nuerk, H. et al (2017). *Applying embodied cognition: from useful interventions and their theoretical underpinnings to practical applications.* ZDM Mathematics Education 49, 545–557. https://doi.org/10.1007/s11858-017-0850-z

Dargue, N., Sweller, N. (2019). *Learning Stories Through Gesture: Gesture's Effects on Child and Adult Narrative Comprehension*. Educational Psychology Review. Published online 26 August 2019. https://doi.org/10.1007/s10648-019-09505-0

Ghazali-Mohammed, Z. (2017). Literature Review: *An embodied perspective of conceptual understanding of science in the early years.* Please contact Move2Learn to receive a copy.

Ghazali-Mohammed, Z., Manches, A. & Lindgren, R. (2020, Apr 17 – 21) *Video Analysis to Real-Time Observation of Adult-Child Interaction: The Challenge of*

Translation [Poster Session]. AERA Annual Meeting San Francisco, CA http://tinyurl.com/sj3jye2 (Conference Canceled)

Glenberg, A. M., Witt, J. K., & Metcalfe, J. (2013). *From the Revolution to Embodiment: 25 Years of Cognitive Psychology.* Perspectives on Psychological Science, *8*(5), 573–585. https://doi.org/10.1177/1745691613498098

Goldin-Meadow, S. et al (2009). *Gesturing Gives Children New Ideas About Math.* Psychological Science, Vol 30, No. 3, 267-272. https://doi.org/10.1111/j.1467-9280.2009.02297.x

Hostetter, A.B., Alibali, M.W. (2019). *Gesture as simulated action: Revisiting the framework.* Psychonomic Bulletin and Review 26, 721–752. https://doi.org/10.3758/s13423-018-1548-0

Kita, S. et al (2017). *How Do Gestures Influence Thinking and Speaking? The Gesture-for-Conceptualization Hypothesis.* Psychological Review: 2017, Vol 124, No. 3, 245-266. https://psycnet.apa.org/doiLanding?doi=10.1037%2Frev0000059

Kontra, C., et al (2015). *Physical Experience Enhances Science Learning*. Psychological Sciences OnlineFirst, published on April 24, 2015, vol 26, Issue 6, 2015. http://10.1177/0956797615569355

Levy, S. (2013). *Young children's learning of water physics by constructing working systems*. International Journal of Technology and Design Education, **23,** 537–566. https://doi.org/10.1007/s10798-012-9202-z

Lindgren, R., & Johnson-Glenberg, M. (2013). *Emboldened by Embodiment: Six Precepts for Research on Embodied Learning and Mixed Reality*. Educational Researcher, 42(8), 445–452. https://doi.org/10.3102/0013189X13511661

Lindgren, R. W., & Price, S. (2018). *Embodiment and technology enhanced learning environments: Cultivating a new community of design research*. Chapter 12 in Conversations on Embodiment Across Higher Education: Teaching, Practice and Research (pp. 173-189). Taylor and Francis. https://doi.org/10.4324/9781315266664

Manches, A., et al (2020). *From Design to Difference: Increasing impact of IDC Research.* IDC 2020 Extended Abstracts, June 21–24, 2020, London, UK. Published in Journal for Education in Museums, June 2020.

McNeill, D. (1994). *Hand and Mind: What Gestures Reveal About Thought*. Bibliovault OAI Repository, the University of Chicago Press. Vol 27 DO

10.2307/1576015. https://www.researchgate.net/publication/37688404_Hand_and_Mind_What_Gestures_Reveal_About_Thought

McNeill, D. (2005). *Gesture: A Psycholinguistic Approach.* Available at McNeill Lab Center for Gesture and Speech Research, University of Chicago. http://mcneilllab.uchicago.edu/pdfs/gesture.a_psycholinguistic_approach.cambridge.encyclop.pdf

Niebert, K. et al (2012). *Understanding needs embodiment: A theory‑guided reanalysis of the role of metaphors and analogies in understanding science.* Science Education, Vol 96, Issue 5, 849-877.

Novack, M.A., Goldin-Meadow, S. (2017). *Gesture as representational action: A paper about function.* Psychonomic Bulletin Review 24, 652–665. https://doi.org/10.3758/s13423-016-1145-z

Núñez, R. **(2012)** *On the Science of Embodied Cognition in the 2010s: Research Questions, Appropriate Reductionism, and Testable Explanations*, Journal of the Learning Sciences, 21:2, 324-336. https://doi.org/10.1080/10508406.2011.614325

Parrill, F. & Sweetser, E. (2004). *What We Mean by Meaning: Conceptual Integration in Gesture Analysis and Transcription.* Gesture. 4. 197-219. 10.1075/gest.4.2.05par. https://www.researchgate.net/publication/233543972_What_We_Mean_by_Meaning_Conceptual_Integration_in_Gesture_Analysis_and_Transcription

Price, S., Roussos, G. & Sheridan, J. (2009). Technology and embodiment: relationships and implications for knowledge, creativity and communication. Beyond Current Horizons, London Knowledge Lab. https://www.researchgate.net/publication/238600360_Technology_and_embodiment_relationships_and_implications_for_knowledge_creativity_and_communication

Wakefield, E. et al (2018). *Gesture for generalization: gesture facilitates flexible learning of words for actions on objects.* Developmental Science, Volume 21, Issue 5. http://indiana.edu/~canlab/assets/wakefield_et_al-2018-developmental_science.pdf

Zubrowski, B. (2009) *Exploration and Meaning Making in the Learning of Science*, in Innovations in Science Education and Technology, 18, DOI 10.1007/978-90-481-2496-1_5, © Springer Science+Business Media B.V. https://www.springer.com/gp/book/9789048124954

Design-Based Research

Collins, A., et al (2004). *Design Research: Theoretical and Methodological Issues.* Journal of the Learning Sciences, 13:1, 15-42. https://doi.org/10.1207/s15327809jls1301_2

Kelly, A. (2004). *Design Research in Education: Yes, but is it Methodological?* Journal of the Learning Sciences, 13:1, 115-128, http://dx.doi.org/10.1207/s15327809jls1301_6

Penuel, W. et al (2011). *Organizing Research and Development at the Intersection of Learning, Implementation, and Design.* Educational Researcher, 40(7), 331–337. https://doi.org/10.3102/0013189X11421826

Sandoval, W. (2013). *Educational design research in the 21st century.* Chapter 33. Routledge. https://www.researchgate.net/publication/259694116_Educational _design_research_in_the_21st_century

Sandoval, W. **(2014)** *Conjecture Mapping: An Approach to Systematic Educational Design Research*, Journal of the Learning Sciences, 23:1, 18-36. https://doi.org/10.1080/10508406.2013.778204

Science/Children's Museum Environments for Learning

Andanen, E., et al (2017) *Researching the Value of Educator Actions for Learning (REVEAL): A Video-Based Reflection Guide for Engaging with Families at Interactive Exhibits* https://external-wiki.terc.edu/display/Reveal/Educator+Resources

Anderson, D. et al (published online 2010). *Children's Museum Experiences: Identifying Powerful Mediators of Learning.* The Museum Journal, Vol 45, Issue 3, July 2002, 213-231. https://doi.org/10.1111/j.2151-6952.2002.tb00057.x

Andre, L., Durksen, T. & Volman, M.L. (2017) *Museums as avenues of learning for children: a decade of research*. Learning Environ Res 20**,** 47–76. https://doi.org/10.1007/s10984-016-9222-9

Barriault, C. and Pearson, D. (2010). *Assessing Exhibits for Learning in Science Centers: A Practical Tool.* Visitor Studies. 13. 90-106. https://www.researchgate.net/publication/233338902_Assessing_Exhibit s_for_Learning_in_Science_Centers_A_Practical_Tool

Black, G. **(2018)** *Meeting the audience challenge in the 'Age of Participation',* Museum Management and Curatorship, 33:4, 302-319. https://doi.org/10.1080/09647775.2018.1469097

Bron, S. et al (2018). ecsite Online Newsletter SPOKES Vol #38. *Science centres as research facilities, exhibitions as explorations.* https://www.ecsite.eu/activities-and-services/news-and-publications/digital-spokes/issue-38-0#section=section-indepth&href=/feature/depth/science-centres-research-facilities-exhibitions-explorations

Callanan, M. (2012). *Conducting Cognitive Developmental Research in Museums: Theoretical Issues and Practical Considerations*. Journal of Cognition and Development. https://doi.org/10.1080/15248372.2012.666730

Dancu, T.,Gutwill, J. & Sindorf, L. (2015). *Comparing the Visitor Experience at Immersive and Tabletop Exhibits.* Curator: The Museum Journal. 58. 401-422. 10.1111/cura.12137. https://onlinelibrary.wiley.com/doi/abs/10.1111/cura.12137

Dierking, L. and Falk, J. (1994). *Family Behavior and Learning in Informal Science Settings: A Review of the Research.* Science Education 78(1):57-72. https://doi.org/10.1002/sce.3730780104

Hobson, M. and Hauan, N. (2016) *Finding Common Ground between Designers and Museum Practitioners.* ecsite Online Newsletter Spoke, Vol #21. https://www.ecsite.eu/activities-and-services/news-and-publications/digital-spokes/issue-21#section=section-lookout&href=/feature/lookout/finding-common-ground-between-designers-and-museum-practitioners

Kidd, J. and Nieto McAvoy, E. (2019). *Immersive Experiences in Museums, Galleries and Heritage Sites: A review of research findings and issues*. Discussion Paper 2, School of Journalism, Media and Culture, Cardiff University. https://pec.ac.uk/discussion-papers/immersive-experiences-in-museums-galleries-and-heritage-sites-a-review-of-research-findings-and-issues

Leister, W. et al (2016). *Assessing Visitor Engagement in Science Centres and Museums.* International Journal on Advances in Life Sciences, vol 8, 1 & 2. https://www.researchgate.net/publication/305000820_Assessing_Visitor_Engagement_in_Science_Centres_and_Museums

National Research Council. 2009. *Learning Science in Informal Environments: People, Places, and Pursuits*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12190. https://www.nap.edu/catalog/12190/learning-science-in-informal-environments-people-places-and-pursuits

Piscitella, B. and Anderson, D. (2001). *Young Children's Perspectives of Museum Settings and Experiences*. Museum Management and Curatorship, September 2001. DOI: 10.1016/S0260-4779(01)00018-8

Povis, K. and Crowley, K. (2015). *Family Learning in Object-Based Museums: The Role of Joint Attention.* Visitor Studies, 18:2, 168-182. https://www.researchgate.net/publication/283780236_Family_Learning_in_Object-Based_Museums_The_Role_of_Joint_Attention

Sobel, D. and Jipson, J, editors (2016). Cognitive Development in Museum Settings: Relating Research and Practice. Routledge, New York, NY. https://www.routledge.com/Cognitive-Development-in-Museum-Settings-Relating-Research-and-Practice/Sobel-Jipson/p/book/9781848724891

Swartz, M. and Crowley, K. (2004). *Parent Beliefs about Teaching and Learning in a Children's Museum*, Visitor Studies Today, Summer 2004, Volume VII, IssueII http://upclose.pitt.edu/articles/2004%20Swartz%20&%20Crowley%20Visitor%20Studies.pdf

Van Schijndel, T. et al (2010). *The Exploratory Behavior Scale: Assessing Young Visitors'Hands-On Behavior in Science Museums.* Science Education, Vol 94, Issue 5, September 2010, 794-809. https://onlinelibrary.wiley.com/doi/full/10.1002/sce.20394

Early Learning

Deans for Impact (2019). *The Science of Early Learning*. Austin, TX: Deans for Impact. https://deansforimpact.org/resources/the-science-of-early-learning/

Fleer. M. and Ridgway, A. (eds.), *Visual Methodologies and Digital Tools for Researching with Young Children*, International Perspectives on Early Childhood Education and Development 10. https://link.springer.com/chapter/10.1007/978-3-319-01469-2_1

Gopnik, A. (2012). *Scientific Thinking in Young Children: Theoretical Advances, Empirical Research, and Policy Implications*. Science 337, 1623. https://science.sciencemag.org/content/337/6102/1623.abstract

Howard-Jones, P. (2018). *Evolution of the Learning Brain: Or How You Got To Be So Smart.* Routledge. https://doi.org/10.4324/9781315150857

Laevers, F. (2005). *Deep-level-learning and the Experiential Approach in Early Childhood and Primary Education*, Katholieke Universiteit Leuven Research Centre for Early Childhood and Primary Education.

Malvilidi, M. et al (2018). *Immediate and delayed effects of integrating physical activity into preschool children's learning of numeracy skills.* Journal of Experimental Child Psychology 166 (2018) 502-519. https://doi.org/10.1016/j.jecp.2017.09.009

McClure, E. R. (2017). *STEM starts early: Grounding science, technology, engineering, and math education in early childhood*. New York: The Joan Ganz Cooney Center at Sesame Workshop. A full-text PDF of this report is available as a free download from: http://www.joanganzcooneycenter.org

Shwe Hadani, H, Lead Researcher and Co-author, Rood, E., Editor and Co-author (2018). *The Roots of STEM Success: Changing Early Learning Experiences to Build Lifelong Thinking Skills*, Center for Childhood Creativity. http://www.informalscience.org/news-views/roots-stem-success

Silander, M., et al (2018) *What Parents Talk About When They Talk About Learning: A National Survey About Young Children and Science*. New York, NY, & Menlo Park, CA: Education Development Center, Inc., & SRI International. https://www.edc.org/sites/default/files/uploads/EDC_SRI_What_Parents_Talk_About.pdf

Sinatra, G., Heddy, B. and Lombardi, D. (2015) *The Challenges of Defining and Measuring Student Engagement in Science.* Educational Psychologist, 50:1, 1-13. https://doi.org/10.1080/00461520.2014.1002924

Weinstein, Y., Sumeracki, M. and Caviglioli, O. (2018). *Understanding How We Learn: A Visual Guide*.
Routledge. https://www.routledge.com/Understanding-How-We-Learn-A-Visual-Guide-1st-Edition/Weinstein-Sumeracki-Caviglioli/p/book/9781138561724

Videos

Lakoff, G. (2015). *How Brains Think: The Embodiment Hypothesis.* Keynote address recorded March 14, 2015 at the inaugural International Convention of Psychological Science in
Amsterdam https://www.youtube.com/watch?v=WuUnMCq-ARQ

Lakoff, G. (2013). Presentation by Cognitive Science and Linguistics Professor at UC Berkeley: *Cascade Theory: Embodied Cognition and Language from a Neural Perspective* at the Central European University on October 22, 2013. https://www.youtube.com/watch?v=XWYaoAoijdQ

Penuel, W., et al. (2016). *Design-Based Research Implementation*. http://learndbir.org/

On the Web

Bailenson, J. (2017). V*irtual reality offers a captivating way to learn—in the classroom and beyond.* Interview on School's In radio program, Stanford University Graduate School of Education, April 16, 2017. https://ed.stanford.edu/news/virtual-reality-offers-captivating-way-learn-classroom-and-beyond

Beaumont, L. (2015). The *Adult Child Interaction Inventory: A tool for exhibit development and evaluation.* Evergreene Research and Evaluation. http://evergreeneresearch.com/index#/acii

Blanquet, E., Stylinaidou, F. and du Preez, H, guest editors (2018). *Special Issue: STEM & Early Childhood Education*, European Journal of STEM Education: 2018, Volume 3, Issue 3. http://www.lectitopublishing.nl/european-journal-of-stem-education/volume-3/issue-3

Goldhill, O. (2019). *The replication crisis is killing psychologists' theory of how the body influences the mind.* Quartz, January 16, 2019.   https://qz.com/1525854/

Gutwill, J. and Dancstep, T (2019). *How Do Children Engage with STEM Museum Exhibits? Results from a Large Observational Study. Posted online at https://www.informalscience.org/news-views/how-do-children-engage-stem-museum-exhibits-results-large-observational-study*

Hadani, H., ed. (2017). *Attention, please!: Optimizing children's learning in museums.* Creativity Trend Report. Vol 2: Spring 2017, 6-7. http://centerforchildhoodcreativity.org/wp-content/uploads/sites/2/2016/03/CCC-Trend-Report-2-single-page-14.pdf

Hadani, H., and Rood, E., editor (2018). *The Roots of STEM Success: Changing Early Learning Experiences to Build Lifelong Thinking Skills.* Center for Childhood Creativity. https://centerforchildhoodcreativity.org/roots-stem-success/

Munley, M. (2012). *Early Learning in Museums: A Review of Literature.* Prepared for the Smithsonian Institution's Early Learning

Collaborative NetworkandSmithsonian Early Enrichment Center (SEEC). Available online at https://www.si.edu/seec/resources

Wallis, C. (2017). *How Seeing and Using Gestures Make Ideas More Memorable.* The Hechinger Report, Oct 25, 2017 https://www.kqed.org/mindshift/49541/how-seeing-and-using-gestures-make-ideas-more-memorable