



Network for Information and Digital Access

The impact of Science Literacy delivery methods - what works?

Bibliography

Multimodality | Group 6. Multiliteracies/Multimodalities

Ver. 2.00

Date: May 2019

Introduction

This thematic bibliography is the result of research to survey existing literature available on Science Literacy delivery methods.

The search was carried out by retrieving documents and articles from a wide range of sources, including research databases, Google Scholar, ResearchGate, subject databases, open access repositories etc. using keyword combinations.

The results of the resource discovery are divided into two groups: one containing impact assessments using qualitative, quantitative or mixed method (both qualitative and quantitative) approaches to data collection and a second including descriptive resources, which encompass, for example, reviews, guides, handbooks, reports and project reports.

This bibliography is work in progress and is not designed to be fully exhaustive or complete. We will be pleased to receive suggestions and recommendations for additions that can contribute to the understanding of science, its applications and, to the promotion of science literacy.

Groups and methods list

During the first part of the Desk Research phase of this project (i.e. Task 1), the team identified 42 single-mechanism approaches, 2 composite approaches and 1 related approach that were relevant to the delivery and dissemination of scientific information. The list of single mechanisms was further organised into 7 thematic groups, as presented in the following Table.

Single mechanism approach	Group
Exhibitions, Expo, Festivals, Movies, Picnics, Science fairs, Seminars, Talks, TED Talks, Theatre, Workshops	1. Events, meetings, performances
Colloquia, Courses, Curricula, E-learning, Webinars	2. Education and training – including online
Animations, Books, Brochures, Cartoons, Comics, Games, Graphics, Posters, Publications, Radio, Reports, TV, Videos	3. Traditional publishing and journalism – print and broadcast
Competitions, Experiments, Makerspaces, Mobile classrooms, Mobile laboratories	4. Activities and services
Blogs, E-books, E-zines, Mobile Apps, Podcasts, Social media, Websites, Wikis	5. Online interactions
Composite approaches	
Multiliteracies	
Multimodalities	
Related approach	
Citizen Science	

Attribution 4.0 International (CC BY 4.0)

Impact Assessment

- Anastopoulou, Stamatina, Mike Sharples, and Chris Baber. 2011. "An Evaluation of Multimodal Interactions with Technology While Learning Science Concepts." *British Journal of Educational Technology* 42 (2): 266–90. <https://doi.org/10.1111/j.1467-8535.2009.01017.x>.
- Bennett, William Drew. 2011. "Multimodal Representation Contributes to the Complex Development of Science Literacy in a College Biology Class." PhD thesis, Iowa City, Iowa, USA: University of Iowa. <https://doi.org/10.17077/etd.dhati9dz>.
- Cho, Hye Sook, and Jeonghee Nam. 2017. "Analysis of Students Use of Multimodal Representations in a Science Formative Assessment (Assessing Pupils' Progress, APP) Task in the UK." *Journal of the Korean Chemical Society* 61 (4): 211–17. <http://dx.doi.org/10.5012/jkcs.2017.61.4.211>.
- Gelmez Burakgazi, Sevinc, Ali Yildirim, and Noah Weeth Feinstein. 2016. "Communicating Science to Impact Learning? A Phenomenological Inquiry into 4th and 5th Graders' Perceptions of Science Information Sources." *Journal of Science Education and Technology* 25 (2): 244–62. <https://doi.org/10.1007/s10956-015-9590-4>.
- Gillies, Robyn M., and Bernard Baffour. 2017. "The Effects of Teacher-Introduced Multimodal Representations and Discourse on Students' Task Engagement and Scientific Language during Cooperative, Inquiry-Based Science." *Instructional Science* 45 (4): 493–513. <https://doi.org/10.1007/s11251-017-9414-4>.
- Gunel, Murat, Sevgi Kingir, and Nurdane Aydemir. 2016. "The Effect of Embedding Multimodal Representation in Non-Traditional Writing Task on Students' Learning in Electrochemistry." In *Using Multimodal Representations to Support Learning in the Science Classroom*, edited by Brian Hand, Mark McDermott, and Vaughan Prain, 59–75. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-16450-2_4.
- Hand, Brian, Mark McDermott, and Vaughan Prain, eds. 2016. *Using Multimodal Representations to Support Learning in the Science Classroom*. Cham: Springer International Publishing. <https://doi.org/10.1007/978-3-319-16450-2>.
- Jackson-Howard, Cynthia Darlene. 2015. "Teachers' Perceptions of Multimodal Literacies in Middle School Health Literacy Programs." PhD thesis, Minnesota, USA: Walden University. <https://scholarworks.waldenu.edu/dissertations/322>.
- Kim, Mi Song. 2017. "Multimodal Modeling Activities with Special Needs Students in an Informal Learning Context: Vygotsky Revisited." *Eurasia Journal of Mathematics, Science and Technology Education* 13 (6): 2133–54. <https://doi.org/10.12973/eurasia.2017.01218a>.
- Murcia, Karen. 2014. "Interactive and Multimodal Pedagogy: A Case Study of How Teachers and Students Use Interactive Whiteboard Technology in Primary Science." *Australian Journal of Education* 58 (1): 74–88. <https://doi.org/10.1177/0004944113517834>.
- Nam, Jeonghee, and Hyesook Cho. 2016. "Examining the Impact of Multimodal Representation Instruction on Students' Learning of Science." In *Using Multimodal Representations to Support Learning in the Science Classroom*, edited by Brian Hand, Mark McDermott, and Vaughan Prain, 117–33. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-16450-2_7.
- Nixon, Ryan. 2012. "Explicitly Teaching Multiple Modes of Representation in Science Discourse: The Impact on Middle School Science Student Learning." Master's thesis, Provo, Utah, USA: Brigham Young University - Provo. <https://scholarsarchive.byu.edu/etd/3582>.
- Tolppanen, Sakari, Toni Rantaniitty, and Maija Aksela. 2016. "Effectiveness of a Lesson on Multimodal Writing." In *Using Multimodal Representations to Support Learning in the Science Classroom*, edited by Brian Hand, Mark McDermott, and Vaughan Prain, 39–57. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-16450-2_3.

- Townsend, Dianna, Cynthia Brock, and Jennifer D. Morrison. 2018. "Engaging in Vocabulary Learning in Science: The Promise of Multimodal Instruction." *International Journal of Science Education* 40 (3): 328–47. <https://doi.org/10.1080/09500693.2017.1420267>.
- Walsh, Maureen. 2010. "Multimodal Literacy: What Does It Mean for Classroom Practice?" *The Australian Journal of Language and Literacy* 33 (3): 211–39. <http://search.informit.com.au/documentSummary;dn=413764741373610;res=IELHSS>.
- Zhang, Ying. 2016. "Multimodal Teacher Input and Science Learning in a Middle School Sheltered Classroom." *Journal of Research in Science Teaching* 53 (1): 7–30. <https://doi.org/10.1002/tea.21295>.

Descriptive Resources

- Alvermann, Donna E., and Amy Alexandra Wilson. 2011. "Comprehension Strategy Instruction for Multimodal Texts in Science." *Theory Into Practice* 50 (2): 116–24. <https://doi.org/10.1080/00405841.2011.558436>.
- Andrade, Alejandro. 2017. "Understanding Student Learning Trajectories Using Multimodal Learning Analytics within an Embodied-Interaction Learning Environment." In *Proceedings of the Seventh International Learning Analytics & Knowledge Conference on - LAK '17*, 70–79. Vancouver, British Columbia, Canada: ACM Press. <https://doi.org/10.1145/3027385.3027429>.
- Arroio, Agnaldo, and D de Souza. 2012. "Multimodality in Natural Science Education." *Problems of Education in the 21st Century* 44: 5–9. <http://oaji.net/articles/2014/457-1413726454.pdf>.
- Bensen, Elizabeth. 2015. "Multimodal Composing Across Disciplines: Examining Community College Professors' Perceptions of Twenty-First Century Literacy Practices." PhD thesis, Norfolk, Virginia, USA: Old Dominion University. <https://doi.org/10.25777/r8g9-0377>.
- Bucher, Hans-Juergen, and Philipp Niemann. 2012. "Visualizing Science: The Reception of Powerpoint Presentations." *Visual Communication* 11 (3): 283–306. <https://doi.org/10.1177/1470357212446409>.
- Buchholz, Beth A., and Damiana Gibbons Pyles. 2018. "Scientific Literacy in the Wild: Using Multimodal Texts in and out of School." *Reading Teacher* 72 (1): 61–70. <https://doi.org/10.1002/trtr.1678>.
- Cárcamo, Melisa Millaray Acuña, Romina Amanda Concha Cartes, Ninoska Ester Estrada Velásquez, and Claudio Heraldo Díaz Larenas. 2016. "The Impact of Multimodal Instruction on the Acquisition of Vocabulary." *Trabalhos Em Linguística Aplicada* 55 (1): 129–54. <https://doi.org/10.1590/010318134842170942>.
- Chandler, Paul D. 2017. "To What Extent Are Teachers Well Prepared to Teach Multimodal Authoring?" Edited by Mark Boylan. *Cogent Education* 4 (1): 1–19. <https://doi.org/10.1080/2331186X.2016.1266820>.
- Connors, Sean P. 2013. "Weaving Multimodal Meaning in a Graphic Novel Reading Group." *Visual Communication* 12 (1): 27–53. <https://doi.org/10.1177/1470357212462812>.
- Cook, Mike P., and Jeffrey S.J. Kirchoff. 2017. "Teaching Multimodal Literacy Through Reading and Writing Graphic Novels." *Language and Literacy* 19 (4): 76. <https://doi.org/10.20360/G2P38R>.
- Danielsson, Kristina, and Staffan Selander. 2016. "Reading Multimodal Texts for Learning – a Model for Cultivating Multimodal Literacy." *Designs for Learning* 8 (1): 25–36. <https://doi.org/10.16993/dfl.72>.
- Duffy, Damien, and Allison N. Clark. 2008. "OurComixGrid: Designing a Multimodal New Media Learning Environment." *Proceedings of the 6th International Conference on Networked Learning*, 7. http://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2008/abstracts/PDFs/Duffy_591-597.pdf.

- Ferguson, Ralph Black. 2015. "Multimodal Literacy as a Form of Communication." Bachelor thesis, Falun, Sweden: Dalarna University. <http://www.diva-portal.org/smash/get/diva2:787468/FULLTEXT01.pdf>.
- Hines, Samantha. 2014. "Multimodal Literacy and Why It Matters: A Brief Overview." *Against the Grain* 26 (4): 2. <https://doi.org/10.7771/2380-176X.6902>.
- Jacobs, Dale. 2014. "Webcomics, Multimodality, and Information Literacy." *ImageTxT* 7 (3). http://imagetext.english.ufl.edu/archives/v7_3/jacobs/.
- Jewitt, Carey. 2003. "A Multimodal Framework for Computer Mediated Learning : The Reshaping of Curriculum Knowledge and Learning." PhD thesis, UK: Institute of Education, University of London. <http://discovery.ucl.ac.uk/10006654/>.
- . 2005. "Multimodality, 'Reading' and 'Writing' for the 21st Century." *Discourse: Studies in the Cultural Politics of Education* 26 (3): 315–32. <http://discovery.ucl.ac.uk/10000865/>.
- . 2008. "Multimodality and Literacy in School Classrooms." *Review of Research in Education* 32 (1): 241–67. <https://doi.org/10.3102/0091732X07310586>.
- Karchmer-Klein, Rachel, and Valerie Harlow Shinas. 2012. "21st Century Literacies in Teacher Education: Investigating Multimodal Texts in the Context of an Online Graduate-Level Literacy and Technology Course." *Research in the Schools* 19 (1): 60–74. <https://eric.ed.gov/?id=EJ991528>.
- Kress, Gunther. n.d. "Kress on Multimodality in the Science Classroom | Chapter 10: Making Spatial, Tactile, and Gestural Meanings | Γραμματισμοί | Neamathisi." Accessed December 1, 2018. <http://neamathisi.com/literacies/chapter-10-making-spatial-tactile-and-gestural-meanings/kress-on-multimodality-in-the-science-classroom>.
- Lim, Sun Sun, Elmie Nekmat, and Siti Nurharnarni Nahar. 2011. "The Implications of Multimodality for Media Literacy." In . Routledge. <http://scholarbank.nus.sg/handle/10635/99061?mode=full>.
- Lindell, Tiina, Stefan Hrastinski, and Inga-Britt Skogh. 2015. "Exploring Students' Multimodal Mobile Use as Support for School Assignments." In *2015 ASEE Annual Conference and Exposition Proceedings*, 26.733.1-26.733.14. Seattle, Washington: ASEE Conferences. <https://doi.org/10.18260/p.24070>.
- Liu, Yu. 2011. "Scientific Literacy in Secondary School Chemistry: A Multimodal Perspective." PhD thesis, University of Singapore. <http://scholarbank.nus.edu.sg/handle/10635/31637>.
- Loerts, Terry, and Rachel Heydon. 2017. "Multimodal Literacy Learning Opportunities within a Grade Six Classroom Literacy Curriculum: Constraints and Enablers." *Education 3-13* 45 (4): 490–503. <https://doi.org/10.1080/03004279.2016.1139608>.
- Ludovico, Luca Andrea, Domenico Morreale, and Tatiana Mazali. 2016. "Towards Multimodal Content Fruition in On-Line Scientific Journals: The Case of DigitCult." *DigitCult | Scientific Journal on Digital Cultures*, no. 1.3 (December): 1–10. <https://doi.org/10.4399/97888548993911>.
- McDermott, Mark. 2010. "Using Multimodal Writing Tasks in Science Classrooms." *The Science Teacher*, 32–37. <https://pdfs.semanticscholar.org/9b36/e96bd1667ba22699ad0d2b470c7e5ec126ae.pdf>.
- Meng Ms., Xing. 2016. "A Pedagogy of Multiliteracies into Practice: A Case Study in One Grade One Literacy Classroom." Master's thesis, Ontario, Canada: The University of Western. <https://ir.lib.uwo.ca/etd/3846>.
- Neville, Mary. 2006. "Teaching Multimodal Literacy Using the Learning by Design Approach to Pedagogy." Master's thesis, Australia: Royal Melbourne Institute of Technology (RMIT). <https://researchbank.rmit.edu.au/view/rmit:6283>.

- Nichols, Kim, and Geraint Barton. 2018. "Transforming Knowledge and Learning through Technologies and Modalities: Mapping Patterns of Practice in New Life Science Classrooms Transforming Knowledge and Learning through Technologies and Modalities: Mapping Patterns of Practice in New Life Science Classrooms." In , 11. Brisbane, Australia.
https://www.researchgate.net/publication/267703027_Transforming_knowledge_and_learning_through_technologies_and_modalities_Mapping_Patterns_of_Practice_in_New_Life_Science_Classrooms_Transforming_knowledge_and_learning_through_technologies_and_modalit.
- Nouri, Jalal. 2018. "Students Multimodal Literacy and Design of Learning During Self-Studies in Higher Education." *Technology, Knowledge and Learning*, April, 1–16. <https://doi.org/10.1007/s10758-018-9360-5>.
- Pandian, Ambigapathy, and Shanthi Balraj. 2010. "Driving the Agenda of Learning by Design in Science Literacy in Malaysia." *E-Learning and Digital Media* 7 (3): 301–16.
<https://doi.org/10.2304/elea.2010.7.3.301>.
- Paziuk, Greg. 2013. "Communicating with Multimodalities and Multiliteracies." *Teaching Innovation Projects* 3 (1): 10. <https://ir.lib.uwo.ca/tips/vol3/iss1/10>.
- Pereira, Iris Susana Pires, Altina Ramos, and Jackie Marsh. 2016. "The Digital Literacy and Multimodal Practices of Young Children: Engaging with Emergent Research: Proceedings of the First Training School of COST Action IS1410, University of Minho, Braga, Portugal, 6th-8th June, 2016." In *Proceedings of the First Training School of COST Action IS1410*, 1–247. University of Minho, Braga, Portugal,. https://www.sheffield.ac.uk/polopoly_fs/1.660127!/file/1st_TrainingSchool.pdf.
- Rowell, Jennifer, and Maureen Walsh. 2011. "Rethinking Literacy Education in New Times: Multimodality, Multiliteracies, & New Literacies." *Brock Education Journal* 21 (1): 53–62.
<https://doi.org/10.26522/brocked.v21i1.236>.
- Sanchez, Suana, Heng Gu, Kai Kunze, and Masahiko Inami. 2015. "Multimodal Literacy: Storytelling Across Senses." In *Adjunct Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers*, 1257–1260. UbiComp/ISWC'15 Adjunct. New York, NY, USA: ACM.
<https://doi.org/10.1145/2800835.2807940>.
- Sanders, Jennifer, and Peggy Albers. 2010. "Multimodal Literacies: An Introduction." *Literacies, the Arts, and Multimodality* 3: 1–25.
https://secure.ncte.org/library/NCTEfiles/Resources/Books/Sample/32142Intro_x.pdf.
- Sankey, M., D. Birch, and M. Gardiner. 2010. "Engaging Students through Multimodal Learning Environments: The Journey Continues." In *Proceedings of the 27th Australasian Society for Computers in Learning in Tertiary Education*, 852–63. University of Queensland.
<http://research.usc.edu.au/vital/access/manager/Repository/usc:7026>.
- Sarsar, Nasreddine. 2008. "Adopting a Multimodal Approach to Address the Multiliteracy Needs of My Students." <https://files.eric.ed.gov/fulltext/ED501748.pdf>.
- Stephens, Sally. 2012. "From Collection to Connection: Teaching and Learning Science in an Interactive Multimodal Learning Environment." *Brisbane Girls Grammar School* (blog). May 3, 2012.
<https://www.bggs.qld.edu.au/2012/05/from-collection-to-connection-teaching-and-learning-science-in-an-interactive-multimodal-learning-environment/>.
- Suflita, Natalie. 2012. "Multimodality in the Science Classroom: A Focus on Multimedia Representations and How Students Learn." Master's thesis, USA: The College at Brockport: State University of New York.
https://digitalcommons.brockport.edu/ehd_theses/140.

- Svärdemo Åberg, Eva, and Anna Åkerfeldt. 2017. "Design and Recognition of Multimodal Texts: Selection of Digital Tools and Modes on the Basis of Social and Material Premises?" *Journal of Computers in Education* 4 (3): 283–306. <https://doi.org/10.1007/s40692-017-0088-3>.
- Tang, Kok-Sing. 2016. "How Is Disciplinary Literacy Addressed in the Science Classrooms? A Singaporean Case Study." *Australian Journal of Language and Literacy* 39 (3): 220–32. <https://espace.curtin.edu.au/handle/20.500.11937/17128>.
- Tang, Kok-Sing, Caroline Ho, and Gde Buana Sandila Putra. 2016. "Developing Multimodal Communication Competencies: A Case of Disciplinary Literacy Focus in Singapore." In *Using Multimodal Representations to Support Learning in the Science Classroom*, edited by Brian Hand, Mark McDermott, and Vaughan Prain, 135–58. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-16450-2_8.
- Unsworth, Leonard Charles, and Eveline Chan. 2009. "Bridging Multimodal Literacies and National Assessment Programs in Literacy." *Australian Journal of Language and Literacy*, 245–57. https://researchbank.acu.edu.au/fea_pub/3118.
- Van Rooy, Wilhelmina Sabina, and Eveline Chan. 2017. "Multimodal Representations in Senior Biology Assessments: A Case Study of NSW Australia." *International Journal of Science and Mathematics Education* 15 (7): 1237–56. <https://doi.org/10.1007/s10763-016-9741-y>.
- Wilson, Amy Alexandra. 2008. "Moving beyond the Page in Content Area Literacy: Comprehension Instruction for Multimodal Texts in Science." *Reading Teacher* 62 (2): 153–56. <https://doi.org/10.1598/RT.62.2.7>.