CURRICULUM VITAE

KIRSTEN R. BUTCHER

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EDUCATION

Ph.D., Cognitive Psychology & Cognitive Science   1999 - 2003
University of Colorado at Boulder
  Department of Psychology and Institute of Cognitive Science
  Advisor: Walter Kintsch

M.A., Cognitive Psychology   1997 - 1999
University of Colorado at Boulder
  Department of Psychology and Institute of Cognitive Science
  Advisor: Walter Kintsch

B.A., Psychology, *summa cum laude*   1993 - 1997
Whitman College, Walla Walla, Washington

ACADEMIC POSITIONS

Associate Dean of Faculty and Student Affairs, College of Education   2023 - present

Professor, Department of Educational Psychology, University of Utah   2023 - present
  Programs: Instructional Design & Educational Technology, Learning Sciences

Associate Professor, Department of Educational Psychology, University of Utah   2014 - 2022
  Programs: Instructional Design & Educational Technology, Learning Sciences

Director, Instructional Design and Educational Technology (IDET) Program   2014 - present
  Department of Educational Psychology, College of Education, University of Utah

Director, Center for the Advancement of Technology in Education (CATE)   2012 - present
  College of Education, University of Utah

Assistant Professor, Department of Educational Psychology, University of Utah   2008 - 2014
  Programs: Instructional Design & Educational Technology, Learning Sciences

Postdoctoral Research Fellow, Learning & Cognition/Educational Technology   2005-2008
University of Pittsburgh
  Learning Research & Development Center (LRDC); Pittsburgh Science of Learning
  Center. Mentors: Michelene T.H. Chi (University of Pittsburgh), Vincent Aleven
  (Carnegie Mellon)

Postdoctoral Fellow, Science Visualization and Digital Library Research   2003 - 2005
University Corporation for Atmospheric Research (UCAR)
& the National Center for Atmospheric Research (NCAR)
  Digital Library for Earth Systems Education (UCAR) & Visualization and Enabling
  Technologies Section (NCAR). Mentors: Mary Marlino, Tamara Sumner (CU
  Boulder), Don Middleton, Tim Scheitlin

INDUSTRY EXPERIENCE

Human Factors and User Experience Researcher, Lextant Corporation, Boulder, CO.	2001
Design and Usability Group: Researcher, US West Advanced Technologies, Boulder, CO.	2000

RESEARCH INTERESTS

Comprehension and Learning with Multimedia and Instructional Technology

Design, Development, and Assessment of Interactive Learning Systems

High-Level Cognitive Processes: inference, integration, mental model development

Human Computer Interaction, User Experience Design, and Usability

GRANTS

FUNDED GRANTS: NATIONAL FUNDING AGENCIES/CENTERS

PI: Kirsten Butcher, co-PIs: Mitchell Power and Madlyn Runburg. *National Science Foundation: Discovery Research PreK-12 (DRK-12).* EPIC Bioscience: A Practice-Based Online Learning Environment for Scientific Inquiry with Digitized Museum Collections in Middle School Classrooms. DRL #1812844. **$1,313,939**.
2018-2023

PI: David Johnson, Co-PI: **Kirsten R. Butcher.** *NSF IIS: Cyberlearning: Transforming Education.* Award #IIS-1217301. EXP: Deepening Conceptual Understanding with Hands-on, Augmented-Reality Experimentation. **$524,051.**
2012-2016

PI: **Kirsten R. Butcher**. *NSF DUE: National STEM Education Distributed Learning (NSDL).* Award # DUE-1043717. Collaborative Project: Understanding Impact: A Scaling and Replication Study of the Curriculum Customization Service. **$47,001.**
2010-2012

PI: **Kirsten R. Butcher**. Co-PIs: Anne Cook, Robert Zheng. *NSF DUE: National STEM Education Distributed Learning (NSDL).* Award # DUE-0938041. Is there an educational advantage to NSDL? Assessing impact on cognitive processes and learning outcomes during resource selection and use. **$328,905.**
2009-2013

PI: **Kirsten R. Butcher**. *NSF DRL, Research and Evaluation on Education in Science and Engineering (REESE).* Award # DRL-0835454. Collaborative Research: Enabling Robust Learning with Conceptual Personalization Technologies. **$145,558.**
2009-2014

PI: Vincent Aleven, Co-PIs: Ryan Baker, **Kirsten Butcher**, Hao Cen, Ron Salden. *Pittsburgh Science of Learning Center (NSF SBE-0354420):* Geometry greatest hits: Optimizing student learning through synergistic techniques. **$101, 861**. (University of Utah portion: $33,538).
2009 - 2010

PI: **Kirsten Butcher**, Co-PI: Vincent Aleven. *Pittsburgh Science of Learning Center (NSF SBE-0354420):* Visual feature focus in geometry: Instructional support for visual coordination during learning. **$133,553**.
2007 - 2008

PI: Tamara Sumner, Co-PIs: James Martin, Mary Marlino, **Kirsten Butcher**. *NSF IIS, Advanced Learning Technologies.* Award # IIS-0537194: Supporting Science Understanding through a Customized Learning Service for Concept Knowledge. **$504,815**.
2005 - 2008

PI: Mary Marlino, Co-PI: **Kirsten Butcher**. *NSF IIS, Information Integration.* Award # IIS-0534515: Collaborative Research: Developing a Computational Model of "Quality" for Educational Digital Libraries. **$144,811**.
2006 - 2008

PI: Vincent Aleven, Co-PI: **Kirsten Butcher**. *Pittsburgh Science of Learning Center (NSF SBE-0354420):* Robust learning in visual/verbal problem solving: Contiguity, integrated hints, and elaborated explanations. **$294,304**.	2005 - 2007

FUNDED GRANTS: FOUNDATIONS

PI**: Kirsten Butcher.** eScience Workspace (technology-supported physical science and engineering instruction). Castle Foundation. **$4,500**	2016
College of Education lead: Kirsten R. Butcher. Collaborative work with the Natural History Museum of Utah. *Advancing Critical Thinking: Developing an Innovative Approach to Enhancing Critical Thinking Skills in Young People.* Funding: Joseph and Evelyn Rosenblatt Charitable Fund and the IJ and Jeanné Wagner Foundation. Approximate subcontract funding to date: $109,577.	2013 - 2018

FUNDED GRANTS: STATE AND UNIVERSITY

PI: Seung-He (Claire) Son, Co-PI Kirsten Butcher. Preschooler's multimedia learning of STEM vocabulary and concept knowledge. *Learnt Grant, University of Utah College of Education.* **$12,000.**	2021
PI: **Kirsten Butcher**, Co-PI Anne Cook. Online, on-demand, and on a budget: Using micro-credentials to expand outreach and create education pathways. *University of Utah Dean's Initiative to Realize a Post-Pandemic College of Education.* **$10,000.**	2021
PI: **Kirsten Butcher**. *University of Utah, College of Education Faculty Research Incentive Seed Grant.* Personalized STEM Learning with Virtual Reality and 3D Prints. **$9,977.**	2019
PI: Robert Zheng, Co-PIs: **Kirsten Butcher**, Paul Gore, A.J. Metz. *Utah System of Higher Education (USHE).* Evaluation of UtahFutures.org. **$50,000.**	2011
PI: **Kirsten R. Butcher**, Co-PI: Robert Zheng. *University of Utah, College of Education Proposal Development Grants.* Using Interactive Multimedia to Develop Robust Scientific Thinking Skills. **$3,875.**	2011
PI: **Kirsten R. Butcher**. *University of Utah, University Research Council.* Learning with Interactive Educational Technology: New Methods for Self-Explanation? **$5,950.**	2009 - 2010
Subcontracts	
Researcher: **Kirsten Butcher.** *Subcontract to Arizona State University.* Title: Learning with Visualizations: Engineering Education. **$67,276.**	2010 - 2012
Researcher: **Kirsten Butcher.** *Subcontract to Cornell University.* Title: Preserving and Enhancing NSF's Investment in NSDL. **$49,999.**	2010 - 2011
PI: Robert Zheng. Co-PI. **Kirsten R. Butcher**. *Subcontract to Utah Education Network.* Evaluation of the NetSafe Project. **$29,750.**	2009 - 2011
Researcher: **Kirsten Butcher.** *Subcontract to Cornell University.* Title: NSDL Technical Network Services: A cyberinfrastructure platform for STEM education. **$74,944.**	2009 - 2010

ACADEMIC HONORS, AWARDS, AND NOMINATIONS

University of Utah, College of Education Research Award	2019
University of Utah Faculty Fellow Award	2017
University of Utah Presidential Scholar Award	2015-2018

Best of NMC Award: New Media Consortium. Co-author Runburg, M. Presentation: *Leveraging 3D technologies for learning*	2015
Outstanding Volunteer Award, Utah FIRST LEGO League	2014
Nominated for University of Utah, College of Education Research Award	2013
Nominated for University of Utah, College of Education Teaching Award	2012
Advanced Study Program Fellowship, National Center for Atmospheric Research	2003
Psychology Department Service Award, University of Colorado, Boulder	2000
Institute of Cognitive Science Travel Grant, University of Colorado, Boulder	1999
Phi Beta Kappa, Whitman College	1997
Outstanding Psychology Graduate Award, Whitman College.	1997

PUBLICATIONS

PEER-REVIEWED PUBLICATIONS

JOURNAL ARTICLES

*Asterisk indicates student co-authors

Butcher, K.R. (revise and resubmit.) Promoting Understanding in Digital Contexts: Applying the Construction-Integration Model to Educational Technology Design and Assessment. *Discourse Processes.*

Son, S. C., & **Butcher, K.R.** (resubmitted.) Effects of story-relevant and story-irrelevant animations on preschool children's digital storybook reading outcomes. *Journal of Research in Reading.*

Butcher, K.R., Hudson, M.*, Lane, M.*, & Larson, M. (2023). Critical thinking in middle school science: What do practicing teachers value and observe? *Teachers and Teaching, 29*(6), 594-614 https://doi.org/10.1080/13540602.2023.2191186.

Butcher, K.R., Larson, M., Lane, M.*, & Power, M.J. (2022). Rethinking online science learning: Creating virtual research experiences using digitized museum specimens. *Connected Science Learning, 4(2).* https://www.nsta.org/connected-science-learning/connected-science-learning-march-april-2022/rethinking-online-science

Butcher, K.R., Power, M., Larson, M., Orr, M.*, Velásquez-Franco, S.*, Hudson, M.*, & Bailey, V.* (2021). Museum leadership for engaging, equitable education: The transformative potential of digitized objects for authentic learning experiences. *Curator: The Museum Journal, 64*(2), 383-402.

Son, S. C., **Butcher, K.R.,** & Liang, L.A. (2020). The influence of interactive features in storybook apps on children's reading comprehension and story enjoyment. *The Elementary School Journal, 120*(3), 422-454. DOI: 10.1086/707009 ****Winner: 2022 Dina Feitelson Research Award for outstanding empirical study from the International Literacy Association****

Butcher, K. R., Larson, M., & Lane, M. (2019). Making critical thinking visible for student analysis and reflection: Using structured documentation to enhance effective reasoning and communication. *Science Scope, 42(8)*, 44-53.

Poitras, E., **Butcher, K. R.,** Orr, M.*, Hudson, M. A.*, & Larson, M. (2019). Predicting student understanding by modeling interactive exploration of evidence during an online science investigation. *Journal of Interactive Learning Environments.* DOI: 10.1080/10494820.2019.1689146

Butcher, K. R., Runburg, M., & Hudson, M.* (2017). Using digitized objects to promote critical thinking and engagement in classrooms. *Library High Tech News, 34(7),* 12-15.

Butcher, K. R., Leary, H., Foster, J.* & Devaul, H. (2014). Facilitating teachers' thinking about pedagogy and technology with an online curriculum planning tool. *Journal of Technology and Teacher Education, 22(4),* 423-447.

Johnson, A. M., **Butcher, K. R.**, Ozogul, G., & Reisslein, M. (2014). Introductory circuit analysis learning from abstract and contextualized circuit representations: Effects of diagram labels. *IEEE Transactions on Education, 57 (3),* 160-168.

Butcher, K. R., Aleven, V. (2013). Using student interactions to foster rule-diagram mapping during problem solving in an intelligent tutoring system. *Journal of Educational Psychology, 105*(4), 988-1009.

Wetzler, P.*, Bethard, S.*, Leary, H., **Butcher, K.**, Bahreini, S. D.*, Zhao, J., Martin, J., & Sumner, T. (2013). Characterizing and predicting the multi-faceted nature of quality in educational web resources. *Transactions on Interactive Intelligent Systems, 3*(3), Article 15 (15:1-15:25).

Johnson, A. M., **Butcher, K. R.**, Ozogul, G., & Reisslein, M. (2013). Learning from abstract and contextualized representations: The effect of verbal guidance. *Computers in Human Behavior, 29(6),* 2239-2247.

Ferrara, L.*, & **Butcher, K. R.** (2012). Understanding Feedback: Exploring Students' Perceived Needs and Ideas about Feedback in Online Learning Environments. *International Journal on Cyber Behavior, Learning, and Psychology, 2*(2), 48-70.

Butcher, K. R., & Sumner, T. (2011a). How does prior knowledge impact students' online learning behaviors? *International Journal on Cyber Behavior, Learning, and Psychology, 1* (4), 1-18.

Butcher, K. R., & Sumner, T. (2011b). Self-directed learning and the sensemaking paradox. *Human Computer Interaction, 26*(1), 123-159. DOI: 10.1080/07370024.2011.556552

de la Chica, S.*, Ahmad, F.*, Sumner, T., Martin, J. H., & **Butcher, K**. (2008). Computational Foundations for Personalizing Instruction with Digital Libraries. *International Journal on Digital Libraries, 9,* 3-18.

Caillies, S., & **Butcher, K. R.** (2007). Comprehension of idiomatic expressions: Evidence for a new hybrid view. *Metaphor and Symbol, 22,* 79-108.

Butcher, K. R., Bhushan, S.*, & Sumner, T. (2006). Multimedia displays for conceptual search processes: Information seeking with strand maps. *ACM Multimedia Systems Journal, 11,* 236-248.

Butcher, K. R. (2006). Learning From Text With Diagrams: Promoting Mental Model Development and Inference Generation. *Journal of Educational Psychology, 98,* 182-197.

Butcher, K. R., & Kintsch, W. (2001). Support of content and rhetorical processes of writing: Effects on the writing process and written product. *Cognition and Instruction, 19,* 277-322.

CHAPTERS

Orr, M.*, Poitras, E., **Butcher, K**., (2021). Informal learning with mixed reality environments: Current trends in museums, heritage, and tourism. In V. Geroimenko (Ed.), *Augmented reality in tourism, museums, and heritage* (pp. 3 – 26). Springer.

Poitras, E., **Butcher, K**., Orr, M.* (2020). Modeling interactive behaviors while learning with digitized objects in virtual reality environments. In Zheng, R. (ed.), *Cognitive and affective perspectives on immersive technology* (pp. 215 – 234). IGI Global.

Butcher, K.R., Hudson, M.*, Runburg, M. (2018). Visualizations for deep learning: Using 3D models to promote scientific observation and reasoning during collaborative STEM inquiry. In Zheng, R., (ed.) *Strategies for deep learning with digital technology: Theories and practices in education* (pp. 111-135). Hauppauge, NY: Nova Science Publishers.

Butcher, K.R., Runburg, M., Altizer, R. (2017). Dino Lab: Designing and developing an educational game for critical thinking. In Zheng, R., & Gardner, M. (eds.) *Handbook of research on serious games for educational applications* (pp. 115 – 148). IGI Global.

Butcher, K.R., & Jameson, J. M. (2016). Computer-based instruction (CBI) within special education. In J. K. Luiselli and A. J. Fischer (Eds.), *Computer-Assisted and Web-Based Innovations in Psychology, Special Education, and Health* (pp. 211 – 254)*.* San Diego: Academic Press.

Butcher, K.R., & Davies, S.* (2015). Inference generation during online study and multimedia learning. In E.J. O'Brien, A.E. Cook, & R.F. Lorch (Eds.), *Inferences during Reading* (pp. 321 – 347). New York: Cambridge University Press.

Butcher, K.R. (2014). The multimedia principle. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning, 2nd Edition* (pp. 174-205). New York: Cambridge University Press.

Butcher, K.R., & Kintsch, W. (2012). Text comprehension and discourse processing. In A. F. Healy & R. W. Proctor (Eds.), *Experimental Psychology*. Volume 4 in I. B. Weiner (Editor-in-Chief) *Handbook of psychology, 2nd Edition* (pp. 578-604). New York: Wiley.

Butcher, K.R., & de la Chica, S.* (2010). Supporting Student Learning with Adaptive Technology: Personalized Conceptual Assessment and Remediation. In M. Banich & D. Caccamise (Eds.), *Generalization of Knowledge: Multidisciplinary Perspectives* (pp. 297-330)*.* Taylor & Francis.

Butcher, K.R., de la Chica, S.*, Ahmad, F.*, Gu, Q.*, Sumner, T., & Martin, J. (2008). Conceptual Customization for Learning with Multimedia: Developing Individual Instructional Experiences to Support Science Understanding. In R. Zheng (Ed.), *Cognitive effects of multimedia learning* (pp. 260 – 287). Hershey, PA: IGI Global.

Butcher, K. R., & Kintsch, W. (2003). Text Comprehension and Discourse Processing. In A. F. Healy & R. W. Proctor (Eds.), *Experimental Psychology* (pp. 575-595). Volume 4 in I. B. Weiner (Editor-in-Chief) *Handbook of psychology*. New York: Wiley.

CONFERENCE PROCEEDINGS

Butcher, K. R., Hampton, J.*, & Larson, M. (Submitted). Digital data collection and analysis in middle school science: Student and teacher perceptions of learning. *Proceedings of the International Conference on the Learning Science (ICLS).*

Butcher, K. R., & Hampton, J.* (Submitted). Student perceptions of learning supports in an educational game. *Proceedings of the International Conference on the Learning Science (ICLS).*

Butcher, K. R., Hudson, M. A.*, Larson, M., Orr, M. P.*, Lane, M.*, Velásquez-Franco, S.*, Bailey, V. J.*, Davis, M., Power, M. (2022). Its face is so cute! Engaging students in science investigations using digitized museum specimens. *Proceedings of the 7th International STEM in Education Conference (STEM 2022).* University of Sydney, Sydney, Australia. November 23-26 [Virtual Conference]. University of Sydney.

Butcher, K. R., Hudson, M. A.*, Larson, M., Lane, M.*, Velásquez-Franco, S.*, Bailey, V. J.*, Orr, M. P.*, Davis, M., Power, M. (2022). Learning science practices via online research: Investigations with digitized specimens. *Proceedings of the 7th International STEM in Education Conference (STEM 2022).* University of Sydney, Sydney, Australia. November 23-26 [Virtual Conference]. University of Sydney.

Butcher, K. R., Larson, M., Power, M., Lane, M.*, & Hudson, M.* (2021). Using digitized scientific collections to engage students in authentic, object-based science investigations. In D. Anderson, M. Milner-Bolotin, R. Santos, & S. Petrina (Eds.), *Proceedings of the 6th International STEM in Education*

Conference (STEM 2021). (pp. 499-503). University of British Columbia. https://dx.doi.org/10.14288/1.0402129

Butcher, K. R., Larson, M., Power, M., Bailey, V.*, Hudson, M.*, Orr, M.*, & Velásquez-Franco, S.* (2021). EPIC Bioscience: An online learning environment for biodiversity investigations using digitized specimens from scientific collections. In D. Anderson, M. Milner-Bolotin, R. Santos, & S. Petrina (Eds.), *Proceedings of the 6th International STEM in Education Conference (STEM 2021).* (p. 545). University of British Columbia. https://dx.doi.org/10.14288/1.0402129

Orr, M.* & **Butcher, K.** (2020). Can instructional prompts support effective learner behaviors with tangible and digital 3D models? In Gresalfi, M. and Horn, I. S. (Eds.), *The Interdisciplinarity of the Learning Sciences, 14th International Conference of the Learning Sciences (ICLS) 2020, Volume 2* (pp. 839-840). Nashville, Tennessee: International Society of the Learning Sciences.

Butcher, K. R., Hudson, M.*, & Runburg, M. (2018). Student perceptions of object-based learning with digitized museum materials during classroom science instruction. In *Proceedings of the 13ʰ International Conference of the Learning Sciences (ICLS 2018): Rethinking learning in the digital age. Making the Learning Sciences count* (pp. 1683-1684). London, UK: University College London (UCL).

Jensen, M.*, Casucci, T., Runburg, M., **Butcher, K. R.**, Bown, R., & Altizer, R. (2015). Research Quest: Critical thinking through video games and interdisciplinary collaboration. In *Proceedings of the 10th International Conference on the Foundations of Digital Games (FDG 2015).* Available online: http://www.fdg2015.org/papers/fdg2015_extended_abstract_24.pdf

Davies, S.*, **Butcher, K.**, & Stevens, C.* (2013). Self-regulated learning with graphical overviews: When spatial information detracts from learning. In M. Knauff, M. Pauen, N. Sebanz, & I. Wachsmuth (Eds.), *Proceedings of the 35th Annual Conference of the Cognitive Science Society* (pp. 2136 – 2141). Austin, TX: Cognitive Science Society.

Butcher, K., Ferrara, L.*, & Devaul, H. (2013). Impact of an online curriculum planning tool: How teachers' use influences student learning. *Proceedings of EdMedia 2013: World Conference on Educational Media & Technology.* Chesapeake, VA: AACE.

Ozogul, G., Johnson, A. M., & Reisslein, M., & **Butcher, K.** (2012). Representation guidance with abstract and contextualized representation: Effects on engineering learning performance in technology literacy education. *Proceedings of the ASEE Annual Conference, 2012.* Available online: http://www.asee.org/public/conferences/8/papers/3625/view

Butcher, K. R., Davies, S.*, Crockett, A.*, Dewald, A.*, & Zheng, R. (2011). Do graphical search interfaces support effective search for and evaluation of digital library resources? *Proceedings of the 11th annual international ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL '11)* (pp. 315-324). New York: Association for Computing Machinery.

Ferrara, L.*, & **Butcher, K. R.** (2011). Visualizing feedback. Using graphical cues to promote self-regulated learning. In L. Carlson, C. Hölscher, & T. Shipley (Eds.), *Proceedings of the 33rd Annual Conference of the Cognitive Science Society* (pp. 1880-1885). Austin, TX: Cognitive Science Society.

Butcher, K. R. (2010). How diagram interaction supports learning: Evidence from think alouds during intelligent tutoring. In A. Goel, M. Jamnik, & N. H. Narayanan (Eds.), *Diagrammatic Representation and Inference: Lecture Notes in Computer Science, Volume 6170* (pp. 295-297). Berlin/Heidelberg: Springer.

Butcher, K. R., & Aleven, V. A. (2010). Learning during intelligent tutoring: When do integrated visual-verbal representations improve student outcomes? In S. Ohlsson & R. Catrambone (Eds.), *Proceedings of the 32nd Annual Conference of the Cognitive Science Society* (pp. 2888 – 2893). Austin, TX: Cognitive Science Society.

Butcher, K. R., Sumner, T., Maull, K.*, & Okoye, I.* (2010). Conceptual personalization technology:

Promoting effective self-directed, online learning. In V. Aleven, J. Kay & J. Mastow (Eds.), *Lecture Notes in Computer Science 6095: Intelligent Tutoring Systems Conference, 2010, Part II* (pp. 278-280). Berlin: Springer-Verlag.

Sumner, T., **Butcher, K. R.**, & Wetzler, P.* (2010). Open educational resource assessments (OPERA). In V. Aleven, J. Kay & J. Mastow (Eds.), *Lecture Notes in Computer Science 6095: Intelligent Tutoring Systems Conference, 2010, Part II* (pp. 414-416). Berlin: Springer-Verlag.

Bethard, S.*, Wetzler, P.*, **Butcher, K. R.,** Martin, J. H., Sumner, T. (2009). Automatically characterizing resource quality for educational digital libraries. In *Proceedings of the 9th ACM/IEEE Joint Conference on Digital Libraries, JCDL '09* (pp. 221-230). ***Winner: JCDL 2009 Vannevar Bush Best Paper Award***

Wetzler, P.*, Bethard, S.*, **Butcher, K.**, Martin, J. H., & Sumner, T. (2009). Automatically assessing resource quality for educational digital libraries. In *Proceedings of the 3rd ACM Workshop on Information Credibility on the Web: WICOW '09I* (pp. 3-10). Madrid: ACM Press.

Gu, Q.*, de la Chica, S.*, Ahmad, F.*, Khan, H.*, Sumner, T., Martin, J.H., & **Butcher, K.** (2008). Personalizing the selection of digital library resources to support intentional learning. In B. Christensen-Dalsgaard et al. (Eds.), *ECDL 2008, Lecture Notes in Computer Science 5173: Research and Advanced Technology for Digital Libraries* (pp. 244-255). Berlin: Springer-Verlag.

Butcher, K.R., & Aleven, V. A. (2008). Diagram Interaction during Intelligent Tutoring in Geometry: Support for Knowledge Retention and Deep Understanding. In B. C. Love, K. McRae, & V. M. Sloutsky (Eds.), *Proceedings of the 30th Annual Conference of the Cognitive Science Society* (pp. 1736-1741). Austin, TX: Cognitive Science Society.

Butcher, K., & Aleven, V. (2007). Integrating visual and verbal knowledge during classroom learning with computer tutors. In D.S. McNamara & J.G. Trafton (Eds.), *Proceedings of the 29th Annual Cognitive Science Society* (pp. 137-142). Austin, TX: Cognitive Science Society.

Ahmad, F.*, de la Chica, S.*, **Butcher, K.**, Sumner, T. R., & Martin, J. H. (2007). Towards Automatic Conceptual Personalization Tools. In E. Rasmussen, R. Larson, E. Toms, & S. Sugimoto (Eds.), *ACM/IEEE Joint Conference on Digital Libraries, JCDL '07*. (pp. 452 – 461). Vancouver, BC: ACM Press

Butcher, K. R., & Bhushan, S.* (2005). Using strand maps to engage digital library users with science content. *Proceedings of the 5th ACM/IEEE-CS joint conference on digital libraries*, p. 371. New York: Association for Computing Machinery.

Butcher, K. R., & Kintsch, W. (2004). Learning with diagrams: Effects on inferences and the integration of information. In A. Blackwell, K. Marriott, & A. Shimojima (Eds.), *Lecture notes in artificial intelligence 2980: Diagrammatic representation and inference* (pp. 337-340). New York: Springer.

OTHER PUBLICATIONS

Butcher, K. R. (2003). Cognitive approaches to assessing the impact of digital libraries. Available online: http://eduimpact.comm.nsdl.org/evalworkshop/_butcher.php

Sumner, T., Marlino, M., & **Butcher, K.** (2003). Developing a Strategy for Evaluating the Educational Impact of NSDL. Preliminary Report on the NSDL Workshop: Evaluation Educational Impact. October 2-3, 2003: Washington DC. Available online: http://swiki.dlese.org/nsdl2003/uploads/42/Preliminary_Report_from_the_NSDL_Workshop.doc

Giersch, S., **Butcher, K.**, & Reeves, T. (2003). Annotated Bibliography of Evaluating the Educational Impact of Digital Libraries. Available online: http://eduimpact.comm.nsdlib.org/evalworkshop/eval_ann-bib_09-29-03.doc

PRESENTATIONS

CONFERENCE PAPERS (PEER-REVIEWED WITHOUT PROCEEDINGS)

Son, S. C., **Butcher, K. R.,** Liang, L. A. (2022, April). Using multimedia storybooks with Head Start children: An experimental study of interactive features. *American Educational Research Association Annual Meeting (AERA 2022)*. San Diego, CA. Thursday, April 21 – Tuesday, April 26, 2022.

Hudson, M.*, & **Butcher, K. R.** (2022, April). Challenges in using rating scales to document students' observations during science investigations. *American Educational Research Association Annual Meeting (AERA 2022)*. Virtual conference meeting, Thursday, April 21 – Tuesday, April 26, 2022.

Orr, M.*, Aina, D.*, **Butcher, K. R.,** & Poitras, E. (2021, April). Embodied learning with virtual reality: Gesture clustering and forecasting. *American Educational Research Association Annual Meeting (AERA 2021)*. Virtual conference meeting, Thursday, April 8 – Monday, April 12, 2021.

Son, S. C., **Butcher, K. R.,** & Liang, L. A. (2020, July). Children's story comprehension and enjoyment from electronic books with story-relevant versus irrelevant features [Paper session]. Society for the Scientific Study of Reading Annual Meeting. Newport Beach, CA. (Conference canceled due to COVID-19 pandemic.) https://www.triplesr.org/children%E2%80%99s-story-comprehension-and-enjoyment-ebooks-story-relevant-versus-irrelevant-features

Butcher, K. R., Orr, M.*, Hudson, M.*, Larson, M., & Power, M. (2020, April). A cognitive process framework for critical thinking applied to evaluation and design of science investigations. *American Educational Research Association Annual Meeting (AERA 2020)*. San Francisco, CA. (Conference canceled; Paper available in online repository.)

Orr, M.*, **Butcher, K. R.,** Larson, M., & Power, M. (2020, April). Perceptions of authenticity in 3D objects for science education: Evidence from 3D prints of fossils. *American Educational Research Association Annual Meeting (AERA 2020)*. San Francisco, CA. (Conference canceled; Paper available in online repository.)

Orr, M.*, Poitras, E., & **Butcher, K. R.** (2019, April). Evolutionary algorithm of interactive factors in inquiry-based learning. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2019)*. Toronto, CA.

Poitras, E., **Butcher, K. R.**, Orr, M.*, & Hudson, M.*, & Runburg, M. (2019, April). Modeling student interactions with an online map to predict differentiated understanding of scientific observations in an inquiry-based learning environment. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2019)*. Toronto, CA.

Orr, M.*, & **Butcher, K. R.** (2019, April). Does physicality impact learner interactions? Evidence from tangible and digital 3D models. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2019)*. Toronto, CA.

Hudson, M.*, **Butcher, K. R.**, & Runburg, M. (2019, April). Supporting scientific thinking in middle school: Impact of expert video models on students' collaborative processing. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2019)*. Toronto, CA.

Leary, H., **Butcher, K. R**., & Devaul, H. (2018, April). Impact of an ICT planning tool on student-centered technology integration. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2018)*. New York, NY.

Orr, M.*, **Butcher, K. R**., & Davies, S.* (2018, April). Do erroneous explanations hinder learning? Evidence from physics. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2018)*. New York, NY.

Poitras, E., **Butcher, K. R**., & Hudson, M.* (2018, April). Subgroup mining of learning behaviors with interactive diagrams in Research Quest. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2018)*. New York, NY.

Butcher, K. R., Hudson, M.*, & Runburg, M. (2017, April). Critical thinking in the classroom using 3-D models of museum objects. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2017)*. San Antonio, TX.

Butcher, K. R., Orr, M.*, & Verma, S. (2017, April). Multimedia materials for patient education increase confidence and explanation quality. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2017)*. San Antonio, TX.

Poitras, E., **Butcher, K. R.**, & Hudson, M.* (2017, April). Mining sequential patterns in student collaborative dialogue while learning from Research Quest. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2017)*. San Antonio, TX.

Butcher, K. R., & Fazeli, N.* (2016, April). Scaffolding video explanation using cueing and comparison. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2016)*. Washington, DC.

Ferrara, L.*, & **Butcher, K. R.** (2015, April). Promoting deep learning through use of effective self-regulated learning strategies in online learning. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2015).* Vancouver, Canada.

Ferrara, L.*, & **Butcher, K. R.** (2015, April). Using graphical organizers to improve online self-regulated learning outcomes. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2015).* Vancouver, Canada.

Ferrara, L.*, & **Butcher, K. R.** (2012, April). Can feedback visualization promote metacognitive awareness of revisions? Paper presented at the *American Educational Research Association Annual Meeting (AERA 2012).* Vancouver, Canada.

Zheng, R., **Butcher, K. R., &** Callister, P.* (2011, April). Enhancing collaborative learning outcomes during video instruction: Deep prompts support knowledge retention and transfer. Paper presented at the *American Educational Research Association Annual Meeting (AERA 2011).* New Orleans, LA.

Ferrara, L. A.*, & **Butcher, K. R.** (2010, May). *Does pretraining format predict learning with educational technology?* Paper presented at the annual meeting of the American Educational Research Association 2010, Denver, CO.

Butcher, K. R., & Aleven, V. A. (2009, August). Visual self-explanation during intelligent tutoring? More than attentional focus? Paper presented at the *13th biennial conference of the European Association for Research on Learning and Instruction (EARLI)*, Amsterdam, Netherlands.

Butcher, K. R., & Chi, M. T. H. (2006, August). *How can diagrams scaffold text comprehension?* Paper presented at the EARLI SIG2 Meeting 2006, University of Nottingham, Nottingham, UK.

POSTERS, TALKS, AND WORKSHOPS

Larson, M. **Butcher, K. R.**, Lane, M. (Submitted: 2024, September). Data-driven inquiry with digitized specimens: Exploring methods and strategies for learning with natural history collections. Association for Science and Technology Centers (ASTC) 2024. Chicago, IL.

Son, S. C., & **Butcher, K. R.** (Submitted: 2024, June). Head Start children reading digital stories: Effects of varied multimedia animations [Poster session proposal submitted for review]. National Research Conference on Early Childhood (NRCEC) 2024. Administration for Children and Families, US Department of Health and Human Services. Arlington, VA.

Velásquez-Franco, S.*, Sanchez-Duque, D., Jouffroy-Bapicot, I., Power, M.J., & Butcher, K. (2023, June). *Exploring fungal diversity through the recent past: new laboratory and educational approaches.* [Poster.] *55th Annual Meeting of AASP-TPS Joint with the Commission Internationale Microflore Paléozoique (CIMP).* June 6-10, 2023, Lexington, KY.

Butcher, K. R. (2023, September*). Using online investigations for student-driven research in middle school science.* [Workshop presentation.] Utah Science Teachers Association (UtSTA 2023). September 15, 2023, Layton, UT.

Butcher, K. R. (2023, March). *Online science investigations: Collecting data from digitized specimens.* [Workshop presentation.] Utah Coalition for Educational Technology Annual Conference (UCET 2023). March 14-15, Provo, UT.

Butcher, K. R. (2023, March). *The glorious art of reusable videos.* [Presentation.] Utah Coalition for Educational Technology Annual Conference (UCET 2023). March 14-15, Provo, UT.

Butcher, K. R., & Larson, M. (2022, October). *Using digitized collections to transform education outreach online.* [Poster session.] Western Museum Association Annual Meeting *(WMA 2022).* October 6 – 9, Portland, OR.

Butcher, K. R., Larson, M., & Lane, M. (2022, July). *Using online investigations with digitized specimens to enhance data literacy and scientific reasoning.* [Workshop presentation.] National Science Teachers Association: NSTA Chicago National Conference. July 21-23, Chicago, IL.

Butcher, K. R., Larson, M., & Lane, M., (2022, July). *Effective, engaging, and efficient: Virtual scaffolds that transfer to classrooms.* [Speed sharing presentation.] National Science Teachers Association: NSTA Chicago National Conference. July 21-23, Chicago, IL.

Velásquez-Franco, S.*, **Butcher, K. R.,** Bailey, V. J.*, & Power, M. J. (2021, December). *EPIC Bioscience: An online learning environment for ecological investigations aligned with Next Generation Science Standards (NGSS) using museum digitized collections.* [Poster presentation.] American Geophysical Union (AGU) 2021 fall meeting, December 13-17, New Orleans, LA.

Butcher, K. R., & Larson, M. (2021, December). *Engaged and online—virtual science investigations using digitized museum specimens.* [Workshop presentation.] National Science Teacher Association Meeting, Los Angeles area conference, December 9 - 11, 2021. Los Angeles, CA.

Butcher, K. R., & Larson, M. (2021, November). *Engaging students in online science investigations using digitized museum specimens.* [Workshop presentation.] National Science Teacher Association Meeting, National Harbor area conference, November 11 - 13, 2021. National Harbor, MD.

Butcher, K. R., & Larson, M. (2021, October). *Online Investigations: Using Digitized Specimens for Engaged Science Learning.* [Workshop presentation.] National Science Teacher Association Meeting, Portland area conference, October 28 – 30, 2021. Portland, Oregon.

Butcher, K. R., & Larson, M. (2021, June). *Pandemic Year Insights: Adapting Upper Elementary, Middle School Projects – EPIC Bioscience.* [Presentation and panel discussion]. 2021 DRK-12 PI Meeting, June 15-17. Online.

Butcher, K. R., Larson, M., & Power, M. (2021, June). *A Practice-Based Online Learning Environment for Scientific Inquiry with Digitized Museum Collections in Middle School Classrooms* [Poster session]. 2021 DRK-12 PI Meeting, June 15-17. Online.

Son, S. C., **Butcher, K. R.**, & Liang, L. A. (2021, April). *The impact of using electronic storybooks with story-relevant versus story-irrelevant features among head start children* [Poster session]. Society for Research in Child Development 2021, Virtual Biennial Meeting, April 7-9. Online.

Butcher, K. R., Larson, M., & Orr, M.* (2020, November). *Authentic inquiry with digitized museum objects.* [Poster Session.] International Society for Technology in Education Virtual Conference (ISTE 2020), November 29-December 5, 2020. Online.

Larson, M., **Butcher, K. R.**, & Orr, M.* (2020, May*). Leveraging digitized collections for learning: EPIC Bioscience.* [Poster Session.] American Alliance of Museums Virtual Annual Meeting (AAM 2020). May 17-20, 2020. San Francisco, CA.

Levitt-Bussian, C. G., Larson, M., **Butcher, K. R.**, & Lane, M. (2019, May). *Examining critical thinking skills of middle-school age learners with 3D models of museum objects in an inquiry-based learning system.* [Poster Session.] Preservation of Natural History Collections (SPNHC) Annual Meeting. May 25-31, 2019. Chicago, IL.

Butcher, K. R. (2019, March). *eScience Workspace.* [Poster session & Playground Workshop.] Utah Coalition for Educational Technology (UCET 2019). March 5-6, 2019.

Son, S. C., **Butcher, K. R.**, & Liang, L. A. (2019, March). *The Impact of Interactivity in Storybook Apps on Children's Story Recall and Inference* [Poster session.] Society for Research in Child Development Biennial Conference. Baltimore, MD.

Poitras, E. G., **Butcher, K.**, & Hudson, M.* (2018, September). *Mining sequential patterns in student collaborative dialogue while learning from Research Quest.* [Poster Session.] 2018 Data Science Day @ University of Utah. Salt Lake City, UT.

Son, S. C., Liang, L. A., **Butcher, K. R.**, & Poitras, E. (2018, June). *The Influence of the Story-Related Interactivity of Storybook Apps on Children's Story Recall: A Preliminary Investigation.* [Poster Session.] National Research Conference on Early Childhood (NRCEC) 2018. Administration for Children and Families, US Department of Health and Human Services. Arlington, VA.

Butcher, K. R. (2018, February). *Online assessments as tools for deep learning.* [Talk.] ITC eLearning Conference, 2018. February 11-14, 2018, Tucson, AZ.

Runburg, M., **Butcher, K.R.**, Lane, M. (2017, March). *Integrating real-world science, NGSS three dimensions of learning, and technology to promote critical thinking, collaboration, and communication.* [Workshop.] National Science Teachers Association Annual Meeting, 2017. March 28 – April 2, Los Angeles, CA.

Butcher, K. R. (2017, March). *Robotics for elementary education.* [Spotlight talk.] Utah Coalition for Educational Technology (UCET 2017). March 16-17, Salt Lake City, UT.

Liang, L. A., Son, S. C., & **Butcher, K. R.** (2017, March). *Storybook apps for early elementary.* [Talk.] Utah Coalition for Educational Technology (UCET 2017). March 16-17, Salt Lake City, UT.

Butcher, K. R., Runburg, M., & Lane, M. (2017, March). *NHMU Research Quests: 3D and Inquiry.* [Talk.] Utah Coalition for Educational Technology (UCET 2017). March 16-17, Salt Lake City, UT.

Levitt-Bussian, C. G., Runburg, M., **Butcher, K.R.**, Lane, M., Toth, N. (2016, October). *Diverse Approaches to Paleo Outreach Programs: Ideas, Strategies, and Logistics.* [Workshop.] Society of Vertebrate Paleontology Annual Meeting, 2016. October 26-29, Salt Lake City, UT.

Butcher, K. R., (2016, March). *Embedding Effective Questions in Videos.* [Talk.] Utah Coalition for Educational Technology Annual Meeting (UCET 2016). March 17-18. Salt Lake City, UT.

Butcher, K. R., & Runburg, M. (2016, March). *Advancing Critical Thinking: Online Inquiry with NHMU Objects.* [Talk.] Utah Coalition for Educational Technology Annual Meeting (UCET 2016). March 17-18. Salt Lake City, UT.

Butcher, K. R., (216, March). *Is a 3D print worth 1000 words?* [Talk.] IGNITE presentation, Utah Coalition for Educational Technology Annual Meeting (UCET 2016). March 17-18. Salt Lake City, UT.

Butcher, K. R., & Davies, S.* (2016, February). *Using videos of hands-on experiments for distance learning in science.* [Talk.] eLearning 2016. Feburary 14-17, Scottsdale, AZ.

Levitt-Bussian, C. G., Runburg, M., **Butcher, K. R.**, Collins, T., & Hudson, M.* (2015, October). *Leveraging paleontology research, collections, and 3D technologies to promote critical thiking.* [Poster Session.] 75th Annual Meeting of the Soceity of Vertebrate Paleontology. October 14-17, Dallas, TX.

Hudson, M.*, Davies, S.*, **Butcher, K. R.,** & Cook, A. E. (2015, July). *Using essays to evaluate learning: Results from human and computerized scoring approaches.* [Poster Session.] 25th Annual Meeting of the Society for Text & Discourse. July 6-8, Minneapolis, MN.

Butcher, K. R., & Runburg, M. (2015, June). *Leveraging 3D technologies for learning.* [Poster Session.] New Media Consortium Summer Conference. June 10-11, Washington, DC. **** Best of NMC Award ("Best in Show")****

Butcher, K. R. (2015, April). *Using learning theory to write better questions.* [Talk.] Utah Coalition for Educational Technology Annual Meeting (UCET 2015). April 2-3, Herriman, UT.

Butcher, K. R. (2015, April). *Tools and apps for assessment.* [Talk.] Utah Coalition for Educational Technology Annual Meeting (UCET 2015). April 2-3, Herriman, UT.

Dewald, A.*, & **Butcher, K. R**. (2015, April). *Flipped classrooms: Designing and implementing.* [Talk.] Utah Conference on Educational Technology (UCET) 2015. April 2-3, Herriman, UT.

Ferrara, L.*, & **Butcher, K. R**. (2014, April). *Choosing apps for optimal learning.* [Talk.] Utah Coalition for Educational Technology Annual Meeting (UCET 2014). April 3-4, Murray, UT.

Davies, S.*, **Butcher, K. R.**, & Cook, A. (2013, August). *Graphical overviews structure online learning: Evidence from eye tracking.* [Poster Session.] 35th annual meeting of the Cognitive Science Society, Berlin, Germany.

Butcher, K. R., & Ferrara, L.* (2013, August). *Supporting self-regulated learning in conceptual feedback environments.* [Poster Session.] 35th annual meeting of the Cognitive Science Society, Berlin, Germany.

Ferrara, L.*, & **Butcher, K. R.** (2013, July). *Using graphical organizers to improve self-regulated learning: Constructive activities enhance deep learning with online materials.* [Poster Session.] 35th annual meeting of the Cognitive Science Society, Berlin, Germany.

Butcher, K. R., Indahl, T.*, & Devaul, H. (2013, April). *Assessing factual knowledge vs. deep understanding of science concepts using visually-based assessment items?* [Poster Session.] American Educational Research Association 2013, San Francisco, CA.

Ye, L., Walker, A., Recker, M., Leary, H., Devaul, H., **Butcher, K.**, & Sumner, T. (2013, April). *Integrating Technology, Curriculum, and Online Resources: A Multilevel Model Study of Impacts on Science Teachers and Students.* [Poster Session.] American Educational Research Association 2013, San Francisco, CA.

Butcher, K. R. (2013, March). *Using photos and videos for deeper learning.* [Talk.] Utah Coalition for Educational Technology (UCET 2013), Sandy, UT.

Butcher, K. R. (2012, March). *Visual multimedia for learning: What, when, and how?* [Talk.] Utah Coalition for Educational Technology (UCET 2012), Sandy, UT.

Dewald, A.*, & **Butcher, K. R.** (2012, March). *Using Google apps to create a deeper learning experience for students.* [Talk.] Utah Coalition for Educational Technology (UCET 2012), Sandy, UT.

Butcher, K. R., Davies, S.*, Crockett, A.*, Zheng, R., Dewald, A., & Cook, A. (2011, July). *Graphical search interfaces for online information seeking.* [Poster Session.] 33rd Annual Conference of the Cognitive Science Society. Boston, MA.

Zheng, R., **Butcher, K. R.**, Gupta, U.*, & Callister, P.* (2011, July). *Prompting effective collaboration using deep questions.* [Poster Session.] 33rd Annual Conference of the Cognitive Science Society. Boston, MA.

Butcher, K. R., Crockett, A.*, & Davies, S.* (2011, June). *Representing educational content in digital library resources.* [Poster Session.] Joint Conference on Digital Libraries (JCDL 2011). Ottawa, Canada.

Published in *Proceedings of the 11th annual international ACM/IEEE-CS joint conference on digital libraries,* doi: http://dx.doi.org/10.1145/1998076.1998174

Butcher, K.R., & Zheng, R. (2011, March). *Using the National Science Digital Library in teacher preparation: Research findings and practical strategies.* [Talk.] Utah Coalition for Educational Technology Annual Conference (UCET 2011), Sandy, UT.

Dewald, A.*, **Butcher, K**., & Zheng, R. (2011, March). *Developing interactive multimedia to enhance elementary students' critical thinking in science.* [Talk.] Utah Coalition for Educational Technology Annual Conference (UCET 2011), Sandy, UT.

Zheng, R., **Butcher, K.**, Callister, P.*, & Gupta, U.* (2011, March). *Strategies for increasing student learning with online videos: Findings from a NetSafe study.* [Talk.] Utah Coalition for Educational Technology Annual Conference (UCET 2011), Sandy, UT.

Butcher, K., Foster, J.* (2010, November). *A cognitive interview protocol for assessing changes in teacher knowledge*. [Talk.] National Science Digital Library Annual Meeting (NSDL 2010). Washington, DC.

Butcher, K., Davies, S.*, Mazal, A.*, Dewald, A.*, Zheng, R., & Cook, A. (2010, November). *Helping preservice teachers find and evaluate digital resources for the classroom: Can educational digital libraries help?* [Talk.] National Science Digital Library Annual Meeting (NSDL 2010). Washington, DC.

Butcher, K. R., Zheng, R., Cook, A., Crockett-Mazal, A.*, & Davies, S.* (2010, November). *What do preservice teachers find when using NSDL vs. Google: An analysis using the ADMIRE rubric.* [Poster Session.] National Science Digital Library Annual Meeting (NSDL 2010). Washington, DC.

Butcher, K. R., Zheng, R., Cook, A., Ferrara, L.*, Davies, S.*, Crockett-Mazal, A.*, & Dewald, A.* (2010, August). *Facilitating educator evaluation of online instructional materials: Does conceptual browsing impact cognitive processing?* [Poster Session.] 32nd Annual Conference of the Cognitive Science Society. Portland, OR.

Butcher, K. R., & Sumner, T. (2010, May). *What predicts learning with web resources? Relationships between prior knowledge, approaches to online learning, and learning outcomes.* [Poster Session.] American Educational Research Association Annual Meeting 2010, Denver, CO.

Butcher, K.R., Sumner, T., Martin, J., & Devaul, H. (2010, March). *Personalization technology: Supporting cognitive and metacognitive processes during learning.* [Poster Session.] REESE annual PI meeting, Washington, DC.

Sumner, T., Martin, J., **Butcher, K.,** & Devaul, H. (2010, March). *A personalized learning environment.* [Poster Session.] REESE annual PI meeting, Washington, DC.

Butcher, K.R., & Zheng, R. (2010, February). *Is there life beyond Google? Using digital libraries to find educational resources for the classroom.* [Talk.] Utah Coalition for Educational Technology Annual Conference (UCET 2010), Salt Lake City, UT.

Zheng, R., & **Butcher, K. R.** (2010, February). *Design and develop effective learning resources to support K-12 education: A panel discussion*. [Talk.] Utah Coalition for Educational Technology Annual Conference (UCET 2010), Salt Lake City, UT.

de la Chica, S.*, Ahmad, F.*, Gu, Q.*, Okoye, I.*, Maull, K.*, Sumner, T., & **Butcher, K. R.** (2009, June). *A personalized learning environment*. [Poster Session.] Joint Conference on Digital Libraries (JCDL 2009). Austin, TX. Published in Proceedings of the 9th annual international ACM/IEEE-CS joint conference on digital libraries, doi: 10.1145/1555400.1555467

Butcher, K.R., Zheng, R., & Cook, A. (2009, November). *Is there an educational impact of NSDL? Studying users' cognitive processes and learning outcomes*. [Poster Session.] Annual Meeting of the National Science Digital Library, Washington, DC.

Butcher, K.R. (2008, September). *Visual interaction and robust learning*. [Talk.] International Workshop on Spatial Cognition and Learning, University of Freiburg, Freiburg, Germany.

Butcher, K. R., & Aleven, V. A. (2008, April). *Visual interaction in intelligent tutoring: Support for robust learning*. [Talk.] Symposium for visiting educators and officials from Singapore's Ministry of Education, Carnegie Mellon University, Pittsburgh, PA.

Butcher, K. R., & Aleven, V. A. (2008, March). *Concept training and deep knowledge assessment: Using CTAT in the classroom*. [Poster Session.] Open Learning Interplay Symposium 2008, Carnegie Mellon University, Pittsburgh, PA.

Butcher, K. R., & Aleven, V. A. (2008, January). *Learning from visual-verbal sources in intelligent tutoring*. [Talk.] Inter-Science of Learning Center Conference (iSLC), Carnegie Mellon University, Pittsburgh, PA.

Butcher, K. R., & Aleven, V. A. (2007, October). *Visual-verbal coordination: Diagram interaction promotes robust learning in geometry*. [Poster Session.] Science of Learning Centers Annual Meeting, Arlington, VA.

Aleven, V., Evenson, S., & **Butcher, K. R.** (2006, April). *Improved Interaction Design in a Cognitive Tutor for Geometry*. [Poster Session.] Carnegie Mellon University's Human-Computer Interaction Institute 12th Anniversary Celebration, Pittsburgh, PA.

Butcher, K. R., & Bhushan, S.* (2005, June). *Using Strand Maps to Engage Digital Library Users with Science Content*. [Poster Session.] Joint Conference on Digital Libraries 2005, Denver, CO.

Butcher, K. R. (2005, April). *Learning with scientific visualizations: Effects of background knowledge and interactivity*. [Poster Session.] American Educational Research Association Annual Meeting 2005, Montreal, Canada.

Butcher, K. R., & Kintsch, W. (2004, March). *Learning with diagrams: Effects on inferences and the integration of information.* [Poster Session.] Diagrams 2004, University of Cambridge, Cambridge, UK.

Butcher, K. R. & Pandya, R. (2004, February). *Preliminary Data on Student Learning with VGEE (The Visual Geophysical Exploration Environment).* [Poster Session.] National Science Foundation Cutting Edge Workshop: Teaching Geoscience with Visualizations: Using Images, Animations, and Models Effectively, Carleton College, Northfield, MN.

Greene, L., Boyko, M., Susnowitz, S., **Butcher, K. R.**, Kintsch, E., & Kintsch, W. (1998, December). *Introducing Science WRITE.* [Poster Session.] International Conference of the Learning Sciences, Atlanta, Georgia.

INVITED TALKS AND WORKSHOPS

Society for Text and Discourse, Invited Talk. A Framework for Effective Educational Technology: Using the Construction-Integration Model to Design and Develop Digital Learning Environments. July, 2024	2024
NSTA Online Webinar: Case Studies from Connected Science Learning: Transformative Science Learning through Museum-School Collaboration. Invited presenter. May 16, 2022. https://my.nsta.org/resource/125354	2022
Center for Teaching & Learning Excellence, Faculty Boot Camp, University of Utah, Invited workshop. (Title: "Designing Instruction for (Effective) Active Learning")	2020

Preceptor Grand Rounds, College of Pharmacy, University of Utah, Invited Talk. (Title: "Teaching with Technology: Strategies to Support Effective Learning")	2020
Cognitive Science Society Annual Meeting, Rumelhart Prize Symposium in honor of Michelene Chi. Invited symposium speaker. "Designing learning environments for effective cognitive engagement." CogSci 2019. July 24-27, 2019. Montreal, Canada.	2019
Visualization in Science and Education (Gordon Research Conference). Invited plenary talk, "From seeing to understanding: The impact of high-level cognitive processes during learning with visualizations." GRC-Viz 2019. July 14-19, 2019. Portland, ME.	2019
Portland Community College Summit for Faculty Teaching Online. Invited talk and workshop: "Quizzes for deep learning." May 3, 2019. Portland, OR.	2019
Instructional Technology Council Network, Invited eLearning Webinar. (Title: Online Assessments as Tools for Deep Learning). October 23, 2018	2017
Utah Valley University Instructional Design Summit, Keynote talk. (Title: "Designing Digital Assessments for Deep Learning")	2017
Center for Teaching & Learning Excellence, Faculty Boot Camp, University of Utah, Invited workshop. (Title: "Using HCI & Learning Science to Improve Digital Organization and Online Assessment)	2017
Center for Teaching & Learning Excellence, Graduate Student Teaching Workshop Series, University of Utah, Invited Workshop (Title: "Learning to Develop Effective Outreach")	2017
Faculty Seminar Series, Molecular Biology Umbrella Program, University of Utah, Invited Talk (Title: "Transforming Teaching using Cognitive Science")	2015
Research Administration NAKAMA Series, University of Utah, Invited Talk (Title: "How Visual Presentations of Multimedia and Educational Technology Impact Cognitive Processes")	2013
J. Willard Marriott Library: Information Visualization Lecture Series, Invited Talk (Title: "Multimedia in the Classroom: How Images and Visual Interactions Promote Deeper Learning")	2013
POGIL (Process Oriented Guided Inquiry Learning) Southwest Regional Workshop: Plenary speaker (Title: "Using Interactive Technologies and Multimedia to Promote Deep Student Learning")	2012
Utah Futures Executive Steering Committee, Utah State Capitol	2011
Utah State University	2010
Brain, Mind, Learning (Scientific Symposium Session): Society for the Advancement of Native Americans & Chicanos in Science (SACNAS)	2008
Indiana University, Bloomington	2007
Kent State University	2007
University of Pittsburgh	2005
Carnegie Mellon University	2005
University of Memphis	2005

ADVISORY BOARD / EXPERT PANEL MEMBERSHIPS & INVITATIONS

Expert Project Team. ACT 2.0: The Next Big Thing (TNBT) Interdisciplinary Planning and Development Team. Natural History Museum of Utah.	2021 - 2022
Advisory Board Member. Meta-Analysis to Support an Integrated Theory of Multimedia Learning: An ECR Synthesis Proposal. PI: Jennifer Cromley (University of Illinois at Urbana-Champaign). NSF ECR grant project.	2017 - 2022
National Advisory Team. Advancing Critical Thinking Project, Natural History Museum of Utah (NHMU).	2013 - 2016
Advisory Board Member. Improving search, sensemaking, learning, and social tagging through a universal appliance for query expansion and meaningful concept displays. *Institute of Museum and Library Services: National Leadership Grant for Libraries.* PI: Xia Lin (Drexel University); co-PIs: Dagobert Soergel (University at Buffalo), Murtha Baca (Getty Research Institute), William Yang (ARTstor)	2011 - 2014
Advisory Board Member. Fostering more effective use of the learning progressions in NSDL Science Literacy Maps. *NSF DUE # 1043169.* PI: Francis Molina (American Association for the Advancement of Science: AAAS); co-PIs: Jo Ellen Roseman (AAAS), Mary Koppal (AAAS)	2011 - 2013
Advisory Board Member. Edited Book: Zheng, R., Hill, R., & Gardner, M. (eds.) (2012). Engaging older adults with modern technology: Internet use and information. Hershey, PA: IGI Global Publisher.	2011
External Evaluator. Robust and efficient learning: Modeling and remediating students' domain knowledge. *NSF, DRL # 0910188.* PI: Albert Corbett (Carnegie Mellon University); co-PIs: Ryan Baker (Worchester Polytechnic Institute), Aaron Mitchell (Carnegie Mellon University)	2010 - 2013
Advisory Board Invitation. Design Characteristics of Effective Online Professional Development: Tools to Support the Common Core State Standards for Geometry. PI: Nanette Seago (WestEd). *Grant submitted to the Institute of Education Sciences.*	*Grant Declined*
Advisory Board Invitation. Efficacy study on the impact of interactive white board technology. PI: Steve Schneider (WestEd STEM Program). *Grant submitted to the Institute of Education Sciences.*	*Grant Declined*
Advisory Board Invitation. Celebrated frogs: Natural science education through the lens of domestic amphibian declines. *Grant submitted to the National Science Foundation: Informal Science Education.* PI: Kenning Arlitsch (University of Utah); co-PIs: Jeff Rice (University of Utah), Laura Hunter (Utah Education Network)	*Grant Declined*
Advisory Board Invitation. Fostering pedagogical content knowledge in weather and climate though online professional development. *Grant submitted to the National Science Foundation Discovery Research K-12.* PI: Francis Molina (AAAS); co-PIs: Ted Willard (AAAS), Mary Koppal (AAAS), Robert Steiner (AMNH), Al Byers (NSTA)	*Grant Declined*
Advisory Board Invitation. Understanding faculty learning through the NSDL: A case study using 'Teach the Earth.' *Grant submitted to the National Science Foundation: National STEM Distributed Learning.* PI: Cathy Manduca (Carleton College).	*Grant Declined*

TEACHING EXPERIENCE

Grant Writing Seminar (EDPS 7960). Educational Psychology. Graduate Seminar. University of Utah.	2021 – current

Advanced Instructional Design (EDPS 6431). Educational Psychology. Undergraduate/Graduate Course. University of Utah.	2014 – current
Educational Applications of Technology (Grades 6-12): Mathematics (EDPS 5151 / 6151). Educational Psychology. Undergraduate/Graduate Course. University of Utah.	2014
Learning with Visual Multimedia and External Representations (EDPS 7851). Educational Psychology. Graduate Seminar. University of Utah.	2013
Integrating Technology II: Science (EDPS 5442/6442). Educational Psychology, Online Undergraduate/Graduate Course. University of Utah.	2010 – 2016
Human Computer Interaction (EDPS 6440). Educational Psychology, Graduate Course: Instructional Design & Educational Technology. University of Utah.	2009 - current
Learning Sciences Seminar (EDPS 7440). Educational Psychology, Graduate Course: Learning Sciences. University of Utah.	2009 - 2014
Using Technology in Diverse Classrooms (EDPS 2140/6141), Regular & Honors Sections. Educational Psychology, Undergraduate/Graduate Course (Required for Pre-service Teachers in Elementary Education). University of Utah.	2008 - current
Introduction to Web-Based Tools and Applications (EDPS 6447). Educational Psychology, Graduate Course: Instructional Design & Educational Technology. University of Utah.	2009
Technology & Cognition: Learning with Multimedia. Institute of Cognitive Science, Graduate Seminar, Co-taught with Dr. Tamara Sumner (CU Boulder). University of Colorado at Boulder.	2005
Cognition and Perception Core. Cognitive Psychology, Undergraduate Core Course. University of Colorado at Boulder.	2001
(Teaching Assistant) *Psychology of Perception*. Cognitive Psychology, Undergraduate Course. University of Colorado at Boulder.	1998
(Teaching Assistant) *Introduction to Psychology*. Psychology Department, Undergraduate Course: University of Colorado at Boulder.	1997

EDUCATIONAL TECHNOLOGY CREDENTIALS

Adobe Certified Associate Visual Design using Adobe Photoshop	2020 - 2023

TEACHING INTERESTS

Comprehension, Learning, and Cognition

Educational Technology, Multimedia, and Instructional Design

Cyberlearning Tools and Services

Technology Integration and Online Instruction for Pre-Service and Practicing Teachers

STUDENT MENTORING

PH.D. STUDENTS

Ph.D. Advisor to Matt Orr, Learning Sciences, University of Utah	2015 -
Ph.D. Advisor to Aaron Dewald, Learning Sciences, University of Utah	2010 - 2023

Ph.D. Advisor to Michelle Hudson, Learning Sciences, University of Utah	2018 - 2022
Ph.D. Advisor to Sarah Davies, Learning Sciences, University of Utah	2011 - 2018
Ph.D. Advisor and Dissertation Committee Chair, Lisa Ferrara, Ph.D. Educational Psychology (Learning and Cognition), University of Utah.	2009 - 2017

SERVICE

PROFESSIONAL SERVICE

GRANT REVIEW PANELS

Principal Member Appointment, Institute of Education Sciences (IES), Basic Processes Education Research - Standing Peer Review Panel (5-year term)	2020-2025
Institute of Education Sciences (IES), Peer Review Panel – Research Network Focused on Critical Problems of Policy and Practice	2023
Institute of Education Sciences (IES), Peer Review Panel – Education Research	2019
Institute of Education Sciences (IES), Ad Hoc Peer Review Panels	2015, 2016
National Science Foundation, Cyberlearning: Transforming Education	2011, 2013, 2014
National Science Foundation, Ad Hoc Grant Proposal Reviewing	2012
National Science Foundation, National Science Digital Library (NSDL)	2007
National Science Foundation, Advanced Learning Technologies (ALT)	2006

EXPERT PANELS

Global Panelist, EDUCAUSE Teaching and Learning Horizon Report 2022	2022

JOURNAL SERVICE

EDITORIAL BOARD MEMBER

Psychological Science	2020 -
Journal of Educational Psychology	2012 - 2021

EDITORIAL BOARD, ASSOCIATE EDITOR

International Journal of Research on Cyber Behavior, Psychology, and Learning	2008 - 2021

AD HOC REVIEWER

Applied Cognitive Psychology	2009, 2013 -
Behavior Research Methods	2011, 2014
Computers and Education	2014 -
Cognition and Instruction	2011 -
Computers in Human Behavior	2017 -
Discourse Processes	2014 -
Instructional Science	2017 -
Learning and Instruction	2010 -
Metacognition and Learning	2020 -

PLOS-ONE	2019
Review of Educational Research	2023 -
Education Research and Reviews	2008
Frontiers in Psychology	2019
Human Computer Interaction (HCI)	2009
IEEE Transactions on Learning Technologies	2016
International Journal on Digital Libraries	2006
Journal of Computer Assisted Learning	2013
Journal of Computer Assisted Learning	2013
Journal of Educational Psychology	2005, 2008 - 2012
Journal of Educational Data Mining	2010
Journal of Learning Analytics	2015
Transactions on Computer-Human Interactions (TOCHI)	2005
Asia Pacific Education Review	2011 - 2018

PEER-REVIEWED ACADEMIC CONFERENCES

International Society of the Learning Sciences Annual Meeting (ISLS 2024), Senior Reviewer.	2024
16th International Conference on Computer Supported Education (CSEDU 2024), Program Committee	2024
American Psychological Association Conference on Technology Mind, Society (TMS). Peer Reviewer.	2021
STEM in Education Conference (STEM 2020), Peer Reviewer.	2020
American Educational Research Association, 2016 Annual Meeting.	2016

- Session Discussant. Paper session: *Examining flipped classroom learning environments. (Division C: Learning and Instruction)*
- Session Discussant. Paper session: *Technology for improving robotics and mathematics learning in early educational settings. (SIG: Technology, Instruction, Cognition, & Learning)*

American Educational Research Association, 2014 Annual Meeting.	2014

- Session Discussant: Paper session: *Presence, Interaction, and Engagement in Learning (Instructional Technology SIG)*
- Session Chair: *Learning on the Go: Mobile Devices in Education (Division C Learning and Instruction)*

American Educational Research Association, 2013 Annual Meeting. Session Discussant: Paper session: *Technology-Mediated Collaborative Inquiry (Division C Learning and Instruction)*	2013
American Educational Research Association, 2012 Annual Meeting. Session Chair:	2012

- *Visual Displays Paper Session (Division C)*
- *Issues in Technology, Instruction, Cognition and Learning Roundtable Session (SIG: Technology, Instruction, Cognition and Learning).*

American Educational Research Association (AERA): Proposal Reviewer	2011 - present

Cognitive Science Conference (CogSci): Proposal Reviewer	2006 - present
Computer Human Interaction (CHI) Conference: Proposal Reviewer	2006, 2007

OTHER ACADEMIC SERVICE

Program Coordinator and Host Institution: Learning, Instruction, and Technology (LIT) Graduate Student Poster Conference. (Mountain region: Boise State University, Brigham Young University, University of New Mexico, Utah State University, University of Utah).	2019

UNIVERSITY, COLLEGE, & PROGRAM

STANDING COMMITTEES AND GROUPS

University of Utah, Chair of the Strategic IT Committee (SITC)	2023 -
University of Utah, College of Education Scholarship Committee	2018 - 2022
University of Utah, Strategic IT Committee (SITC) Member	2017 - 2023
University of Utah, Biodiversity Faculty Cluster	2015 -
University Information Technology (UIT) Teaching and Learning Portfolio Committee Member, University of Utah	2013 -
University of Utah, University Teaching Committee Member	2022 - 2025
University of Utah, Academic Appeals and Misconduct Committee Member	2020 - 2023
University of Utah, Academic Senate: College of Education Senator	2018 - 2021
University of Utah, College of Education, RPT Committee Member	2016 - 2017
University of Utah, College of Education, Undergraduate Degree Committee Member	2016 - 2017
University of Utah, College of Education: Library Representative	2014 – 2015
Innovation Scholar Program, Steering Committee Member, University of Utah	2011 - 2014
Committee for a Technology Enhanced Curriculum, Member, University of Utah	2009 - 2012
College of Education Honors Committee Member, University of Utah	2012 -
Department of Educational Psychology, Learning Sciences Program Committee Member, University of Utah	2009 -
Department of Educational Psychology, Diversity Committee Member, University of Utah	2009 - 2015

TASK FORCES, SEARCH COMMITTEES, AD HOC COMMITTEES

University of Utah, Envision 2030: Innovating the Classroom Experience, Committee Member	2024
College of Education, Chair of the College of Education Strategic Planning Steering Committee, University of Utah.	2024
College of Education, Ad Hoc Committee on Faculty Workload Policy, Member, University of Utah.	2023
College of Education, Associate Dean for Research (*internal search*); Search Committee Member, University of Utah.	2023

Faculty Search – Instructional Design & Educational Technology (Educational Psychology), Chair of Search Committee, University of Utah	2021 – 2022 and 2022 – 2023
College of Education Associate Dean for Faculty & Student Affairs; Search Committee Member, University of Utah	2020 - 2021
College of Education Dean's Search Committee, Co-Chair, University of Utah	2019 - 2020
University of Utah, Taskforce on Educational Futures and Student Success; Education Delivery Working Group	2019
University of Utah, Graduate School, Graduate Council Review Committee	2019
University of Utah, College of Education & Natural History Museum of Utah. Search Committee: Sustaining Biodiversity Cluster (Four interdisciplinary positions)	2015 - 2020
University of Utah, Department of Educational Psychology, Ad Hoc Art Committee	2016
University of Utah, College of Education: Ad Hoc Committee for Research Excellence	2015
University of Utah, College of Education: Information Technology Manager search committee	2014
University of Utah, College of Education: Mathematics Faculty search committee	2014-2016
University of Utah, Search Committee: Marriott Library Associate Dean for Information Technology services	2014
University of Utah, Student Textbook Savings Committee	2014
University of Utah, Educational Psychology Department, Instructional Design & Educational Technology Program, Search Committee: IDET New Faculty.	2013-2014
University of Utah, Marriott Library Classroom Task Force	2013 - 2014
College of Education, Task Force on Multiple Approaches to Course Instruction, University of Utah	2012 - 2013
Project Administration & Management (PAM) Faculty Advisory Committee, University of Utah	2011
College of Education, Research Action Plan Team, University of Utah	2010 -2011

FACULTY MENTORING

Faculty Mentor – University of Utah VP-NSF Cohort Fellowship Program. (Mentee: Yunwen Su, Assistant Professor, World Languages and Cultures)	2022 - 2023
Career Award Mentor - NIH Research Career Development (K) Award to Aubrey Jones (University of Utah, Research Assistant Professor – Pharmacotherapy). *A theory-based practice guide for creating patient education.*	2022 - 2024
Educational Psychology, Faculty mentor to Dr. Tracy Dobie	2018 -
Educational Psychology, Faculty mentor to Dr. Lauren Barth-Cohen	2016 -
Educational Psychology, Faculty mentor to Dr. Eric Poitras	2014 - 2020

PUBLIC SERVICE / COMMUNITY ENGAGEMENT

Utah C-Forum Participant, September 2, 2022. C-Forum gathers technology trainers and staff developers from Utah schools and districts to share ideas, resources, and needs.	2022
Utah EdChat (#UTEdChat). Twitter chat moderator. "Strategies for Online Engagement and Participation." October 6, 2021.	2021

Inclusivity, Diversity, Equity, Access (I.D.E.A.) Symposium, Natural History Museum of Utah. Symposium participant. May 11, 2021.   2021

Lead Judge: 2020-2021 High School Utah Entrepreneurship Challenge (HS UEC)   2021

Natural History Museum of Utah, Teacher outreach workshop co-presenter: Designing Effective Learning Environments Online, November 14, 2020. https://nhmu.utah.edu/educators/workshops/EffectiveOnlineLearning   2020

Lead Judge: 2018-2019 High School Utah Entrepreneurship Challenge (HS UEC)   2019

Project Judge: 2016-2017 High School Utah Entrepreneurship Challenge (HS UEC)   2017

Volunteer Expert Session for Brownie Troop #326. Developed and guided 20 girls through a cohesive set of skill-based digital activities to earn their "Computer Expert" badges at the University of Utah.   2017

Participant and Session Leader: Utah Ed Camp. Annual professional development event to facilitate collaboration and knowledge exchange amount Utah teachers and educators. (Sponsored by UCET.)   2014 - 2019

State Judge Advisor (all areas), Utah FIRST LEGO League Robotics State Championship, Salt Lake City, UT   2013-2016

Qualifying Tournament Judge Advisor, Utah FIRST LEGO League (a robotics & science innovation program for 9-14 year olds). Salt Lake Community College qualifying tournament.   2015-2017

Head Judge (Core Values) and Organizing Committee Member, Utah FIRST LEGO League (a robotics & science innovation program for 9-14 year olds)   2011-2012

Utah FIRST LEGO League Robotics State Championship, Project Judge, Salt Lake City, UT   2011