

Jennifer K. Knight

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Education

B.A. 1989	Cornell University	Biology (Neurobiology and Behavior)
Ph.D. 1994	University of Michigan	Neuroscience, with Pamela Raymond (Development of the goldfish visual system)
Post Doc 1995-1999	University of Colorado	Developmental Genetics, with W.B. Wood (Genetic control of gastrulation in <i>C. elegans</i>)

Academic Appointments

2015-present	Associate Professor	MCD Biology, University of Colorado
2005-2015	Senior Instructor	MCD Biology, University of Colorado
2006-2014	Coordinator	MCD Biology Science Education Initiative
2004-2005	Research Associate (20%)	Science Education, Carl Wieman
1999-2005	Instructor	MCD Biology, University of Colorado
1997	Lecturer	MCD Biology, University of Colorado

Honors, Awards and Fellowships

2019	BFA Excellence in Teaching and Pedagogy Award
2018	Best Should Teach Gold Award for Excellence in Teaching
2015-2016	Boulder Faculty Assembly Leadership Institute Fellow
2016	Chancellor's Award for Excellence in STEM Education: <i>Student thinking about core physiology concepts across a physiology major</i> (with Katharine Semsar)
2010	Chancellor's Award for Excellence in STEM Education (<i>Developing a Capstone Assessment</i>)
2009	Mentor, Biology Scholars Research Residency Program (Scholarship of Teaching and Learning Institute, American Society for Microbiology)
2008	Biology Scholars Research Residency Program
2005	National Academies Education Mentor in the Life Sciences
2004	National Academies Education Fellow in the Life Sciences
2002, 2004	Dean's Fund for Excellence
2004	Council on Research and Creative Work (CRCW) Seed Grant
2001, 2002	Recognition of Influential Professors Award, Committee on Learning and Academic Support Services, University of Colorado.
1996-1998	American Cancer Society Postdoctoral Fellowship: <i>Cell determination in C. elegans</i> .
1995	National Institutes of Health Postdoctoral Fellowship: <i>Cell determination in C. elegans early embryos</i> .

Funding: Active

6/17-5/20	<i>Problem Solving Through Practice: Identifying Common Student Struggles in Solving Complex Biology Problems and Developing Tools to Drive Improvement</i> , PI. NSF DUE 1711348: \$299,718.
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Funding: Completed

1/14-12/19	<i>Collaborative Research: Impact of the Summer Institutes on Faculty Teaching and Student Achievement</i> , PI. NSF DUE 1323019: \$476,146
9/13-8/19	<i>Collaborative Research: Expanding a National Network for Automated Analysis of</i>

- Constructed Response Assessments to Reveal Student Thinking in STEM*, PI. NSF DUE 1323022: \$137,661
- 4/11-8/18 *Dissemination of Scientific Teaching through Summer Institutes*, PI. Regional Institute Director. HHMI 52007221: \$200,000
- 8/15-7/18 *Evaluating the Validity and Instructional Sensitivity of Concept Inventories in Biology*, Co PI. Keck Foundation: \$293,727
- 9/13-8/17 *Collaborative Research: Navigating from Vision to Change with Bio-MAPS*, PI. NSF DUE 1322364: \$153,236.
- 9/13-8/17 *Collaborative Research: A Community of Enhanced Assessment Facilitates Reformed Teaching*, PI. NSF DUE 1347729: \$55,056.
- 6/12-5/15 *Investigating Instructional Influences on the Productivity of Clicker Discussions*, PI. NSF DUE 1140789: \$196,627
- 9/10-8/14 *Collaborative Research: Automated Analysis of Constructed Response Concept Inventories to Reveal Student Thinking: Forging a National Network for Innovative Assessment Methods*, PI. NSF DUE 1022653 (CCLI Phase II Collaborative Proposal): \$84,529
- 6/10-5/11 Chancellor's Award for Excellence in STEM Education: *Development of a capstone concept assessment to measure learning and retention in graduating MCDB students*. \$9,000
- 7/02-6/03 Association of Biology Laboratory Educators Laboratory Initiative Grant: *Using C. elegans in undergraduate laboratories*. \$5000

Service (University of Colorado)

- 2018-present Co-chair, Arts and Sciences Instructor Task Force
- 2017-2019 Boulder Faculty Assembly, MCDB Representative
- 2016 F, 2017 S Transforming Education, Stimulating Teaching and Learning Excellence (TRESTLE) Scholar Program: Faculty Leader
- 2016-2017 Campus Teaching and Learning Committee
- 2013-2019 Boulder Faculty Assembly Instructor Affairs Committee

Service (MCDB department)

- 2012-'14, '15-present MCDB Teaching Evaluation Committee; chair 2018, 2019
- 2014-present MCDB Curriculum Committee
- 2013-present Fellow, Center for STEM Learning, University of Colorado, Boulder
- 2007-2012 University of Colorado TIGER/CIRTL Advisory Board
- 2003-present Faculty Advisor, Alpha Epsilon Delta Pre-Health Honors Society
- 2003-2006, 2013 Pre-health Advisory Committee
- 2002-2015 MCDB Departmental Undergraduate Curriculum Committee (UGCOM)

Professional Service (external)

- 2019-present President, Society for the Advancement of Biology Education Research (SABER)
- 2017-present Genetics Society of America, Education Committee member
- 2017-2019 Steering Committee member, Society for the Advancement of Biology Education Research (SABER)
- 2017-present Genetics Editor, *CourseSource*
- 2013-present Monitoring Editor, *CBE-Life Sci Educ.*

2012-2016	Chair, Abstract Committee, Society for the Advancement of Biology Education Research (SABER)
2013	Contributor, active learning exercises and videos, <i>Biology for a Changing World</i> (W.H. Freeman)
2013	National Academies Summer Institutes Workshop: Entering Biology Education Research; co-leader, with Clarissa Dirks
2012	National Academies Summer Institute Leadership Summit; Leader, Biology Education Research Group
2010	Founding member, Society for the Advancement of Biology Education Research (SABER)
2010	Leader, Biology Scholars Assessment Institute (American Society for Microbiology)
2009-2012	Faculty Workshop Leader, FIRST IV: Faculty Institutes for Reforming Science Teaching (NSF-funded professional development program for postdoctoral fellows)
2007, 2008	Contributor, assessment questions, Praxis Testing Services, Biology Education
2007	Contributor, clicker questions for 20 chapters of <i>Life</i> , 8e (Pearson)
2006-present	Reviewer: Life Science Education (LSE), Journal of Microbiology and Biology Education, Journal of Science Education and Technology.

Publications

- Avena JS and **Knight JK** (2019). Problem solving in genetics: Content hints can help. *CBE Life Sci Educ.* 18:ar23 doi: 10.1187/cbe.18-06-0093.
- Sieke SA, McIntosh BB, Steele MM, **Knight JK** (2019). Characterizing students' ideas about the effects of a mutation in a non-coding region of DNA. *CBE Life Sci Educ.* 18:ar18 doi: 10.1187/cbe.18-09-0173.
- Smith M, Brownell S, Crowe A, Holmes N, **Knight JK**, Semsar K, Summers M, Walsh C, Wright C, Couch B. 2019. Tools for change: measuring student conceptual understanding across undergraduate biology programs using bio-maps assessments. *J. Microbiol. Biol. Educ.* 20(2): doi:10.1128/jmbe.v20i2.1787
- Zagallo P, McCourt J, Idsardi R, Smith MK, Urban-Lurain M, Andrews TC, Haudek K, **Knight JK**, Merrill J, Nehm R, et. al. (2019). Through the Eyes of Faculty: Using Personas as a Tool for Learner-Centered Professional Development. *CBE Life Sci Educ.* 18 (4).
- Couch, BA, Wright CD, Freeman S, **Knight JK**, Semsar K, Smith MK, Summers MM, Zheng Y, Crowe AJ, Brownell SE (2019). GenBio-MAPS: A programmatic assessment to measure student understanding of *Vision and Change* core concepts across general biology programs. *CBE Life Sci. Educ.* 18:arx 1–14, doi: 10.1187/cbe.18-07-0117.
- Semsar K, Brownell SE, Couch BA, Crowe AJ, Smith MK, Summers MM, Wright CD, **Knight JK** (2019). Phys-MAPS: A programmatic physiology assessment for introductory and advanced undergraduates. *Adv Physiol Educ* 43: 15–27, 2019; doi:10.1152/advan.00128.2018.
- Durham MF, **Knight JK**, Bremers E, DeFreece J, Paine A, Couch BA (2018). Student, instructor, and observer agreement regarding frequencies of Scientific Teaching practices using the Measurement Instrument for Scientific Teaching-Observable (MISTO). *IJ STEM Ed* 5: 31. doi.org/10.1186/s40594-018-0128-1
- Pelletreau K, **Knight JK**, et al. (2018). A Faculty Professional Development Model That Improves Student Learning, Encourages Active-Learning Instructional Practices, and Works for Faculty at Multiple Institutions. *CBE Life Sci. Educ.* 17(2) doi.org/10.1187/cbe.17-12-0260.
- Summers MM, Couch BA, **Knight JK**, et al. (2018). EcoEvo-MAPS: An Ecology and Evolution Assessment for Introductory through Advanced Undergraduates. *CBE Life Sci. Educ* 17(2) doi.org/10.1187/cbe.17-02-0037.
- **Knight JK**, Brame CJ (2018). Evidence-Based Teaching Guides: Peer Instruction. *CBE Life Sci. Educ.* 17(2) doi.org/10.1187/cbe.18-02-0025.
- Shi J, **Knight JK**, Chun H, Guild NA, Martin JM (2017). Using Pre-Assessment and In-Class Questions to Change Student Understanding of Molecular Movements. *J. Microbiol. Biol. Educ.* 18(1):18.1.3. doi:10.1128/jmbe.v18i1.1195.
- McCourt JS, Andrews TC, **Knight JK**, et al (2017). What Motivates Biology Instructors to Engage and Persist in Teaching Professional Development? *CBE Life Sci. Educ.* 16(3):ar54. doi:10.1187/cbe.16-08-0241.
- Durham MF, **Knight JK**, Couch BA (2017). Measurement Instrument for Scientific Teaching (MIST): A Tool to Measure the Frequencies of Research-Based Teaching Practices in Undergraduate Science Courses. *CBE Life Sci Educ.* 16:ar67. doi: 10.1187/cbe.17-02-0033.

- Pelletreau, K.N., Andrews, T., Armstrong, N., Bedell, M.A., Dastoor, F., Dean, N., Erster, S., Fata-Hartly, C., Guild, N., Greig, H., Hall, D., **Knight, J.K.**, Koslowsky, D., Lemons, P.P., Martin, J., McCourt, J., Merrill, J., Moscarella, R., Nehm, R., Northington, R., Olsen, B., Prevost, L., Stoltzfus, J., Urban-Lurain, M., and Smith, M.K. (2016). A clicker-based study that untangles student thinking about the processes in the central dogma. *Course Source* Vol 3.
- **Knight JK**, Wise SB, Sieke S (2016). Group random call can positively affect student in-class clicker discussions. *CBE Life Sci. Educ.* 15(4).
- Prevost LB, Smith MK, **Knight JK** (2016). Using student writing and lexical analysis to reveal student thinking about the role of stop codons in the central dogma. *CBE Life Sci. Educ.* 15(4).
- Batzli JM, **Knight JK**, Hartley LM, Cordero Maskiewicz A, Desy E (2016). Crossing the Threshold: Bringing Biological Variation to the Foreground. *CBE Life Sci. Educ.* 15(4).
- Couch BA, **Knight JK** (2015). A Comparison of Two Low-Stakes Methods for Administering a Program-Level Biology Concept Assessment. *J. Microbiol. Biol. Educ* 16, 178-185.
- Couch BA, Brown TL, Shelpat TJ, Graham MJ, **Knight JK**. (2015) Scientific Teaching: Defining a Taxonomy of Observable Practices. *CBE Life Sci. Educ.* 14, 1-12
- Couch BA, Wood WB, **Knight JK**. (2015) The Molecular Biology Capstone Assessment: A Concept Assessment for Upper-Division Molecular Biology Students. *CBE Life Sci. Educ.* 14,1-11.
- **Knight JK**, Wise SB, Rentsch J, Furtak EM (2015). Cues Matter: Learning Assistants Influence Introductory Biology Student Interactions during Clicker-Question Discussions. *CBE Life Sci. Educ.* 14, 1-14.
- **Knight JK**, Wise, SB, Southard KM (2013). Understanding clicker discussions: student reasoning and the impact of instructional cues. *CBE Life Sci. Educ.* 12, 645–654.
- **Knight, JK**, Wood, WB, Smith, MK. (2013). What's downstream? A set of classroom exercises to help students understand recessive epistasis. *Journal of Microbiology and Biology Education* 14, 197-205.
- Prevost, LB, **Knight, JK**, Smith, MK, Urban-Lurain, M (2013). Student writing reveals their heterogeneous thinking about the origin of genetic variation in populations. In Proceedings of the National Association for Research in Science Teaching (NARST) annual conference. Rio Grande, Puerto Rico.
- Hoskinson, A-M, Cabalero, MD, **Knight JK** (2013) How Can We Improve Problem-solving in Undergraduate Biology? Applying Lessons From 30 Years of Physics Education Research. *CBE Life Sci. Educ.* 12: 153-161.
- Smith, MK and **Knight, JK** (2012). Using the Genetics Concept Assessment to Document Persistent Conceptual Difficulties in Undergraduate Genetics Courses. *Genetics* 191, 21–32.
- Haudeck KC, Kaplan, JJ, **Knight JK**, Long, T, Merrill, J, Munn A, Nehm R, Smith MK, Urban-Lurain M (2011). Harnessing Technology to Improve Formative Assessment of Student Conceptions in STEM: Forging a National Network *CBE Life Sci Educ* 10, 149-155
- Semsar K, **Knight JK**, Birol G, Smith MK (2011). The Colorado Learning Attitudes about Science Survey (CLASS) for use in Biology. *CBE Life Sci. Educ* 10, 268-278.
- Smith MK, Wood, WB, Krauter, K, **Knight JK**. (2011). Combining Peer Discussion with Instructor Explanation Increases Student Learning from In-class Concept Questions. *CBE Life Sci. Educ.* 10, 55-63.
- Shi J, Wood WB, Martin JM, Guild NA, Vincens Q, **Knight JK**. (2010). A Diagnostic Assessment for Introductory Molecular and Cell Biology. *CBE Life Sci. Educ.* 9, 453-461.
- **Knight JK** and Smith MK (2010). Different but equal? How non-majors and majors approach and learn genetics. *CBE Life Sci. Educ.* 9, 34-44.
- Smith MK, Wood WB, Adams WK, Wieman C, **Knight JK**, Guild NA, Su TT (2009). Why peer discussion improves student performance on in-class concept questions. *Science* 323, 122-124.
- Smith, MK, Wood, WB, **Knight, JK** (2008). The Genetics Concept Assessment: A New Concept Inventory for Gauging Student Understanding of Genetics. *CBE Life Sci. Educ.* 7, 422-430.
- **Knight, JK** and Wood, WB (2005). Teaching more by lecturing less. *CBE Life Sci. Educ.* 4, 298–310.
- **Knight, J.K.** and Wood, W.B. (1998). *gad-1* is required for gastrulation initiation in *C. elegans* and encodes a protein with WD repeats. *Dev. Biol.* 198, 253-265.
- Powell-Coffman, JA, **Knight, JK**, Wood, WB (1996). Onset of *C. elegans* gastrulation is blocked by inhibition of embryonic transcription with an RNA polymerase antisense RNA. *Dev. Biol.* 178, 472-483.

- **Knight, JK**, Raymond, PA (1995). Retinal pigmented epithelium does not transdifferentiate in adult goldfish. *J. Neurobiol.* 27, 447-456.
- Raymond, PA, Barthel, LK, Rounsifer, ME, Sullivan, SA, **Knight, JK** (1993). Expression of rod and cone visual pigments in goldfish and zebrafish: a rhodopsin-like gene is expressed in cones. *Neuron* 10, 1161-1174.
- **Knight, JK**, Raymond, PA (1990). Time course of opsin expression in developing rod photoreceptors. *Development* 110, 1115-1120.

Conference Proceedings

- Wood, WB and **Knight, JK** (2004). Teaching large biology classes: active-engagement alternatives to lecturing and evidence that they work. *Molecular Biology of the Cell* 15, S338a.
- **Knight, JK**, (2004) Using the worm, *Caenorhabditis elegans*, in undergraduate genetics and developmental biology laboratories. *in: Tested Studies for Laboratory Teaching, Conference Proceedings of the Association for Biology Laboratory Education (ABLE), Volume 26.*
- **Knight, JK** and Wood, WB (2002). Student discussion of journal articles in a class of >60. *Dev. Biol.* 247, 408.

Invited Review

- **Knight JK.** (2010). Biology Concept Assessment Tools: Design and Use. *Microbiology Australia* 31(1), 5-8.

Books and Book Chapters

- Smith MK and **Knight JK** (in press). Clickers in the Biology Classroom: strategies for writing and effectively implementing clicker questions that maximize student learning. In J.J. Mintzes and E.M. Walter, Eds. Active learning in college science: The case for evidence based practice. Berlin: Springer Nature.
- Dirks C, **Knight JK** (2016). Measuring College Learning in Biology. *in Improving Quality in American Higher Education: Learning Outcomes and Assessments for the 21st Century*, Jossey-Bass, San Francisco CA.
- Mari-Beffa, M and **Knight, JK** eds. (2005) Key Experiments in Practical Developmental Biology. Cambridge University Press.

Invited Talks

2019 September Colorado School of Mines, invited faculty seminar

2019 October Washington University, Center for Integrative Research on Cognition, Learning, and Education, invited faculty seminar

2019 December Vanderbilt University, Biology Dept invited faculty seminar

2018 December Case Western Reserve University, invited faculty seminar, Neuroscience Dept.

2018 October Cornell University, invited talks for Center for Teaching Innovation
 2018 February UC Santa Cruz, Biology department, invited faculty seminar
 2017 October Scientific Teaching Webinar; Yale Center for Teaching and Learning
 2017 July ASMCUE Denver; invited plenary: Evidence-based methods to improve student learning
 2017 January UC San Diego, Dept. Biology faculty seminar
 2017 January UC Irvine SABER West invited workshop and talk
 2017 February University of Utah, Dept. Biology faculty seminar
 2016 West Virginia University, Dept. Biology, faculty seminar
 2016 University of North Texas, Dept. Biology, faculty seminar
 2016 University of Maine Center for RISE workshop and invited conference talk
 2016 Harvard University Medical School, seminar for Curriculum Fellows Program
 2016 Yale University Summer Institute Leaders Meeting
 2015 University of Tennessee, Dept. Biology faculty seminar
 2015 Iowa State, Dept. Biology faculty seminar
 2015 University of Georgia, Department of Genetics, faculty seminar
 2015 University of Minnesota, Department of Biology Teaching and Learning, faculty seminar
 2015 University of Northern Colorado, Department of Biology, faculty seminar
 2014 Colorado State University, Department of Biology, faculty seminar
 2014 University of North Carolina Chapel Hill, Department of Biology, faculty seminar and workshop
 2014 Yale University; faculty workshop and keynote speaker
 2014 Arizona State University, two workshops on active learning and assessment
 2013 Society for the Advancement of Biology Education Research, U. of Minnesota, Keynote Speaker
 2013 Wayne State University, Backward design workshop
 2013 University of Wyoming Department of Biology, faculty seminar
 2013 University of Richmond Department of Biochemistry, faculty seminar
 2013 St. Mary's College of Maryland, Biochemistry and Molecular Biology Workshop invited speaker
 2013 Colorado State University Department of Biology, Teaching workshop
 2013 University of Colorado, Denver, Department of Biology, faculty seminar
 2012 Experimental Biology Meeting, San Diego CA, invited speaker
 2012 University of Washington Medical School AWARE Retreat: Plenary Speaker and workshop presenter
 2012 University of Northern Colorado, Department of Biology, faculty seminar
 2012 Introductory Biology Program Conference, Washington DC, invited speaker
 2012 University of Maine, Department of Biology, faculty seminar
 2012 Southeast Summer Institute on Undergraduate Education in Biology, invited speaker
 2011 University of New Mexico Medical School Active Learning Workshop, invited speaker and workshop
 2010 Case Western University Department of Biology, faculty seminar
 2010 American Society for Microbiology Undergraduate Educators, invited Plenary Speaker
 2010 University of Georgia, Department of Plant Biology, faculty seminar
 2010 University of New Mexico, Department of Biochemistry, faculty seminar
 2007 Biology Leadership Conference (sponsored by Pearson), invited speaker.
 2006 to present Faculty Teaching Excellence Program, University of Colorado, workshop presenter
 2005 Improving Biology Education: Theory & Practice (sponsored by W.H. Freeman), invited speaker

Teaching Activities

Postdoc advisor to:

Michelle Smith	2006-2010; Current position: Assistant Professor, University of Maine
Jia Shi	2006-2009; Current position: Instructor, Integrative Physiology, U. of Colorado
Sarah Wise	2009-2010; Current position: Science Teaching Fellow, EBIO, U. of Colorado
Brian Couch	2011-2014; Current position: Assistant Professor, University of Nebraska, Lincoln
Jeremy Rentsch	2014-2015
Kate Semsar	2014-2016

Jennifer Avena 2015-current
Betsy McIntosh 2017-2018
Melanie Peffer 2019-current

Graduate student advisor to

Alex Paine 2016-present
Gretchen Wettstein 2017-2019

Main Research Advisor to Undergraduate Honors Students

Austin Hammermeister Suger: present
Tassa Ruoff '01, Summa Cum Laude, MCD Biology, University of Colorado
Nicholas Breitnauer '09, Summa Cum Laude, General Honors, University of Colorado

Undergraduate Honors Student Committees: served on 17 since 2003

Undergraduate Research Students supervised: 30 since 2006

Teaching supervised: Learning Assistants in the University of Colorado Learning Assistant: 25 since 2005, in courses MCDB 1030, MCDB 1041, MCDB 2150, and MCDB 4650

Formal Teaching

Current courses:

MCDB 2150 Principles of Genetics	Spring semesters: 2015-present
MCDB 4650 Developmental Biology	Fall and Spring semesters 1999-2007; Spring semesters 2007-2013, Fall 2017 -present
MCDB 5650 Teaching and Learning	once per academic year 2010-2017

Previously taught courses:

MCDB 1041 Fundamentals of Human Genetics; Spring semesters 1999-2014
MCDB 3650 The Brain, from Molecules to Behavior; Fall semesters 2007-2014
MCDB 4660 Developmental Biology Lab; Fall and Spring semesters 1999-2007
MCDB 4790 Experimental Embryology; Spring semesters 2014, 2015
CIRTL Network Synchronous Online Instructor: "Research Mentor Training", Fall 2010, with
Christine Pfund, University of Wisconsin Delta Program