

Kenneth C. Walsh

Director of Project BoxSand and the Lightboard Studio at the Physics Department of Oregon State University

Education and Employment

Education

- Ph.D. (2010)** Physics, Oregon State University, Corvallis OR, USA
Thesis “Electronic Structure Calculations of Free Atoms and Atoms Immersed in a Metal”
Advisor: Henri Jansen
- B.S. (2003)** Physics, Oregon State University, Corvallis OR, USA
Thesis “Thermodynamic Efficiency Calculations of Micro-fluid Flow”
Thesis Advisor: Deborah Pence
- B.S. (2003)** Engineering (mechanical focus), Oregon State University, USA

Professional Appointments

- 2016 – Present Senior Instructor – Department of Physics, Oregon State University
- 2011 – 2016 Instructor – Department of Physics, Oregon State University
- 2009 – 2011 Adjunct Professor – Natural Science Department, Western Oregon University
- 2009 – 2011 Summer Instructor – Department of Physics, Oregon State University
- 2010 Instructor – Department of Physics - Linn Benton Community College
- 2005 – 2009 Teaching Assistant – Department of Physics – Oregon State University
- 2004 Research/Teaching Assistant – Department of Physics – Oregon State University
Advisor: Kenneth Krane

Teaching, advising and other assignments

Curriculum Development

- 2016 – present: Course Integration with Online Resources (OSU): Project BoxSand is a grant funded venture to create a website with the best open (free) resources on the web and a trove of custom OSU-created content. Students are guided through the resources with the *Daily Learning Guide* and tracked, allowing us to study correlations with their engagement with material outside of class and performance in the class.
- 2015/16 AY: Learning Assistant Program for the General Physics Sequence (OSU): after a pilot program in Winter of 2015, and through the support of the Integrated Biology general pedagogy training, I created a LA program in the introductory 20x sequence. I train LA's in physics-specific pedagogy and they assist me in the flipped classroom lectures, in homework help sessions, and by moderating online resources.
- Summer & Fall 2015 Project BoxSand (OSU): Developed proof-of-concept online resource for delivery of the topic of forces. This project explores whether students can learn from open source online content without the proprietary textbook. The site tracks when and what content students access to learn about how they engage with the site.
- 2014/2015 AY: Flipped the General Physics Sequence Lectures (OSU): Created a flipped classroom curriculum for the introductory sequences. Development entailed, but was not limited to:
- Creating pre-lecture videos to deliver the traditional lecture content

- Developing pre- and post-lecture online assignments for every class session
- Creating in-class engagement activities, mostly clicker questions, to tell the story of physics without a traditional lecture
- Implementing the use of digital pen interfaces to provide online access to all videos, notes, worksheets, homework, and solutions.

- Winter 2014 Explore the Thermodynamic Space (OSU): an exploratory, station-based discovery lab to address students' struggles with connecting theoretical models in thermodynamics to real world experiments and systems.
- 2013/14 AY: General Physics with Calculus Reform Focus Group (OSU): Re-organized the sequence of topics taught in the PH 21x series with special emphasis on rotational mechanics.
- 2005 Winter & Spring: Modern Physics Lab Reform (OSU): Changed and added material presented in the laboratory, created online repository of visual learning aids, developed Maple code for visualizing waves across boundaries.
- 2009 – 2012 Studio-Style General Physics (WOU): Given complete autonomy on all curriculum decisions, I developed a studio style curriculum for both algebra and calculus based introductory sequences.

Professional Development of Teaching Skills

- Oct 2017 Oregon American Association of Physics Teachers Fall Meeting: Attended session on physics education with emphasis on the state level. Portland, OR, Role: Oregon Rep
- July 2017 American Association of Physics Teachers National Summer Meeting: Attended and presented on Physics Education Research talks. Cincinnati, OH, Role: Participant
- May 2017 10th Annual Ecampus Faculty Forum: Attended sessions on “Shaping the World of Online Ed through Research” and attended a workshop on “Research Design for Teaching, Learning, and Technology Projects”. OSU, USA. Role: Participant
- Feb 2017 American Association of Physics Teachers National Winter Meeting: Attending session on a host of Physics Education Research based talks. Atlanta, GA. Role: Participant
- June 2016 American Association of Physics Teachers New Faculty Workshop: The nation’s premier workshop targeted at training new physics faculty. Multiday event full of every facet of teaching. College Park, MD. Role: Participant
- Varied Teaching Seminar: Physics department seminar on teaching strategies like active engagement, Socratic methods, and physics pedagogy. Oregon State University, USA. Attended: Fall 2004, Spring 2005, Winter & Spring & Fall 2015. Role: Participant
- March 2015 Pearson Physical Sciences Forum: Introduced to new innovations in publisher content, engaged in focus groups on curriculum, pedagogy and resources. Pearson Headquarters, San Francisco, USA Role: Participant
- Winter 2015 Cross Discipline Weekly Pedagogy Meetings: Met to discuss best practices with educators from across the sciences; Physics, Integrated Biology, Chemistry, and Math. Oregon State University, USA Role: Participant
- Spring 2014 CTL Teaching Triads: worked with Mary Beisiegel (Math) and Alex Greaney (Engineering) on peer evaluations of teaching. Oregon State University, USA Role: Participant
- Winter 2014 Physics Department Teaching Trios: worked with Oksana Ostroverkhova and Bo Sun on peer evaluation of teaching. Oregon State University, USA Role: Participant
- May 2014 Eric Mazur workshop on peer learning. Oregon State University, USA Role: Participant

March 2014	Pearson Physical Sciences Forum: New innovations in publisher resources, focus groups on curriculum and pedagogy. New Orleans, USA	Role: Participant
July 2006	“Quantum Mechanics in the Paradigms” Summer Faculty Workshop. Oregon State University, USA.	Role: Participant
Spring 2004	Teaching Assistant Seminar: Physics department seminar on skills and practices. Oregon State University, USA	Role: Participant

Graduate and Undergraduate Student Trainees

Teaching Apprenticeships

Jay Howard	Spring 2016	Flipped classroom lesson development on circuits, homework and exam writing, OSU
Morgan Brown	Winter 2016	Flipped classroom lesson development: mathematical modeling of masses on springs, OSU
Ryan Scheirer	Winter 2015	Flipped classroom lesson development, homework and exam writing, OSU
Andrew Stickel	Fall 2014	Flipped classroom lesson development, homework and exam writing, OSU

Curriculum Development

Ikiaka Mckeague-Mcfadden, Tymotheny Mangan	Summer 2015	Project BoxSand: funded positions where students' tasks were searching and filtering of online mechanics resources, organization of content, website development, and some wordsmithing, OSU
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Student Contributed Open Resources

Mackenzie Raschko, Caitlyn Buswell, Jacob Smith, Kayla Epperly, Celine Mjalby, Mariana Colussi-Pelaez, Cade Trotter	Summer 2017 - present	Recognizing an untapped synergistic resource I've been working with students to create open resources for teaching physics. This includes concept maps, infographics, problem examples, lightboard videos, and more. OSU
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Research Experience

Ikiaka Mckeague-Mcfadden	Spring 2017	Analysis of BoxSand student surveys and an experiment in student's engagement with simulations
Henry Nguyen, Alexis Amatisto, Ryan Todd	Fall 2016	The relationship Between L.A.H.H.H. and Office Hours on Student's Exam Scores
Justin Moss, Alyssa Becker, Christina Moody	Fall 2016	Prior Physics Knowledge Effects on Class Performance
Liam Contino, Christopher Dang, Amandip Singh, Drew Turner,	Fall 2015	Efficacy of the LA homework help sessions on student's performance, OSU
Lisa Corley, Mason Crow, Sam Moshofsky, Brandon Wick	Fall 2015	Effects of university-sponsored learning such as Supplemental Instruction and the Wormhole on students' performance, OSU

Undergraduate Thesis Advisor

Jake Bigelow	Current	BoxSand correlation data mining on students engagement with digital resources
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Ryan Ball	Current	BoxSand correlation data mining on students engagement with digital resources
Allyson Petersen (OSU)	AY 2017	Students' engagement with pre-lecture videos correlations with grades
Tallon Korn (OSU)	AY 2017	Overall engagement with course content correlations with grades
Shawn Decker (WOU)	AY 2010	Angular momentum coupling and energy comparisons of non-spherical atoms, instabilities in system convergence for closely lying triplet states, (Graduated from OSU with a PhD in Chemistry)

Senior Project Advisor

Max Moulds, Anya Lehman, Samuel Morey (OSU)	AY 2018	Project BoxSand Web Development: OpenStax Tutor, dashboards, inventory of mastery, AsynSync
Laura Waight (WOU)	AY 2010	Curriculum development: bridging the gap between math and physics for intro physics students, multiple representations, Graduation 2010)

Team or Collaborative Efforts

2017/2018 AY

I worked with a cross-discipline group of educators on a third Action Research Fellowship. We all have separate projects but meet and share ideas around the scholarship of teaching and learning.

Sam Mckegeen and national level team of experts are building a Physics for Life Science Porthole. I have been testing and providing feedback on the system and its features.

The APLU funded Math 111 redesign team has been redesigning their curriculum and many of their new methods are based off presentations and observations of my Flipped classroom curriculum.

I continue to attend events hosted by the Center for Teaching and Learning and the ESTEME group including Faculty, Food, and Fun and other Symposiums.

I've continue my collaborations supporting LAs and Supplemental Instruction students.

2016/2017 AY

My second Action Research Fellowship has found me working with other STEM teachers on Evidence Based Instructional Practices. We meet and share ideas guided by the ESTEME project.

I have helped John Griffis from the OSU Cascades Campus develop an interim PH2xx series. This has included support on curriculum, resources, and advice.

The Math department is going through a curriculum and overall class restructure of their 11x series. They are implementing a more engaged class experience and I have been consulting with them on this change. I presented to them on my flipped classroom then they have been visiting my class and following up with questions.

Dr. Sam McKagan and a group from the University of Maryland, College Park are developing an online portal for resources to teach Introductory Physics in the Life Sciences. They spent an entire day interviewing me, observing my class and my MCAT prep group meeting.

Dr. Dan Rockwell (Math) and I are building a Light Board studio and making lecture videos to supplement the flipped classroom. During spring of 2017 over 10 videos were produced, including 1 video by a student and 2 videos during a high school outreach event.

I continue to attend events hosted by the Center for Teaching and Learning and the ESTEME group including Faculty, Food, and Fun and their Symposiums. I also continue collaborations supporting LAs and Supplemental Instruction students.

2015/2016 AY

I continued to engage with the Center for Teaching and Learning (CTL), attending a meeting/workshop once or twice a term. I received an Action Research Fellowship (ARF) through the CTL and the Enhancing STEM Education (ESTEME) group, which includes working with educators from most of the sciences and some of the engineering disciplines and research projects to improve our classes. I am the PI for the BoxSand project connected to the ARF, and team members include Henri Jansen, Andrew Stickel, Ann Sitomer, and Kathy Quardokus.

I started the Learning Assistant program in the General Physics sequence through collaborations with Integrated Biology. LA's are trained in general teaching pedagogy in the IB program, then in physics specific content and pedagogy by me. They help answer students' questions in the flipped lectures, hold homework help sessions, and moderate online help forums. I was successful in lobbying for LA's to be an established paid position, helping to codify the program.

I continued to work with the Supplemental Instructors who provide study tables for my students.

I helped Rebecca Webb from the OSU Cascades Campus to develop an interim PH20x series. This included support on curriculum, resources, and advice.

2014/2015 AY

I presented with Dr. Devon Quick on the use of technology in the classroom at the CTL's fall symposia. I also started my continuing collaboration with the CTL and the ESTEME group, attending events aimed at bringing together educators from Science and Engineering to improve undergraduate education in those fields. Ann Sitomer from the Center for Research for Life Long STEM Learning attended my lectures and did the out of class activities for two weeks during winter term to learn more about my flipped classroom approach. She provided evaluations and feedback. During fall term I also met weekly with educators from the STEM fields to discuss best practices in the lower level undergraduate courses.

I participated with Mary Beisiegel (Math) and Alex Greaney (Engineering) in the CTL's Teaching Triads peer evaluation program in Spring of 2014. I also participated with Oksana Ostroverkhova and Bo Sun in the Physics Department's Teaching Trios peer evaluation program.

I worked with the Supplemental Instructors who provide study tables for my students.

2013/2014 AY

I began working with Marjorie Coffey, the director of Supplemental Instruction. This program provides study tables for large enrollment science courses and I started the General Physics sequence use of this service.

I collaborated with researchers from UW-Madison on their study of STEM courses and data driven decision making. They studied my class by attending lectures and interviewing me and the students.

I worked closely with Skye Dorsett, a new instructor in the Physics Department, training and supporting him on teaching the large lecture classes and navigating the department and university rules and procedures.

2012/2013 AY

I co-taught with Jim Ketter different sections of the General Physics with Calculus class, coordinating all homework, labs, recitations, and exams.

Advising

I've been an informal advisor to hundreds of students over the years. I've advised students through everything from a tough year of physics, to how to evaluate fundamentally different career paths, to periods of suicidal tendencies, where I directed them to professional help. I typically write between 10 and 20 letters of recommendation to medical, veterinarian, pharmacy, and physics therapy schools on the behalf of my students each year. I also write between 5 and 10 other recommendations for scholarships, awards, graduate school, research positions, and jobs for undergraduate and graduate students each year.

Scholarship and Creative Activity

Publications

I intend to publish the results from Project BoxSand which is currently in the stage of IRB-approved data collection.

Professional Meetings, Conferences, Colloquia, Symposia, and Ceremonies

1. OSU Physics Department Colloquium, OSU: Invited Speaker, "*Confessions of a Former Lecturer: Evidence-based Reform in the Introductory Physics Sequence*" (Fall 2017)
2. American Association of Physics Teachers National Meeting, Cincinnati, OH: Contributed Talk, "Project BoxSand: Educational Data Mining and Student Web Behavior" (Summer 2017)
3. American Association of Physics Teachers National Meeting, Cincinnati, OH: Contributed Poster, "Project BoxSand: What do Students Do When I'm Not Looking" (Summer 2017)
4. Northwest Regional Learning Assistant Alliance Workshop, OSU: Panel Member, "The LA Experience: A Panel Discussion with LA Faculty" (Summer 2016, 2017)
5. Winter Oregon AAPT meeting, OSU: Hosted the event; ran a round table discussion on how to reach out to new and old members; initiated a program to record and stream future talks (Winter 2017)
6. Math 11x Course Reform Committee, OSU: Invited presenter, "Flipped Classroom Model for Large Traditional Lectures" (Winter 2017)
7. Oregon American Association of Physics Teachers Fall Meeting, Pacific University, Forest Grove, OR: Invited presenter, "*Project BoxSand: Tour of the Web Resource*" (October 2016)
8. Action Research Fellowship Poster Session, OSU: Invited presenter, "Project BoxSand: Three and a Half Week Long Study on Student Engagement with Online Resources" (May 2016)
9. Oregon American Association of Physics Teachers Winter Meeting, LBCC, Albany OR: Invited presenter, "*Learning Assistants (LAs): Simple, Easy, and Effective*" (March 2016)
10. Center for Teaching and Learning Spring Symposium, OSU: Invited presenter, "*Confessions of a Former Lecturer*" (Spring 2016)
11. College of Science Teaching and Advising Awards, OSU: Invited presenter, "*Project BoxSand*" (Winter 2016)
12. Oregon American Association of Physics Teachers Fall Meeting, Vernier, Portland, OR: Invited presenter, "*Confessions of a Formal Lecturer; One Year in and the World has not Collapsed*" (October 2015)
13. Center for Teaching and Learning Symposia, OSU, Corvallis, OR: Invited presenter, "*How Digital Technologies Have Improved Our Classrooms*", with Devon Quick (October 2014)
14. Guest Science Lecture Series, Western Oregon University, Monmouth, OR: Invited presenter, "*Modeling Atoms*" (April 2009)
15. Northwest American Physical Society Annual Meeting, Lewis and Clark College, Portland OR: Presented a method for calculating the total electronic energy of non-spherical atoms, dealing with instabilities in the solutions, and extending the model to atoms immersed in an electron gas. (May 2008)

Funding

Current/Past Awarded Fellowships and Grants

PI: Walsh OSU Ecampus Introductory Physics Sequence, Ecampus, OSU To build an Evidence-based Active Engagement Online Introductory Physics Series	2018 \$101,500
PI: Walsh Ecampus Research Fellowship, Ecampus, OSU Project BoxSand: <i>Correlation Data Mining Students' Engagement with Open Resources to Inform Meaningful Interventions</i>	2018 \$20,000
PI: Walsh Action Research Fellowship, ESTEME Group (funded by the WIDER grant), OSU Project BoxSand: <i>Development of a Longitudinal Educational Data Mining Study on Student Engagement with BoxSand.org Online Resources</i>	2018 \$3,000
PI: Walsh Open Educational Resources – Open Oregon State RFP Supporting the development and adoption of Open Resources on the BoxSand.org site and the creation of an Open Source Textbook from those materials	2017 \$30,000
PI: Lindsay Biga Learning Innovation Grant, OSU Funds given to my Lightboard Studio to support technological improvements	2017 \$5,000
PI: Walsh Professional Faculty Development Funds AAPT National Meeting, Winter 2017: Matching funds to support attending the meeting	2017 \$1,000
PI: Walsh Learning innovation Grant, OSU Light Board Studio: Build a studio for making lecture videos	2017 \$8,640
PI: Walsh Action Research Fellowship, ESTEME Group (funded by the WIDER grant), OSU Project BoxSand: <i>Developing a Systematic Study of How Students' Access to Online Resources Correlates with Performance in Introductory Physics</i>	2017 \$3,000
PI: Walsh Learning innovation Grant, OSU Project BoxSand: Funds to create a website with all the best open source resources found around the web and at OSU. Tracking students' access to the content for study.	2016 \$10,000

PI: Walsh	2016
Action Research Fellowship, ESTEME Group (funded by the WIDER grant), OSU	\$3,000
Project BoxSand: <i>Performance Correlations of Student Engagement with Online Learning Tools</i>	
PI: Andrew Wheeler, Technology Recipient: Walsh	2015
Technology Resource Funds, OSU	~\$1500
Awarded 5 Surface tablets for use by LAs, TAs, and students in my courses	
PI: Walsh, co-PI: Jansen	2015
L.L. Stewart Faculty Development Fund, OSU Foundation	\$4,400
Project BoxSand: <i>Performance Correlations of Student Engagement with Online Learning Tools</i>	
co-PI: Bonar, Quick, Biga, Kayes, Zee, Walsh, Coffey	2015
TRF Learning Innovation Grant, OSU	\$9,820
3D Applications and Interactive Tablets for Supplemental Instruction	

Professional Working Groups

Lower Division Working Group – I started and chaired a group of department faculty to develop shared teaching resources, including worksheets and class activities. (2016 – present)

Geometry of Learning Study – working with Technology Across Curriculum to investigate how physical space in the lecture halls, like room orientation and seating choices, influence learning.

Role: Participant, acquired all data on my students seating choices throughout the year (2015 – 2016)

Learning Assistant Research Projects – LA's perform a research project on the class they serve as part of their training. They present these projects at a poster session hosted by Integrated Biology.

Role: Student Advisor, Participant, (2015)

Insights into Course Planning, Classroom Teaching, and Student Experiences in STEM Courses – Researchers (Hora, Bouwma-Gearhart, Oleson, Collins) from UW-Madison studied STEM classes from around the country to track the processes of data-driven decision making in higher education. My class was chosen, and I helped facilitate their data collection.

Role: Participant, (2013)

Service

Department Service

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| 1. Lower Division Committee | 2012, 2013, 2014 – present (chair) |
| 2. eCampus PH20x Planning Committee | 2017 - present |
| 3. OSU Cascades Campus Hiring Committee | 2016 - present |
| 4. PER Scheduling Committee | 2016 - present |
| 5. Faculty Chair Search: I Provided Input | 2014 |
| 6. Physics 21x Textbook Review Group Member | 2013 |
| 7. Graduate TA, Paradigms in Physics Committee | 2006 |
| 8. Graduate Student Committee for P&T | 2005 |
| 9. Graduate Student Committee, Faculty Search | 2004 |

University Service

1. College of Science Online Education Planning Committee 2016
2. PI Day – Pie DR. Walsh in the face - Fundraiser for Edible Corvallis, hosted by the MLC 2016
3. Promotion and Tenure evaluation of Kristin Ziebart, Chemistry, Senior Instructor 2016
4. Promotion and Tenure evaluation of Danial Rockwell, Math, Senior Instructor 2016
5. College of Science Fall 2014 Social: Introduced the Physics department 2014

National Service

1. American Association of Physics Teachers, Oregon Section Representative 2017 - present

Service to the Public (professionally related)

oSUPREMEd

- I gave three lectures on Modern Physics, primarily focused on preparing pre-meds for the MCAT exam. These are open to all students and the public. (Spring 2013 - 2016)
- The venture expanded, with the group meeting 7 times in Winter and Spring terms. Five of the meetings are about studying physics in medicine and 2 are about modern physics. The group is building a wiki style resource for premed students preparing for the physics portion of the MCAT. (Winter 2017 – present)

Mi Familia Weekend

- Event designed to connect underrepresented and diverse families with their college students and OSU community. We present demonstrations including hovercrafts, Tesla coils, and magnetic levitation racing tracks. (Spring 2017)

Taft High School Visits

- Physics students visit the department yearly to learn about all the cool research at OSU. I have shown them modern physics demonstrations, presented them with Project BoxSand, and given them a tour of the Lightboard Studio, complete with them making videos about what they learned while on campus and in physics this past year. (Spring 2015, 2017)

University Pre-college Programs

- Adventures in Learning and Outside the Box, OSU summer camps – developed and instructed a two week summer course for middle school kids. Courses taught include: Electricity and Magnetism, Quantum Mechanics, Water Bottle Rocketry, Building Bridges with Pasta, Physics of Everyday Things, General Physics Challenges (July 2006, 2007, 2008)

Awards and Recognition

Faculty Teaching Excellence Awardee

Oregon State University 2017/2018
Award given to faculty who devote a significant amount of time to teaching and are dedicated to innovative teaching, high standards for rigor, and exceptional efforts to ensure a quality education

Action Research Fellowship III

ESTEME Group, Oregon State University 2017/2018
Project BoxSand: “*Development of a Longitudinal Educational Data Mining Study on Student Engagement with BoxSand.org Online Resources*”

Integrated Learning Resource Center Colloquium

Academic Technology, Oregon State University 2017

The keynote speaker spoke used the lightboard studio and my videos as the main demonstration of cutting edge technology in teaching

Action Research Fellowship II

ESTEME Group, Oregon State University 2016/2017
Project BoxSand: *“Developing a Systematic Study of How Students’ Access to Online Resources Correlates with Performance in Introductory Physics”*

Loyd Carter Award for Outstanding and Inspirational Teaching in Science (nominee)

College of Science, Oregon State University 2016

Action Research Fellowship I

ESTEME Group, Oregon State University 2015/2016
Project BoxSand: *“Performance Correlations of Student Engagement with Online Learning Tools”*

Peter Fontana Outstanding Teaching Assistant of the Year

Department of Physics, Oregon State University Spring 2008