VII. STANDING COMMITTEES

A. Academic and Student Affairs Committee

Teaching and Learning at the University of Washington

INFORMATION ONLY

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Teaching and Learning at the University of Washington: *Executive Summary*

At the University of Washington, undergraduate students experience research up close, through classes, conversations, and laboratory practice with some of the nation's—and world's—top researchers. These "academic close encounters" with leading researchers are the hallmark of a UW education; students learn from, and join, the people who are doing path-breaking research and scholarship in dozens of fields.

In UW classes, laboratories, internships and activities, students learn the vital research and critical thinking skills—analytical, writing and presentation skills—that will guide them in their own careers and spur the innovation and leadership the state, nation, and world require.

UW students learn through innovative instruction

The University's research culture infuses teaching and learning. Research guides innovative, evidence-based teaching methods—engaging students through technology, in-depth discussion, tailored content, field trips, and research experiences—that successfully engage our tech-savvy, increasingly diverse 21st century students while preserving our timeless values of learning, citizenship, and service. Students receive personal instruction from experts with over 60% of UW classes enrolling fewer than 30 students. The average class size is just 38 students.

UW students learn through research

The University's research culture provides undergraduate students with opportunities to investigate complex problems and discover solutions shoulder-to-shoulder with some of the world's best scholars. Each year over 5,800 undergraduates spend over one million hours devoted to research. The discipline and analysis required for research are essential skills in any field and provide a foundation for launching successful careers as leaders and innovators.

UW students learn about society's most pressing issues

In UW classes designed to investigate the most important issues facing society today, students learn about the challenges of our century from scholars closest to the action. Cutting-edge courses examine pressing issues—environmental sustainability, global health, poverty and social justice, to name a few—helping students develop the knowledge and independence of mind to act as engaged local and global citizens. Instruction in over 50 world languages provides direct access to global communities, enabling our students to be active on all 7 continents.

UW students learn in and from the community

Students enrich their understanding with experiential learning opportunities—through internships, partnerships with industry, field trips, service learning and training programs—in our local and global communities. Over 5,300 undergraduate students engage in university-sponsored service learning and public service each year.

UW students are leaders, working to improve the community and the world

Students take on leadership roles across campus and beyond. Their energy, vision, and creativity are making an impact today and changing our communities for the better as they devote over half a million hours a year to local, regional, and global service. They are raising awareness of and providing solutions to real problems. The skills of inquiry they learn at the UW have lasting impact beyond campus.

Teaching and Learning at the University of Washington: *Examples*

At the University of Washington, undergraduate students experience research up close, through classes, conversations, and laboratory practice with some of the nation's—and world's—top researchers. These "academic close encounters" with leading researchers are the hallmark of a UW education; students learn from, and join, the people who are doing path-breaking research and scholarship in dozens of fields.

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Examples include:

- **"Flipping" the classroom**—Linda Martin-Morris has taken her 120-student, lecture-style class and "flipped" it, asking students to watch videos of lectures before class in order to free up class time for more active learning tasks. Once in class, students engage in focused discussion of material that extends and deepens the understanding of the topic.
  Linda Martin-Morris, Lecturer, Biology, lmorris@uw.edu

- **Moving office hours online, for student convenience—**Chemistry professor AJ Boydston uses the *Canvas* learning management system to hold online office hours at times that are more convenient for his students. Live chat, PowerPoint slides, and an online whiteboard allow him to interact with students remotely and effectively. Sessions can be recorded and kept online for future review. More students are able to seek one-to-one help and student feedback shows they appreciate and are comfortable with the format.
  Presentation: http://www.washington.edu/lst/news/2012/ignite-recap
  AJ Boydston, Assistant Professor, Chemistry, boydston@chem.washington.edu

- **Remotely controlling labs—**UW-Bothell's pioneering B.S. in Electrical Engineering hybrid degree combines on-site and remote learning. Students can complete experiments at home using an innovative lab equipped with instruments that can be remotely controlled over the Internet.
  http://uwbdr.uwb.edu/ee
  Warren Buck, Director, Electrical Engineering, UWB, wbuck@uw.edu

- **Using a back-channel chat tool for student-to-student interaction during lectures—**Professor Mike Eisenberg of the Information School uses an in-house developed web chat tool, *Yarn*, to give students a way to ask and answer questions in real time without disrupting a lecture; *Yarn* also allows collaborative note-taking.
  Presentation: http://www.washington.edu/lst/news/2012/ignite-recap
  Mike Eisenberg, Professor and Dean Emeritus, Information School, mbe@uw.edu

- **Inviting public officials into the classroom—**UWT's combined student/citizen course "Urban Government and Organizations" facilitates unique collaborations, Public officials speak in the class each week, which is open to citizens.
  Article: http://www.tandfonline.com/doi/full/10.1080/03098265.2011.638706
  Mark Pendras, Assistant Professor, Urban Studies, UWT, pendras@uw.edu

- **Recording lectures—improving access, review, and use of class time—** Instructors record lectures before or during class using a new, UW-IT supported lecture capture system, *Tegrity.* Review is easier—especially valuable to students with disabilities and English-language learners. The ability to film and post lectures online also allows instructors to hold classes despite bad weather or to "flip" classes—viewing lectures before class to free up class time for discussion, practice, and student collaboration.

  https://depts.washington.edu/tegrity/
  Video: http://youtu.be/Kx8vcKgnR0o

- **Providing video feedback on student writing—**UW-Tacoma is providing video feedback ("veedback") on student essays in freshman composition classes, a practice that allows for focused attention, personalization, and tone. Students overwhelmingly preferred video review of their work to written feedback.

  http://www.washington.edu/lst/help/profiles/Riki%20Thompson
  Riki Thompson, Assistant Professor, Rhetoric & Composition, UWT, rikitiki@uw.edu

- **Engaging students with polling tools in large classes—**Faculty in a variety of large introductory courses are using personal response devices ("clickers" and other polling tools) to gather instant feedback on student engagement and understanding. Departments include: Biology, Chemistry, Physics, Communication, Program on the Environment, Biological Structure, Earth and Space Sciences, and the Information School.

- **Adding online options—**Foreign language and linguistics courses went from a 5x/week classroom model to a 3x (classroom) + 2x (online) model using *Moodle*, a learning management system. The new approach allows more students to enroll and has resulted in improved learning outcomes.

  Julia Herschensohn, Chair, Linguistics, herschen@uw.edu
  Hedwige Meyer, Senior Lecturer, Linguistics, hedwige@uw.edu

- **Designing innovative spaces for collaborative learning—**Student teams make extensive use of new, flexible spaces that make it easy to work in teams. Allen Library South was transformed into a Research Commons with movable furniture and dividers, whiteboards, and large screen displays. A similar set of spaces have been created in the Beardslee Building on the UW-Bothell campus.

  http://commons.lib.washington.edu/
  Article: http://goo.gl/0YhXW

- **Supporting a faculty culture of innovation and scholarship around teaching and learning**
  - **Sharing teaching tips with colleagues—**In 2012 participation quadrupled in Faculty and Professional Learning Communities hosted by The Center for Teaching and Learning. Topics to date include engaging students in large classes, social media, service learning, and teaching English Language Learners.

    http://www.washington.edu/teaching/

  - **Researching effective teaching techniques—**The Biology department is a national leader in scholarship on effective instructional techniques, such as engaging students in large classes and using Bloom's Taxonomy to evaluate and develop effective assessments. The department hosts the Biology Education Research Group (BERG), a weekly seminar attended by instructors from UW and beyond.

    List of publications: http://uw-berg.wetpaint.com/page/Articles+by+BERG+members
    Scott Freeman, Lecturer, Biology, srf991@uw.edu
    Mary Pat Wenderoth, Lecturer, Biology, mpw@uw.edu

  - **Helping faculty incorporate online learning—**The Hybrid Course Development Institute is a 10-week professional development program for UW-Bothell faculty. It is delivered in a hybrid format, with in-class and online elements using Blackboard, to give faculty participants a "student's experience." Diverse faculty have developed twenty hybrid courses and counting. Several are exploring partnering with other universities, for example, a partnership with New York University (NYU) in which UW-Bothell students could earn UWB EE credit for taking one of NYU's online courses. http://goo.gl/QSmb2

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Examples include:

- **Searching for water on Mars**—Nancy Thomas maps the locations of water-related minerals to help determine if there was ever water on Mars. She also analyzes data from the Kepler Spacecraft in search for new planets orbiting other stars. She began her research as part of the Washington NASA Space Grant Summer Undergraduate Research Program. She works with mentors Joshua Bandfield of Earth and Space, and Eric Agol and Andrew Becker of Astronomy. Thomas received the Astronomy Department's 2012 Baer Prize for undergraduate scholarship and service.

  Joshua Bandfield, Research Assistant Professor, ESS, joshband@uw.edu
  Eric Agol, Associate Professor, Astronomy, agol@astro.washington.edu
  Andrew Becker, Research Assistant Professor, Astronomy, becker@astro.washington.edu

- **Using brain stimulation to rehabilitate spinal cord injuries—**Eric Secrist works with Chet Moritz (Assistant Professor of Rehabilitation Medicine, and Physiology and Biophysics) to research rehabilitation following cervical spinal cord injury. Currently they are focusing on brain stimulation that releases dopamine and its role in movement recovery.

  Chet Motz, Assistant Professor, Rehabilitation Medicine, Physiology & Biophysics, ctmoritz@uw.edu

- **Examining the impacts of wind farms—**Shawn Friang conducted a case study into unequal siting of large-scale wind farms and industrial plants, while Eric Hopson examined local citizens' ability to participate in siting decisions for wind farms. Both students collaborated with UW Bothell Assistant Professor Gwen Ottinger.

  Gwen Ottinger, Assistant Professor, IAS, UWB, ottinger@uw.edu

- **Developing direct-to-target cancer treatments—**To reduce the toxicity of chemotherapy, two Bioengineering majors are developing molecules to take drugs directly to cancer cells, bypassing healthy tissue. Danee Hidano is synthesizing carbohydrate-polymers to deliver drugs to receptors on target cells, while Benjamin Dulken researches encapsulating chemotherapeutic drugs inside nanoparticles.

  Daniel Ratner, Professor, Bioengineering, dratner@uw.edu
  Suzie Pun, Associate Professor, Bioengineering, spun@uw.edu

- **Designing a tool to increase energy efficiency in the home—**Justin Brown is working with mentor Daniel Kirschen (Professor of Electrical Engineering) to develop a computer system that acts behind the scenes (in homes and workplaces) to allocate electricity efficiently to delay or initiate tasks, such as laundry and dishwashing, so that they occur at times where power rates are at their lowest.

  Daniel Kirschen, Professor, EE, kirschen@uw.edu

- **Creating a new kind of dirt—**Brian Hite works with the City of Tacoma to develop an innovative synthetic soil mixture for use in storm water rain gardens. http://www.tacoma.uw.edu/center-urban-waters

  Joel Baker, Director, Center for Urban Waters, jebaker@uw.edu

- **Designing a circuit model of gene interaction, for teachers and students—**Bioengineering Professor Herbert Sauro and undergraduate Bennet Ng are designing an electrical circuit that models gene interactions for use as a teaching tool in high school and undergraduate biology classes. Sauro raised more than $1,100 from donors on the crowd-funding site Microryza that will help him and Ng build the prototype, as well as pay for educational materials.

  https://www.microryza.com/projects/genetic-circuits-for-interactive-learning
  Herbert Sauro, Associate Professor, Bioengineering, hsauro@uw.edu

- **The annual Undergraduate Research Symposium allows over 1,000 students to present their work to the broader community each year.** http://exp.washington.edu/urp/symp/

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Examples include:

- **Examining the relationships between global health and human rights—**Law Professor Beth Riven's course examines the interdependence and tensions between the fields of public health and human rights law, exploring the impact of health policies and programs on human rights.

  GH 516/LAW 540/SIS 590B, Health and Human Rights, Spring 2012
  Beth Riven, Director, Associate Professor, Law, brivin@uw.edu

- **Learning journalism by doing—**Communication Professor Phil Howard's "Comparative Media Systems" and "Basic Concepts of New Media" classes run like newsrooms. The course gives student teams the opportunity to disseminate their findings to journalists, policy makers, and researchers around the world. Student reporting has been featured by the Seattle Times, USA Today, NPR, and the BBC. Projects include:
  - **Conducting a city-wide audit of mobile phone habits of Seattle drivers—**In 2010, teams provided useful metrics at a time when the state was evaluating legislation to discourage driving and mobile phone use.
  - **Studying the educational experience of young adults in Seattle's for-profit colleges in 2011**

  COM 300, Basic Concepts of New Media; COM 420, Comparative Media Systems
  Phil Howard, Associate Professor, Communication, pnhoward@uw.edu

- **Improving biodiversity by participating in global conservation efforts, *in situ*—**As part of an environmental science course, undergraduates join an ongoing research project in eastern Kenya with UW Tacoma Professor John Banks. Students work with local colleagues to understand the link between endangered bird species and arthropod biodiversity. Professor Banks also coordinates a tri-campus restoration ecology network.

  John Banks, Professor, IAS, UWT, banksj@uw.edu

- **Learning through serving those with disabilities and differences—**In the undergraduate course "Community Service Learning," students apply social work theory to practice, advocate for social justice, and are involved in community service. Students learn by connecting classroom theory and community-based experience through the completion of community-based projects in social work-type agencies.

  SOC WF 315, Community Service Learning, Spring 2012
  Rachel Vaughn, Director, Carlson Leadership & Public Service Center, rvaughn@uw.edu

- **Developing conservation plans for the Nature Conservancy—**Graduate students from diverse disciplines meet in an Environmental and Forest Sciences course where they collaborate with The Nature Conservancy (TNC). Together they redesign a TNC property portfolio using current data sets and produce actionable recommendations to the TNC.

  SEFS 521B, Connectivity Planning, Winter 2012
  Josh Lawler, Associate Professor, School of Forest Resources, jlwaler@uw.edu

- **Acquiring skills for creating Smart Grids—**In Electric Engineering's Professional and Continuing Education certificate in "Smart Grid & Renewable Energy," students learn how to use low-cost communication, sensing, and computing technologies to make the power grid smarter and more flexible to accommodate power from unpredictable green energy sources. It is just one of a number of PCE certificates and degree programs in Environment and Sustainability.

  http://www.ee.washington.edu/admissions/pmp/certificates.html
  http://www.pce.uw.edu/environment-sustainability.html

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Examples include:

- **Learning about politics up close—**Students intern in the state legislature; student reporting on 2012 state and national primaries in Communication's *Election Eye* has been reprinted in local and national media.
  http://blogs.seattletimes.com/uwelectioneye/

- **Tutoring local, rural, and tribal youth—**Over 1,000 undergraduates are service-learners and volunteers as part of the Pipeline Project. The project places tutors and mentors in Seattle Public Schools, coordinates an Alternative Spring Break program, and is active in rural and tribal communities.
  http://www.washington.edu/uwired/pipeline/

- **Leading the nation in meeting children's educational needs—**The UW was named to the President's Community Service Honor Roll (2009) in the area of Early Childhood Education, in recognition of the work of JumpStart Seattle at the University of Washington, the Early Childhood and Family Studies program, and the Experimental Education Unit. As part of Jumpstart Seattle, over 100 students make a year-long commitment to work with hundreds of low-income children in preschool classrooms to build language, literacy, social, and emotional skills. The UW Jumpstart program is among the top five in the country.
  http://depts.washington.edu/jstart/

- **Creating and curating glass arts with local experts—**UW-Tacoma and the Museum of Glass offer internships for students from across campus; students are involved in all aspects of the development of two exhibitions to debut in January 2013. In addition, UWT offers a new high-demand course in "Glass Arts" (led by instructor Scott Darlington of the Pratt Fine Arts Center) in which students learn about studio glass-making methods, creating a portfolio of glass artwork displayed for Museum visitors to enjoy.
  T ARTS 336, Glass Arts, Spring 2012
  Scott Darlington, Lecturer, IAS, UWT, rsd7@uw.edu

- **Bringing health services to a tribal community, and bringing the tribal community to higher education—**Pharmacy students engage in clinical training and student internships with the Nisqually tribe, thanks to partnerships between faculty and tribal leaders. As a result of the partnership, they were able to secure an ARRA grant to help establish a tribal pharmacy and IT systems, and a King County Health Department grant to fund student outreach on tobacco cessation. This partnership has increased interest among tribal members in enrolling in the School of Pharmacy.
  Donald Downing, Clinical Professor, School of Pharmacy, dondown@uw.edu

- **Interning at a military base—**2012 inaugurates a partnership between UWT and Joint Base Lewis-McChord (JBLM). Undergraduates are interning in the planning department and the chief of staff's office, and on a new research project in the human resources division.
  Lisa Hoffman, Associate Professor, UWT, hoffmanl@uw.edu

- **Working with community clients on city planning—**Through internships and capstone projects, students in the College of Built Environment's Community, Environment, and Planning program work with community "clients" to brainstorm, scope, and complete projects that benefit the partner organization or the community as a whole. In 2011–2012, students worked with the City of Seattle, the City of Bellevue, Sightline Institute, IslandWood, Solid Ground, Tent City, Seattle's P-Patch network, and a local elementary school.
  http://cep.caup.washington.edu/overview.php

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Examples include

- **Solving molecular and disease puzzles with an online game—**Undergraduate CSE students helped develop the Foldit project, in which computer gamers around the world help medical researchers by decoding the folding patterns of disease-related proteins. In 2011 gamers solved the structure of an AIDS-related enzyme, a major break-through for AIDS research. http://fold.it/portal/

- **Founding a company to help women rise above poverty—**UW Business School student, Kohl Crecelius, co-founded the company Krochet Kids that teaches women in poverty to crochet hats and pays them a living wage for their work. Each hat (sold in Nordstroms and other high-end stores under the slogan *Buy a hat. Change a life.*) comes with the personal story of the woman who made it. Krochet Kids won the "Best Social Idea" at the UW Center for Innovation and Entrepreneurship Business Plan Competition in 2008. It has grown around 250% a year, employs 122 women from a war-torn province in Uganda, and is expanding to Peru.
http://www.foster.washington.edu/centers/cie/businessplancompetition/Pages/BPC.aspx
http://www.krochetkids.org/

- **Creating an underwater robot for local scientists—**A 16-member team of undergraduates from diverse disciplines designed and created an underwater robot to lend to scientists mapping the floor of Puget Sound, saving the scientists the cost of renting a robot. The designers have entered their robot in the international Marine Advanced Technology Education underwater robotics competition. Article: http://goo.gl/gDZD2
Trevor Uptain, team captain, trevoru@uw.edu

- **Backing student-run environmentally sustainable projects around campus—**Deeply committed students created the Campus Sustainability Fund (CSF) to devote a portion of student fees to funding environmentally sustainable projects across campus. CSF support has enlarged the student-run UW Farm, raised awareness of composting, and funded fix-it-yourself bike stations around campus. 2012–2013 Fund projects include a "green wall" of plants on the side of Gould Hall, a bioswale to filter pollutants from stormwater run-off from a parking lot, and an onsite composting facility on the UW campus. http://f2.washington.edu/oess/csf/

- **Using an online game to support local wetlands restoration—**Responding to concerns for local ecosystems, UW-Bothell students created a Facebook game—*UWB Wetlands Restoration*—to raise funds and awareness. The game's 25-day cycle models 50 years of restoration work. Supported by a partnership led by the Center for Serious Play, proceeds benefit the Wetlands Restoration project. The game was featured in *VentureBeat,* an online blog that reviews innovative technology and applications.
Jordan Weisman, Executive Director, Center for Serious Play, Jordan@uwbcsp.com

- **Researching best practices to advise public officials—**UW-Tacoma Criminal Justice students Lauren Vetsch, Rebecca Knecht, and Stacy Kahler helped develop a position paper for the Tacoma City Council on evidence-based practices in policing. The position paper made an impact on policy decisions and was forwarded by the Police Chief to rank and file officers, who appreciated the recognition for what they do on a daily basis.
Carol Donaldson, Associate Director, Social Work, UWT, cdonalds@uw.edu

- **Building a biodiesel plant on campus—**Engineering and business students are gaining the skills they need to become future energy innovators and leaders through the Biodiesel Cooperative, a project to build and operate an entirely student-run, financially sustainable biodiesel plant on campus to produce biodiesel from waste oil collected from campus restaurants and distribute it to campus biodiesel users.
https://sites.google.com/a/uw.edu/biodiesel-cooperative-at-the-university-of-washington/

- **Revolutionizing jazz music—**Music students rehearse in the style of professional jazz musicians in Professor Cuong Vu's demanding classes that emphasize jazz fundamentals with an ultramodern twist. They select and develop the music, improvise freely, incorporate personal musical influences, and eventually write their own music. Vu helps students find their voices as musicians—voices that are revitalizing the Seattle jazz scene. Former students play in Vu's various bands and students organize the annual Improvised Music Project festival that features internationally acclaimed jazz artists along with their own original music.
  Cuong Vu, Assistant Professor, School of Music, Jazz Studies, cuongvu@u.washington.edu
  http://www.washington.edu/facultystaff/awards/2010-recipients/cuong-vu/

- **Monitoring local water quality—**UW-Tacoma students and First Creek Middle School students monitor water quality on a storm water impacted creek that empties into the Puyallup River as part of the Joint First Creek Monitoring and Stewardship Project. The City of Tacoma awarded the project a *Make a Splash!* grant in 2010.
  Joyce Dinglasan-Panlilio, Research Faculty, Center for Urban Waters, UWT, jdignpan@uw.edu

- **Leading student-community research partnerships on water quality—**SoundCitizen was started in 2008 by a group of undergraduates who wondered if it was possible to detect human-originated compounds in the water systems. They honed their research skills detecting levels of cooking spices in local waters and now apply those skills to studying pollutants. SoundCitizen encourages involvement by volunteers and school groups who collect water samples, perform a series of basic chemical tests, then mail samples to the SoundCitizen lab to be further analyzed for emerging pollutants. https://depts.washington.edu/soundcit/about/

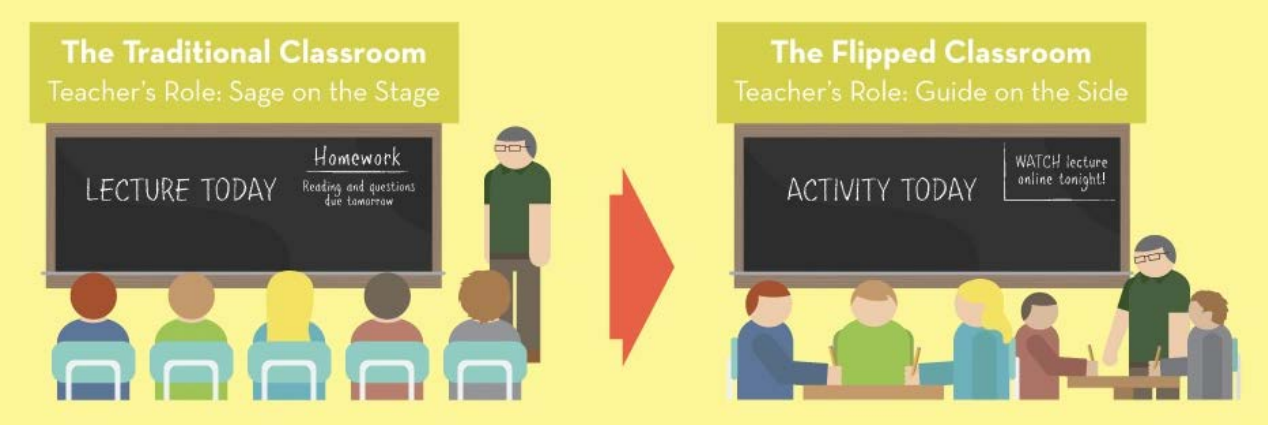
- **Making meaningful contributions and earning leadership-based scholarships—**Many students have been recognized by the Mary Gates Leadership Scholarship for their outstanding leadership contributions, including:
  - Bryan Dosono serves as an appointed commissioner for the City of Seattle's Citizens' Telecommunications and Technology Advisory Board, a group that advises the Mayor and City Council. He earned the attention of the community through his work refurbishing computers for the underserved through a nonprofit that makes technology accessible to communities worldwide. Dosono received the Ellis Civic Fellowship for his commitment to bettering the community by promoting digital inclusion.
  - Chelsey Jay, a senior in Environmental Science and Resource Management, has worked with fellow students to develop an environmental-science-based curriculum for students at the Quileute Tribal School in La Push, WA. http://www.washington.edu/uaa/mge/about/scholarslist.htm

FLIPPING THE CLASSROOM

DESCRIPTION

Lectures are a time-honored method for engaging students, conveying information, and posing questions. The lecture format sometimes includes opportunities for students to ask or answer questions. Yet data-driven research on teaching and learning has long indicated that the lecture is only one way to engage students in learning. Other teaching approaches promote and advance student learning while responding effectively to changes in student and faculty demographics. Teaching scholars have successfully explored non-tech, low-tech, and high-tech ways to apply these research findings in their courses.

"Flipping the Classroom" refers to a collection of practices that increase active learning, allow students to review lectures or parts of lectures at their own pace, and use class time to grapple with the most challenging material, in ways that rely on faculty expertise. Technologies now make it possible for faculty and students to benefit extensively from research on active learning by providing accessible alternatives to the "in-class lecture, out-of-class homework" model. In the "flipped" classroom, students "attend" the lecture at home or in the library, while class time is spent on case studies, group projects, complex problem sets, and collaborative work, in the interest of increasing student learning through increasing their active engagement. In this model, faculty members can use class time to focus on areas that students find the most challenging.



RESOURCES ON "FLIPPING THE CLASSROOM"

"Things you should know about Flipped Classroom" *Educause Learning Initiative.*
http://net.educause.edu/ir/library/pdf/ELI7081.pdf

"Flipping the Classroom Requires More Than Video" Kevin Makice for *Wired*. April 2012.
http://www.wired.com/geekdad/2012/04/flipping-the-classroom/

"Leaving Lectures Behind" Sept 2011. Article at NC State University.
http://www.ncsu.edu/features/2011/09/leaving-lectures-behind/

Cynthia Furse, 2011. "Lecture-Free Engineering Education," *IEE Antennas and Propagation Magazine 53*(5). *Available as a PDF through UW Libraries.*

Furse's workshop materials: http://ctle.utah.edu/instructor-resources/hybrid-courses-furse.php