EXPANDING TRANSPORTATION EDUCATION ACROSS THE ACADEMY:
THE SUSTAINABLE CITY YEAR PROGRAM

A Paper Submitted to the
2013 Transportation Research Board Annual Conference
and
for consideration of publication within
Transportation Research Record

Word Count = 6,337 (including 4 Figures & 1 Table)

by:
Marc Schlossberg, PhD
Associate Professor; Planning, Public Policy and Management
Associate Director, Sustainable Cities Initiative
University of Oregon

Nico Larco, AIA
Associate Professor; Department of Architecture
Associate Director, Sustainable Cities Initiative
University of Oregon

Corresponding Author:
Marc Schlossberg, PhD
Associate Professor
Planning, Public Policy and Management
University of Oregon
1209 University of Oregon
Eugene, OR 97403-1209
541-346-2046
schlossb@uoregon.edu
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Marc Schlossberg, PhD  
Nico Larco, AIA  
University of Oregon

ABSTRACT

Transportation agencies are grappling with new and unfamiliar issues from addressing big problems like climate change to focusing on accessibility, where land use, urban design, and active transportation modes are more important. These challenges come at a time when the resources necessary to meet them are scarce and many agency staff members are reaching retirement. At the same time, Universities continue to attract a new generation of students who are not only comfortable and familiar with these new concepts, but are eager for a workplace that embraces this multi-disciplinary environment.

A multi-disciplinary approach that includes fields not normally associated with transportation would seem to be critical to making sustainable transportation thrive in the complex environment of the city. The Sustainable City Year Program (SCYP) at the University of Oregon addresses this complexity head on by annually connecting twenty-five courses across ten or more disciplines with transportation and other sustainability projects identified by city staff of a different city each academic year. Each year, about 25 faculty and 500 students give over 80,000 hours of effort to help local cities move forward on vexing issues. Students gain professional hands-on experience, an opportunity to learn from multiple disciplines, and an understanding that complex transportation issues require a diverse set of skill sets and perspectives to solve.

This paper describes SCYP, highlights a few transportation-specific projects that “non-traditional” transportation students take on, and presents a new model for higher education across the country that can help train the next generation transportation workforce.
EXPANDING TRANSPORTATION EDUCATION ACROSS THE ACADEMY: THE SUSTAINABLE CITY YEAR PROGRAM

Transportation agencies are grappling with new and unfamiliar issues within their domain, from addressing big problems like climate change to focusing on accessibility, where land use, urban design, and active transportation modes are more important. These challenges come at a time when the resources necessary to meet them are scarce and many agency staff members are reaching retirement. At the same time, Universities continue to attract a new generation of students who are not only comfortable and familiar with these new concepts, but are eager for a workplace that embraces this multi-disciplinary environment.

A multi-disciplinary approach that includes fields not normally associated with transportation would seem to be critical to making sustainable transportation thrive in the complex environment of the city. At the core, planning and urban design would seem to be centrally important in thinking about urban form that fosters more sustainable modes of transportation. But additional disciplines are critical to the endeavor as well. For example, law schools can help analyze and enhance federal, state, and local policy; architecture can focus on individual building designs that support walkable urban space, business school can help students understand the opportunities for the private sector to thrive in this new city development model; landscape architecture can help connect environmental restoration with multi-use path networks; and, even fields like arts administration can focus on public art and plazas that enhance the pedestrian experience of city travel.

These are not only some of the disciplines that are theoretically interconnected and directly related to professional transportation work, but ones currently part of an exciting, replicable approach to higher education that can prepare the next generation transportation workforce for a more sustainable, economically efficient, and balanced transportation system.

This paper will describe a new program at the University of Oregon that combines applied learning, multi-disciplinary perspectives, and community service in the area of sustainable community design, with a focus in this paper on some of the transportation-specific work being carried out. This unique experiment, potentially replicable at any other university, is simultaneously helping local cities address complex issues related to transportation and the built environment and training students from across disciplines for careers engaged with transportation issues.

ACCELERATING PROFESSIONAL SKILL BUILDING THROUGH LEARNING BY DOING

Traditional classroom learning obviously serves many students and subjects well and the core educational experiences of most transportation students happen on campus within a lecture or lab format. For highly technical or theoretical fields, such approaches may be entirely adequate, but for many future professionals who work with transportation issues in some way, this traditional approach is unnecessarily limiting. Such professionals may be formally trained in a transportation field like transportation planning or engineering, but may also come from fields that work on transportation through designing cities or creating livable places for the people that inhabit and use them, including architecture, landscape architecture, law, business, economics, public administration, journalism, product design and others. These social science fields frequently get overlooked per their role in impacting the transportation system, but given that transportation is a derived demand and what creates that demand is the organization of cities and communities, integrating the skillsets and expertise from these additional disciplines is critical.
both for the future of multi-modal transportation systems and for the workforce that will be charged with modernizing them.

Today, many of these transportation professionals are expected to know how to work across disciplines, work in collaborative teams, understand local community politics, know how to publicly present their work orally and in writing, and a host of other “soft” skills that are critically important in today’s workforce. Some of these skills can be taught and practiced within a more traditional classroom, but many cannot. Therefore, providing opportunities for future professionals to gain these skills, while still in school, would seem to be extremely important when thinking of the future of the transportation workforce.

One approach to expanding the skillset of transportation students into these other arenas is through applied or experiential-learning opportunities. Experiential learning encourages the development of transferable, professional skills such as working in collaborative teams, developing public communication skills, and creative problem solving and can result in a more rewarding educational experience for students[1]. In these settings, students work on “real world” projects in conjunction with “real world” partners so that student work is both grounded in actual professional situations and that there is an outside audience providing professional input and critique to students as they learn. Some argue that more than just providing richer educational experiences for its students, Universities should also support service learning to help provide desperately needed assistance to local communities or agencies [2].

In experiential learning situations, students are not consultants, but partners with a local community or agency where each partner gains from being part of the relationship. The Experiential Learning Center at the University of Colorado lists four key components of this type of education[3]:

1. Reflection, critical analysis and synthesis
2. Opportunities for students to take initiative, make decisions, and be accountable for the results
3. Opportunities for students to engage intellectually, creatively, emotionally, socially, or physically
4. A designed learning experience that includes the possibility to learn from natural consequences, mistakes, and successes

Although there is a large body of knowledge around experiential learning, very few such references appear within the Transportation Research Record database, perhaps reflecting a lack of such applied learning opportunities within transportation education specifically. Applied learning and transportation pedagogy tend to be within city planning programs [4-6], although the transportation education opportunities described are not necessarily linked to real issues where student work is expected to help contribute to community solutions. Rather, the focus has been on better scenario development for lab, design, or hypothetical modeling experimentation.

That said, it is not surprising that more transportation courses do not include a service component. Many instructors have not been trained in or exposed to service learning, do not understand how to lead a service-learning course, or simply are unaware of some of the benefits of this pedagogical approach. Moreover, many instructors may be hesitant to develop full service learning courses because of the time commitment to the students and community partners. Therefore, developing opportunities for instructors to easily connect to service programs, without needing to necessarily be the lead champion for such projects, may be a key for engaging more faculty and students in applied, experiential opportunities as part of their transportation education.
THE SUSTAINABLE CITY YEAR PROGRAM (SCYP) AT THE UNIVERSITY OF OREGON

The SCYP experiment – both radical and shockingly simple - basically asks existing faculty across multiple disciplines to voluntarily direct their existing courses to help address sustainability issues identified by city staff across departments. For example, in 2010-11, SCYP worked with the City of Salem (OR), organizing 27 faculty, 30 courses, 10 disciplines, 2 Universities, 600+ students and over 80,000 hours of student and faculty effort toward the city’s needs. In 2011-12, SCYP worked with Springfield (OR) on a similar effort of scale and scope. In all, over the first three years of the program’s existence, work has been conducted with and for three cities, 13 academic departments, 40 projects, 75 courses, 30 different professors, 1,300 students, and about 200,000 hours of University-directed effort.

While some courses and projects work primarily on transportation issues, many touch on them as part of other disciplinary emphases. Working on livable and sustainable cities from a business, law, planning, architecture, or social equity perspective will undoubtedly cross paths with significant transportation concerns. Students across disciplines get applied transportation training, which directly benefits the cities they are working with and helps prepare them for future transportation careers. It is important for the future of our transportation system and the sustainable functioning of our cities, that who we think of as transportation professionals be expanded and how we support this expanded set of transportation professionals be re-thought.

Why it Exists

The Sustainable City Year Program exists to challenge both students and city partners to think critically about barriers to sustainability, and to work together to design creative solutions. Cities are faced with the urgent need to meet the new demands of livability and sustainability, while suffering from insufficient capacity – both in expertise and personnel - to do so effectively. A significant limitation of advancing new sustainable transportation and urban development is a complete lack of trained professionals, outdated problem framing, and an inability for the public to imagine what different mixes of transportation may even be possible within their communities.

Universities are in a unique position to help – both immediately through engaged learning, applied research, and service projects, and long term through the training of the next generation of professionals. In our experience, students hunger for coursework that combines the theoretical with the applied, and desperately want to contribute their work toward sustainability goals. Students regularly come up with good ideas that communities could use, but those ideas usually only appear in term projects for Professors to grade. Students also, in our experience, desperately want to learn from other disciplines – to learn the language and perspectives of others, to understand a bit about what other disciplines are good at, and to fully understand and appreciate their own disciplinary contributions to making a better world. In the end, SCYP courses deliver content and models for best practice directly to city staff in the form of site analysis, research, design guidelines, architectural renderings, planning documents, GIS reporting and analysis, and other products that provide foundational information to support our city partners’ movement toward sustainability.

Identifying multiple courses across multiple disciplines to connect regular coursework to projects and needs identified by city staff is an incredibly motivating opportunity and experience
for all students. And given that many faculty already do engage in community work, but do so in
different ways that are usually isolated from one another, there is a ready opportunity to get more out of
the resources that already exist. In the end, it is the goal of SCYP to train students to be more
effective in the workforce, to help them be more effective in retrofitting cities and suburbs across
the country from an automobile-oriented development pattern to places with more balanced
transportation systems and urban form, and to begin this applied catalytic work while still
students.

**How SCYP works**

SCYP works by matching a set of courses across disciplines to a set of interests within a
city over an academic year. Each year the focus is on a new city. The process of matchmaking
includes three key steps:

1. **Step 1: City applies and is accepted to the program**
   Cities must apply and be accepted through a formal process to the program, primarily to
   ensure that city staff are prepared to engage with students seriously and to ensure that there is a
   serious commitment to moving forward with student-produced ideas as appropriate. Successful
   applications include three key elements: 1) 15-20 potential projects that can be accomplished in
   a ten week academic term must be identified; 2) there must be explicit buy-in from the top,
   including the Mayor, City Council, and City Manager; and 3) the City must demonstrate that it
   can pay the University for the cost of running the program. Multiple city departments get
   involved, many of which also engage in transportation-related issues even though that isn’t the
   primary focus of their work. Some of the municipal departments have included City Manager’s
   Office, Urban Development, Public Information, Engineering, Police, Parks, Transportation
   Planning, Facilities Management, Housing and Social Services, and Public Works.

2. **Step 2: Faculty express interest in working with the city**
   Once a city is selected, the projects identified in the proposal are distributed to faculty
   across campus to see if any instructors are interested in working on one of the projects through
   their courses. Four different outcomes emerge from this matchmaking process: 1) there is a
direct match between City project and course; 2) there is a close match, but some alterations are
needed; 3) no instructor steps forward to work on a proposed city project; or 4) faculty propose
ideas to the city that were not originally identified in the proposal. Throughout this
matching process, individual faculty are paired with a counterpart in the city to define and
refine projects that can be meaningful for the city and appropriate learning opportunities for
students. The instructor and city staff person then continue working together until their project is
complete.

3. **Step 3: Coordinators within the university and city facilitate systems to carry out the work**
   A key element of the success of the SCYP is to establish coordinators on campus and in
   the city for the yearlong engagement. For example, the City of Salem estimated that for each of
   their 15 projects, 1-3 city staff spent two full days a month on the project and that it was
   necessary for the City to have an internal coordinator spend 20 hours per week on SCYP
   activities. City staff define problems, provide information, accompany students on site visits, and
   participate in reviews of student work to ensure that they are developing viable solutions. A full
time SCYP Program Manager coordinates the University side of the partnership. This Program
Manager manages the application process, selects the partner city, matches faculty and courses with city identified projects, facilitates creation of scopes of work for each project, manages the budget, organizes events and communications, and oversees final reports for the city.

PROJECT EXAMPLES

While part of the power and impact of the program rests with the scale of the engagement, actionable items and real world experience do emerge from individual courses. Below are brief summaries of four course-based projects that engage with transportation issues by students in planning, architecture public administration, civil engineering, and product design.

Enhancing Bicycle Connectivity - Springfield, OR
Course Discipline: Community and Regional Planning

The City of Springfield was interested in enhancing its bicycle infrastructure and approached the course with four different areas they wanted explored: 1) to figure out a way to connect a new bike bridge over the interstate to a nearby employment and commercial hub; 2) to look for bicycle boulevard opportunities as a way to offer safe cycling environments parallel to arterials; 3) to design and integrate a multi-use path currently owned by a private timber company, but used as a de facto path by the public; and 4) to re-envision main street in a way that better accommodates cyclists. The City had no specific design requirements; rather they were interested in a broad set of ideas, using the latest knowledge and examples from around the world, applied to the local context so that community conversations about the future bicycle transportation system could more easily take place.

The purpose of the course that focused on these issues was to give students the opportunity to explore the various elements involved in planning for increased utilization of bicycles as a form of urban transportation by focusing on: 1) policy and planning; 2) design, safety, and legal issues; and 3) social change. The course had a final group project requirement that resulted in eleven total teams. Students in the class were a mixture of undergraduate and graduate from a variety of disciplines, including planning, architecture, environmental studies, political science, sociology, and others. FIGURE 1 is a rendering from one student group, which focused on linking a new bike bridge over the interstate to a major, new hospital and employment center about a half-mile away. These images show a conceptual re-design of a multifamily housing parking to accommodate a protected and direct bicycle facility.

FIGURE 1 Enhancing Bicycle Connectivity in Springfield, Oregon

Students were both energized and initially overwhelmed by the freedom to develop ideas.
as they determined, but knowing that the City was deeply interested in their work was
motivational for them to produce ideas that could both be realistically implemented and would
allow for the community to dream a little bigger than perhaps they knew they could. Students
presented their work as poster presentations in an open forum in city hall at an event attended by
approximately thirty community members, including the Mayor, Fire Chief, staff from planning,
transportation, and public works, local cycling advocates, and others. Each group had two
minutes to describe their work, giving students practice in public speaking and doing so
concisely, and the rest of the two-hour event was spent engaging and discussing. The
community reaction was overwhelmingly positive with several staff wanting access to images
and final reports on the spot. Students were extremely energized by the experience of seeing their
work taken seriously by the City and community. When the term ended, one student from class
(and all SCYP courses) was hired to take all student work and synthesize it into a final report that
was then given to the City as a permanent record.

North Downtown Waterfront – Salem, OR
Course Disciplines: Architecture, Community and Regional Planning, Law, Civil Engineering
(from Portland State University)

The North Downtown Waterfront project in Salem (OR) was an effort to develop
alternatives for redevelopment of an old industrial area. The area is adjacent to a still thriving
downtown and borders the beautiful Willamette River, yet is bisected by major arterials and a
freight railway. A total of four courses and a student law fellow worked on this project,
sometimes in concert, sometimes in parallel with one another. Two graduate courses in planning
focused on land use and economic development opportunities, one course in architecture focused
on different urban design and site planning ideas, and one course in civil engineering focused on
alternative street design and traffic flow models.

Student groups created alternative re-designs of the area, including re-positioning the
railway in ways the City had not thought of, recommending new traffic circulation patterns to
make the site more viable for redevelopment, and developing specific building designs for a
hypothetical future developer or tenant. FIGURE 2 shows one of the many conceptual drawings,
renderings, and analyses of the study area.
This street light project engaged students in two very different disciplines, and ones not normally associated with transportation, to help Salem: 1) save money on its street light program in terms of program administration and ownership; and 2) reduce emissions / electricity from the system itself. For a variety of historical reasons, streetlights in Salem are owned by a variety of different governmental agencies, making it difficult to manage the system in a cohesive, coordinated, and efficient way. At the same time, the lights use old, inefficient technology that does not add much aesthetic value to the community.

Public administration students examined three aspects of streetlight operations in Salem: 1) possible alternative funding methods as used in some other cities that could enhance revenue available for operations in Salem (the students recommended a direct fee earmarked for streetlights, to be levied on each residential address); 2) the costs and benefits of purchasing some of the streetlights within the city that are currently owned and maintained (with a charge to the city) by a local utility company (the students found that the purchase would pay for itself within nine years); and 3) the question of upgrading and converting to energy-efficient LED lighting systems. Product Design students conducted an analysis, by transportation mode, for different lighting needs by modal user. They then designed and built a new lighting system for multi-use paths that are aesthetically beautiful, use less energy, and help light the multi-use path without disturbing adjacent uses.

FIGURE 3 provides examples of the streetlight analysis by mode and a rendering of a new energy-efficient design that was actually built by students as well.
FIGURE 3 Streetlight Analysis and Design

Student analysis of streetlight needs by transportation mode (above). A rendering of a newly designed energy efficient lighting system along a multi-use path in Salem, OR (below). Close up of the light design, which students also built (bottom images).
Rockwood is an area west of Portland that has been somewhat economically disadvantaged for quite some time despite being on the main east-west light rail line in the region. There is a transit station in the heart of Rockwood, but without much commercial or residential activity within the 6.5 acres directly adjacent to it. One of the primary retailers in the area, a big box store, has been closed for a long time, creating an open and barren environment.

Gresham was therefore interested in ideas to improve this area, but city staff had very little trust or relationships with the primarily Latino and Slavic population in the area.

An urban design studio took on the challenge of the site with six multiple groups of students coming up with different redevelopment design ideas. Before any designs were created, however, students spent a lot of time in the area, meeting business owners, community residents, and church leaders to get an understanding of what local residents were interested in having in their neighborhood. Engaging the public in this way is important for the acceptance and implementation of any eventual ideas both because the design ideas will reflect community desire and because the community has been part of the process and will feel some ownership of the ideas.

A variety of ideas emerged. One of the ideas (see FIGURE 4) was to initially transform the site into a park and ride by day, and a community space and farmer’s market by night and weekend. The community had expressed frustration at a lack of a central gathering spot for community events, yet the economic conditions of the area were not ready to support intense development. Students used their design skills to create a space that felt comfortable for the multiple uses (traditional parking lots don’t feel very pleasant as a community space) and the ideas went over extremely well with the community. In fact, the Director of TriMet, the area’s transit agency, was so enthusiastic with student designs that TriMet is pursuing using it as a model for all park and ride lots throughout the transit system.

FIGURE 4 Re-Design of the Rockwood Transit Node in Gresham, Oregon

Conceptual re-design of existing open parking lot and vacant land adjacent to the Rockwood transit stop into a multi-use facility accommodating transit park and ride service during the day, and different community uses during the evenings and weekends.
OUTCOMES

There are two different ways to look at the outcomes of this work - from the student perspective and from the city perspective. Both are relevant to the future needs of the transportation workforce. Students report the following benefits from participation in SCY:

1. **Leadership Opportunities:** Students are challenged to work closely with real clients; these opportunities build professionalism and engender confidence.

2. **Real-World Issues:** Students consider the impact of design, planning, and policy on real communities. They expand theoretical concepts beyond the classroom to consider a broad array of potential implications, and they develop an understanding of the complexities and requirements involved in civic projects.

3. **Access to Professionals:** Students work with city staff, local professionals, elected officials, and community leaders; many students form professional relationships that can lead to job opportunities after graduation.

4. **Interdisciplinary Education:** Students have the chance to experience and work on projects holistically and across disciplines. Their work is informed by the richness of collaborating with their peers, and they develop new perspectives by working with students outside of their own disciplines.

The partner cities benefit directly from bold ideas that propel fresh thinking in new directions, improve livability for residents, and invigorate city staff. The ideas offered by the students often spark community and staff discussions, increase community involvement, broaden conversations around projects, and get “stuck” projects moving. In Salem, for example, much of the student work (transportation and other projects) are beginning to be put into practice (see TABLE 1). In Gresham, commenting on the Rockwood project described above, one city councilor “called the UO students’ ideas fresh, innovative and better than anything he’d seen from the six developers who made pitches for the project”, that “It was way beyond anything that’s been presented before” and that, “From a citizen engagement point of view, it’s the best thing I’ve seen in the three years I’ve been on the City Council” [8]. The New York Times has called this new model of engaged, multi-disciplinary approaches to higher education as “perhaps the most comprehensive effort by a U.S. university to infuse sustainability into its curricula and community outreach” [9].
TABLE 1 Sample of Student Projects Being Implemented in Salem, OR

<table>
<thead>
<tr>
<th>Area</th>
<th>What's happening</th>
</tr>
</thead>
<tbody>
<tr>
<td>North downtown area</td>
<td>The city plans to do a mobility study and evaluate the market for new housing in the area.</td>
</tr>
<tr>
<td>Commercial Street corridor area</td>
<td>The city budgeted $87,000 to determine the feasibility of the students' ideas in the area south of Mission and north of Owens streets SE.</td>
</tr>
<tr>
<td>Energy efficient lights</td>
<td>In a pilot project, the city is installing 96 LED (energy efficient) lights at Riverfront Park this fall; LED lights could be installed throughout the city.</td>
</tr>
<tr>
<td>Park signage</td>
<td>This fall, city staff will ask the public for input on wayfinding and interpretive signage for Minto-Brown Island Park.</td>
</tr>
<tr>
<td>Willow Lake Treatment Industrial digester</td>
<td>Eight-week trial to test the use of SeQuential BioFuels' waste product in the city's Willow Lake Treatment Industrial digester</td>
</tr>
<tr>
<td>Civic engagement</td>
<td>The city is organizing a team to work on students' strategy ideas. Also, six of 19 neighborhood associations launched Facebook pages.</td>
</tr>
<tr>
<td>Police facility, civic center campus</td>
<td>The city's architect team, ZGF Architects and CB</td>
</tr>
</tbody>
</table>


CONCLUSION

The future of the transportation workforce will be different than it has been if for no other reason than the role of transportation is changing. Transportation is a derived demand, and the transportation workforce of the future is going to have to fully understand that what creates the demand for transportation is city design, public policy, and community desires, some of which may emphasize environmental protection, physical activity, or social equity more than mobility of vehicles as primary goals. While there will still be a need for traditional transportation professionals, there will be a growing need for a workforce that can span disciplines and that may not even find employment in traditional transportation agencies and organizations. Re-training current professionals may be difficult, but we can begin training the next generation of the workforce in these ideas immediately.

The Sustainable City Year Program offers one way to expand the experiences of students to be more effective in the workplace. Specifically, giving students applied experience on real world projects with an actively engaged client, while still in school will better prepare students...
after graduation. Moreover, engaging in work that is interdisciplinary helps students develop the expectation that working with other disciplines is normal in addition to giving students a head start in understanding the language, culture, and biases of those in other disciplines. The Sustainable City Year Program also provides a model for other Universities to move forward with multidisciplinary applied work in that the model is based entirely on taking advantage of existing courses and instructors who voluntarily apply their courses to this endeavor.

Transportation is inherently multi-disciplinary, although our educational approach to training transportation professionals is almost entirely rooted in engineering. In preparing the transportation workforce for the future, it is imperative that we engage a broader range of disciplines with transportation issues and engage traditional transportation education with a broader array of disciplines that impact the demand of a variety of transportation modes. The Sustainable City Year Program at the University of Oregon is one such way to prepare the next generation transportation workforce, and because its model is based on resources that already exist within universities, it is scalable and transferable, and can become an integral part of transportation education and workforce development nationally.

REFERENCES


