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### IBPI: Bicycle and Pedestrian Education Program

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OREGON  
TRANSPORTATION  
RESEARCH AND  
EDUCATION CONSORTIUM

# **IBPI: Bicycle and Pedestrian Education Program**

**OTREC-ED-10-05  
December 2010**



# **IBPI: BICYCLE AND PEDESTRIAN EDUCATION PROGRAM**

## **Final Report**

**OTREC-ED-10-05**

by

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## **EXECUTIVE SUMMARY**

Since the 1990s, the amount of attention and funding for bicycle and pedestrian infrastructure has increased significantly. This, combined with the role of transportation in public health and environmental concerns, has raised expectations for engineering and planning practitioners to possess more knowledge and skills related to pedestrian and bicycle planning and design. This demand requires more education around these topics, but university curriculum doesn't reflect these important shifts in the field.

This project was intended to begin addressing the need for more bicycle and pedestrian curriculum in two ways: (1) Determine the existence of and need for courses and curriculum modules on bicycle and pedestrian design and planning by conducting a national survey of planning and transportation faculty; and (2) Expand the range of opportunities for university students to learn about the value and needs of bicycle and pedestrian transportation by designing and testing two new curriculum modules, one for transportation planning and one for transportation engineering.

The survey provided a comprehensive source of information on the amount and type of coverage given to bicycle and pedestrian topics in transportation planning and engineering courses at the graduate and undergraduate level. It also provided useful insight into faculty and student interest in these topics, and a rich data source which IBPI can use to identify areas for future module and curriculum development.

The process of developing and piloting the two curriculum modules demonstrated how bicycle and pedestrian topics can be successfully integrated into existing courses that may have a broader transportation scope. In addition, the feedback on the student evaluations illustrated the low level of student knowledge about some of the basic elements of bicycle and pedestrian facilities design and analysis. This supports the need for more integration of these topics into transportation planning and engineering courses.

## I. BACKGROUND AND OBJECTIVES

Since the passage of ISTEA in the early 1990s, the amount of funding for bicycle and pedestrian infrastructure has increased significantly. At the same time, the U.S. has experienced a growing focus on context sensitive design in roadway planning, increased support for addressing public health objectives through transportation and land use planning, and concerns about oil dependence and global warming. Combined, these factors have raised expectations for engineering and planning practitioners to possess more knowledge and skills related to pedestrian and bicycle planning and design. This demand requires more education around these topics. However, university curriculum is slow to change and doesn't reflect these important shifts in the field. While a few universities offer a course in pedestrian and bicycle planning (including PSU), few integrate these topics into existing courses, such as transportation planning and traffic engineering. By doing so, all transportation engineers and planners graduating from such programs will have some exposure to the topic, rather than just those students who enroll in a specific class on bicycling and walking because they are already interested in these forms of transportation.

The need for this integration has been clearly expressed by engineers in Oregon's Department of Transportation (ODOT), and nationally through the Transportation Research Board's committees on pedestrians and bicycle transportation. According to Michael Ronkin, the former director of the ODOT's bicycle and pedestrian program, "Many students graduate with a civil engineering or planning degree with little or no exposure to pedestrian and bicyclist concerns or needs. They learn that the primary goal of transportation is to move motorized traffic; pedestrians and bicyclists, when mentioned, are rarely considered an important component of the transportation mix. If anything, they are often treated as an impediment to traffic flow." The development of more comprehensive curricula for undergraduate and graduate courses in planning and engineering remedies this issue by equipping future professionals with the knowledge needed to increase the safety and mode share for bicycle and pedestrian transportation.

This project was intended to begin addressing the need for more bicycle and pedestrian curriculum in two ways: (1) Determine the existence of and need for courses and curriculum modules on bicycle and pedestrian design and planning by conducting a national survey of planning and transportation faculty; and (2) Expand the range of opportunities for university students to learn about the value and needs of bicycle and pedestrian transportation by designing and testing two new curriculum modules, one for transportation planning and one for transportation engineering.

## II. PROJECT DESCRIPTION

This project was comprised of two elements: a national survey of transportation planning and engineering faculty regarding courses and curricula on bicycle and pedestrian topics, and the development of two course modules for existing engineering and planning curricula, including an evaluation to measure the effectiveness of the course modules. It involved a team of faculty members and practitioners, including Dr. Karen Dixon (OSU); Dr. Jennifer Dill (PSU); Marc Schlossberg and Dr. Lynn Weigand (PSU); and Sheila Lyons (ODOT). All resulting educational materials, course modules and project outcomes are posted on the IBPI website (<http://www.ibpi.usp.pdx.edu>).

### **Conduct National Survey of Transportation Planning and Engineering Courses and Curricula**

#### Overview

The investigators developed and conducted a national survey of transportation planning and engineering faculty who teach at both the undergraduate and graduate level. The survey was intended to collect information about the following topics related to teaching bicycle and pedestrian transportation topics in the university setting:

- The number and type of courses offered that focus primarily on bicycle and/or pedestrian travel;
- Whether and what bicycle and pedestrian topics are covered in other transportation planning and engineering courses;
- Resources used to teach bicycle and pedestrian curriculum;
- Faculty interest in availability of course modules on bicycle and pedestrian topics;
- Importance of including bicycle and pedestrian topics in planning and engineering courses; and,
- Estimation of student interest in bicycle and pedestrian topics.

#### Methods

The survey was developed by the investigators and reviewed by Lyons, ODOT's Bicycle and Pedestrian Coordinator, and Schlossberg, associate professor at the University of Oregon. It was produced in Vovici (formerly WebSurveyor) software and sent electronically to all faculty in accredited planning and engineering schools who list transportation as a research or education interest on their departmental website. The list of planning departments came from the Association of Collegiate Schools of Planning. The list of civil engineering departments came from the American Society for Engineering Education (ASEE). The website for each department was first checked to see if the program offered a transportation specialization. If so, the website was used to identify transportation faculty and get their email address.

The survey was distributed with a cover letter from Weigand, director of the Initiative for Bicycle and Pedestrian Innovation. After 30 days, all survey recipients received a second email requesting their participation. A total of 451 surveys were distributed, and 91 were returned,

resulting in a 20% response rate. Data were analyzed by Weigand and Dill, co-principal investigators, and described in a full report that is attached.

### **Develop Two Course Modules on Bicycle and Pedestrian Engineering and Planning**

The investigators developed two course modules on bicycle and pedestrian transportation: one for an engineering class at OSU taught by Dixon and one for a transportation planning class at PSU taught by Dill. They worked with ODOT's Lyons and other leading academics and practitioners to identify educational needs for engineering and planning practice to inform the course modules. These modules were intended to help students understand how pedestrians and bicyclists contribute to the overall transportation mix, how walking and bicycling are modes that enhance livability, and how to develop plans and engineering standards that enhance walking and bicycling.

#### Engineering Course Module

Dixon developed a full course module for bicycle and pedestrian design and safety to incorporate into a Transportation Facilities Design course that is required for students acquiring a graduate degree in transportation engineering at OSU. This course was offered during spring quarter 2008. Learning objectives included student understanding of "complete streets" (all modes of transportation sharing one facility) and implications of traffic calming for bicycle and pedestrian travel. The course had one required reading and two supplemental documents that addressed bicycle and pedestrian issues. The modules lasted a total of two weeks during the second and third week of the term. Students participated in an active learning exercise in which they divided into groups and reviewed two to three case studies. Following their review and critique, they presented their findings to the class for discussion and feedback. The final exam also included a question about the case studies. In addition, Dixon worked with one of the students to develop a flash movie to help students visualize interactions between bicycles and motor vehicles.

Dixon conducted a student survey before beginning the bicycle and pedestrian course modules to determine their level of knowledge about bicycle and pedestrian facility design, safety and crash assessment. When the students demonstrated that they were less familiar with design of shared-use facilities than they initially indicated, the instructor added content on this topic.

The students provided feedback in two ways at the conclusion of class. First, they were asked to provide written comments about the class with attention to the bicycle and pedestrian topics. They also rated the class content during the standard class evaluation process.

All of the course materials and a detailed description of the course are located in a separate, attached report as well as on the IBPI website at (<http://www.ibpi.usp.pdx.edu>).

#### Planning Course Module

During the 2007-2008 academic year, Dill and Weigand developed a pedestrian module that was integrated into the graduate-level transportation and land use planning course USP 570, an elective course in the Master's of Urban and Regional Planning (MURP) program at PSU. The class was held during spring quarter 2008, and met one time per week for approximately three hours.

This curriculum module was designed to give students the opportunity to test assumptions about pedestrian travel distances that transportation planners use when estimating distance that the average person is willing to walk to a destination. The curriculum included a lecture about pedestrian transportation planning and a student project. Three articles on attributes of pedestrian travel were assigned for the project readings. The activities related to the module took place over approximately one month.

Weigand gave a lecture on pedestrian planning that covered the purpose and process for pedestrian master planning, including data needs, analysis, project development and evaluation, and design guidelines. Weigand also provided examples from several recent plans. The lecture was given during a portion of one class period and lasted approximately 60 minutes, including discussion. During the same class period, the students were given handouts with project instructions, data recording forms, and a letter of introduction signed by Dill, the course instructor. Dill and Weigand explained the project goals and logistics, and asked the class to divide into four teams of approximately six students each. They provided an opportunity for questions and clarification about the project.

For the project, the students were asked to conduct a brief survey at several destination types that are often cited in plans - such as grocery stores, coffee shops and civic destinations - and write a brief summary of their findings. The class was divided into four teams of six and assigned to one of four neighborhoods within the Portland area. The neighborhoods were selected to provide similar destinations with different residential and commercial densities. All project materials are located in Appendix 2.

The students conducted their surveys on one of two weekends after the lecture class. They were asked to summarize their findings and shared their survey results in a class discussion after the surveys were completed, approximately one month after the lecture and project introduction took place. Dill and Weigand developed a supplementary evaluation from which the students completed at the conclusion of the module. All course materials, project results and evaluations are located on the IBPI website at (<http://www.ibpi.usp.pdx.edu>).

### **III. OUTCOMES AND RESULTS**

#### **Curriculum Survey**

The survey yielded useful information on the status of bicycle and pedestrian curriculum in transportation planning and engineering courses. Specifically, the survey results indicated that while bicycle and pedestrian topics receive some attention in transportation engineering and planning courses, much more could be done to integrate these topics into the curriculum. At the same time, it appears there is divided interest among faculty to add more bicycle and pedestrian content to current course curricula.



## **Curriculum Modules**

The process of developing and piloting the two curriculum modules demonstrated how bicycle and pedestrian topics can be successfully integrated into existing courses that may have a broader transportation scope. In addition, the feedback on the student evaluations illustrated the low level of student knowledge about some of the basic elements of bicycle and pedestrian planning and design. For example, one student indicated he did not know that riding his bicycle on the sidewalk or in the bike lane approaching traffic was illegal or unsafe. Another student thought that a bike lane was the same as a shared-use path (two completely different transportation facilities).

Specifically, the evaluation of the engineering module demonstrated the strong need for more bicycle and planning concepts in the curriculum to better prepare students on the concepts of design, safety and analysis of the right-of-way for all modes of transportation. The feedback from the transportation planning module indicated that there is strong interest in planning for pedestrian travel, and that it promoted better student understanding of the need to integrate land use and transportation planning to achieve transportation goals.

Faculty involved with the transportation planning module would make some revisions based on student feedback. In particular, the topic overlapped with other material covered in this class, and may be more appropriate for use in the graduate-level transportation policy course. Also, the field survey work was more time consuming than anticipated, and could be streamlined to achieve the same experience in less time.

The curriculum modules and materials provide a resource for PSU faculty and partner universities, as well as planning and engineering schools around the country. The bicycle and pedestrian educational components, though well received by students, were often confusing when considered in the context of motor-vehicle interactions. Enhanced tools to provide visual examples of these interactions would greatly benefit future offerings of the material. The modules may be useful to faculty members who are interested in adding course material on these topics by providing the resources they can either use “out of the box” or modify to fit their needs. As more modules are developed or revised, the pool of teaching resources will grow. This is anticipated to make it easier for faculty to incorporate these topics into their transportation courses and give students a more well-rounded education on all transportation modes.

#### IV. FURTHER ACTIVITIES

The survey report, course modules, assessment tools and other educational materials are being disseminated via the IBPI website clearinghouse (<http://www.ibpi.usp.pdx.edu>), which was developed as the result of a year-one OTREC grant in a previous grant cycle.

Weigand presented preliminary data from the survey at the September 2008 Pro Walk Pro Bike Conference in Seattle as part of a panel presentation on bicycle and pedestrian curriculum. A pdf of the presentation is available on the IBPI website at <http://ibpi.usp.pdx.edu>. The investigators will continue to seek venues to present the results of the survey and share the data with interested faculty from around the country.

The survey report will be disseminated electronically to all survey respondents. Contact information for the respondents will be used for future correspondence to share information and resources about future curriculum on bicycle and pedestrian topics.

Dixon taught the engineering-based class again in the winter 2009 term, and intended to teach the modules again during that term. She also has been approached by the Oregon State University facilities administration with an on-campus project for the winter term that directly addresses bicycle and pedestrian access in the proximity of activity centers. In addition, facilities have also proposed a bicycle project for the 2010 offering of the class.

The IBPI used the survey to identify additional curriculum needs in bicycle and pedestrian transportation, and has obtained funding to develop additional curriculum modules and full courses based on the survey feedback. IBPI also disseminated survey results and future curriculum to all respondents in an effort to broaden the reach of the information and promote further integration of bicycle and pedestrian topics into university course work nationwide. In addition, survey results were highlighted at a session of the 2008 Pro Walk Pro Bike Conference in Seattle and at a workshop at the TRB Annual Conference in January 2010.

In June 2009, Dixon was invited to speak at the Transportation Engineering Education conference. Specifically, she was asked to discuss innovative teaching materials that can help other instructors. During this presentation, she included the Adobe Flash animation developed for this project as one example of using technology to help clarify hard-to-picture transportation concepts.

The urban planning faculty involved in the project submitted an abstract to present the project findings at the next Association of Collegiate Schools of Planning annual conference in Fall 2009. This conference attracts faculty from all of the accredited planning programs in the U.S. Professor Dill also shared the results with the Bicycle Transportation Committee of TRB, which she chairs, at its annual meeting in January 2009. She will also send the results to the TRB Pedestrian Committee.







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OTREC is dedicated to stimulating and conducting collaborative multi-disciplinary research on multi-modal surface transportation issues, educating a diverse array of current practitioners and future leaders in the transportation field, and encouraging implementation of relevant research results.