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Final Report

Development of Pedestrian &
Bicycle Transportation Course
Modules
(2012-028)



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ABSTRACT

According to a 2012 report by the Alliance for Biking and Walking, crashes involving bicyclists and/or pedestrians account for almost 15% of all traffic crashes. The states that house STRIDE consortium universities, including Florida, Alabama, Georgia, North Carolina, and Mississippi, are among the top seven states with the highest pedestrian and bicyclist fatality rates in the nation. Training the next generation of planners and engineers to consider pedestrian and bicyclist needs is critical to addressing safety and livability concerns and creating more balanced, integrated, and efficient transportation systems. We developed and evaluated three short teaching modules for undergraduate students on planning and design for pedestrians and bicyclists (available at http://www.pedbikeinfo.org/training/courses_short.cfm). Each module includes a PowerPoint file and a narrative accompanying the file. The third module also contains a mini exercise or capstone case, bringing together the concepts presented in the three previous modules. The aim is that the instructor can choose between one, two, or all three modules. Modules were tested and evaluated by students at Auburn University enrolled in a junior-level introductory Transportation Engineering course. Since being made available to the public in August 2013, the materials were downloaded more than 120 times by individuals affiliated with educational and non-educational institutions. Although the main use of the modules is educational and training activities, they have also been used for advocacy and practice.

EXECUTIVE SUMMARY

According to a 2012 report by the Alliance for Biking and Walking, crashes involving bicyclists and/or pedestrians account for almost 15% of all traffic crashes. The states that house STRIDE consortium universities, including Florida, Alabama, Georgia, North Carolina, and Mississippi, are among the top seven states with the highest pedestrian and bicyclist fatality rates in the nation. Training the next generation of planners and engineers to consider pedestrian and bicyclist needs is critical to addressing safety and livability concerns and creating more balanced, integrated, and efficient transportation systems.

Despite increasing recognition and emerging evidence regarding the importance of walking and bicycling for livability and sustainability, and the need to address safety issues for these road users, these topics are not often covered in traditional transportation courses at the graduate and undergraduate levels. Although offering a semester-long course on pedestrians and bicycles is increasingly popular, one barrier limiting its adoption is the difficulty of adding a whole new course to a curriculum and staffing it. One way to address this limitation is to prepare materials for short mini-courses that can be incorporated into *existing* courses. This overcomes the need to teach a new extra course, while making sure that key concepts are well-covered. It also enhances the likelihood of adoption of a module for an introductory course.

In this work, we developed and evaluated three 50-minute teaching modules on planning and design for pedestrians and bicyclists for undergraduate students. These three modules augment undergraduate courses in basic civil engineering and/or transportation planning. The lessons, which cover Planning for Pedestrians and Bicycles, Pedestrian and Bicycle Facility Design, and

Pedestrian and Bicycle Data and Performance, are ideally suited to be integrated into an existing course, such as the first or introductory course in transportation engineering.

Each of the educational modules contains presentation slides for a 50-minute lecture, speaker notes for instructors, references, and recommended additional readings. The modules can be used individually or sequentially. The last module also includes one student assignment with a grading key for instructors.

Materials are intended for undergraduate students studying introductory transportation planning or engineering. The courses also may be suitable for graduate students. These short modules are designed to supplement an existing course.

Modules were tested and evaluated in spring 2013 by 43 students at Auburn University enrolled in the junior-level introductory course, Transportation Engineering. Since being made available to the public, the materials were downloaded more than 120 times.

The modules can be downloaded from:

http://www.pedbikeinfo.org/training/courses_short.cfm

CHAPTER 1 BACKGROUND

According to a 2012 report by the Alliance for Biking and Walking (1), crashes involving bicyclists and/or pedestrians account for almost 15% of all traffic crashes, and an updated report shows that they represent 15.8% of all fatalities (2). The states that house STRIDE consortium universities, including Florida, Alabama, Georgia, and North Carolina, and Mississippi, are all among the top seven states with the highest pedestrian and bicyclist fatality rates in the nation. Training the next generation of planners and engineers to consider pedestrian and bicyclist needs is critical to addressing safety and livability concerns and creating more balanced, integrated, and efficient transportation systems.

Despite increasing recognition of the importance of walking and bicycling for livability and sustainability, and the need to address safety issues for these road users, these topics are rarely covered in traditional transportation courses at the graduate and undergraduate level. Some programs have been able to offer entire (mostly graduate) courses devoted exclusively to the issues of pedestrians and bicyclists. One of the pioneers in this area was William E. Moritz who taught a bicycle planning course at University of Washington in the 1990s. Early in the 2000s, UNC offered a full-semester, in-person pedestrian and bicycle planning class. In 2006, the Federal Highway Administration (3) contracted some of the current investigators to develop a semester-long course (available, with other national courses, at http://www.pedbikeinfo.org/training/courses_fhwa.cfm). Nowadays at least eight universities nationwide regularly offer such classes at the graduate level, but none other than UNC are located in the STRIDE member states.

Most programs, however, can only cover key topics under existing courses. For a traditional introductory undergraduate course in engineering or planning, instructors often have about 40 contact hours to identify major concepts, processes, and application for multiple transportation modes (4). It also appears that the content of these introductory courses is critical to attract undergraduates to the field of transportation (5).

Although the semester-long course on pedestrian and bicycle planning is increasingly popular, there are many barriers to adopting such course. A first difficulty is staffing an entirely new course. Second, adding a full-semester course on issues would be difficult under the typical undergraduate civil engineering curriculum. A pedestrian and bicycle planning course would most likely fill a technical elective slot, but fewer students would be able to take such a course.

One way to address this limitation is to prepare materials for short mini-courses that can be incorporated into *existing* courses. This overcomes the need to teach a new extra course, while making sure that key concepts are well-covered. It also enhances the likelihood of adoption of a module for an introductory course. In this work, we developed and evaluated three short teaching modules on planning and design for pedestrians and bicyclists for undergraduate students.

CHAPTER 2 RESEARCH APPROACH

Not applicable to the current proposal.

CHAPTER 3 FINDINGS AND APPLICATIONS

The Curriculum Subcommittee of the Institute for Transportation Engineers' (ITE) Education Council (including Auburn and UNC staff) developed a list of core competencies developed that every transportation planner should have. Among the 13 learning outcomes identified for an introductory transportation engineering course, three had explicit pedestrian and bicycle components to them:

- Design and conduct a safety analysis
- Integrate complete streets principles in planning, design, and operations of a transportation system
- Connect driving and pedestrian experiences with transportation terminology and common or classic transportation engineering problems

Furthermore, all of the learning outcomes had elements that could be applied to pedestrian and bicycle planning (e.g., geometric design, level of service analysis, demand forecasting, and impact assessment).

In an unrelated effort, knowledge tables on the topic of non-motorized transportation and transit were created as part of the introductory course in transportation engineering (6). For the modules, we considered those knowledge tables. Furthermore, we also considered how the material being presented fit with Bloom's taxonomy (7) and Wiggins and McTighe's (8) levels of understanding (concepts, process, tools and context). This helped us consider the types of learning activities that might be most appropriate for students.

The three classes were designed to: a) introduce the context within which engineers consider pedestrian and bicycle decisions; b) expose students to design aspects of pedestrian and bicycle

facilities; and c) identify and apply current methods for pedestrian and bicycle performance assessment. Following we include the learning objectives and the levels of understanding (concepts, process, tools and context) following the Wiggins and McTighe's (8) criteria for the topics covered in each of the three modules developed.

Class 1 covers planning for pedestrians and bicycles. It has the following learning objectives:

- Identify the land use policies that affect our transportation choices
- Understand plans as policy tools
- Recognize challenges to plan development and implementation
- Become familiar with useful strategies to address challenges

Concepts	Tools
Transportation plans	Pedestrian Road Safety Audit Guidelines
Strategic importance of pedestrian and bicycle as transportation modes	Highway Safety Manual
Connection between pedestrians and bicycles and the built environment (roads, vehicles, design)	Connection of plans with other traffic and development management tools
Process	Context
Plan-making multimodal transportation systems	Livability
Implementation of transportation plans	Benefits of multi-modalism: health, economy, environment, mobility
Funding for transportation plans	Policies and plans to support pedestrian and bicycle facilities

Class 2 covers pedestrian and bicycle design. It has the following learning objectives:

- Give reasons for designing for pedestrian and bicycle use

- Understand how the streetscape influences design
- Give examples of roadway design for pedestrians and bicyclists
- Give examples of intersection design for pedestrians and bicyclists
- Identify opportunities to retrofit existing streets for pedestrian and bicycle use

Concepts	Tools
Facility typology	AASHTO ped & bike guide
Geometric design for lane, intersection, island, sidewalks, grading, and traffic calming treatments	MUTCD
Complete streets and context sensitive design	ADA Guidelines
Special treatments for ped-bikes	Highway Capacity Manual
	Context
Process	Complete Streets policies
Facility design process	Traffic calming
	Perceived safety and mode choice

Class 3 covers pedestrian and bicycle design data and performance. It has the following learning objectives:

- Describe data needs for bicycle and pedestrian monitoring, analysis, and planning
- Identify existing sources of data
- Understand possible analyses (e.g., level of service) based on data
- Calculate level of service for bicycle facilities

Concepts	Tools
Performance characteristics of peds and bikes	PB-LOS software, Transit LOS Manual
Process	Sources of pedestrian data
Identify seasonal and daily patterns	Technical Resources
Collecting primary data	Context
Pedestrian and bicycle LOS	Non-motorized pilot projects (US)
	Town demonstration program (UK)
	Geographic levels/scales of ped/bike plans and processes

Each of the educational modules contains presentation slides for a 50-minute lecture, speaker notes for instructors, references, and recommended additional readings. The modules can be used individually or sequentially. The last module also includes one student assignment with a grading key for instructors. All modules and assignments can be downloaded for free from:

http://www.pedbikeinfo.org/training/courses_short.cfm

These three modules augment undergraduate courses in basic civil engineering and/or transportation planning. The lessons are ideally suited to be integrated into an existing course, such as the first or introductory course in transportation engineering. The courses also may be suitable for graduate students.

In spring 2013, all modules were tested and evaluated by 43 students at Auburn University enrolled in the junior-level introductory course, Transportation Engineering. Most feedback received focused on shortening the material to fit the 50-minute period and to better connect the tools to the concepts. Students were enthusiastic about the topic and realized it was an important addition to their educational experience. Materials were updated and improved based on this feedback.

Once tested and completed, modules were disseminated *nationwide* by UNC's Highway Safety Research Center through its Pedestrian and Bicycle Information Center (PBIC). The PBIC took a multi-faceted approach to announcing and marketing the availability of the new modules. The PBIC first announced in August 2013 the creation of the courses to more than 300 transportation, planning and engineering educators through a targeted mailing list, as well as a broader e-mail list of more than 6,100 planners, engineers and others who have signed up to receive PBIC news.

That announcement was coupled with postings to the PBIC's Facebook page, which had approximately 1,500 followers at that time. The modules were again announced in the September 2013 PBIC Messenger Newsletter, which was distributed to nearly 6,200 people on the PBIC news distribution list. PBIC staff also promoted the university short course series with a flier at the American Public Health Association annual meeting in November 2013, at the American Planning Association conference in April 2014, and at Walk21, and ProWalk/ProBike. The PBIC included the university short course series in its 2014 Update Report, distributed to the Transportation Research Board (TRB) pedestrian and bicycle committees, as well as the subcommittee on ped/bike education, during the TRB annual meeting in January 2014. We will continue to market and promote the modules beyond the duration of the grant.

Since being made available to the public, the materials were downloaded more than 120 times. Most of those requesting materials are university affiliated individuals, although non-university personnel were also active in downloading the materials (Figure 1). For downloading PBIC requires a very simple registration in order to build a list of people accessing/using the materials, so that we can follow up and get a better sense of who is using it. PBIC performs surveys of past course registrants to report to FHWA. If no registration is required, there will be no way to follow up to get feedback for future course improvements, so this is a trade-off the PBIC has made. When analyzing the stated use of the modules, most were going to be applied to teaching, professional development, and capacity building. Some users were going to use it to advocate for particular solutions while others were going to use it in project development (Figure 2).

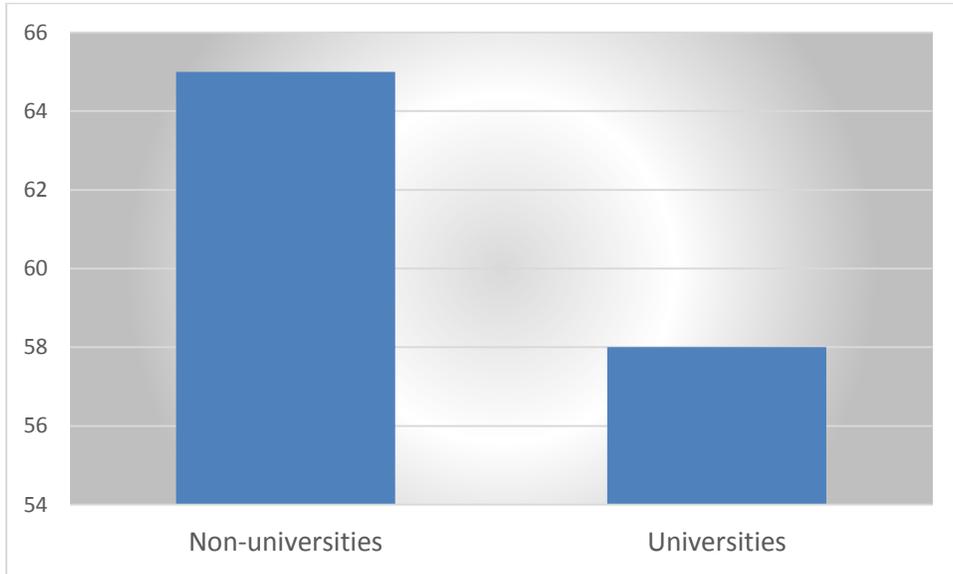


Figure 1. Affiliation of individuals downloading the modules (N=123)

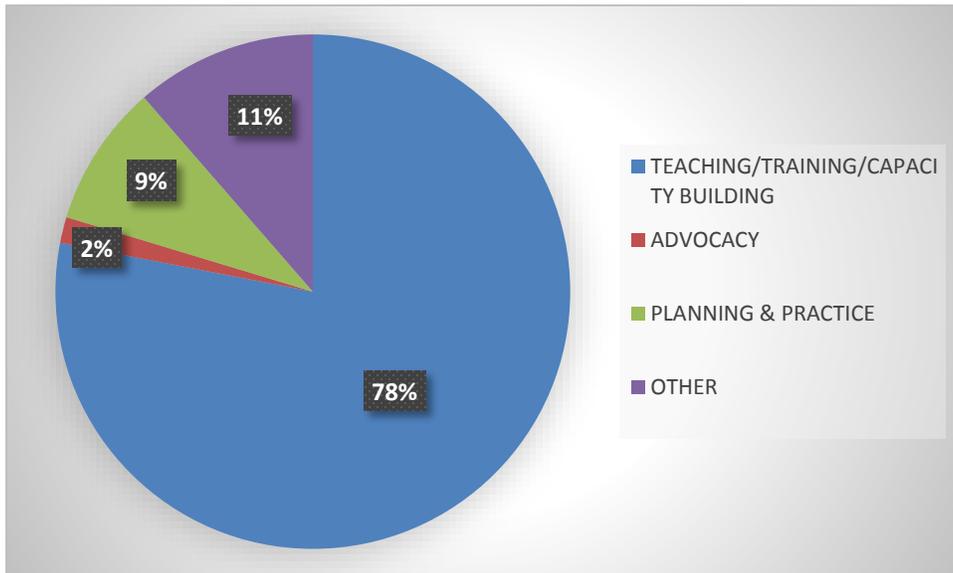


Figure 2. Stated use for the modules downloaded (N=123)

CHAPTER 4 CONCLUSIONS, RECOMMENDATIONS, AND SUGGESTED RESEARCH

The products developed aid not only in education but also in developing a 21st Century transportation workforce that is well-versed in the multi-modal transportation skills increasingly demanded. The modules complement the existing, full semester course offerings by exposing a larger group of students in core transportation courses to critical pedestrian and bicycle concepts.

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