

Center for Environmental Excellence by AASHTO One Stop Source of Environmental Information for Transportation Professionals

Context Sensitive Solutions/Design (CSS/CSD) in University Curricula

Introduction

Educating the "professionals of tomorrow" is an important strategy to incorporate new concepts into the transportation profession. The AASHTO Center for Environmental Excellence Design Flexibility and Context Sensitive Solutions Workshop in July 2019 generated a request for a survey to gauge the extent to which institutions of higher learning include Context Sensitive Solutions (CSS) and Context Sensitive Design (CSD) concepts in their academic programs.¹ The study team surveyed representatives of U.S. universities that offer transportation planning, engineering, and/or policy as part of their undergraduate and graduate curricula. This case study outlines the survey, its findings, and general conclusions.²

Survey Structure and Methodology

The project team sent the survey to all directors affiliated with the University Transportation Center program, a set of other universities targeted because of their size and breadth of program offerings (e.g., having both civil engineering and planning programs), as well as a selection of Historically Black Colleges and Universities (HCBUs). In total, 13 university representatives responded to the survey. Of those, five affirmed that CSS/CSD concepts are taught in their program but did not fill out the rest of the survey; these were not included in the final survey summary. Overall, the survey generated eight complete responses.

The survey also reflected the notion that CSS/CSD as a concept might not be covered in a course, but that the principles underlying CSS/CSD might be. Thus, a question examined the eight CSS/CSD principles as defined by FHWA to determine if these concepts were taught somewhere in the curriculum. Three options were available for response: not covered, covered in one or more courses for usually less than 30 minutes, and covered in one or more courses for usually more than 30 minutes.

Survey Questions

The survey included five questions: four multiple choice and one open-ended.

- Do one or more courses in your educational program present material specifically labeled as CSS/CSD concepts? If no, why not?
- 2) If yes, what types of courses include this material and to what extent is the material covered (in terms of the amount of time devoted to the topics)?
- 3) To what extent is the concept of Complete Streets included in this coverage?
- 4) What thoughts or questions do you have about CSS/CSD or the survey itself? (open ended).

Sixty-one (61) universities were sent a survey; 13 surveys were returned with 8 surveys having all of the questions answered. In these eight surveys, on average, two courses were identified as having CSS/CSD concepts with a total of 11 different courses listed. All of the universities had both planning and engineering academic programs.



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¹ See <u>https://environment.transportation.org/wp-content/uploads/2021/05/flexible_design_summary_doc.pdf</u> ² FHWA. "CSS/CSD State of the Practice Assessment," Accessed September 23, 2021 from <u>https://www.fhwa.dot.gov/planning/css/key_references/fhwahep18071.pdf</u>

Survey Conclusions

The low response to the survey constrains generalized conclusions about how CSS/CSD concepts are taught in U.S. universities and colleges. However, the respondents did represent some of the largest and most influential in transportation education programs in the country (e.g., Georgia Tech, North Carolina State University, Penn State University, Portland State University, University of California–Davis, University of Florida, University of Texas, and the University of Wisconsin). As leaders in transportation planning and engineering education, they represent the "leading edge" of what is being taught to future transportation professionals.

Conclusions from the survey include:

Seven of eight academic programs include CSS/CSD concepts in the curriculum, not so much from the
perspective of CSS/CSD as an approach. In some sense, these programs have evolved to a broader
approach that is based partly on the fundamental concepts of CSS/CSD (one respondent noted that
their courses emphasize community-centric design, which included CSS/CSD concepts). In this context,
community-centric design emphasizes the community as a whole, and how individual projects and
project designs affect, and are affected by, community norms and values.

Figure 1 shows the extent to which CSS/CSD concepts are found in the curriculum. The survey respondents identified where CSS/CSD and Complete Streets concepts were found in their curriculum. The courses ranged from traditional geometric design courses to planning and policy courses. The range of courses was primarily a function of the focus of the type of academic program in which the respondent resided. Planning professors identified one planning and policy courses, whereas engineering professors identified one engineering course (although one respondent indicated there were two course with such material).



Q1 Do one or more courses in your educational program present material specifically labeled as CSS/CSD concepts?

| ANSWER CHOICES | RESPONSES | |
|---|-----------|----|
| Yes, we cover CSS/CSD as a concept in more than one course. | 30.77% | 4 |
| Yes, we cover CSS/CSD as a concept in one of our courses. | 53.85% | 7 |
| No, we do not cover CSS/CSD as a concept in any of our courses. | 15.38% | 2 |
| TOTAL | | 13 |

Figure 1. Respondents who identified that CSS/CSD concepts are covered in their curricula

- Of the universities responding, seven of eight academic programs include CSS/CSD concepts in one or more of the courses. In all but one case, these courses were part of the graduate program. There was one undergraduate course listed.
- The CSS/CSD principles that receive the most attention in the curriculum, as defined as more than 30 minutes exposure, were:

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- "Provide safe passage for residents, travelers, tourists, recreationists, and wildlife by working cooperatively to integrate safety as a basic business principle in all activities" and,
- "Use interdisciplinary project development teams to develop cost-effective creative solutions that fit into the natural and human environments while functioning efficiently and operating safely."

This emphasis is not surprising given a traditional emphasis in coursework on safety/mobility and interdisciplinary planning and design approaches.

| | Table 1. | Courses | Covering | CSS/CSD | Topics |
|--|----------|---------|----------|---------|---------------|
|--|----------|---------|----------|---------|---------------|

| Course | Courses Where CSS/CSD Concepts Are Covered | Courses Where Complete Streets Are Covered | | | |
|--|---|---|--|--|--|
| Identified in Planning and Engineering Respondents | | | | | |
| Transportation Policy | Х | Х | | | |
| Health and the Built Environment | Х | Х | | | |
| Transportation Policy and Planning | Х | Х | | | |
| Identified in Planning Respondents Only | | | | | |
| Transportation Practicum | Х | | | | |
| Bicycle Master Plan | Х | Х | | | |
| Bicycle and Pedestrian Planning | | | | | |
| Coordination of Transportation and Land Use | Х | Х | | | |
| Identified in Engineering Respondents Only | | | | | |
| Introduction to Transportation Engineering | Х | | | | |
| Highway and Street Design | Х | | | | |
| Advanced Highway Design and Traffic Control | Х | Х | | | |
| Geometric Design of Transportation Facilities | Х | Х | | | |

4. Similarly, the CSS/CSD principles receiving the least attention in the curriculum were:

- "Demonstrate clearly defined, effective decision-making and implementation that meets commitments" and,
- "As appropriate, actively communicate and employ early, continuous, and meaningful participation of the public and all stakeholders throughout the transportation planning, program development, and project delivery processes in an open, honest, and respectful manner."

These two, unlike those that receive the most attention (see #2), are focused more on process than the goals or outputs of planning or project development.

- 5. In some sense, where CSS/CSD is taught in a course, it is used as a way of introducing other interdisciplinary concepts into the course. Thus, planning courses that present CSS/CSD concepts are introducing planners to some engineering concepts. Engineering courses likewise are introducing planning concepts.
- 6. Seven respondents said they would like to receive CSS/CSD materials that could be used in their courses. Given the limited amount of time CSS/CSD principles are covered in the curriculum, such materials should be targeted/focused on very specific concepts that could be presented in a short period of time (e.g., 15 minutes), or that could be assigned as reading. Given today's internet-based learning, a video that highlighted CSS/CSD concepts might be an appropriate resource. Part of this material could be case studies of state DOT efforts at CSD/CSS, perhaps undertaken in cooperation with respective committees of the American Association of State Highway and Transportation Officials (AASHTO).

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For the eight CSS/CSD principles identified by FHWA,³ the majority of respondents for each noted that they were either not covered in their courses or were covered for usually less than 30 minutes. Table 2 lists the key CSS/CSD principles and the number of responses that identified how in depth they are covered in education program courses.

Table 2. CSS/CSD Principles Taught in Some Courses

| CSS/CSD Principles Identified by FHWA | Response (# of Responses) |
|---|--|
| Be respectful of the land, partner and agency goals, tribal values, cultural significance of landforms and sites, wildlife, and habitat. | Covered in one or more of our courses for usually less than 30 minutes (6) Covered in one or more of our courses for 30 minutes or more (1) |
| Provide safe passage for residents, travelers, tourists, recreationists, and wildlife by working cooperatively to integrate safety as a basic business principle in all activities. | Not covered in our courses (2) Covered in one or more of our courses for usually less than 30 minutes (2) Covered in one or more of our courses for 30 minutes or more (3) |
| 3. Minimize impacts to existing features and conditions in a manner that lays "lightly on the land" and minimizes construction impacts on the traveling public. | Not covered (3) Covered in one or more of our courses for usually less than 30 minutes (3) Covered in one or more of our courses for 30 minutes or more (1) |
| Use interdisciplinary project development teams to develop cost-effective creative solutions that fit into the natural and human environments while functioning efficiently and operating safely. | Covered in one or more of our courses for usually less than 30 minutes (4) Covered in one or more of our courses for 30 minutes or more (3) |
| As appropriate, actively communicate and employ early, continuous, and meaningful participation of the public and all stakehold- ers throughout the transportation planning, program development, and project delivery processes in an open, honest, and respectful manner. | Not covered (2) Covered in one or more of our courses for usually less than 30 minutes (4) Covered in one or more of our courses for 30 minutes or more (1) |
| Satisfy the project vision, purpose and need as developed and agreed upon early in the process by a full range of stakeholders. | Not covered (2) Covered in one or more of our courses for usually less than 30 minutes (3) Covered in one or more of our courses for 30 minutes or more (2) |
| Demonstrate clearly defined, effective deci- sion-making and implementation that meets commitments. | Not covered (3) Covered in one or more of our courses for usually less than 30 minutes (2) Covered in one or more of our courses for 30 minutes or more (2) |
| 8. Deliver a quality transportation solution with ef- ficient and effective use of everyone's resourc- es including cost, time, effort, and material. | Not covered (1) Covered in one or more of our courses for usually less than 30 minutes (5) Covered in one or more of our courses for 30 minutes or more (1) |

³ FHWA. "CSS/CSD State of the Practice Assessment," Accessed September 23, 2021 from https://www.fhwa.dot.gov/planning/css/key_references/ [Continue



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For those who provided open ended comments, CSS/CSD was not really a separate concept from effective transportation planning and/or project development. In essence, CSS/CSD was engrained in how the professors teach (as one said) "responsible planning and design." The optional comments included:

- "We are not currently offering a design course at the graduate level, so the time available for these topics is quite limited."
- "The questions you posed seem to relate more to responsible planning and design, not CCS/CSD. To me CSS/CSD means you are creating more than plain vanilla / off-the-shelf / standard design solutions that respect the ambience of the surrounding environment."
- "We have so evolved from the concept of CSS/CSD that I would no longer use that terminology. Do I teach CSS/CSD concepts? No, not at all. Do I teach questioning the rigidity we have built into design practices? Absolutely. Do I teach community-centric design? Absolutely. But I also teach moving away from design on a corridor basis and instead to do so on a network basis. I teach understanding the inherent values of the community prior to doing design."

Respondents were also given the option of choosing challenges in teaching CSS/CSD concepts in their curriculum such as a lack of time to cover these along with other topics, lack of teaching material, and the like. The only challenge noted was the lack of course time to cover the material.