LANDSCAPE PERFORMANCE EDUCATION GRANT (LPEG) 2016 REFLECTION

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OVERVIEW OF COURSE & LPEG WORK

LPEG work included curriculum changes to a required fourth-year studio course for the undergraduate major in Landscape Design. The studio focuses on site planning and design of landscapes in the public realm, and the teaching approach is structured around a service-learning project. Learning objectives relate to building theoretical and applied knowledge in sustainable site design and gaining advanced skills in design presentations, technical writing, and team collaboration.

The primary goal of curriculum changes was to go beyond simply building knowledge of sustainable site design principles to calculating landscape performance benefits pre- and post-schematic design. In addition, course content and assignments were re-organized around four themes (vegetation and soils, water, materials and energy, human health and well-being) to better integrate with the Landscape Performance Series resources. Finally, to assess learning, a pre- and post-quiz on landscape performance was incorporated into three individual reflection exercises already part of the service-learning methodolgy.

TOPICS & ACTIVITIES

The course's assignments and key activities are listed in the table on page 2, organized by three modules. The understanding module was meant for students to learn about the importance of landscape performance (LP) and sustainable site design strategies, specifically in our context of the semi-arid Middle Rockies. The teaching approach used more experiential strategies than in the past, but continued to include traditional lecture and discussion activities. The application and communication modules were comprised of activities relating to the service-learning project with the City of Bozeman Water Conservation Division (for a description of the project, see sample assignment). For baseline and schematic design LP assignments, an Excel spreadsheet was developed for the course. The spreadsheet organized and, where possible, automated relevant metrics to improve accuracy and consistency when aggregating performance data among several sites analyzed. As part of the design process, the application module incorporated two in-progress reviews, one with the project partner and one with landscape design colleagues. Interactive team tasks were incorporated throughout the application module to simulate a work environment. For example, students organized and facilitated the partner review. The communication module culminated the service-learning project with a formal, public design presentation.

MODULE	ASSIGNMENTS	ACTIVITIES/DESCRIPTION	%
Participation & engagement (throughout)	Reflection 1 (R1): Strengths and desires for course and personal development; landscape performance pre-quiz R2: Analysis of mid-review presentations, designs, and performance targets R3: Analysis of final presentation, design, and representation; landscape performance post-quiz Engagement: attendance, teamwork, discussion, professionalism		20
Understanding (4 weeks)	Assignment 1(A1): Performance Principles	• LAF webinar on LP resources • Textbook readings and discussions • Guest lecture by Dr. Matt Lavin on Montana native plant communities • Guest lecture by City of Bozeman Water Conservation Division on state of local water resources • Field day with Greater Gallatin Watershed Council • Field trip to Westscape native plant nursery • Field tour with local design firm, Design5, on water resiliency projects	20
Application, service-learning project (8 weeks)	A2: Baseline Performance A3: Schematic Design Mid-Review A4: Design Performance	• Site analysis and baseline LP calculations • LP targets and scenarios matrix development • Schematic design development and LP calculations	40
Communication (4 weeks)	A5: Sharing Solutions A6: Memo	• Landscape representation • Final public presentation • Technical research and writing on management and cost estimate	20

STUDENT PRODUCTS & OUTCOMES

In A1 students produced infographics illustrating principles of LP around the four themes. Many of the infographics also became useful graphic representations for showing design approach and performance benefits in the later communication module. The design process and project description of the service-learning project is described in the included sample assignment sheet. Students collected and calculated landscape performance data for seven representative parcels to establish a broader snapshot of baseline performance of single family parcels across the City. The data was produced using Excel, AutoCAD, Google Earth, City of Bozeman water meter data, and online calculators. The same data was collected and compared for the final schematic designs (see A4 student sample work). Key metrics included vegetation species richness, vegetation descriptive statistics, stormwater collection volumes, irrigation volumes from the EPA Water Budget tool, tree benefits from National Tree Benefits calculator and iTree Design, management time and materials, and human health and well-being opportunities. The process of quantifying and qualifying LP benefits was extremely valuable for students to self-discover the impacts of both the status-quo residential landscape and their design decisions. One student commented, “Looking at landscape from a performance standpoint allowed for a

more in depth understanding of how and why a site functions." The LP framework and data helped students grasp the extent of sustainable design challenges faced in local ecosystem, especially the use of potable water in the landscape.

Informed by baseline performance, site analyses, and partner goals, students developed performance targets and a scenario matrix for seven different schematic designs (see student work sample). The scenarios featured varying performance goals, design concepts, parcel layout, orientation, and existing features to provide a suite of plug-n-play design ideas for residents to implement. The team collaboration to establish the LP targets, scenario matrix, and final presentations was particularly rewarding for students.

The schematic designs included layout and dimensioning, grading and drainage considerations, planting plans, materials, and limited construction details. A public review culminated the project and included team introductory slides that described the LP approach and scenario matrix, followed by individual presentations for the seven scenarios. The final presentation is expected to be the most professional to date in their curriculum, and to prepare, students recorded practice presentations beforehand. The class worked together to create presentation layout and design, which resulted in very effective cohesion that the partner praised. One student wrote, "as a group it was a good training experience to rely on the work of others to accomplish a combined task. It allowed for independent creativity with a common bond in design concept, which I feel offered the opportunity to push personal limits of presentation standards. We now were not just representing ourselves, we were representing each other." Reviewer and audience surveys were collected at the final review to provide students a range of feedback and comments, especially from non-design experts.

Following the final review, students produced technical papers (A6) on an operations and management topic of their choosing to research what steps would be necessary for sustainable construction and care of the design scenario. This assignment allowed students to critically analyze and communicate the importance of management for landscapes to perform as intended. In addition, students were required to attach a revised cost estimate for materials. Developing a schematic design cost estimate provided a tangible activity to see the economic impacts of sustainable site design strategies. For example, many students commented how surprised they were to see how much money and resources could be saved by choosing re-used hardscape materials and soils.

INSTRUCTIONAL ASSESSMENT & REFLECTIONS

In the understanding module, experiential activities like field trips and guest lectures were extremely well received and helped students better understand local landscape challenges that were applied in the service-learning project. I think the field activities help students especially visualize underlying materials and performance aspects often overlooked when simply thinking of design as a finished static product. In addition, I think with fewer field-based opportunities in our current curriculum, students were drawn to these practical experiences. Our field trips related primarily to building understanding of LP early in the course, however, in the future I would also plan to tour precedent ideas after site visits as students are in the process of early

design sketching. A1 was designed to be more open ended so that students could chose specific questions to research due to the breadth of landscape performance principles and strategies. For undergraduate students, this ended up being too broad-scoped which led to less shared knowledge among all students. I think it would be ideal to have a separate theoretical and classroom based course that covered these foundations. Alternatively, a test or series of quizzes on each LP theme would more explicitly outline key literature and principles.

The three reflection exercises have been integrated into the course based on service-learning pedagogy, but I think they would be extremely valuable for any studio setting so students assess their own learning and development as designers. Including the LP pre- and post-quiz in the beginning and final reflections was logistically effective, but the quiz questions themselves should have been more specific. Furthermore, I would recommend incorporating small quizzes throughout the course for each LP theme to gauge student understanding throughout the course. Based on the students' answers in the post-quiz, it was clear they grasped the over-arching principles. For example, one student responded, "landscapes do not have to be static visually stimulating compositions. We can now see that even a playground can function as a performing landscape." Another student wrote, "to create landscape sustainability, I think the cultural perception needs to change and people need to see that sustainability can be beautiful and hopefully begin to change the norm one lawn and neighborhood at a time." However, their responses did not demonstrate a more in-depth understanding of specific literature or data to support their answers. The LP pre- and post-quiz were closed book, short answer essay questions. In the future, I will likely adjust this to a format with variable question types.

For the service-learning project, students collected/calculated baseline and design landscape performance data by filling out or completing a spreadsheet provided. The spreadsheet listed all calculations and characteristics that were to be catalogued and described, and students were not required to research or determine their own quantitative or qualitative methods to determine LP benefits. This strategy was chosen to better direct student work time and create more consistency among scenarios. For undergraduate students working on LP data for the first time, this worked well to keep students focused with a limited timeframe (8 weeks for the service-learning project). Two of the more significant challenges with LP data were 1) unforeseen varying student ability with Microsoft Excel, and 2) inaccuracy among scenario LP data due to inconsistent input data, mistakes in take-off calculations, and other mathematical errors. Assessing student spreadsheets took considerable time and effort, beyond a typical studio course. Incorporating more in-class activities or assignments for students to cross-check or grade their own work or each other's would be recommended. This challenge was compounded by the fact that the data and design work was for a real partner organization.

The final paper/memo on operations and management is one that is always well received by the students, because they value the opportunity to practice technical writing. In the future, to improve the student's accuracy and robustness of information they write about, I plan to assign additional readings specifically related to installation and management. I find that many current texts on landscape performance and sustainable sites principles are still too overarching and

often more applicable to larger scale sites, and not as relevant to small site installation and maintenance.

Finally, although the partner was a public organization and some of the initial design phases were applied at a community scale, the actual site design scenarios were for private single-family parcels. Typically, this course has focused on public landscapes, like parks, schools, and streets, but because the project partner had identified this as being their primary need, the project sites needed to remain only private residential. Because single family equivalent parcels account for nearly 70% of the City's potable outdoor water use, this approach would have the greatest potential impact.

SUPPLEMENTAL MATERIALS

The following select materials are included:

- Course syllabus
- Sample reflection assignment 1 (R1), includes LP pre- and post-quiz questions
- Sample assignments, application module service-learning project and A6
- Samples of student work from A1, A2, A3 (performance targets and design scenarios), A4, A5 (team introductory presentation and individual presentations)

Glossary

A	assignment	LAF	Landscape Architecture Foundation
R	reflection	LP	Landscape Performance