Civil/Structural Engineering Design Using Virtual Regineering Vir and often complain that they have learned "nothing useful" in their college education.



Proposed Solution

1. A design course (CE 571) is revised into an engineering bidding for an office building. 2. The instructor serves as a client while the students are firms seeking the design job. 3. A total of ten competitive design proposals are required 4. Design submittals must include a professional cover letter, explaining the design.

What went on well: 1. Important design concepts are better mastered by THIS class. 2. Students are interested in the simulated engineering bidding process, and there is no complaint about the required cover letter. 3. The use of small teaching techniques in classroom discussions greatly improve the classroom dynamics. What needs further effort: Cover letter is not good data as most are repeated. 2. Surveys/evaluations should include numerical following the lecture schedule. questions to facilitate data collection and analyses. 3. The process of simplifying real-world problems into class examples needs better explained. What is next:

Data and Methods

1. Students are required to list known knowledge in a pre-semester survey.

2. Cover letters are collected and analyzed to evaluate the effectiveness of instruction. 3. Students are required to list

known knowledge in a postsemester survey.

4. The texts in the pre- and post-semester surveys are compared using word clouds.

5. A winning "firm" is announced based on design submittals & exam.

1. A Virtual Reality Infrastructure (VRI) lab has been created. 2. An NSF proposal

Qualitative Analysis Results

The pre-surveys contain general keywords, while the post-semester surveys contained 18 more relevant **beams for the second s** Students used "calculate" and "determine" to demonstrate their understanding of the modeling process. In addition, "loads" were used more than 90 times by 22 students, indicating that the important concept was successfully conveyed. Finally, "capacity" "checks" per "ACI" "codes" are clearly shown.

> "I like the course about engineering reality though the project is not real"

5. Qualitative analyses are conducted on the cover letters.

> **development**^{get} **Chec**

