

# Use of Technology Solutions to Improve CAD Instruction

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## Summary

Engineering Graphics curricula have changed dramatically in the past three decades, from manual drafting and descriptive geometry to 3D parametric solid modeling (SM) systems. Effective use of SM systems requires the development of declarative and strategic knowledge such as selection of solid modeling alternatives and use of modeling constraints. This paper explores the use of a web based Learning Management System (LMS) in an attempt to make more faculty and student time available to focus on strategic knowledge and conceptual understanding of SM. This paper records student perceptions of using an LMS to understand basic competencies and identifies that there is a lack of conceptual assessments available to adequately understand the impact on their wider education.

The LMS system was implemented in a 3-credit hour Advanced CAD course for juniors and seniors in mechanical, manufacturing and aerospace engineering at WPI. Students have taken the introductory 3-credit CAD course and are familiar with solid modeling methods and strategies and basic drawings and assemblies. Typically, the lectures cover conceptual material such as modeling strategies and constraint theory, and lab exercises were based on tutorial texts. In this course offering, students were required to complete the LMS tutorial and quiz before lab. Students were then given more challenging parts to model in the lab, when the instructors were available to assist with the more difficult modeling exercises.

Upon completion of the course, students were queried to evaluate their perceptions of the use of the LMS tutorials. Students rated the LMS tutorials as average, however, three-fourths of the students stated that they would **not** prefer a tutorial text over the LMS online tutorials. Forty percent of the students felt that the online tutorials helped them to be more productive during the lab periods, and another quarter of the students felt that there was no difference between the online and text-based tutorials in terms of productivity. A significant number of students (39%) expected that they would use the vendor website during the coming year to access additional tutorials for further learning.

Our preliminary results suggest that use of the LMS was successful and resulted in similar outcomes as compare to the use of tutorial texts. Furthermore, students preferred the online learning system, and recognized advantages to be able to access the learning modules for more advanced topics later in their academic program. Future work will focus on the use of the model checking software to reduce instructor grading time and provide feedback to students on modeling strategies.