

## Teaching Process Improvement in a Graduate Software Engineering Course

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**Abstract** - This presentation discusses the experience at Drexel University in using the Personal Software Process (PSP) to teach software process improvement in a graduate software engineering course. The presentation describes the context in which the PSP is used and discusses issues related to students, course structure, PSP features, and instructor load.

The faculty members participating in this work believe that the PSP is a very effective approach to teaching about process improvement and to enhancing students' understanding of software engineering. The presentation includes some preliminary results that provide insight into the impact of the course on student attitudes toward software engineering. This data is drawn from a post course survey administered six to eighteen months after students completed the course. The survey data also provides information about adoption of the PSP by the students after they complete the course.

The presentation will provide a useful summary of experience for faculty members considering teaching the PSP.

### Presentation Overview

The Capability Maturity Model (CMM) has attracted a great deal of interest and many organizations in the defense community and beyond have adopted the model as part of efforts in software process improvement.

The Personal Software Process (PSP) is a self-improvement process for software engineers. It teaches skills that individuals need to operate in a software development environment with mature processes as defined by the CMM. Since the publication of the first PSP text and an additional text to support use of PSP concepts in other courses, a number of universities have started to teach the PSP in whole or part. In addition, several commercial organizations have applied the PSP in their environments.

Drexel University began using the PSP in a graduate curriculum shortly after publication of the initial text. The primary goal has been to use the PSP to change students'

understanding of software engineering. Many Drexel students were learning about topics such as software measurement and metrics, or software estimation without having much actual experience with trying to perform the tasks related to these topics. The PSP appeared to be a good vehicle to give students a hands-on experience with software engineering methods at an individual level.

The overall results with the PSP at Drexel have been very positive. The PSP seems to be effective in teaching practical skills that individual engineers can apply in actual software work and it seems to be excellent for substantially increasing students' insights and understanding of software engineering. Preliminary follow-up surveys that indicate the PSP can produce attitudinal and behavioral change in working software professionals well after they have completed a PSP course.

This presentation will begin with a brief overview of the PSP, the standard course for teaching it, and a description of the context in which Drexel is using the PSP. Successive sections present a series of issues that affect PSP instruction. These issues are grouped into the following categories:

**Students** – including reaction and resistance to PSP concepts and required entry skills

**Course structure** – including teaching the PSP in quarterly terms, use of class time, and providing feedback to students

**PSP features** – including concepts students find difficult

**Instructor load** – including preparation, and support provided by the PSP materials

The last part of the presentation will discuss preliminary results of a post course survey being conducted to evaluate impact of the PSP on students. Preliminary survey results indicate that the PSP changes students' understanding of software engineering and what it takes to work in an environment with mature development processes as defined by the CMM. Preliminary results also indicate that the PSP had a lasting impact on students' work habits, although the details of this impact varied substantially.