Lessons Learned in SEI
Blended Learning

Software Engineering Institute
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Pittsburgh, PA  15213

Philip Miller
23 September 2008
Outrageous

“My conclusion was that society’s rate of progress was at least partly limited by software technology. If we did not master this technology, industrial growth would be stunted and human progress constrained. This seemed like a challenge worth devoting my life to. This is what I called an outrageous commitment. While I had no illusions that I could change the world of software, I decided it would be an exciting challenge and it would certainly be worth the effort.”,

- Watts Humphrey

Not Really

Watts was wrong. With the help of many of the people in this room Watts is changing the world. It is high time we start acting like it.
Questions that come to my mind.

• What are the PSP educational objectives?
  – PSP BOK.
• How do we teach it?
  – Levels of understanding.
  – Summative/formative evaluation.
• Can the student tell if they understand the material as they should?
  – Instructor feedback on exercises.
  – Ability to function in on a TSP team.
  – PSP Certification Exam.
• Will our educational efforts scale and retain quality?
• Is PSP/TSP education and training sustainable?
  – Is it affordable and a good value to the potential customers?
  – Does it provide adequate ROI to the SEI?
SEI Blended Learning – How It Works

1. Teach/certify teachers in technical material.
2. Provide training in pedagogy.
4. Ensure quality delivery.

Industry needs → TSP Team → mentors

consultation

curriculum

feedback

preparation and support

instructors

students

servers

1. Store and serve materials to students.
2. Store assignments, solutions and feedback.
## A Few Facts

1. Sept 2005, first SEI BL course offering, PSP for Eng. I
2. Aug 2006, CMMI v1.2 Upgrade Training Introduced
3. Aug 2008, CMMI-ACQ Pilot

### Student Assessment

<table>
<thead>
<tr>
<th>Formative?</th>
<th>Summative?</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td></td>
</tr>
<tr>
<td>informal</td>
<td>✔</td>
</tr>
<tr>
<td>formal</td>
<td>✔ ✔ ✔</td>
</tr>
</tbody>
</table>

### Teaching & Learning Style

<table>
<thead>
<tr>
<th>Distance</th>
<th>Mix</th>
<th>Presential</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMMI-UT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMMI-ACQ</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>CMMI-ACQ</td>
<td>✔ ✔</td>
<td>✔ ✔ ✔</td>
</tr>
</tbody>
</table>
# Course Enrollments

## All SEI BL Courses

<table>
<thead>
<tr>
<th>9/5/08</th>
<th>CMMI v1.2 UT</th>
<th>CMMI v1.2 UT for ILA’s</th>
<th>CMMI ACQ</th>
<th>PSP Courses</th>
<th>PSP Instr BL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accounts Created</strong></td>
<td>7107</td>
<td>677</td>
<td>6</td>
<td>735</td>
<td>46</td>
<td>8571</td>
</tr>
<tr>
<td><strong>Completions</strong></td>
<td>6054</td>
<td>610</td>
<td>2</td>
<td>156</td>
<td>24</td>
<td>6846</td>
</tr>
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</table>

Completion is required for continuation of SEI credentials in CMMI.

## PSP SEI BL Courses Only

<table>
<thead>
<tr>
<th>9/5/08</th>
<th>PSP I</th>
<th>PSP II</th>
<th>Basic</th>
<th>Fund</th>
<th>Adv</th>
<th>Instr BL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accounts Created</strong></td>
<td>218</td>
<td>222</td>
<td>62</td>
<td>215</td>
<td>18</td>
<td>46</td>
<td>781</td>
</tr>
<tr>
<td><strong>Completions</strong></td>
<td>57</td>
<td>61</td>
<td>38</td>
<td></td>
<td></td>
<td>24</td>
<td>180</td>
</tr>
</tbody>
</table>

Completion is required to earn credentials as an SEI BL Instructor.
What are our learning objectives?

The Personal Software Process Body of Knowledge (PSP BOK)

- key skill: proficiency, facility, or dexterity that is acquired or developed through training or experience within a particular knowledge area
- key concept: an explanatory principle applicable to a specific instance or occurrence within a particular knowledge area

http://www.sei.cmu.edu/tsp/tools/bok.html
What are our (PSP) learning objectives?

Bloom’s Taxonomy (new version)

Creating: can the student create new product or point of view? assemble, construct, create, design, develop, formulate, write.

Evaluating: can the student justify a stand or decision? appraise, argue, defend, judge, select, support, value, evaluate.

Analyzing: can the student distinguish between the different parts? appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.

Applying: can the student use the information in a new way? choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.

Understanding: can the student explain ideas or concepts? classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase.

Remembering: can the student recall or remember the information? define, duplicate, list, memorize, recall, repeat.

http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

“Application of Bloom’s Taxonomy Debunks the “MCAT Myth””, SCIENCE 25 Jan 2008, VOL 319
What are our (PSP) learning objectives?

Bloom’s Taxonomy (new version)

Create a PSP version or an alternative to PSP.
Creating: Write your own story.

Evaluate the effectiveness of current verification methods.
Evaluating: What was the point of the story?

Analyze a process to improve it. Analyze phase yields.
Analyzing: How did each bear react to what Goldilocks did?

Produce the product size estimate. Follow the script for a process.
Applying: Write a sign to be placed near the edge of the forest.

Why detailed plans are needed?
Understanding: What did Goldilocks look like?

What is the Process Quality Index? What is added code?
Remembering: Who was Goldilocks?
### SEI BL and the PSP Cognitive Objectives

<table>
<thead>
<tr>
<th>Bloom’s Taxonomy</th>
<th>PSP BOK</th>
<th>Traditional and Present SEI BL</th>
<th>Possible SEI BL (Add to Present)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating</td>
<td>PIPs, tailoring of the method</td>
<td>Programming Assignments</td>
<td>Formative Practical Assessments</td>
</tr>
<tr>
<td>Evaluating</td>
<td>Limited to selection of components such as design or verification.</td>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>Analyzing</td>
<td>27 meaningful references generally calling for full fledged analysis of data improving personal processes.</td>
<td>Reports</td>
<td>Practical and MCQ Assessments</td>
</tr>
<tr>
<td>Applying</td>
<td>Large number of applications of processes.</td>
<td>Programming Assignments</td>
<td>Formative MCQ Assessments</td>
</tr>
<tr>
<td>Understanding</td>
<td>Little explicit emphasis on this cognitive level but necessary for higher level cognition.</td>
<td>PSP Certified Developer Exam (Summative Only)</td>
<td>Formative MCQ Assessments</td>
</tr>
<tr>
<td>Remembering</td>
<td>Rich with detail to be recalled.</td>
<td>PSP Certified Developer Exam (Summative Only)</td>
<td>Formative MCQ Assessments</td>
</tr>
</tbody>
</table>

MCQ means Multiple Choice Question
Contact Information

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