The Engineering Design Log: A Digital Design Journal Facilitating Learning and Assessment

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Why EDP Logs?

• Concise, scaffolded guide of student process
• Allows for self-reflection
• Used in both science and engineering classes
• Defends non-working prototypes/no artifact
• Requires instruction for usage
• Provides a gradable resource

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Engineering Notebooks

The evolution of the eEDPL

- Manage quantity (about 200 for semester)
- Intermediate submission of items
- Structure to the entries

- Paper based 3-ring binder notebooks
  - Student sabotage
  - Drop = loss of pages and organization
- Composition/Spiral Notebooks
  - Identification of owner
  - No method to insert pages
Engineering Design Process (EDP)

Identify the Problem
- Problem Statement
  - What design problem are you working on?

Understand
- Design Requirements & Goals
- Background Research
- Customer Needs

Ideate
- Brainstorm Design Ideas
- Sketch to Communicate
- All Ideas Welcome

Evaluate
- Design Meets the Requirements?
- Design Strengths/Weaknesses
- Use a Decision Tool to Rate Designs
- Select Promising Design(s)

Prototype & Test
- Detailed Technical Drawings
- Mathematical and Computer Models
- Build Physical Model
- Requirement Tests

Communicate your Solution
- Share Your Solution
- Justify Your Design Using Collected Data
- Provide Design Process Documentation
The eEDP Log:
electronic Engineering Design Process Log

Tabbed spreadsheet aligned with EDP
Formatted and auto-populating example

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EDP Log

Scoring and Grading

• EDPPSR (Goldberg 2011)
• Modified for both High and Middle School use
• Revised to 8 elements
• 0-5 for High School and 0-4 for Middle School
• Student checklist aligned to rubric
• *Rubric is designed for GROWTH (not as absolute scale)!*

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Teachers’ Perspective

- 6 teachers varying utilization
  - Teacher led class activity
  - Student completion for each activity
- Benefits at both age groups
  - Organization and documentation skills
  - Improved understanding of EDP
  - Informed design decisions
- Challenges using EDPL
  - Student resistance
  - Student writing, reading and critical thinking skills
  - Technology disruption

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Results

EDPL Descriptive Statistics for Middle School Logs, Max Score =3, n=20

<table>
<thead>
<tr>
<th>Element</th>
<th>Mean</th>
<th>SD</th>
<th>Range(min,max)</th>
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</thead>
<tbody>
<tr>
<td>A: Identify the problem</td>
<td>0.8</td>
<td>0.89</td>
<td>(0,2)</td>
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<tr>
<td>B: Understand</td>
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<td>0.67</td>
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<td>C: Ideate</td>
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<td>D: Evaluate</td>
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<td>E: Prototype &amp; Test</td>
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<td>0.44</td>
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<td>F: Iterate</td>
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<td>0.22</td>
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<tr>
<td>G: Progression</td>
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<td>0.22</td>
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Element H: Communicate your solution was not scored.
Conclusions

• Use of EDP Log needs to have clear purpose and expectations for students
• Pedagogical and assessment value clear to teachers
• A separate reflective aspect needs further work
• Explicitly incorporate EDP Log use in the curricula
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• Pedagogical and assessment value clear to teachers
• A separate reflective aspect needs further work
• Explicitly incorporate EDP Log use in the curricula
Questions

• AMP-IT-UP is funded by the NSF MSP award #1238089

• www.ampitup.gatech.edu

• jeff.rosen@ceismc.gatech.edu
# Identify the Problem

# Problem Understanding

Document your design requirements here, with a date and an appropriate source. This will provide a dated list as you add requirements later in the process.

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<thead>
<tr>
<th>Date</th>
<th>Requirement</th>
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<tr>
<th>Testing Result data</th>
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Based on your results above, are there additional requirements or functions for your design?

New Requirement:

***This will need to be added to your requirements list on the Identify & Understand tab***