The Development and Implementation of a Potential AP for Engineering Design Using a Rubric-Based e-portfolio

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The Motivation for Engineering

- **AP®** – Parents and school systems view AP® as a pathway to college placement and acceptance.
- **Weighted GPA** – Honors, gifted and talented, and AP impact the weighted average.
- **Inclusion** – Level the ‘playing field’ and increase diversity.
- **Align Project-based Activities** – Recognize student achievements in both formal and informal education settings.
- **Student learning trajectories** – Research and document for: design process, problem-solving, team work, and creativity.
Phases and Timelines
EDPPSR e-portfolio and Case Studies

Definition of problem – “Why no AP® Engineering

- Focus Groups
- Expert Interviews
- Review of Syllabi
- Workshop
- Pilot study of Course Model

Development of Models and Solution Sets

- Workshops
- Focus Groups
- Expert Interviews
- Formation of Collaborators
- Model Development for Rubric and e-portfolio

Prototype Construction
Validation & Reliability Testing

- Rubric for Design Process (EDPPSR)
- Inter-rater scoring
- Innovation Portal™
- Database development
- Psychometric Tool Development

Case Studies – Test bed

- AP® Engineering Design
- Dual-credit
- Scholarships
- Competitions
- ABET Tool Kit
- Admissions Indicators

PHASE I
Feb 2005 – April 2007

PHASE II
Apr 2007 – Summer 2010

PHASE III
Fall 2010 - Ongoing

PHASE IV
Start ~ 2013

Start ~ 2013

PHASE II
Apr 2007 – Summer 2010

PHASE III
Fall 2010 - Ongoing

PHASE IV
Start ~ 2013

PHASE I
Feb 2005 – April 2007

PHASE II
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PHASE III
Fall 2010 - Ongoing

PHASE IV
Start ~ 2013
Toward AP Adoption

Basic College Board Criteria

1. Recognition and acceptance by the post-secondary constituents. Willingness of large numbers of US higher education institutions to grant credit and exemption from an existing undergraduate course.

2. Availability of professional development and related curriculum and instructional resources for teachers.

3. A sustainable financial model.
Common Syllabi Elements

- Design process
- Problem solving
- Creative thinking
- Teaming
- Technical and engineering communications
- Ethics
- Basic computer tools
- Time management
- Project management
- Modeling
- Apply mathematics and science knowledge
- What it means to be an engineer
- Role in society
Developing an accessible ePortfolio resource

www.innovationportal.org
Element C: Presentation and justification of solution design requirements

Please see the pdf file below for the contents of this portfolio subsection.

Document:

Element C Presentation and justification of solution design requirements.PDF
Element C Resources - Presentation and justification of solution design requirements

These resources and examples are specific to helping students develop a comprehensive and robust portfolio entry for Element C

"Presentation and justification of solution design requirements"

EXAMPLES: Annotated Portfolio Examples for Element C

1. Snow Clear LED Traffic Signal Visor - (PDF) averaged reviewer score = 1

2.

3.

IDEAS and RESOURCES: Presentation and justification of solution design requirements
### Presentation and justification of solution design requirements

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<td>5</td>
<td>Design requirements are listed and prioritized, and they are consistently clear and detailed; these design requirements presented are consistently objective, measurable, and they would be highly likely to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, many if not all primary stakeholder groups.</td>
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<tr>
<td>4</td>
<td>Design requirements are listed and prioritized, and they are generally clear and detailed; these design requirements presented are nearly always objective and measurable, and they would be likely to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, several primary stakeholder groups.</td>
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<td>Design requirements are listed and prioritized, and they are generally clear and somewhat detailed; these design requirements presented are generally objective and measurable, and they have the potential to lead to a tangible and viable solution to the problem identified; there is evidence that requirements represent the needs of, and have been validated by, at least a few primary stakeholder groups.</td>
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Next Steps

• **Continue the research** to address the College Board’s Criteria.

• **Review portfolios across ‘Challenges,’ programs and faculty** committed to participate (FIRST®, SeaPerch®, PLTW, TN Tech, UMD, USNA, UVA, and Vanderbilt).

• **Understand, define and document** how the EDPPSR / e-portfolio aligns to grades 10 to 16 informal activities, Introduction to Engineering courses, course related design projects and CAPSTONE courses.

• **Develop and test** training processes for the scorers / raters, teachers, faculty and mentors.

• **Develop scoring and reporting tools.**