Leveraging a Pre-Collegiate Innovation Competition to Integrate Entrepreneurial Concepts in Capstone Design Projects

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Objective

Establish a sustainable relationship with the statewide Invent Idaho competition to create a pipeline of innovative capstone projects with mutually beneficial educational experiences.

Introduction & Background

Capstone Design:

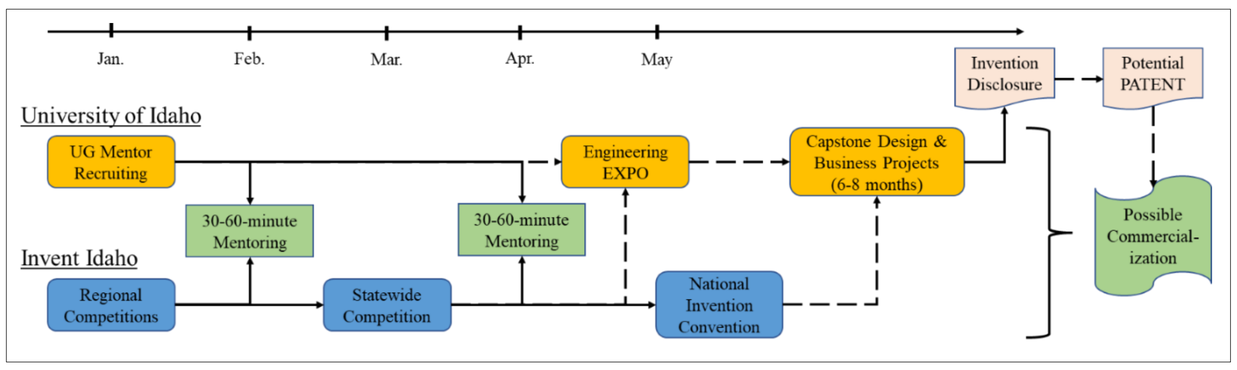
- Interdisciplinary program; two semester sequence
- Predominantly industry-sponsored projects, with little opportunity for entrepreneurship-related learning
- Need a project model to enable capstone students to innovate while developing an "**entrepreneurial mind set**"

Invent Idaho:

- Grade 1-12 students: statewide, extracurricular competition
  - ~2000 participants at local schools each year
  - Regional → State competitions (75-100 participants)
  - ~20 students invited to the National Invention Convention
- Participants can only spend up to $25 on prototypes
- **Afterward**: limited resources to continue developing ideas

Approach

1. At regional competition: judges choose strong ideas for advancement to the state competition.
2. Electromechanical invention ideas are selected by U. of Idaho for possible mentoring; expect 6-10 annually.
3. Formal invitation for mentorship sent to the **parents**



Undergraduate Mentoring:

- Volunteer undergraduate engineering students
- Mentors provided basic training on coaching techniques and engagement with pre-collegiate students
- Purpose: feedback on feasibility of invention idea, facilitate brainstorming, and assist articulating the value proposition.
- Expect 30-60-minute mentoring sessions

Transition to Capstone:

- Capstone instructors review/decide ideas for Capstone
- Project is "pitched", and capstone student team is assigned
- In parallel, Entrepreneurship students assigned to advance the product pitch and draft a business plan.

Pilot Project (our first Experience)

7th Grader invention – novel **Tree Planter**

Novel idea:

- Projectile planter impacts the ground during planting, removing the need to dig a hole.
- Capsule protects the seeds or seedling during impact, then biodegrades within ~30 days.

Capstone Project involved 5 ME/MSE students, completing:

- Analysis and optimization of the capsule (shown below)
- Materials research for printable/moldable bio-material
- Design and prototype of a spring-loaded planter mechanism

Results:

- Evaluation by the **USDA Forest Service** for reforestation purposes.
- Invention Disclosure submitted Dec. 2021

Hardness Test Samples

Ownership

- Capstone project results in **Invention Disclosure**
- U. of Idaho assumes ownership of IP developed via Capstone project; has the right to pursue patent application. **Important to coordinate the timing** between disclosure and provisional patent filing.
- Commercialization mechanism is via licensing with industry partner. Licensing fees result in **royalties dispersed to inventors**, including the Invent Idaho participant.

Reflection and Future Development

- Intellectual Property discussions need to be with **parents**. Need to formalize the discussion and paperwork around explanation of ownership, licensing, and royalties.
- Undergraduate mentors need more formal **training** for engaging and coaching the pre-collegiate participants. Moving forward, U. of Idaho will transition mentoring to the **Engineering Ambassadors** (which are paid positions), enabling more targeted engagement and formal training.
- Creating **metrics** for measuring success of the mentoring is challenging; requires IRB approval to conduct surveys. Recommend focusing follow up surveys on **parents** to reduce the "layers" of approval required

*Undergraduate student

Acknowledgments: The authors wish to acknowledge and thank the Founder and Director of the Invent Idaho program, Beth Brubaker, for ongoing encouragement and enthusiastic implementation of this initiative within Invent Idaho. Funding for capstone projects and mentoring is generously provided by the Idaho Entrepreneurs Gap Fund, VentureWell, and the NASA Idaho Space Grant Consortium.