



Guiding Background Research in Engineering Capstone Design through Information Literacy

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CONTEXT & PROBLEM

► **Background Research is Critical -- and Hard** IE Capstone students must conduct thorough literature reviews across diverse, project-specific domains. Five years ago, they received only a brief introduction and rarely used available library resources. A structured, iterative, librarian-led information literacy (IL) module was developed to close this gap and yield improvements.

FIVE-YEAR DEVELOPMENT TIMELINE

- **2021** First dedicated IL class module
- **2022** New activity: whole team brainstorming
- **2023** Expanded to ME and BioE
- **2024** Research skills tutorials added
- **2025** Excel workbook guide launched

INTERVENTION DESIGN

► **Project-Centered Information Literacy Guide** Adapted from Fosmire's Design Information Audit (from Purdue), the guide is a research-focused Excel workbook organized around **6 information types** and **3 exercises** central to engineering design and innovation.

- 6:** **Domain Information** **Existing Solutions** **Stakeholder Needs** **Materials, skills, tools** **Intellectual Property** **Regs & Standards**
- 3:** **Brainstorm:** Guided prompts and major-specific examples spark in-class team thinking. **Plan & Track:** Prioritize questions, divide work, and log shared findings to develop a framework. **Search:** Curated sources, tips and tutorials are provided by information type

CLASS SESSION FORMAT

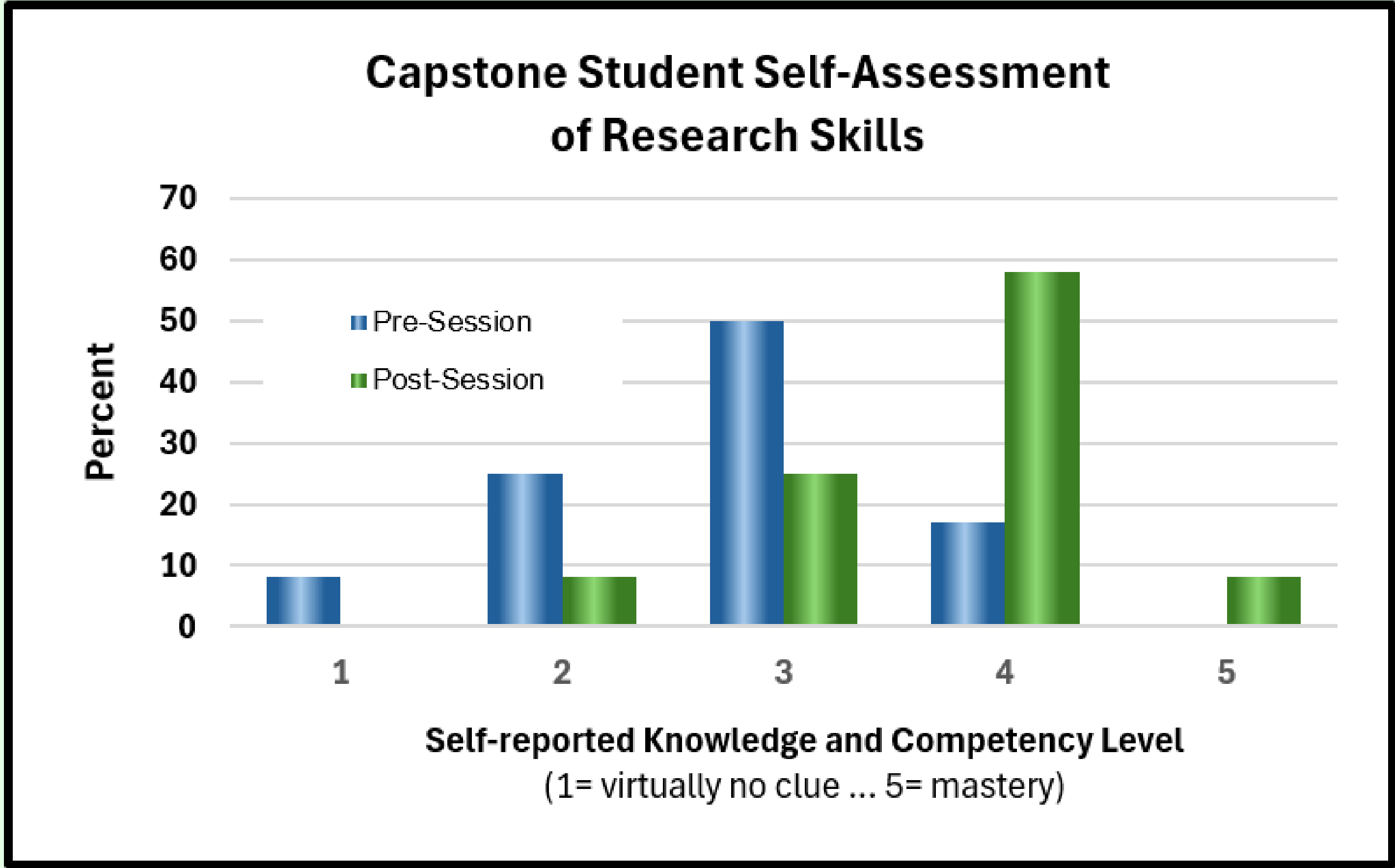
► **Guided Exercises** Librarian introduces each information type with an IE example. Each team brainstorms for their own project, then shares and prioritizes 3-5 initial research questions.

ITERATIVE IMPROVEMENT

► **Informed by Feedback & Data** Five years of outcomes drove annual revisions. **Key insight:** students need more structure and benefit from shared research tracking across team members.

EVIDENCE OF EFFECTIVENESS - STUDENTS

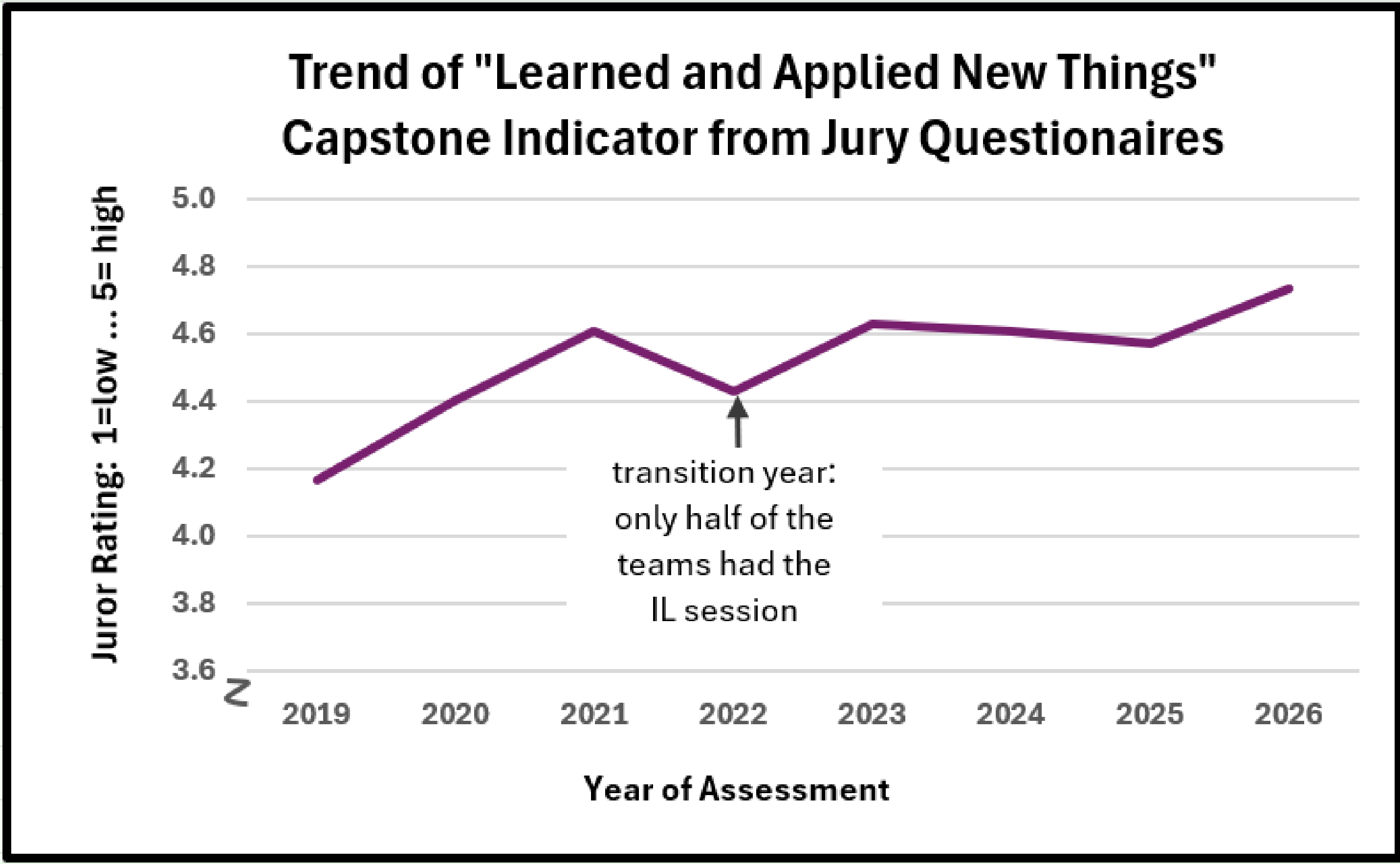
► **Gains in Student Confidence in Research Ability** Students answered the same question prior to the session and following the session by providing confidence ratings.



Q: "How prepared do you feel to conduct proper background research on your Capstone project (without just using google)?"

EVIDENCE OF EFFECTIVENESS - JURORS

► **Jury Feedback for 'Acquiring New Knowledge'** Alumni jurors were provided a rubric to assess key elements of Capstone. Knowledge acquisition and application was rated on a 1-5 scale.



Q: Jurors rated the program on "Acquired and applied knowledge outside the standard mechanical/industrial engineering curriculum".

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SUCCESS METRICS IN A NUTSHELL

Full IE Guide (free): bit.ly/Guide-IE-2025

- 6 areas** of research competency enhanced through IL sessions and exercises
- +33%** Sig. overall increase in confidence in ability to do independent. research
- 3 Programs** Industrial, Mechanical, and Bioengineering currently using guide
- +5%** Alumni juror scores for acquiring and applying new knowledge
- Top 1/3** of Capstone course elements by student satisfaction ratings

QUALITATIVE FINDINGS

► **Sentiments** **Students** reported less frustration starting research, a better grasp of their topics current state, and less inertia writing their first report. **Faculty** observed richer, more diverse research and solution ideation with a noticeably wider lens.

TAKEAWAYS & FUTURE WORK

► **A Versatile Framework** **Key Lesson:** Structure matters: Guided brainstorming, shared tracking, and curated source lists outperform open-ended prompts alone. **Next Steps:** Analysis of student responses to identify learning themes and refine the guide.