

Evolution of the Global Issues Conceptual Design Project: The Freshman Engineering Research Experience at Binghamton University

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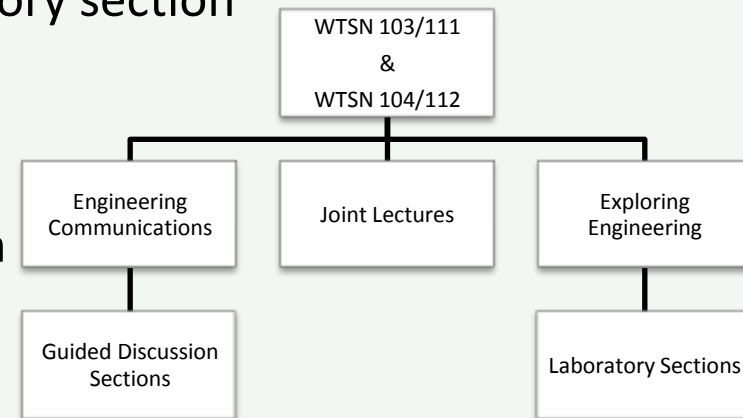
- **Freshman Engineering at Binghamton University**
- **First-year Projects**
- **Global Issues Project**
 - Project Topics
 - Project Layout
 - Student Support
- **Conclusion**

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FRESHMAN ENGINEERING AT BINGHAMTON UNIVERSITY

- Common first year for all freshman students. Each semester the students take the following courses:
 - An Introduction to Engineering course
 - Fall: WTSN 111 - Exploring Engineering I
 - Spring: WTSN 112 - Exploring Engineering II
 - A Technical Communications course
 - Fall: WTSN 103 – Engineering Communications I
 - Spring: WTSN 104 – Engineering Communications II
 - A Calculus course
 - A Science course
 - A General Education Requirement course

- WTSN 103/104 & 111/112 are linked
 - Joint one hour lecture section that meets twice a week
 - ~300 Students
 - Separate activity/discussion sections
 - WTSN 111/112
 - One and a half hour laboratory section
 - ~25 Students/section
 - WTSN 103/104
 - Two hour discussion section
 - ~35 Students/section



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FIRST YEAR PROJECTS

- Fall Semester Projects
 - Make[®]/Arduino Project
 - Hands-on Project
 - Ends in a Poster Exposition
 - Focuses on:
 - Project Management
 - Team Building
 - Reverse Engineering Project
 - Second half of semester
 - Based on principles of Make[®]
 - Focus on Engineering Design Process with emphasis on Generation and Evaluation of Alternative Solutions



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GLOBAL ISSUES PROJECT

- Spring Semester Project

- Semester-long team project

- Based on real World Bank Projects

- Focuses on:

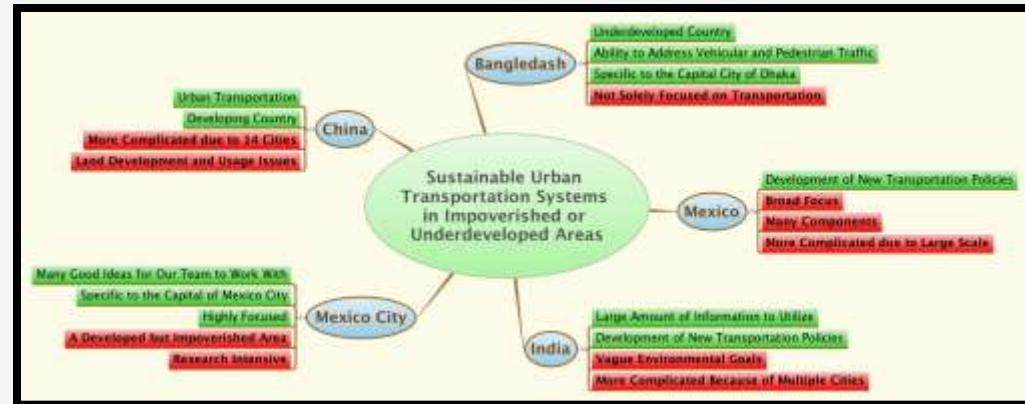
- Reinforcement of Engineering Design Process
- Conceptual Design Process
- Critical Research Practices

- Constantly Evolving Project



<http://www.worldbank.org/>

- Previous models
 - Any World Bank project could be chosen



- Current Version

- Project must be related to Climate Change

- Possible future changes

- Projects relate to a specific type of technology
 - Wind Energy
 - Hydro-power
 - Alternative Energy Vehicles
 - Etc.

■ Previous models

○ Semester long work on Project

• Broken into 3 Research papers

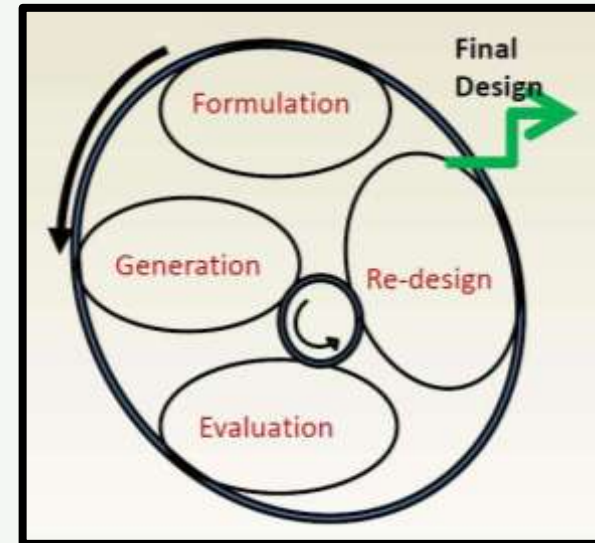
- Country Brief
- Technology Overview
- Solution Research

○ Final Presentation

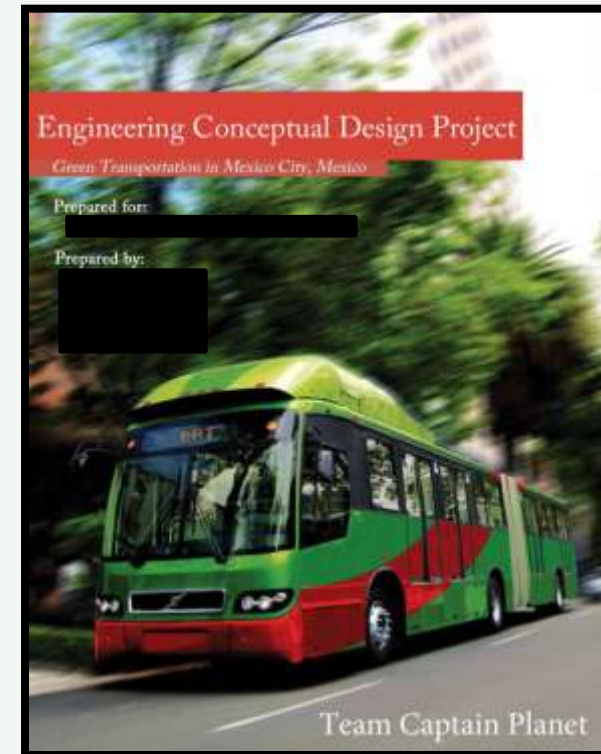
- Summarizes the Project

○ Final Project Report

- Integrates the three research papers to present the final solution



- Changes
 - Mid-Term Problem Statement Presentation
 - Focuses on the development of the Problem Statement
 - Final Presentation
 - Eliminated to allow students to focus on the report at the end of the semester



- Past models
 - Student/teacher interaction was limited to the Engineering Communications instructors
 - Reports were assessed by both
 - Engineering Communications Instructors graded for research and proper grammar
 - Engineering TAs graded solely on technical merit

	Use of Regenerative Shocks to Relieve Stress on Bus Alternator	Regenerative Shock Powered Electrostatic Precipitation	Electromagnet Assisted Driveshaft Power By Piezoelectrics	Piezoelectric Based Electric Steering
Ease of Implementation	S	S	-	-
Safety	S	+	-	-
Reliability	S	S	-	+
Effectiveness	S	-	S	-
Ease of Repair	S	S	-	-
Environmental Impact	S	+	S	S
Cost	S	-	-	-
(+)	0	2	0	1
(S)	7	3	2	1
(-)	0	2	5	5

- Changes
 - Engineering TAs play a larger role in the project development
 - Each WTSN 104 section has an assigned Engineering TA
 - Lab assignments developed to provide assistance
 - Provide feedback at multiple points of the project
 - Problem statement development
 - Mid-term presentations
 - Alternative solutions

■ Changes

- University Science/Engineering Librarians provide tailored support to students
 - Visit with the individual class sections to instruct on proper research methods
 - Provide outside-of-class individual support
 - Created a Library Subject Guide specifically for this Project



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CONCLUSION

- Binghamton University First-Year Engineering Program
 - Linked courses
- Term Projects
 - Fall
 - Make/Arduino
 - Reverse Engineering
 - Spring
 - Global Issues Conceptual Design



- Global Issues – Conceptual Design Project
 - More focus on the understanding of the project
 - Mid-Term Presentation
 - Added Support
 - Possible future changes
 - More focused topics
 - Continued increase in student support
 - Inclusion of the new Sustainability Minor

Any questions?