High-Tech Classroom Design

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Type: Design problem
Student time: Ten weeks
Location: At school

Summary

This project is intended for students to do the feasibility study of classrooms of year 2000 as they envision it. Students will work in a group of 4-5 to study the present classrooms and note the deficiencies. They will examine the various educational technology for use by the instructors and students, alternatives for on-board teaching/learning, availability of software and hardware, etc. Distance learning and in-class learning issues will also be explored. They will examine the economic factors on their designs and evaluate benefit/cost ratio and ultimately recommend a design.

ABET Descriptors

Engr Sci Content: First Year Engineering
Type: System
Elements: Design, engineering economy, feasibility
Features: Design process, envisioneering, open-ended, written and
                               oral communication
Constraints: Cost and convenience
Effort: Team

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Memorandum

To: Engineering Students
From: Technology Task Force (TTF)
Subject: High-Technology Classrooms

As you are perhaps aware that technology is invading all campuses across the globe village. To stay competitive, institutions are challenged to come up with alternative modes of educational delivery. At our institution, we have formed the TTF to assess the uses of technology for benefits of our students. Your dean suggests that you have vision in anticipating requirements of the future and understand well the current and future technology for instructional use. It is understood that the present classroom methodology does not provide instructional environment taking full advantage of available technology. After looking through various web pages and published literature, we have been unable to determine which would fulfill the requirements of students-our major clients.   These classrooms can also be used for continuing programs for the local industry. Perhaps, uses could also be predicted for local high schools for Advanced Placement (AP) courses. Since you-the engineering students-are highly capable of anticipating the uses and misuses of the technology, we on the TTF decided to seek your help in arriving at a solution. A report of TTF is available for your perusal. We are asking for your design, cost analysis, and feasibility reports to assist us in generating and evaluating alternative solutions and making an intelligent choice that can be easily updated as technology advances. Please submit your design and supporting documents within ten weeks.

While considering your choices, you have to fully state the reasons for a particular recommended choice and its implementation procedures. Take one of the existing classroom on campus as an example and evaluate the current deficiencies and how these can be removed by your suggested procedure. Consider that the TTF has only 1 million dollars of startup funds for the next academic year to implement your solution, with future budget to be allocated based on your articulated benefit/cost ratio. Also, consider the ergonomic factors of human usage. Does your solution allow enhanced distance learning as opposed to classroom learning? Discuss benefits and pitfalls.

Evaluation Criteria:
- A conceptual sketch of the new classroom. Engineering drawings preferred
- List of equipment including computers, display and telecommunications devices
- Budget on a spreadsheet (including desks and other required changes in physical facilities)
- Oral report to TTF (participation by all team members, visual aids required). Supporting written report , one week before the presentation deadline

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Engineering Notes:

- **Ergonomics:** The scientific, interdisciplinary study of students and instructors and their relationship to the classroom environments and use of physical facilities. Analysis of distance learning.
- **Visual factors:** Light and color, lighting levels and viewing angles, screen glare, screen size, task lighting, graphics, text size etc.
- **Acoustics:** Echo and background noise problems.
- **Environment:** Heating, ventilation, humidity, air-conditioning, electrical wiring and conduit requirements.
- **Technology:** Computers/workstations, projections, internet and other network connections, audiovisual aids, interactive technology, etc.

Design Competency Outcomes

- **Group Dynamics:** Understand their own and other members' style of thinking and how they affect teamwork; roles and responsibilities of each member of the team; effective listening, speaking, and visual information processing to be an effective communicator in a group; creating supportive workplace environment.
- **Data, Information, and Knowledge Engineering:** Gather data from various sources-internet, journals, surveys, newspapers, government databases, visits to other places, etc. Organize data in a way to give useful information to the group and public at large and put sufficient knowledge into it to make intelligent choices.
- **Needs Analysis:** Understand open-ended nature of problems, develop specific goal statements, and recognize need for an appropriate design as opposed to the existing paradigms.
- **Generating Alternatives:** Create conducive environment for idea generation, brainstorming, understanding constraints of each idea, and synthesis of the ideas to make whole larger than the sum of its components.
- **Evaluation and Decision Making:** Iterative approach for evaluating design and designing a process of continuous improvement. Develop a follow-up plan.
- **Implementation:** Time and resource management to complete the project and make changes in the design as the project progresses to various phases. Sources of funding, resource sharing by several institutions to derive the maximum benefit, ergonomics and other human factors for using resources.
- **Communication:** Production of records, technical papers, memos, ideas in an acceptable and comprehensible style; presentation techniques to peers and public at large; nonverbal interpersonal communications; personal appearances.