

## Project Team and Advisor Characteristics

**Carl A. Erikson, Jr.**  
**Department of Engineering**  
**Messiah College**  
**Grantham, PA 17027**

### Abstract

The Engineering curriculum at Messiah College is a hands-on, project oriented Bachelor of Science in Engineering (BSE) program. A new Integrated Projects Curriculum (IPC) has been implemented. IPC is in its second year of a three year transition from the former engineering program. IPC projects are part of the Collaboratory for Strategic Partnerships and Applied Research. In addition to local agencies, project clients include overseas agencies in Africa and Central America.

This paper discusses three areas based on many years experience with projects in the engineering curriculum:

- What are some characteristics of a great team?
- What are the greatest challenges to advising a team?
- What are the things that successful advisors do?

### Engineering Department

Since beginning the BSE program in 1989 the engineering faculty at Messiah College has determined to teach responsible living and creative problem solving by enabling students to express value commitments and disciplinary knowledge through hands-on learning in real-life settings. This strategy finds support in Kolb's *Experiential Learning*<sup>1</sup>, Schön's *The Reflective Practitioner*<sup>2</sup>, and more than twenty-five years of related research and curricular innovation in areas that now include experiential learning, collaborative learning, problem-based learning, and service-learning. Authentic engagement, however, does not readily integrate into the traditional classroom. For more than a decade faculty members in Department of Engineering have worked outside the formal curriculum to partner with non-profits to create voluntary opportunities for student engagement. Examples of helping technologies developed and implemented by students and their faculty mentors include: (1) simulated landmines to increase awareness about the landmine problem and train abatement workers; (2) solar power systems that provide water and lighting systems for schools, medical work, and AIDS ministry in Burkina Faso, Zimbabwe, Uganda and Mozambique; (3) adaptive personal transportation technologies that empower persons with physical disabilities, and (4) water purification systems that provide potable water for villages in Honduras and Guatemala. The challenge expressed in engagement education literature is not merely to increase technical competence in the disciplines; it is to make citizens. Although the challenge of our College mission statement is similar, making citizens is more difficult than making graduates. It requires that active and multidirectional connections be made for the learner between knowledge, human passion and will, and the active response of the learner. The Department of Engineering has developed a program to create such connections that moves this type of pedagogy into the curriculum.

### The Collaboratory<sup>3</sup>

The Collaboratory for Strategic Partnerships and Applied Research brings Messiah College students and educators together to apply disciplinary knowledge and express value commitments through creative, hands-on problem solving. Participants engage the knowledge content of their academic disciplines to address needs brought by sponsoring clients. Areas of engagement include projects in mathematical and information sciences, engineering, and business. For comprehensive results we also partner with

disciplines and departments from across campus. Our focus is projects that empower the poor, promote justice for the oppressed, reconcile adversaries, and care for the earth. Clients are organizations, businesses and communities that receive a tangible benefit and contribute to educational objectives for students. The Collaboratory fosters learning that supports and builds on quality classroom instruction. Projects enable students to engage classroom fundamentals in an authentic client-provider environment, and the Collaboratory is run by student leaders and the educators who mentor them. Our programs also connect faculty scholarship and service directly to student learning. The purpose of the Collaboratory is to serve the pressing needs of our world today, while advancing the mission of our College to prepare men and women for lives of service, leadership and reconciliation.

#### Program Strategies of the Collaboratory

1. Our projects are academically and professionally challenging, and they enable students to express Christian faith and value commitments through excellence in their academic discipline.
2. Our students share project leadership and administration responsibilities with educators, and learn by seeing their teachers in action.
3. Our educators connect their scholarship directly to student learning by making hands-on professional contributions to projects as mentors and members of project teams.
4. Our Christian discipleship intentionally reflects on learning experiences, to sharpen vocational vision, foster servant-leadership, and nurture courage to act on convictions.
5. Our project teams include students from multiple years of study for increased peer mentoring.
6. We include multiple academic disciplines and partner organizations with their various modes of thinking and analysis for comprehensive outcomes.
7. We are committed to projects that can span multiple generations of students to attain tangible and sustainable results.
8. We integrate Collaboratory programming into curricula, to increase both participation and academic engagement by connecting Collaboratory work to faculty and student loads.

#### Integrated Projects Curriculum (IPC)

The Department of Engineering has developed and begun implementation of an Integrated Projects Curriculum (IPC) to engage students academically and professionally. The IPC draws on service-learning pedagogy to provide students with credit-bearing opportunities to engage the knowledge content of their academic discipline in the context of a specific problem or need, and to reflect on the experience in view of Christian faith commitments. Service-learning is a pedagogy for achieving holistic, value changing, and action oriented learning objectives. It places students in contact with the needs of others, in relationship with persons different from themselves, and is of long enough duration to facilitate mutual understanding and tangible results. A service-learning curriculum includes instruction in relevant theories and knowledge content; engagement that is strategic to established learning objectives; and student reflection to increase understanding of course content, assess the efficacy of the work, guide future engagement, and enhance civic responsibility.<sup>4</sup>

The IPC consists of seven courses involving 11 academic credits over the four years in addition to the student's engineering concentration courses. The IPC includes a Group Orientation course, two Seminar courses, and four Project courses. IPC is in its second year of a three year transition as the faculty keeps the former program for one more year until its last students graduate in May 2008.

#### What Makes Good Project Teams and Advisors

Over the many years of integrating projects into the curricular and co-curricular activities of the Department of Engineering, including many successful projects and some not so successful,

characteristics of what makes projects work well and what makes a great advisor to a project team have emerged. Based on a Collaboratory Advisors Workshop held in May 2007, approximately 25 Group Advisors and Student Leaders were in attendance and responded to three questions. A bulleted list of responses follows for each of the questions.

1] What are some characteristics of a great Collaboratory team?

- Vision. Well defined purpose – to avoid drifting
- Strong student leadership
  - Students committed to the vision and are able to share it with others
  - Students who confront each other and hold each other accountable for the work, and not just expect the advisor to do it.
- Understanding of the shared leadership concept. [ see below for further explanation]
- Good cross section of students from 1<sup>st</sup> year through senior year
- Members who desire to learn and grow
  - Each other
  - Advisors
  - Other cultures
- Excellent communication
  - Clear expectations – both ways, between advisors and students
  - Time expectations
  - Ability to connect mundane tasks back to the vision.
  - If we can't finish a task, how are we doing?
  - Address directly why there was a problem ( not just “cut and run”)
  - Trust and verify
- Well documented work that can be passed on to future members
- Cross-disciplinary teams
- Rewards for achieving goals, such as a trip opportunity
- Good interaction/partnership with the Staff Group of the Collaboratory
- Resources: equipment, contacts, etc.

2] What are the greatest challenges to advising a team today?

- Vision
  - Creating vision
  - Students understanding and owning the vision
- Time
- Student motivation
- Staying encouraged
- Leading volunteers vs. “employees”
- Failure of leaders to delegate
- Personnel conflict
- Holding people accountable for their work
- Managing risk and consequences
  - Where is the line between allowing students to fail and bailing them out for the sake of progress?
  - Need to talk to clients, so they will know there is a possibility of failure
- Turnover. “Passing the torch”

### 3] What are the things that successful advisors do?

- Pray a lot. Connect with the Group spiritually.
- Understand student culture
- Communicate vision. Maintain the long-term vision.
- Clear about expectations, especially with new members.
- Don't give up. Encouragement.
- Manage risk well.
- Teach delegation
- Motivate students
- Enough humility to collaborate with students.

### Shared Leadership

Most of these characteristics are common sense traits for teams and advisors. One important characteristic, shared leadership<sup>5</sup>, may not be a common term for many teams and advisors. Shared advisor-student leadership is a core strategy for mentoring in the Collaboratory. In the traditional classroom, educators serve as the final authority on the content and direction of a course. Advisors in the Collaboratory are also educators, but their role is that of a player-coach, developing student leaders while also making hands-on contributions in their field of expertise. A primary task of the advisor is to work himself or herself out of a job by developing student leaders to assume responsibility, and by transferring authority and responsibility that is commensurate with students' maturity and ability. Early in the relationship the advisor will generally be prescriptive in directing the leader's work, to protect the long term interests of other students and Clients (from rookie errors); but the goal is transition from the role of boss to coach, and from coach to delegator. The benefits provided to Clients are not more important than educational goals for students. For this reason, advisors will sometimes give student leaders the freedom to choose their own course and to learn from mistakes. Finally, advisors work to cultivate an attitude of humility among student leaders and workers regarding Client organizations and communities served, and an expectation that they will benefit from relationships with their partners in addition to serving them. Such humility is of course a lifelong lesson. The great work in every discipline is almost always the work of a student; one who is able to pay attention to and learn from others.

### Conclusion

Integrating projects into any engineering curriculum is challenging but very beneficial to both students and faculty involved. Many constraints/issues arise in a project's duration, both technical and non-technical, just like in the real-world that students will enter as engineering graduates. As both faculty and students work together to complete tasks within the projects, the knowledge learned in the academic setting soon transforms to practical, hands-on skills for the "benefit of humankind". The Integrated Projects Curriculum through the Collaboratory for Strategic Partnerships and Applied Research is just one way to do this.

### Bibliography

1. Kolb, David A. (1984), *Experiential Learning: Experience as the source of learning and development*, Englewood Cliffs, NJ, Prentice-Hall.

2. Schon, Donald A. (1983), *The Reflective Practitioner: How professionals think in action*, New York, Basic Books.
3. Information on the Collaboratory can be found at [http://collaboratory.messiah.edu/wiki/index.php/Main\\_Page](http://collaboratory.messiah.edu/wiki/index.php/Main_Page) . The author is indebted to the Collaboratory's Director, Dr. David Vader, for use of the material on the Collaboratory.
4. The author is indebted to Dr. John Eby, former Director of Service-Learning at Messiah College, and to Robert Bringle and Julie Hatcher, "A Service Learning Curriculum for Faculty", in *The Michigan Journal of Community Service-Learning*, Fall 1995, pp. 112-122, for this description of service-learning.
5. More information on Shared Leadership can be found on the Collaboratory Wiki at [http://collaboratory.messiah.edu/wiki/index.php/Shared\\_leadership](http://collaboratory.messiah.edu/wiki/index.php/Shared_leadership)

#### Biographical Information

Mr. Carl A. Erikson, Jr. is Chair and Assistant Professor in the Department of Engineering at Messiah College. He helped start the new BSE program in 1989. His interest in Appropriate Technology has allowed him to work with students' projects in Venezuela and Guatemala as well as in Harrisburg, Pennsylvania. He has also done work in Kenya and Bolivia. He can be reached at [erikson@messiah.edu](mailto:erikson@messiah.edu).