A.R.I.S.E. CENTER: DEVELOPING INDUSTRY PARTNERSHIPS[1]

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Abstract

We have developed a partnership between NASA and Florida International University (F.I.U.) to establish the Applied Research in Industrial and Systems Engineering (A.R.I.S.E.) Center. The intent of this partnership is to attract and retain women, Hispanics, African Americans, and other minorities individuals to engineering. Students participating in the program are exposed and trained on NASA's mission, given seminars on the realities of the workplace, diversity, and gender issues. Students attend to their regular curriculum during the academic year, while working on projects for NASA. This model is being tested at various levels to transfer it to industry at large. Our preliminary results indicate that such partnership provides a win-win-win situation for the student, industry, and faculty. This article discusses the partnership model and its implementation.

1. The partnership model

The partnership seeks to establish a **combined research and educational** program to attract and retain women, Hispanics, African Americans, and other individuals from minorities groups to engineering. Students participating in the program

- ☑ are exposed and trained in NASA's mission,
- ☑ are given seminars on a variety of issues, including seminars on the realities of the workplace, diversity, and gender issues,

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- ☑ participate in applied research projects,
- ☑ are instructed on the benefits of pursuing postgraduate studies, in the hopes of increasing their chances to succeed in the work place as well as increasing their stature as role models for future generations,
- ☑ have a 4-week on-site internship so that they become acquainted with the various K.S.C. processes needed to complete the projects, and
- ☑ receive a stipend during the academic year and the summer terms.

An important objective of this effort is to foster partnerships between FIU and NASA, as well as among F.I.U. and local industry. The initial partners in this effort have been Florida International University (F.I.U.) in Miami, Florida and Kennedy Space Center (K.S.C.) in KSC, Florida. Florida International University has been the lead institution, whereas K.S.C. has provided steering guidance as well as a source to implement some aspects of the program.

The initial time frame of this effort is two years. In this time frame, it was expected that various aspects of the model should be tested, re-thought and re-tested as needed, so that the model could become an appropriate model for industry-university partnerships. Specifically, a proposal has been developed to begin the selling of the model to local industry. The proposal highlights the benefits that local industry may derive from the A.R.I.S.E. Center **and** the impact their sponsorship will have in shaping the lives of future community leaders.

2. The Student Participants

Recruitment of students is a most crucial activity for this model to work. Only students who are indeed underrepresented and who are indeed qualified should become participants in the program. This requirement is needed to ensure that quality work is delivered to the partners. Many a times, industry shies away from these partnerships because they do not see a clear benefit for them or because they do not believe students can deliver a good quality project. The A.R.I.S.E. Center model calls for each project to be supervised by one faculty member to ensure that the methods and procedures used in the development of the project are correct. This approach enables the A.R.I.S.E. Center to be a pseudo-consulting Center.

Students from underrepresented groups who had a GPA of 3.0 out 4.0 were identified and a letter of invitation was sent. Telephone calls were made to students who had more than 3.2 GPA and did not respond to the letter of invitation.

All selected students were full time students during this period. They were carrying a course load of 12 to 15 credits. Six students received credit in the Project Management Class for the project. Two students receive credit as part of a technical elective course.

3. First Year Implementation

To establish a **combined research and educational** program to attract and retain women and individuals from minorities groups to engineering and NASA related career paths, the activities of the Center had to be **interesting** to the target audience. It was thought that four components

should be present in these activities: relevance to curriculum, money, glamour, and state of the art equipment.

From the start, all projects done by the students would in one way or another become a part of their regular curriculum. In our program of study, students must do a total of five industry projects. Projects done under the auspices of the A.R.I.S.E. are considered as projects for one or two of the required courses. The contents of the project are assessed to make a match to one of five courses: Work Design, Human Factors, Project Management, Facilities Planning and Material Handling, and Senior Design. In cases were the project falls outside the scope of these courses, a consideration is given as to whether it may be counted as an elective independent study, with additional requirements. Students are paired in teams of two to work on selected projects, which were completed over the course of six months; thus, the projects extended over two semesters. Appropriate milestones were established on each project so that professors may give an adequate grade for the work done so far. For more information on actual projects, visit the following web site http://www.eng.fiu.edu/ie/spc98/flyer.htm

All students are given an annual stipend of $4,000. These stipends are disbursed in installments to use them as a performance incentive and to ensure students have sufficient money left, at the end of the year, to pay for housing during the 4-week internship.

The glamour was a relatively easy component to include: to many, the mention of NASA **is** glamorous enough. A series of VIP tours are given to the students even before they go to KSC for their internship. A series of video-based seminar enables them to learn more about the space program and to discover how they can be one of those pioneers. A total of 6 seminars were given, including an overview of NASA, space shuttle history, space shuttle assembly process, gender in the work place, and racism in the workplace. Working side by side with a NASA engineer has enabled these students to discover that most industry leaders were just like them at some point, and what made them leaders and successful was their discipline to study and their ability to convert ideas into tangibles.

Engineering students will be engineering students regardless of the time and age: they all like to play with the latest toys, take them apart, re-assemble, and invent new ones. Thus, the A.R.I.S.E. Center has been equipped with state of the art computer equipment and software. The Center has one server, two-networked laser printer, and 15 PCs purchased over the course of a year. This approach has enabled the A.R.I.S.E. Center to have on hand at least two of the latest PCs. The A.R.I.S.E. Center also has licenses for a variety of software, including Visual Basic, MS Project, MS Office Suite, ARENA, Statistica, StatMost, SPSS, Inoculan, Visio, ABC, Insight, and others. Students are given seminars on these packages

All students are assigned a faculty supervisor. The functions of the faculty supervisor are to supervise the execution of the project and to ensure that students grow professionally. One to one conversations are used to expand the student's perspectives on their professional careers as well as what graduate school is all about and how it can fit their career plans.

A critical objective is to foster a strong relationship between the FIU faculty and NASA KSC engineers. During the summer internship, a faculty member accompanied students during their internship. The faculty was assigned to the Payloads office with the intent of exploring avenues

of collaboration. A workshop on statistical analysis was given to the Payloads office personnel as a result of this exploration. Other means of collaboration were also identified.

4. Lessons Learned

This partnership is in its second year. So far, the hardest part has been the time required making the A.R.I.S.E. Center a success. But, we are beginning to see the payoff of the investment. Here are some of the issues that we have dealt with. We believe that these issues may be universal for most partnerships; however, we cannot prove it just yet. We have learned issues from three different perspectives: projects, students, and faculty.

Projects are the basis of this model. Projects are intended to give industry a reason to pay and be involved, students a vehicle to learn, and the faculty the means to expand personal experiences. Initially, the industry partner in collaboration with the involved faculty must scope projects out. Although projects should not be thoroughly defined, they should have clear boundaries. The student, the partner, and the faculty must establish the final scope of the project; otherwise, the learning opportunity for the student is gone.

Depending on the type of industry the partner belongs to, obtaining projects may prove challenging. Our experience with NASA revealed that the actual liaison must buy into it **and** must be thoroughly aware the partner (company) is actually *paying* the student regardless of whether the student gets or does not get a project. The awareness that the company is paying for it should trigger a desire to demand not just a project, but a good project. Further, it should also trigger the desire of being involved with the project to ensure its success.

It is a well known fact that GPA alone does not ensure the professional success of anyone graduate. However, it is a good indicator as to where the student stands in its technical skills as well as its maturity level. From the beginning we acknowledged this fact and developed a recruitment strategy that included GPA, a statement from the student, and letters of recommendation. We did not consider economic needs whatsoever; this proved to be a nuisance later on.

Students who meet the criteria must be identified well in advance so that there is sufficient time for personal recruitment. A most opportune time to do recruitment proved to be advising time. In our university, all students must see an advisor before they can register for the following semester. So we asked each advisor to tell those students who seem to qualify to apply for the program. This work was facilitated by the existence of a web site with all the information regarding the A.R.I.S.E. Center. Extensive use of electronic mail helped on the *spreading of the word.*

During the first year, we did not have sufficient time, so we had to rush things a little bit. Forty-five letters were sent to students whom we thought qualified. Only three of them responded. So, faced with the low response, we began calling the other forty-two students. Through this phone call, an explanation of the A.R.I.S.E. Center was given with emphasis on the benefits to the students. Ten more students submitted applications. Amazingly, some of the students were simply not interested in working for NASA or in the scholarship at all.

Eight students were selected (out of 13) to participate in the program the first year. A tracking

database has been developed to follow the performance of the students as well as to better know them enabling better ways to help them. Early in the first year, we found out that many of these excellent students already had other scholarships. This was something we expected and caused no trouble to us; however, the Financial Aid Office had troubles with it because some of the students *were exceeding the amount of federal dollars they could receive!*. This is a new rule that the federal government has put in place, and there is not much that one can do about. But it was an early attack on the morale of the students. They felt penalized for being good students. So we had to be a bit creative in maintaining their enthusiasm. A situation like this should not happen if the funds come from the private sector.

Another important issue to keep in mind is the one of the internship if the partner is at a distant place. In most cases, the industry partner should be a local company; however, it does not have to be like that. In the latter case, students must go to the company's city and lived there for the duration of the internship. It is necessary to make sure that students are aware of the various issues that they may face when living away from home, especially if this would be their first time away from home. A couple of meetings to air these issues out proved to be of great value once the students got to Cocoa Beach, Florida for their internships at KSC.

Faculty members play a supervisory and mentoring role in this model. Without the faculty, it would be difficult to establish solid partnerships. However, faculty must be remunerated accordingly. The lead person in the partnership must recruit faculty who are willing and able to serve as mentors to the students **and** who believe in the intangibles of such endeavor. Faculty time is expensive. If the bill for the company is too high, the whole idea of the partnership may collapse. Thus, instead of focusing on salary for faculty, one must focus on stipend for students, software, and equipment. The faculty may obtain appropriate remuneration from company's funds (small) and from the university (large), which is the *other* partner in the partnership.

Summary

This project still is underway. It is expected that by December 1999, the partnership would have expanded from FIU – NASA to FIU – local industry. For more information on the progress of this effort, visit the A.R.I.S.E. Center's web site: http://arise.eng.fiu.edu.

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