AC 2009-336: A SUCCESSFUL COLLABORATION MODEL FOR EDUCATORS AND INDUSTRY PARTNERS FOR LABORATORY DEVELOPMENT AND ENHANCEMENT

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A Successful Collaboration Model for Educators and Industry Partners for Laboratory Development and Enhancement

Abstract

Many universities are feeling the budget crunch of lesser support from States governments and facing dwindling resources at the departmental and college levels. Another factor that colleges are facing is "here today, gone tomorrow" supporters of various programs or initiatives. On the other hand, individual companies or philanthropists who want to leave a legacy and provide equipment or financial support would like to make sure their investments have a long-term and lasting effect. There are many cases where the champions of an education initiative such as professors and industry professionals, collaborate to secure donations and develop a course or laboratory. Unfortunately, those initiatives sometimes do not last because the original champions retire or advance to other positions leaving the burden of running a program to unfamiliar administrators or faculty. Furthermore, the company or industry which made the initial investment or donation stops seeing the value of providing additional support in higher education, delegating most of the upkeep and technological improvements to the academic institutions. As a result, in many cases the corresponding college or programs are faced with additional burdens since they just cannot simply abandon labs or courses that form part of their legacy or curriculum.

These challenges are demanding a new model for success so that both the university and industry interests and needs are well-served. A new model should involve all the main stakeholders including college administrators, faculty, industry professionals and potential philanthropists. The proposed and implemented model seeks to engage industry for support, both in monetary and equipment donations along with the commitment from the university in terms of space and human resources. This model puts special emphasis on long lasting formal relationships which are committed to continue through periods of change. It is a model where universities maximize the future value of the donation so it can perpetuate itself and continue to impact the quality of education. This approach lessens the burden toward the individual academic department or program by sharing the stress of change with industry partners willing to benefit from a win-win relationship. This model uses financial market forces to benefit both the industry and university and can be a stabilizing force during times of uncertainty or shrinking budgets. It is a model that the Department of Engineering Technology and Industrial Distribution (ETID) at Texas A&M University is using to impact current and future education initiatives. It has resulted in the collaboration of Manufacturers, Distributors and the Texas A&M Foundation to secure, build and develop state-of-the-art Fluid Power Technology and Pump Laboratories. Both initiatives are endowed for perpetuity and have the future commitment of industry partners to continue to update equipment and development of educational content based upon the changing needs of the industry. This model is used by all parties to develop the educational requirements for entry level employees, provides continuing education for industry professionals, and enhances collaboration with industry in both areas of research and training, insuring continued financial supports for years to come.

In summary, this paper presents a new success collaboration model of how to manage and develop relationships with industry partners, and explains what it will take to duplicate this success at other academic institutions.

Introduction

Development and creation of new laboratories and training facilities continue to be a challenge in the current economic downturn. State governments across the country are providing fewer resources for new

facilities or initiatives since they still have to cover the basic needs of public institutions. A new model is needed to be able to update and develop new teaching laboratories that can substantially impact students positively and prepare them better for challenging jobs in a wide variety of fields.

In this paper, a new successful collaboration model used to manage and develop relationships with industry partners is presented. The implementation of the model has resulted in the endowment of two state-of-the-art laboratories which have been privately funded.

Background

Development of new teaching laboratories has been a challenge for instructors and administrators alike. Historically, academic institutions have relied on public or State resources to be able to purchase laboratory equipment. However, the level of support received from State governments continues to decrease at an alarming rate. As result, many universities have opted for an internal proposal system where departments must submit formal proposals to receive funds for laboratory improvement. This process is time consuming, and very competitive resulting in a success rate less than 10% in many cases. Many engineering departments have to come up with new different ways to keep up to date laboratories[1]. Many engineering departments have pooled resources from several programs to be able to support new initiatives at the expense of others[2]. Other departments have formed coalitions across the institution to receive the support necessary for new facilities[3]. Creativity has also played a significant role when developing new laboratories including the use toys and simple hardware to make sure students can grasp fundamental concepts[4].

Other approaches have also been contemplated and implemented in the past ranging from used equipment donation from other schools or industry, to one-time cash donations by alumni and corporations, or equipment acquisition at a reduced cost. However, schools need a better mechanism to keep up with the pace of technology and the continuous financial pressures. Current approaches also consist of submitting proposal to funding agencies such as the National Science Foundation (NSF) or the Department of Education either at the State or Federal level. These current approaches are extremely competitive and to a certain extent discouraging for instructors. A new approach or paradigm shift is needed to be able to attract better resources to the universities.

Description of Successful Collaboration Model for Educators and Industry Partners for Laboratory Development and Enhancement

At the Department of Engineering Technology and Industrial Distribution at Texas A&M University, we have implemented a new collaboration model to engage industry partners with a vested interest in our curriculum, students, and our overall facilities and resources. The model's vision consists of engaging industry partners in a way where value can be generated by and for all key stakeholders. The model can be broken down into the following key phases:

1. Identification of industrial distributors and their associated industrial manufacturers' network.
2. Initial industry contacts and visits to their facilities.
3. Identification of the distributors or manufacturers needs including human resources and training.
4. Understanding of the distributors' or manufacturers' long-term strategic goals.
5. Informal and formal discussions on how each party can be beneficial to each other.
6. Presentation of proposals to interested stakeholders by educators.
7. Formal agreement with industry partners.
8. Laboratory development.
9. Building and sustaining a long-term commitment.

Each phase has been proven successful in the development of two laboratories as shown in the case study section of this article. Each phase is described below as follows:

Identification of industrial distributors and their associated industrial manufacturers' network

The department and its faculty members start by identifying the most pressing instructional needs of the department. An assessment of current facilities is conducted to determine if the resources or technology present in each corresponding laboratory meet the expectations of industry. Once a laboratory has been identified for further development, the appropriate faculty member will start identifying potential industrial distributors and their associated industrial manufacturers' network. Industrial distributors and/or manufacturers are identified based on the type of products and technology they represent.

Initial industry contacts and visits to their facilities

Once industrial distributors and/or manufacturers are identified, they are contacted to establish a long-term professional relationship with the goal of understanding their needs. Academic instructors then visit the industrial distributor's or manufacturer's facilities to learn more about their line of work and to see firsthand the level of technological innovation. The visits are intended to help each part (industrial distributor or manufacturer, and academic institution representatives) understand each other needs and identify possible ways of working together. This particular phase is critical in developing common trust and genuine desire to collaborate in the long-term.

Identification of the distributors or manufacturers needs including human resources and training

After initial visits, the academic representatives (instructors or designated faculty members) continue communicating with the appropriate industrial distributor or manufacturer to identify their short-term and long-term needs. In most cases, distributors and manufacturers are in need of qualified entry-level engineers who can impact their organization in a short period of time. In many instances, distributors or manufacturers would like to hire students or entry-level engineers who have already been exposed to their technology and/or processes. The academic representatives also inquiry about the distributor's or manufacturer's training needs to see how they can be complemented through formal lectures in the classroom. In occasions, the industrial partners are invited to give guess-lectures to students and to provide a forum for student-industrial partner interactions.

Understanding of the distributors' or manufacturers' long-term strategic goals

Another key component of the overall collaboration model is understanding the distributor's or manufacturer's long-term strategic goals. It is important for academic representatives to have a good idea what each company is trying to achieve in the long-term to avoid false expectations. Certain companies do need academic support to be able to grow or expand in a dynamic business environment. Others do not have the same needs or long-term goals, and may be reluctant or not ready to sustain a long-term committed relationship with an academic institution. Usually, access to qualified human resources is on the top of the agenda of many companies. Furthermore, many companies would like to hire entry-level engineers that have been exposed to their products or processes, but also have already shown a significant level of personal interest in the company's field or area of expertise. Many companies seek for personnel willing to make their careers in specific technical areas that could help sustain their long-term strategic goals.

Informal and formal discussions on how each party can be beneficial to each other

Once each party has had the opportunity to get to know each other, and to identify each other's needs, informal and formal discussions start taking place to elaborate a collaboration plan. Informal discussions usually consist of telephone conversations and/or e-mail messages to follow up on areas of common interest. Formal discussions consist of additional visits and formal meetings where ideas are brainstormed with the goal of achieving a common goal that would satisfy all stakeholders. Depending on how the discussions go, the parties may decide to continue collaborating and propose concrete steps, or may opt to table the proposed ideas for a later date.

Presentation of proposals to interested stakeholders by educators

After receiving positive feedback from all interested stakeholders in the previous phase, the academic representatives put together a draft proposal which includes a scope of work, list of equipment needs, and a budget. The draft proposal is then submitted to the pertinent industrial distributor or manufacturer to be reviewed or modified based on further discussions. Depending on the budget amount, the company's president, or one of the company's vice-president may have to pre-approve the endowment amount or equipment donation. Sometimes, the scope of work, or extent of the laboratory development needs to be scaled-down to keep the laboratory development initiative alive. Negotiations usually take place after the draft proposal has been reviewed by the industry partners. Most industry partners would like to make sure their technology or processes are showcased to the students on a routine basis. The location of the proposed laboratory is also discussed. The department makes a significant effort to offer a visible and easy-access location[5]. To further engage industry partners, guest lectures by industry representatives and networking activities are coordinated routinely throughout the academic year.

Formal agreement with industry partners

After all parties have agreed upon the scope, nature, and amount of the endowment, university officials get involved to finalize the agreement with the industry partners. The agreement usually consists of a formal endowment document with a specific tax-exempt language to incentivize donors and industry partners to make a significant monetary donation.

Laboratory development

Once a formal agreement has been approved by all parties, the academic representatives provide a list of items needed for the laboratory. The list may contain laboratory equipment, computers, furniture, and all other items necessary to be to have a complete and functional laboratory. Depending on the agreement, some of the resources may come from the university, and others will either be donated by industry partners, or purchased by using the interest generated by the established endowment. A critical phase of the laboratory development is the selection of equipment that reflects the needs of the students and industry partners. A significant effort is put on identifying the most relevant hardware and laboratory exercises to make sure the students get the most up to date equipment and training. Proper coordination is required to make sure the hardware arrives in timely fashion and installed properly. After the equipment has been installed and tested, a formal ribbon-cutting ceremony with all the key players and significant media presence and exposure takes place.

Building and sustaining a long-term commitment

After a laboratory facility has been equipped with new hardware and software, the lab instructors using the facility are responsible for sustaining a long-term relationship with the donors. The relationships with

the donors are sustained by hosting guess-lectures, industry-sponsored on-site training, and by communicating with all the stakeholders on a routine basis. Also, a dedicated website for the new facility is updated on a routine basis which includes information about upcoming events and the latest technological information provided by industry partners. Also, the departmental leadership encourages the faculty members to continue collaborating with the donors.

Case study

The model presented above has been already implemented in the Department of Engineering Technology and Industrial Distribution at Texas A&M University. It has resulted in the collaboration of Manufacturers, Distributors and the Texas A&M Foundation to secure, build and develop two state-of-the-art Fluid Power Technology and Pump Laboratories. Both initiatives were endowed for perpetuity and have the future commitment of industry partners to continue to update equipment and development of educational content based upon the changing needs of the industry. The laboratories provide the opportunity for all parties to develop the educational requirements for entry level employees, and provide a launch pad for continuing education for industry professionals, and enhance collaboration with industry in both areas of research and training.

The development of the first laboratory was the product of multiple conversations, meetings, and visits by academic representatives to Womack Machine Supply in Dallas, TX. Womack Machine Supply is one of the largest distributors of Bosch-Rexroth hydraulic and pneumatic systems in North America. The company has had an excellent business relationship with Bosch-Rexroth over the years which facilitated the inclusion of Bosch-Rexroth in the fluid power lab initiative. After successfully approaching R.C. Womack, president and founder of Womack Machine Supply, an endowment was made by R.C. Womack to Texas A&M University to develop a state-of-the-art fluid power lab. As part of the endowment, Bosch-Rexroth agreed to provide all the training equipment at no cost plus a cash donation valued at $65,000 for additional hardware needs. Currently the fluid power laboratory is used by over 150 students per semester. The laboratory has a total of 8 hydraulic and pneumatic trainers and 16 computers. The computers are used for simulation purposes and to collect fluid power data electronically. The students that use the facility have the opportunity to understand, design, and assemble hydraulic and pneumatic circuits physically, and simulate their behavior computationally. The laboratory has also served to showcase the latest fluid power technology to students, and industry visitors.

A second laboratory was also conceived and developed using the model outlined above. The second laboratory was also the product of an endowment made by DXP Enterprises which is a large of distributors of pumps in the Southwest of the United States. DXP Enterprises and their manufacturers' network provided most of the equipment needed for the new pump laboratory. The laboratory consists of four pump benches with both centrifugal and positive displacement pumps with electronic data acquisition systems. A pump laboratory annex was also developed and includes two large 500 gallon tanks, and four pumps which are used to recreate a real industry environment. The new pump laboratory will be used to teach undergraduate students the fundamental concepts of pump and system performance. Furthermore, the laboratory will also be used to offer 3-day continuing education courses for industry professionals using commercially-available pump equipment.

Conclusion

This paper presents a new success collaboration model for the development of new teaching laboratories with the support of industry. The model has been implemented successfully in two occasions and has resulted in two significant endowments and donations of commercially-available equipment. The model followed by the Department of Engineering Technology and Industrial Distribution at Texas A&M

University continues to provide tangible benefits to multiple stakeholders including students, faculty, and industry partners for years to come.

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