Undergraduate Recruitment: A Model Strategic Plan for Undergraduate Recruitment of Students for Engineering Technology Departments

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Abstract

Flat or declining enrollment in Engineering and Engineering Technology (ET) Departments calls for the development and implementation of a "Strategic Recruitment Plan". This model plan outlines some of the strategic actions that can be utilized to initiate sustainable recruitment and retention processes. The plan is intended to begin a process to ensure that qualified prospective students continue to select a university's ET Department in numbers sufficient to allow the department to support and serve the stated missions of the department, the college, the university, and the constituencies they serve.

Index Terms – *Undergraduate Recruitment and Retention, Strategic Recruitment Plan, Engineering Technology*

1 The author is the principal author of the Engineering Technology (ET) Department "Strategic Recruitment Plan" . He is currently serving as Chairman of the "Recruitment and Retention" committee of the ET department and member of the Engineering College Recruitment Taskforce.

Needs Statement

Meeting the requirements of private industry and the public sector for highly skilled technical personnel depends upon the availability of sufficient numbers of students completing four-year Engineering and ET degrees nationwide. One of the short- to mid-term future challenges confronting four-year Engineering and ET programs nationally is that Engineering and ET student enrollments are flat or falling. The National Science Board, in concert with the National Science Foundation, supervises the collection of a very broad set of data trends in technology. This is published as the *Science and Engineering Indicator*. In their published data, they note "a troubling decline in the number of U.S. citizens who are training to become scientists and engineers, whereas the number of jobs requiring science and engineering training continues to grow" [1].

Indications are that without active intervention, these flat or downward trends can be expected to continue. Fewer students choosing Engineering and ET as an educational and career path presages an increasing risk that ET departments could begin to fall short of fulfilling their responsibilities toward two important constituencies: employers of the college graduates and the citizens that they serve.

Besides the theoretic need outlined above, the pragmatic need of active recruitment should be considered. In today's competitive environments, student census is often a critical component of funding algorithms and influence the departmental financial vigor and political status. Likewise, faculty positions or lines are frequently based upon this same census data. Therefore, the overall health of a department is contingent on critical levels of student populations.

Model Recruitment Plan and Action Recommendations

The initial strategic action a department should undertake is the creation of an active "***Recruitment and Retention Committee*** *(R&R)*" made up primarily of faculty, staff, and students with active participation from the community and industry. Staff, students, industry, and community representatives will need to be actively recruited into the traditionally faculty-only committee. A key member is often the department head and/or associate department head and is required to give direction, accountability, and importance to this action. The mix is dependent on individual department's situations but specific faculty and staff participation could be encouraged by being part of the yearly and/or promotion and tenure evaluation criteria. Student participation could be drawn from the general student population via formal application or more commonly, from student organizations taking into account their requirements for "service". Likewise, industry and community participation will be situational and institutional dependent but could be drawn from regional entities or from the department's Industrial Advisory Committee (IAC) membership. Strong administrative leadership in this committee is crucial. Active participation on the committee must be encouraged and rewarded to maintain a strong and

energetic committee. A dedicated, dynamic, engaged committee with a committed administration is absolutely critical in this plan. General strategic duties of this committee include:

1. Implementation, evaluation, and evolution of the strategic recruitment plan;
2. Assignment and coordination of all recruitment (and retention) responsibilities and resources under a central, accountable leadership;
3. Tracking of the costs and results of recruitment activities, then using this feedback to evaluate the cost/benefit of the plan components and modifying the plan as dictated;
4. Obtaining funding and other resources, and providing the distribution recommendations of this funding and/or resources;
5. Acting as the central repository of recruitment and retention expertise, information, and resources, such as:
    a. The developed and maintained prioritized lists of contacts, "targets", and site locations: Relevant teachers, administrators, guidance counselors, employers, students, etc. at site locations (high schools, junior or community colleges, etc.).
    b. The identification of the tools or methods for recruiting and integrating these into a timely and efficient process.
6. Matching of targets to resources/tools.... Which tool would be most appropriate for which target group? Determine via cost/benefit analysis.
7. Others to be determined.

Secondly, once a plan is in place, resources should be directed toward the design, development, implementation, and maintenance of a ***WEB site*** – one of the most important recruitment tools in today's educational environment. Conventional wisdom and two years of data from the author's surveys[2] suggests that significant prospective student activity involving college selection revolves around electronic searches. The mechanics of the site must allow for effective key word searches such as those used by search engines like Google® and Alta Vista®. The site must be informative and have the "hooks" required to hold searchers attention and direct their on-line actions toward your favor. These hooks are commonly pictures (university, community, campus life, student projects, etc.), video, audio, and catch phrase text that are specific to the individual institution and designed to interest target groups. Often, these are suggested by the R&R student representatives.

Links directing targets to your web site should be cooperatively created at other institutional "targets": High Schools (HS), Junior Colleges (JC), local Community Colleges (CC), branch campuses, etc. This can be accomplished in concert with the R&R's other contact activities with these targets.

The site must have a WEB MASTER – a person responsible for the site's content. This person must be knowledgeable and address ALL the needs of the WEB site - including, but not limited

2 The author has conducted two years of surveys of the departments incoming freshman classes, exit interviews of graduating seniors, alumni , and industry. These results are not a valid statistical sample and are local to this institution but clearly suggest a correlation to this conclusion.

to, recruitment specifics. The expertise required could be in-house and/or externally supplied by a hired professional, dependency upon budget and expertise.

Once the web site is established, it is essential that effective mechanisms are in place for efficient and timely respond to all inquiries, whether generated electronically - emails or WEB form entries; or, via normal mail-ins, phone, or those inquiries which are created through the university's Admission Office actions or other recruitment efforts. An example of a "basic" procedure flowchart is included in the Appendix. This sequence MUST have timely and appropriate responses with several layers of refined follow-ups (email, mail, phone, personal contact, site visits, etc.) and accompanying materials (see below). Assigned duties and responsibilities are essential. There should be a method in place for monitoring the effectiveness at each step of the well-defined sequence designed to handle prospects. Functioning as a type of quality control, the methodology of this monitoring should be well defined in writing and regularly reviewed.

As the two initial items are initiated and on going, fundamentally basic concerns of recruitment and retention must be addressed. These concerns deal with:

- Is the ET department offering a program that is attractive to students, meeting their needs and expectations, and delivered in an appropriate manner?
- Is the ET curricula changing as the industries that we serve change and current to today's environments?
- Are graduates prepared to enter the workforce and meet the requirements of today's public and private sectors?

These questions are strategically and fundamentally important and can be determined through several means such as reviewing other ET programs curricula, feedback from the Industrial Advisory Committee, and appropriate survey questions of current students, graduates and industries that hire these graduates. Many times, this is already done in conjunction with the department's accreditation assessment process and the data is already available for interpretation.

An internet survey of ET programs has suggested that several programs have modified curricula and are offering specific "emphases or targeted focuses" which are permitting specialization by students and creating specific identities for these ET departments. A few examples of employment target areas or emphases are "Construction" or "Construction Management" emphasis in Civil ET; "Manufacturing" emphasis in Mechanical ET; "Information and/or Communications" in Electronic ET; or "Renewable Energy Technologies" [7] as a cross discipline emphasis. Additionally, programs are offering alternative means of delivery such as "distance education" or night and evening programs. A department's individual approach to these questions and concerns is beyond the scope of this paper but literature and internet surveys find significant material that suggest changes in traditional ET curricula can be beneficial in attracting students and preparing these students for entry into the workforce in a competitive environment[3]

3 An example article is found in the spring 2006 issue of this journal , authored by the Technology Editor of *Electronic Design Magazine* [5].

The fourth initial action the Department should address is the design and development of a quality set of physical or hard copy **Promotional or Marketing materials** (in contrast with the electronic or WEB promotional materials) - brochures, posters, letters/post-cards, CD's, computer presentations, "traveling show materials", etc. The design could be in-house, local (Marketing Department or Art Department student projects), or externally generated. Different targets (counsels, teachers, administrators, parents, students) can be utilized to design and manufacture different targeted promotional materials. Again, a diverse R&R committee can be highly beneficial to what is attractive to these target audiences.

In addition, the Department should have admissions, financial aid, housing, sports or athletics material, local community information, etc., as well as the Department promotion and information materials, available in a central cataloged location for easy distribution to walk-ins and easy access to staff for distribution. Electronic versions of all this material should be available that will permit them to be sent via electronic means as well as presented via the WEB site. Electronic material, including CD's, can be very powerful with animation, color, audio, still pictures, and text – all integrated to present the Department, University, and community in the best and most interesting manner. Colored posters that identify and promote the Department are easily designed and commanding. Informational material that is highly visible should be places at locations in high traffic areas on campus, in the local communities, and in the target site locals. These materials should be provided to Admissions and the College of Engineering recruitment personnel for use in their off-campus recruitment activities. Admissions should be educated as to the Department and a close contact maintained through an assigned faculty liaison.

Anecdotal evidence suggests that there is modest success in efforts at recruiting using the tool of **"bringing targets to the department for tours".** This should be instated and could be done unilaterally and in conjunction with existing college or university sponsored campus visits and other activities. The R&R committee should identify appropriate sites and target groups and direct the development of simple and appealing model demonstrations in laboratories for use as tour highlights. Information from Admissions can be “mined” that can yield which high school, community colleges, communities, etc. supply incoming freshmen or transfers; and at what rates. This information can be used in target selecting and prioritizing.

The ET Department should have promotional and informational materials available along with memorabilia or handouts such as pencils, templates, caps, T-shirts, all with department contact information. Other items/resources such as financial aid opportunities, admission procedures, etc. may be appropriate to distribute at this time. Responsibilities and leadership roles need to be assigned.

In addition, the Department can use its contact lists or databases of area sites to schedule independent visits for selected target groups. Additionally, it should identify dates of university and engineering college activities; and, make certain the ET Department is on these tour agendas.

There should be a well-planned tour presentations and guides with assigned responsibilities (good use of student ambassadors here). The admissions office is usually very cooperative in these activities and this resource should be exploited to mutual benefit.

A pool of "***student ambassadors***" should be developed to aid in these (and other) recruitment efforts. These could come from general engineering or ET populations, as well as from student organizations such as SME, Society of Women Engineers, IEEE, TAP, etc. Many student organizations require service commitment – what could be better service to the college or department than recruiting? The ET Department should be involved in these organizations and faculty advisors are an important liaison here. The Department's students need to be utilized and **consulted.** Current students often want to voluntarily participate while others may require incentives such as scholarships or other reward/compensation. Alumni and current students should be involved in the recruitment process, in the idea generation and data collection efforts. Their opinions are important and often quite insightful – after all, these are the people who have already made the decision to come to your department.

Sixth, **Retention** of existing qualified students must be the second key priority of the Department – the "A Bird in the Hand" concept. First, the R&R committee should collect data on student loss - why?, when?, etc. Additional efforts such as those outlined in the following sections should be implemented to improve retention. One student retained is worth many students that are only potentials. Retention efforts should be monitored and assessed by a specific methodology and trending statistics.

Statistics indicate that students leave engineering in greatest numbers as freshman and sophomores. A National Center for Educational Statistics study that tracked freshman who had intended to complete a science or engineering (S&E) major, discovered that fewer than 50 percent had completed an S&E degree within 5 years. Approximately 20 percent of these students had dropped out of college entirely, and the remaining had changed majors [3]. Therefore, emphasis should be placed on these early classes. The Department's freshman classes should: have the best possible instructors, foster a feeling of belonging to a community – the ET community, and expose the students to fun real-world applications to spark and enflame their interest in engineering. Often, math courses can pose difficult challenges at these levels to ET students. If this explains a significant loss of students from the Department, it would also appear to offer opportunities for targeted, relatively cost-effective intervention. The use of mentors whether student (again a possible use of the student organizations or the ambassadors) or faculty, along with the use of the "social community" concepts have shown promise in these problem areas. The concept of social community is one of creating a roster of common class sections to be taken during a given semester by groups of incoming students – thereby establishing a feeling of belonging or shared experiences with which they can identify, thereby enhancing chances of retaining them during follow-on semesters. These hypotheses are already being addressed by engineering colleges or departments with measurable success [4].

A new frontier for program development is that of **"distance education"** courses and distance degree completion programs[4]. This area has great potential for growth, especially in the **transfer** portion of recruitment. Distance education degree completion programs have special advantages; the prerequisites may be less stringent, especially the math which has demonstrated detrimental retention properties; and, it is distance based allowing non-traditional student participation. The strong growth of Junior and Community College populations would be a natural feeder and there is interest and support from industry as well as support from most administrations. Therefore, this should be a high priority focus of the R&R committee actions. (**Caveat: the integrity, rigor, and accreditation of the program must be maintained and should not be compromised for recruitment goals.)**

The Department should be able to receive on a regular basis a spreadsheet file with contact information of people who have contacted Admissions requesting information on the Department. The Department needs to initiate a well-defined and supervised sequence of actions with extensive follow-up and include different informational and promotional materials for an initial contact with these specific targets; and, a sequence of follow-up contact procedures. The Department should also request email contacts from Admissions and institute a similar contact sequence initiated via the electronic means.

In addition to the prospective student list, Admissions usually has available a hardcopy and electronic version of a file of all freshmen admitted to the College of Engineering. Many of these students are "uncommitted" to a degree choice and this is an opportunity to educate these students as to the ET Department and possibly sway their choice to the ET Department's advantage. A "have you considered our department" informational package could be developed and distributed to these prospects with follow-ups.

Of lesser priority are personal **visits to targets** - HS's, "Magnet schools", JCs, CCs, etc. Personal contacts are known to be **very successful**, and there is benefit. However, this is a time and labor-intensive tool in which full-time faculty would likely tend to be unavailable to participate. This tool will have to be controlled for a cost/benefit determination and might be better utilized with local schools or on an "as available time and resources" schedule would permit. On the other hand, non-traditional contact opportunities for personal face-to-face should be incorporated in actives such as "Science Fair Judges" and career days.

Data indicate that Community College enrollment is increasing and is predicted to continue to increase. "The fastest-growing major segment of higher education is community colleges. These institutions are a bridge for students who want to attend 4-year colleges…" according to the National Science Board and the National Science Foundation [2]. Consequently, the Department's R&R committee should **target Community and Junior Colleges** (along with the traditional high school seniors) – this relates back to the degree completion idea above. One of the several

4 Completion programs are directed to students who have completed two years of college work; perhaps an Associate Degree or are from a Junior or Community College, and wish to complete a 4-year degree. Generally the student has completed most of the general education material and is lacking specific technical course work.

methods to increase contact with these sites is using "articulation agreements". This provides multiple benefits: a well-defined path for CC and JC students into the Department; an intra-personal contact with your department and the CC/JC; and, an appearance of intent for mutual benefit would help establish the Department as actively "interested" in the CC/JC students resulting in the Department being favorably treated by their administration and guidance staffs.

In addition, several CC's are being mandated to establish "pre-engineering programs" with dual-articulation with high school students (students receive high school AND college credits simultaneously). The Department must be involved in this program from the start to establish effective articulation agreements with the local CC's.

The Department and the R&R committee should strive to identity opportunities for obtaining external resources for recruiting, including funding of recruitment efforts, scholarships (students often make choices dependent upon finances -$$s), grants, student help or "student ambassadors", internships – co-ops (both shown to help with retention), expertise in required areas, in-kind contributions, etc.

Minorities, especially Women, Native Americans, Hispanics, and African Americans provide a great pool of untapped potential students for engineering and ET Department. These have the added benefit of a strong potential for obtaining funding resources for recruitment directed to these underrepresented groups. This should be a priority of the R&R committee and actions like those of Arizona State's Bridge Program can be used as a model in this area [6]. Secondary minority recruitment of other populations could also be utilized in the same manner if resources are available. A complement to recruiting minority populations, international students offer unique opportunities (and challenges) to increase the Department's population. There is significant reference material on specific recruiting techniques for underrepresented populations and should be consulted if a department takes this approach.

The set of tools and resources that can be utilized in the recruitment process are many and varied. The R&R committee should investigate all possibilities as to the potential of a tool in relation to a particular target group – some tools work best in specific situations or to specific target groups and not as well for others; some work well in regional areas and not in others. Constant feedback and Cost/Benefit analysis should be continuously monitored to determine the best tool for the job. A sample set of tools and targets is presented as an appendix.

Potential Challenges

The first challenge to be addressed is one of resources - *time*, *money*, *expertise.* Most faculty members are busy with teaching, research, publishing, and other duties related to service and administration. Staff members are equally committed. Many faculty members are on a nine-month contract that limits activity during the summer months when much recruitment activity occurs. These faculty and staff members will find it difficult to invest the necessary time and

effort into the demanding recruitment efforts; particularly without some appropriate added incentives. An alternative is external help, which generally is costly.

Students are also busy and may need motivation to participate in the recruitment efforts. This motivation could be a scholarship, recognition, incentives and/or direct compensation, and others that the R&R committee should investigate.

Secondly, a well-defined chain of command with precise responsibilities has to be established and enforced. There must be *responsibility and accountability* in this effort. Due to the nature of the university system, this may be a challenge. Strong commitment and leadership from the Department Head and other administration levels is a necessary component.

Engineering Technology programs have an identity crisis. Much of the population (including students) does not have an understanding about ET and the educational and career paths available. Additionally, there is a conscious or unconscious bias toward ET and ET students/graduates that can be found within the educational, engineering, and industry communities. The external identity problem can be addressed with strong recruitment and marketing effort. Internal bias, however, is harder to address and something that might bring less than optimum results if it causes less commitment to the cooperative efforts required of many recruitment activities.

The process of recruitment should be ideally a cooperative action with the College of Engineering and the University. However, recruitment is also an activity carried out in competition with other universities and with other colleges and departments within the University. This competition can become a source of intra-departmental rivalries.

Conclusions

An ET Department should recognize the real need to actively increase its student population by improving retention of enrolled students and systematically recruiting qualified transfers and freshman in order to continue to fulfill its mission within the College of Engineering and the University. Its continued existence as a viable department depends upon its ability to maintain high-quality, accredited academic programs that produce technically skilled graduates in numbers sufficient to meet anticipated requirements of regional industries and the public sector.

This is an "*initial strategic recruitment and retention plan*" and this boilerplate version should be considered a first step - the process of recruiting and retention must be continuous and evolving. The plan must be monitored and added to or changed as feedback of cost/benefits and results dictate. The implementation and continuance of effort will require significant investment of resources by faculty, staff, and administration and a strong commitment to this investment. Without these, the chances of measurable success are diminished.

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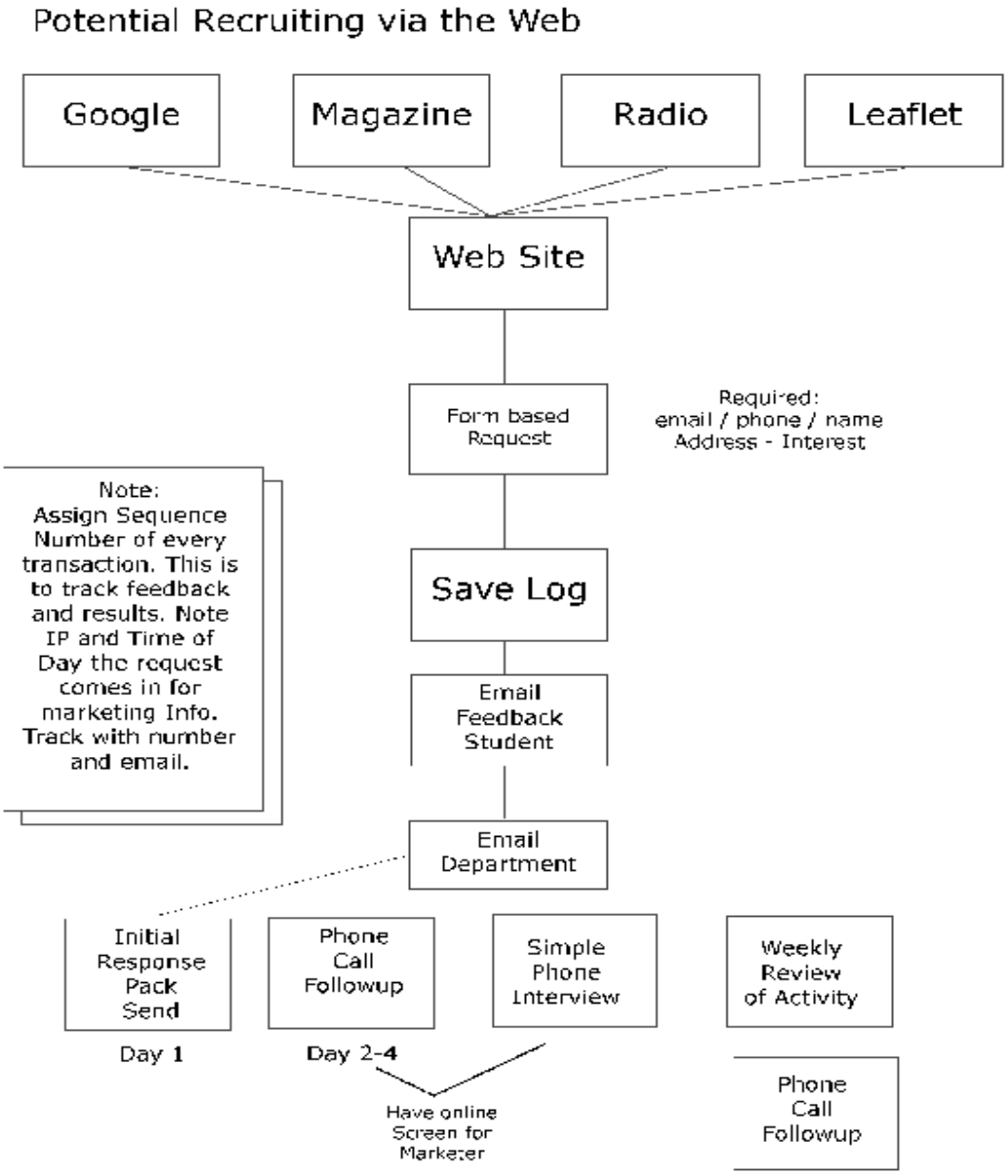
Appendix I: Example of the flow of information through the WEB site[5]



5 Diagram courtesy of Mike Morrell, Assistant Professor of ET at NMSU

Appendix II: Example of Matching Targets and Resource Tools

Matrix Relating Targets and Resources/Tools

TARGETS	**RESOURCES** see below	**Priority**	
HS students	a,b,c(local sites) d,(local sites) e,f,g	1	
Comm. Colleges	a,b,c(local sites) d,(local sites) e,f,g	2	
Women, Hispanics	a,b,g	3	
General Pop.	a,b,g	4	
On-campus	a, b, g	5	
Inter. Students	a,b,g	6	International
Other minorities	a,b,g	7	
Jr. Colleges	a,b,f,g	8	

RESOURCE/TOOL Legend:

a. Web Site
b. Promotion or Marketing (Direct and Indirect Methods)
c. Visits to the Targets with Materials and Presentation
d. On Campus Departmental/College Tours
e. Phone Contacts
f. Articulation Agreements
g. Misc