AC 2010-259: YES: A NSF S-STEM SCHOLARSHIP PROGRAM EXPERIENCE AT THE UNIVERSITY OF CENTRAL FLORIDA

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YES: A NSF S-STEM Scholarship Program Experience at the University of Central Florida

Abstract

According to a study conducted by J. D. Angrist (MIT) and colleagues[1] involving 1,600 students at a large Canadian university (the equivalent of an American state university with heavily subsidized tuition), the combination of participation in (a) a scholarship program and (b) academic support services resulted in higher grade achievement and retention for females (but both males and females used support services and peer advising at higher rates), compared to groups of students who participated in either (a) or (b) but not both. A report by the Educational Policy Institute[2] lists financial aid as one critical factor that affects the decision to pursue a college degree and success in degree attainment for minorities. This paper reports the progress of a persistence-to-graduation scholarship program funded under the National Science Foundation Scholarships (NSF) in Science, Technology, Engineering, and Mathematics (S-STEM) program. We named our program ***YES*** (Young Entrepreneur and Scholar) scholarship program.

The goal of ***YES*** is to enable academically talented, financially needy students to enter the workforce (Entrepreneurship Path) or to pursue a graduate degree (Research Path) following the completion of a baccalaureate degree in a targeted STEM discipline. This goal is facilitated through scholarships offered by the program to qualified student participants in the last two college years (maturing years – juniors and seniors), a mentorship program (faculty and industry mentors), and enhanced educational opportunities (Distinguished Speaker seminar series, Symposium, learning community). The program continues the efforts of and recruits from another NSF-funded program, Science, Technology, Engineering, and Mathematics Talent Expansion (STEP) program, which focuses on the first two student college years (early years—freshman and sophomore) and has been successful in retaining STEM students at significantly higher rates than academically similar STEM students at the university. ***YES***, in its first year of operation, has succeeded in attracting significantly higher percentages of females (46%) and under-represented minorities (69%) than the STEM population at the University of Central Florida (UCF); 54% are first in their family to earn a bachelor's degree; and 54% are in the Research Path and 46% in the Entrepreneurship Path. This paper will focus on the details of the program infrastructure, recruiting strategies that we have pursued, assessment instruments that we have developed to evaluate the program's accomplishments, and student experiences in the program to date.

Background

The University of Central Florida is the largest university in the state and the third largest in the nation in terms of student enrollment[3] (over 53,000 students in Fall 2009). An incoming student can easily be overwhelmed and get lost in the crowd. In 2006, the School of Electrical Engineering and Computer Science (in the College of Engineering & Computer Science) and the Math Department (in the College of Sciences) received five-year funding from the National Science Foundation (NSF) for a Science, Technology, Engineering, and Mathematics (STEP) program which we call EXCEL. EXCEL was designed to increase student success in the first

two years (freshman and sophomore) of a student's college career in a STEM (Science, Technology, Engineering, and Mathematics) discipline. In the book *Talking About Leaving, Why Undergraduates Leave the Sciences*[4], it is stated that nationally 40 percent of undergraduate students leave engineering programs, 50 percent leave the physical and biological sciences, and 60 percent leave mathematics. The losses are disproportionately greater among women and minorities (also seen with the one-year retention numbers at our university; see Table 1).The feeling of a small college experience and a supportive learning community are some of the features that make EXCEL a successful, retention program. Over 90% of the 2006 EXCEL applicants (n = 247) indicated in their application that they had applied to EXCEL because of the small group, support, personalized attention, and tutoring features. Each year EXCEL recruits 200 STEM students, and each cohort of EXCEL students has consistently had higher retention rates than non-EXCEL STEM students at the university. In Fall 2009, our Provost and Dean of Undergraduate Studies agreed to institutionalize and provide continued support for a portion of the support needed by the EXCEL program after NSF-funding for EXCEL ends in 2010.

Table 1. Retention of EXCEL STEM Majors vs. non-EXCEL STEM Majors

Cohort Year 2008-09	**Year 1 All**	**Year 1 Females**	**Year 1 Hispanics**	**Year 1 African Americans**	**Year 1 Caucasians**
EXCEL STEM (n=203)	78.8%	67.7%	77.8%	83.3%	80.3%
Non-EXCEL STEM (n =879)	64.4%	60.7%	68.9%	68.5%	59.7%

With a working retention model (the EXCEL program) for the first two student college years (early years - freshman and sophomore), in 2007, we created a persistence-to-graduation program, the Young Entrepreneur and Scholar (YES) Scholarship program (hereafter referred to as the YES program) to continue the EXCEL program efforts into the last two student college years (maturing years – junior and senior), thus completing the cycle of support (see Figure 1). The YES program was conceived to recognize talented engineering and computer science students who were interested in a business-oriented (*entrepreneurship career*) path or an academic-oriented (*research career*) path. The goal of the YES program is to enable academically talented, financially needy students to enter the workforce following a completion of a baccalaureate degree in a STEM discipline, or continue studies in their field. This goal is facilitated through the scholarships offered by the YES program to qualified student participants. The goal of the YES program is accomplished through the pursuit of two related objectives, Objective 1 (E*ntrepreneurship path*), and Objective 2 (*Research path*). Objectives 1 and 2 are the creation of optional, enhanced educational opportunities to enable the success of a YES scholar.

We submitted our proposal for the YES program to the NSF S-STEM (Scholarships in Science, Technology, Engineering, and Mathematics) program which was declined on the first submission but funded on the second submission in the following year (2008) for $600,000 over 5 years. This paper will focus on the details of the YES program infrastructure, recruiting strategies that we have pursued, assessment instruments that we have developed to evaluate the program's accomplishments, and student experiences in the program to date.

Lessons Learned: *While it is a good idea to build on an existing program that has been successful, be sure to clearly differentiate the operations, management structure, special program features, and program evaluation activities in your proposal for the new program.*

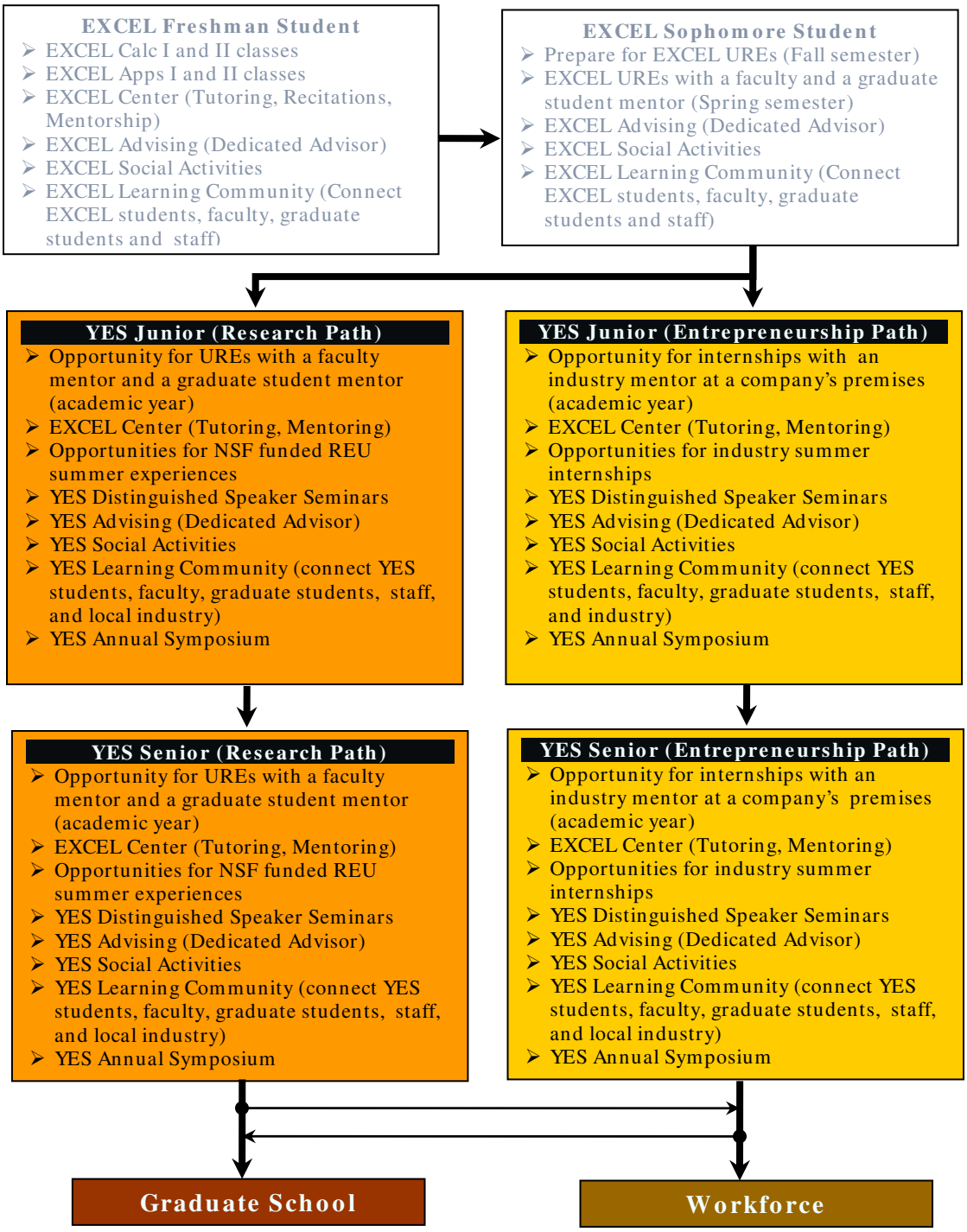

Figure 1. A pictorial illustration of students services offered to EXCEL students in year 1 and 2 of their college career and students services offered for the YES program recipients (recruited from academically talented and financially needy sophomore EXCEL students) in years 3 (junior) and 4 (senior) of their college career.

Program Infrastructure

The YES program's intent is to create a partnership that connects students, graduate students, faculty and industry affiliates, and through its many planned teaching, training and learning activities better prepare the workforce of tomorrow. In this section, we will describe the significance of the YES program, its program requirements, management structure, support services, and educational program features. Throughout the paper, we use interchangeable terms to refer to students in the YES program as either YES students or YES scholars.

Significance of the YES Program

In the Southeastern states, Hispanic and African American students will comprise nearly half of the high school graduates in the future[5]. The rising cost of attending college in these economically turbulent times will continue to be an impediment to middle- and lower-income students (of which this population of under-represented students has traditionally been the least likely to attend and afford college), thereby effectively reducing access to higher education, a conclusion that is supported by a review of the literature on financial aid and the decision to enroll in college in the articles by Hossler[6,] St. John et al.[7], and Perna et al. [8]. A report by the Educational Policy Institute[2] and the Manpower Demonstration Research Corporation[9] (MDRC was created by the Ford Foundation) list financial aid as one critical factor that affects the decision to pursue a college degree and success in degree attainment for low-income and minority populations. Through the NSF funding for the YES program ($600,000 over 5 years) and a university match ($75,000 over 5 years), we are able to offer 24 scholarships a year (typically of $5,000 each) to qualified applicants in the YES program.

The YES program is designed to produce a cohort of well educated students who will successfully persist to a Bachelor's degree achievement in a STEM discipline; some of these scholars will immediately venture into the workplace and some will pursue a graduate degree. There are three performance indicators that the YES program will be assessed by. *Metric 1* is an 80% graduation rate for the YES scholar. *Metric 2* is an 80% pursuit of a graduate degree by a YES research scholar. *Metric 3* is an 80% transition into the workforce by a YES entrepreneur scholar (only fields related to the BS field of the scholar will count). If the YES effort achieves these measures of success from its initiation year, it will graduate more than 100 students with a STEM degree, of which 40 will go to graduate school and 40 will join the workforce (we assume that 50% of the YES scholars will be research scholars and 50% will be entrepreneur scholars). By design, the YES program will recruit STEM students from populations of women and underrepresented minorities, which will increase the diversity of the technical workforce. As an example, we hope to increase the percentage of Bachelor's degrees awarded to females, Hispanics, and African Americans in the College of Engineering & Computer Science (77% of our current YES scholars have an engineering or computer science major) from 35%, 22%, and 23% respectively. Table 2 shows the graduation rate over a six-year period for engineering and computer science students based on the 2000-2001 entering cohort who were full-time. At this point (too soon after the YES program's implementation in 2009), we do not yet have any graduates of the YES program to report results for these three performance metrics.

Table 2. Incoming Engineering and Computer Science Students Who Graduated in 6 Years

2000-2001 Cohort n=636	All	Male	Female	African Americans	Hispanics	Caucasians & Asians
Graduated%	36%	36%	35%	22%	23%	40%
Graduated#	230/636	200/550	30/86	10/45	15/65	198/497

Data Source: UCF Institutional Research Office

YES Program Requirements

To be eligible for the YES program, applicants must meet the following criteria and participate with a mentor (10-15 hours per week) in either the Research Path or Entrepreneurship Path.

- The student has to be a US citizen, alien lawfully admitted to the US for the permanent residence, national of the US (as defined in section 101(a) of the Immigration and Nationality Act), or alien admitted as refugees under section 207 of the Immigration and Nationality Act.

- The student has to be a junior or senior EXCEL student.

- The student has to have a 3.0 GPA.

- The student has to have SAT math scores between 500 – 700. (The ACT currently does not have a math conversion to SAT scores.)

- The student has to demonstrate financial need of at least $5000 through a completed FAFSA (Free Application for Federal Student Aid). The student has to file a FAFSA annually and show financial need of at least $5,000 to maintain eligibility in the program.

- The student has to be enrolled full-time each semester to receive the scholarship (fall/spring 12 hours).

- The student has to maintain one of the EXCEL majors in Engineering, Computer Science, Physics, Chemistry, Forensic Science, Biology, Biotechnology, Molecular and Micro Biology, Statistics, and Math each semester to receive the scholarship.

YES Management Structure

The management structure is simple and consists of a few key committees: Academic, Entrepreneurship, Assessment, Recruitment/Dissemination, and Operations (Figure 2). All these committees report to the YES program Executive Committee, whose purpose is to oversee all the activities of the YES program. The Operations committee acts as a liaison between the YES Program student scholars and the key committees. The chair of each of the Academic, Entrepreneurship, Assessment, Recruitment/ Dissemination, and Operations committees and the YES advisor serve as a member of the Executive Committee.

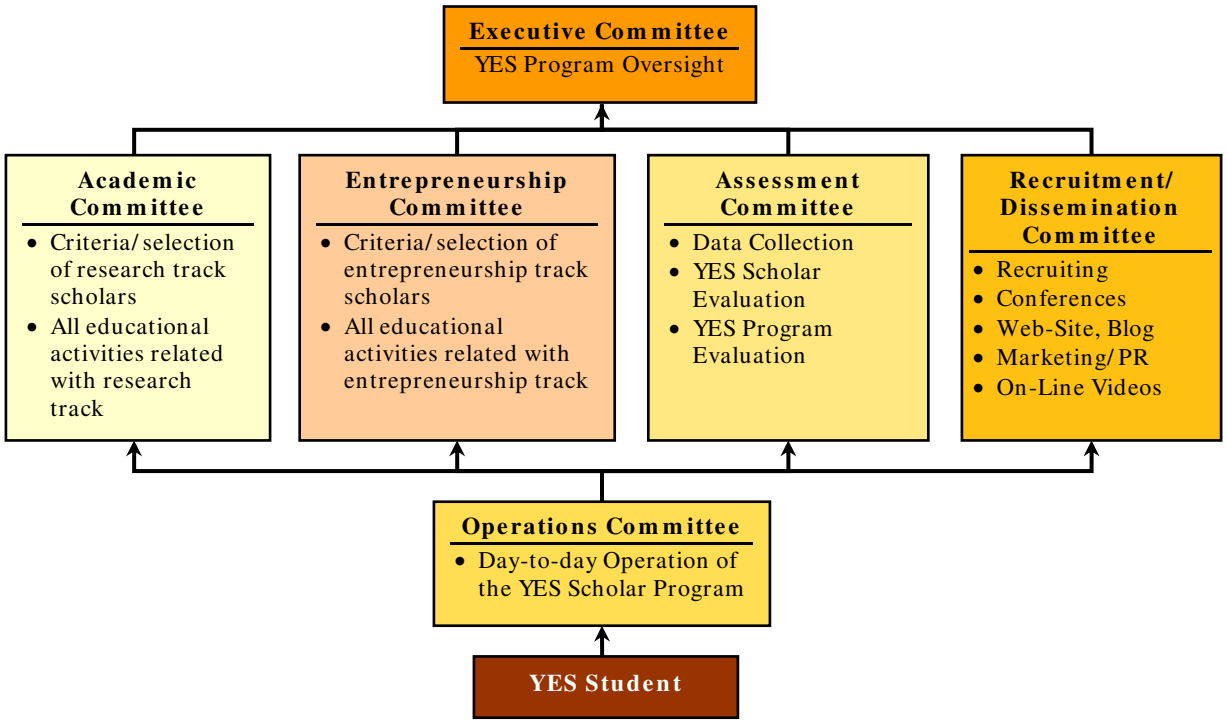

Figure 2. YES Project Management Structure

Support Services and Educational Program Features

Research studies support that performance-based scholarships combined with integrated support services and/or educational programs increase retention and persistence-to-graduation rates for female and under-represented minority students[10]. According to a study conducted by J. D. Angrist (MIT) and colleagues[1] involving 1,600 students at a large Canadian university (the equivalent of an American state university with heavily subsidized tuition), the combination of participation in (a) a scholarship program and (b) academic support services resulted in higher grade achievement and retention for females (but both males and females used support services and peer advising at higher rates), compared to groups of students who participated in either (a) or (b) but not both. J. Gross et al[11] looked at a 2001 cohort of first-time incoming students (n=16,256) enrolled in three doctorate-granting, public, Midwestern institutions and found that institutional, financial aid had a statistically significant effect on student persistence, a finding also documented by A. Gansemer and J. Schuh[12] who analyzed national datasets of 466 institutions. For under-represented students, affordability is a high factor in attending college and graduating. African American students are more likely to make a decision in their college choice and persistence decisions based on finances compared with Caucasian students[7]. Hispanic students are more likely to persist based on their integration into college (achieved in this study by opportunities to interact more closely with faculty and peers by residing on campus) and receiving some form of financial aid (except loans which negatively affected persistence)[13]. We created the YES support services and program features based on this body of research. The YES support services are: access to the EXCEL Tutoring Center by the YES students; a dedicated YES advisor; a social community (YES Socials); and an academic intervention/persistence program. The YES educational programs are: the Mentoring Program, Distinguished Speaker Series, and the Annual Symposium – all features of the YES learning community.

Support Services: The YES program takes advantage of the existing support infrastructure already built for the EXCEL program – access to the EXCEL Center where tutoring and recitation sessions are conducted for all the EXCEL students and now, YES students. The study-group philosophy is part of what makes the EXCEL - YES Center one of the unique places on campus to interact with peers under the careful supervision of an EXCEL graduate student. We also created customized support services for the YES program. Wes Habley, director of ACT's Office for the Enhancement of Educational Practices suggests that the quality of the advising relationship is an important factor in student retention[14]. The dedicated YES advisor is an experienced advisor who manages the student success program which consists of year round group advising sessions, academic alert and probation programs, scholarships, and articulation agreements for undergraduate students in the College of Engineering & Computer Science. She is the primary contact for the YES students, and her primary responsibilities for the YES program are to prequalify students by working closely with the university's Financial Aid Office; guiding applicants through the application process; verifying YES student eligibility requirements each semester; overseeing the YES Success (persistence) program; and coordinating disbursement of scholarship funds with the Financial Aid Office. Through the YES Success program, the YES advisor monitors the academic progress of each student (each semester, every YES student has a mandatory, individual advising session with her one week before the withdrawal deadline to discuss progress in their courses), and alerts YES program directors of any at-risk YES students. The YES program directors then recommend a course of action for each student.

Educational Programs: The YES program takes advantage of the existing educational infrastructure already built for the EXCEL program – the already established educational learning community. Through the YES program, eligible EXCEL students can participate in the research lab of a professor (Research Path) or in a company as an intern (Entrepreneurship Path). YES students who participated in sophomore EXCEL undergraduate research experiences (UREs) have the opportunity to continue the URE, as a junior or senior YES scholar, with the same professor that supervised their sophomore research experience (Research Path students).

We also created customized educational programs for the YES. The YES Educational Programs are: the Mentoring Program, Distinguished Speaker Series, and Annual Symposium.

Mentorship relationships are a key component to the retention and academic success of YES students. A study conducted by Campbell and Campbell[15] found that incoming students participating in a faculty mentor program at a large metropolitan university had higher GPAs, a lower drop-out rate, and more units completed per semester compared with students with similar characteristics who were not in the mentor program. YES scholars who choose the *Research Path* will (a) work on a research project of interest, under the mentorship of a graduate student and a YES faculty; (b) participate in the lab's activities involving other graduate and undergraduate students; and (c) produce a technical paper. YES scholars who choose the *Entrepreneurship Path* will (a) work on a project of interest, to himself/herself and the company, at the company's premises, under the mentorship of a YES industry affiliate; (b) participate in technical and business meetings associated with this project; and (c) produce a technical paper. Moreover, YES scholars who choose to be involved with the research lab of a faculty mentor will have additional opportunities to participate in scientific conferences that their faculty mentor

deems appropriate for the YES scholar to attend. Similarly, YES scholars that choose to be involved with internship opportunities, offered by industry, will have the opportunity to participate in scientific conferences that their industry mentor deems appropriate for them to attend.

The YES Distinguished Speaker series give students an experience of spending a full day with a few of the most famous and accomplished researchers and industry professionals in STEM disciplines. In addition to delivering an appropriate presentation, the distinguished speaker will describe in detail a typical day, week or month in his/her life, so that students can have first-hand knowledge of how these accomplished scientists/engineers spend their time, and how they are driven and inspired to work so hard. Students will have plenty of time to interact with the distinguished speaker and ask questions. In the case where the industry professionals are from an industry, located in the vicinity of the campus, we will make arrangements for this interaction to take place at the industry premises and combine it with a tour of the company's premises. We expect that, through these interactions, the YES scholar students will be motivated to work harder in order to achieve their dreams and aspirations. Through these Distinguished Speaker series, the YES scholar students will also have the opportunity to take advantage of the extensive knowledge of these speakers and obtain good advice about graduate school and job placement options.

During the YES Annual Symposium which will be held in conjunction with SURE (Showcase of Undergraduate Research Experience), YES students will have many opportunities to communicate their experiences through presentations, poster sessions, one-to-one discussions with faculty and industry professionals, and group discussions in a panel setting consisting of select academic and industry professionals. SURE is organized by the university annually (April of every academic year) where any student (accepted through an application process) can showcase their research (through a poster presentation) which is judged by faculty mentors and other invitees.

Lessons Learned: *Be sure to assign a program staff member who is experienced with data collection and analysis with the primary responsibility for documenting statistics for the program. There is a lot of data to collect for assessment and reporting purposes that are provided from many sources. It is likely that important data collection will fall through the cracks if there is no "champion" to manage the process.*

Recruiting Strategies

Once the official award of the NSF grant was announced at the beginning of September 2008, the advertising campaign began by (i) developing and going live with the web site http://yes.ucf.edu ; (ii) revising and reprinting the NSF EXCEL program brochure to include the YES scholarship program; (iii) recruiting students through emails, information sessions, EXCEL orientation, letters to parents, and the YES Distinguished Speaker series (EXCEL students were invited to attend with YES students); and (iv) contacting affiliate faculty and industry mentors to place students admitted into the YES program. Our first YES cohort (recruited from the EXCEL program's 2006 and 2007 cohorts) started its involvement with YES in Summer 2009. (In future cycles when we are on track, students will be recruited during the Spring semester for placement

in Fall of the same year.) The YES advisor sent emails to pre-qualified students, and we held Information Sessions for interested students. For those who could not attend the Information Sessions, individual interviews were scheduled with the YES program directors. The YES Selection Committee reviewed the applications, and students who were accepted into the program were interviewed one-on-one with either the program directors for the *Research Path* or the *Entrepreneurship Path* according to their interest. Students who were accepted in the program were placed either with a faculty or industry mentor. The Entrepreneurship Path co-director is a faculty member in the College of Business and the Executive Director of the Center for Entrepreneurship & Innovation. He is the liaison with start-up companies in the university's business incubation program. Since its founding in 1999, the UCF Business Incubation program has helped more than 120 emerging companies create over $500 million in annual revenue and more than 1,600 new jobs with an average salary of $59,000.

The recruitment statistics for 2009 (the first year of the YES program) are presented below in Table 3. From the pool of 208 EXCEL students from the 2006 and 2007 cohort years, 28% (58) did not have a FAFSA on file (FAFSA is the Free Application for Federal Student Aid which is required to determine financial need for federal funds) and 56% (117) did not meet one or more YES program requirement (e.g., financial need of at least $5,000, overall GPA of at least 3.0), which left 16% (33) eligible for the YES program. All 13 students who were admitted to the program, enrolled in the YES program. By design[1,7,13], the YES program attracted higher percentages of females (46% or 6/13) and under-represented (Hispanic and African American) students (69% or 9/13) than non-YES STEM majors at the university (see Table 4). Moreover, 54% (7/13) are the first in their family to pursue a Bachelor's degree, 54% (7) are in the Research Path, and 46% (6/13) are in the Entrepreneurship Path.

Table 3. 2009 YES Program Application Statistics

Admission	Total	Female	Male	Hispanic	African American	Caucasian/ Asian	1st B.S. Degree in the Family
Eligible	33	11	22	12	6	15	n/a
Applied	22	10	12	8	1	13	10
Admitted	13	6	7	8	1	4	7
Enrolled	13	6	7	8	1	4	7

Table 4. Fall 2009 Enrolled YES STEM Students vs. Non-YES STEM Students

Enrolled	Total	Female	Male	Hispanic	African American	Caucasian/ Asian
YES	13	6 (46%)	7 (54%)	8 (62%)	1 (7%)	4(31%)
Non-YES	9,021	3,242 (36%)	5,779 (64%)	1,579 (18%)	735 (8%)	6,707 (74%)

Within this first year (2009), one student asked to temporarily terminate his involvement with the YES program for Fall 2009 due to a heavy and difficult course load but will re-join the YES program in Spring 2010. In Spring 2010, three students will terminate their involvement with the YES program due to lack of financial need (their total actual financial aid package came in higher than was originally estimated by the Financial Aid Office) but would like to rejoin the YES program when they meet eligibility requirements again. Also, of these three students, in addition to not having enough financial need for Spring 2010, one went on medical leave and the

other did not meet the GPA requirement (10 students are continuing on in the program). We have not begun any formal recruiting for 2010 as yet (will begin in Spring 2010); however, through word-of-mouth and by allowing EXCEL students to attend the YES Distinguished Speaker series, we already have 16 EXCEL students who have expressed interest in being part of the YES program for next year.

Lessons Learned: *The financial need requirement of the NSF grant is one of the most difficult to work with. The student's financial need amount from the projected to the actual can vary greatly, and some students submit their FAFSA close to the beginning of the Fall semester. Also, if students have unmet need but no financial need, grant funds cannot be used to provide scholarships for unmet need. In these instances, YES students have to stop-out from the program until they again meet eligibility requirements. It is disruptive to the student and the mentorship experience.*

Assessment Instruments

The evaluation design described below is consistent with contemporary thinking in the field[16, 17, 18, 19]. The plan involves formative and summative assessment instruments to evaluate and assess both product and process of project goals. The plan uses a mixed-method approach[19] to assess the effectiveness of the proposed educational strategies and in fulfilling the desired learning outcomes, from both educators' and learners' perspectives. The assessment and program evaluation instruments are presented in Table 5. The administrative forms are presented in Table 6. In the last year of the program (summative evaluation), we will have an external program evaluator to conduct a thorough programmatic evaluation of the YES effort. The YES assessment team will also analyze student records to compare the academic performance (GPA in the major), the graduation rates, and the rates of successful transition to graduate school or the workforce of the YES scholar group (experimental group) with an EXCEL group of students (control group of non-YES students with similar characteristics to the YES group).

Table 5. YES Program Assessment and Program Evaluation Instruments

Instrument Name	Instrument Description	Frequency Each Year
Student focus group	student experience in the program	x1
Student survey	YES Distinguished Speaker Series	x2
Evaluation rubric - student poster	YES Annual Symposium/SURE	x1
Evaluation rubric - technical paper	YES Annual Symposium	x1
Student and mentor pre- and post-test	learning growth through the assigned project by the mentor	x2
Student and mentor progress reports	monitor placement satisfaction with the mentorship program	x6
Student academic advisement progress form	mandatory meeting one week before the withdrawal deadline with the YES advisor to discuss academic progress in courses	x3

Table 6. YES Program Administrative Forms

Instrument Name	Instrument Description
Student application package	web-based application (includes resume, 2 recommendation letters, and statement of purpose)
Consent to release student information to 3rd parties (to NSF)	FERPA (Family Educational Rights and Privacy Act) compliance
Screening criteria form	selection committee review and rating of applications
Pre- and post-test informed consent form	IRB (Institutional Review Board) compliance
YES student and mentor agreement form	expectations and responsibilities of students and mentors in the mentorship experience
Checklist for new and returning students	list of forms and deadlines that students need to complete and turn in
Project description - mentor	abstract and project deliverables assigned to the student by the mentor
Student program exit survey	reason for leaving the program and accomplishments

Lessons Learned: *As seen in Tables 5 and 6, there are many forms to be created for the program and data collection. In the beginning, it was time-consuming making sure that students were turning forms in on time. By creating a forms packet for each student containing a checklist with deadlines and hard copies of each form, it greatly decreased the time required to track the forms.*

Student Experiences

In 2010, we will conduct the first student focus group and the YES Annual Symposium, when we will have the first set of results of these activities. We do have some initial information from the pre-tests and results of the surveys from the YES Distinguished Speaker series held in Fall 2009. Pre-tests are given to students (who agree to participate in the pre- and post-test study) to complete two weeks after the beginning of their mentoring experience; their responses are scored by their mentor based on a rubric provided with the pre-test. The same questions will be again given as post-tests at the end of each YES 30-week experience; if a student has two 30-week experiences, then the post-test will be administered a second time. One of the questions on the pre-test asks "In what way will this experience affect your future knowledge or future career?" We include summarized responses of two of the YES Scholars representing each of the two distinct paths:

Student from the Research Path: *The knowledge that I have gained during this short period of time being in this program and doing this research is tremendous. First of all, I am getting an opportunity that very few have especially this early in my college career. It also gives me a starting point and knowledge of how to conduct a proper research which I can continue to graduate school.*

Student from the Entrepreneurship Path: *First, as things are set up now, this will be my first job, during and after college. I have been fortunate to find a job without even having a degree yet while most people that are highly* qualified *cannot. Second, the experience that I will gain, I may not be able to find at any other point in my life, and I can take with me on my resume anywhere that I go. So, ultimately, the experience will be setting up my whole future with an amazing opportunity.*

We also created a video (posted on YouTube http://www.youtube.com/watch?v=B-8yTBmY0tM) in which two of our students describe their experiences in the EXCEL and YES programs.

In October and November 2009, we held two YES Distinguished Speaker series. The survey results are presented below in Table 7 for the close-ended questions. For questions 5 and 6 (understanding of the topic before and after the presentation), we also analyzed the survey responses using a paired samples t-test. For the Entrepreneurship Distinguished Speaker (October) event, there were 13 respondents of which 62% of the respondents were YES students while 38% were EXCEL students. The results were statistically significant, $t(12) = -4.382$, $p < .05$, and there was a large effect size Cohen's $d = 1.611$, $r = 0.627$. For the Research Distinguished Speaker (November) event, there were 10 responses of which 60% of the respondents were YES students while 40% were EXCEL students. The results were also statistically significant, $t(12) = -4.382$, $p < .05$, and there was a medium effect size, Cohen's $d = 1.116$, $r = 0.487$. Overall, students rated the Entrepreneurship presentation higher than the Research one.

Table 7. YES Distinguished Speaker Series Survey Results for Fall 2009

Survey Questions	**E[1]**	**R[1]**
4-Strongly Agree,3-Agree,2-Disagree,1-Strongly Disagree	Mean	Mean
Q1: This event enhanced my understanding of what it takes to be an entrepreneur/researcher.	3.76	3.4
Q2: This event has inspired me to find out more about being an entrepreneur/researcher.	3.46	3.3
Q3: This event provided information that will be useful for my career.	3.53	3.0
Q4: This event provided very valuable networking opportunities.	3.38	2.8
3-Quite a bit; 2-Somewhat; 1- Very Little; 0-Not at all	Mean	Mean
Q5: Before this presentation, I understood this topic _____.	1.4	1.3
Q6: As a result of this presentation, I understand this topic_____.	2.69	2.2
4 = Excellent, 3 =Very Good, 2 = Good, 1 = Fair, 0 = Poor	Mean	Mean
Q7: Overall, I would rate this event as _____.	3.76	3.2

[1]E = Entrepreneurship speaker (October), R = Research speaker (November)

Conclusion

In this paper, we presented an overview of some of our experiences with an NSF project in progress, whose goal is to enable academically talented, financially needy students to enter the workforce (Entrepreneurship Path) or to pursue a graduate degree (Research Path) following a completion of a baccalaureate degree in a targeted STEM discipline. The foundation of Maslow's[20, 21] hierarchy of needs include physiological needs, security needs, esteem needs, and a belongingness need which must be met to attain self-actualization. We believe that performance based-scholarships and support services offered in the YES program address the physiological and security needs. The strength of the relationship between students and mentors in the YES mentoring program addresses the belongingness and esteem needs. The combination of performance-based scholarship, personalized attention individually and in a small group,

mentoring, and support services are the program features that attract students to the YES program, and in particular attract to it higher percentages of females, Hispanics, and African Americans.

In Spring 2010, we will recruit students for our YES 2010 cohort and continue program activities for the returning students (10 students). This continuing cohort of YES scholars will have completed a minimum of 30 weeks in the program. The effectiveness of the program activities will continue to be assessed by a number of formative assessments. For one, we will organize and conduct a focus group meeting of YES scholars to identify program strengths and weaknesses from their perspectives. An appropriate rubric of questions will be designed for this meeting, where all aspects of the program will be evaluated by the YES student participants. Second, we will collect student responses on the post-tests (pre-test responses were collected in 2009); the responses are scored by their mentors based on a rubric. The pre- and post-tests are a snapshot of the learning growth of YES scholars based on the project assigned by their mentors. Third, the YES program will be assessed at the YES Annual Symposium. At this Symposium, YES scholars will have the opportunity to communicate and interact, through various means (presentations, poster presentations, one-to-one discussions, panel discussions) with invited academic and industry professionals. YES scholars will also submit a technical paper based on their project. Our assessment team will design a rubric for the evaluators to score the poster presentations and the technical papers.

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