

## An ABC Sampler of Best Practices NSF STEM Scholar Program at UW-Platteville

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### ABSTRACT

In 2010, the University of Wisconsin – Platteville (UW-Platteville) received a National Science Foundation (NSF) S-STEM grant. The grant provides ten renewable half tuition scholarships to students majoring in a Science, Technology, Engineering and Mathematics (STEM) fields. One focus of the grant is to encourage women and racially/ethnically diverse students to matriculate. UW-Platteville is a land grant university located in a rural community population of 7,458 undergraduate students. Approximately 50% of the incoming freshmen each year are first generation college-bound students who come from rural areas. To be eligible for the scholarship, students must be new to the university, be academically achieving and show financial need. This means that both incoming freshmen and transfer students are eligible to apply. Students who are awarded the scholarship agree to participate in the STEM Scholar program. The program created by four faculty and academic staff members weaves high impact practices to increase retention of students in STEM majors.

This paper begins with a brief description of the NSF S-STEM program. It then describes the programming goals. A description of the application process provides background on the types of students selected as STEM Scholars. Several best practices, including cohort scheduling and development, champions, goal setting, professional development, and peer mentors are then reviewed in detail along with how each are being assessed. Based on feedback and observations made after the first year of the grant, some changes have been implemented with respect to each best practice. Overall, the practices are successful but need to be monitored and adjusted as the program grows.

Keywords: STEM, Conference Proceedings, Student Retention, Best Practices

### INTRODUCTION

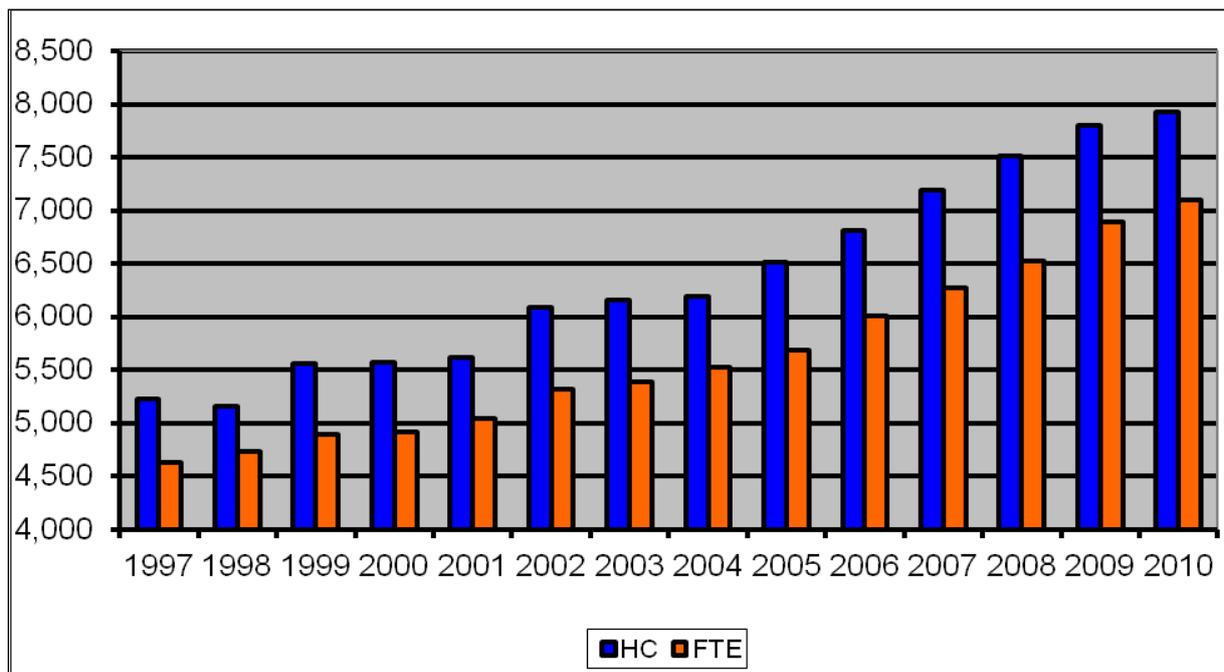
The University of Wisconsin – Platteville (UW-Platteville) strives towards educating and preparing for society the 360-degree graduate. Striving toward educating the 360-degree graduate includes increasing retention, decreasing our achievement gap between majority students and underrepresented students, increasing our graduation rates and diversifying our university population. To reach these goals, the campus focuses on the campuses tradition of providing quality hands-on education both in and outside of the classroom. Engagement of students both in and outside the classroom is critical to the development of the 360-degree student; connections with the community, faculty, industry, government and non-profit agencies help the campus to create outstanding engagement opportunities (Shields, 2011).

The university is home to three academic colleges, with a strong emphasis on STEM majors, teacher preparation, agriculture-based, and criminal justice studies. Students participate in a rigorous set of general education courses in history, social science, humanities, and fine arts. Also included are requirements for both ethnic and gender studies. Additional general education courses are required in composition, speech, mathematics, physical education, foreign language, and lab sciences.

STEM majors within the College of Engineering, Mathematics, and Science (EMS) include, programs in civil engineering, electrical engineering, engineering physics, environmental engineering, industrial engineering, mechanical engineering, and software

engineering. All programs are accredited by the Accreditation Board for Engineering & Technology (ABET). Chemistry offers several majors, including two majors recognized by the American Chemical Society. The Board of Regents recently approved two new majors for the College of EMS in Microsystems and Nanotechnology and Renewable and Sustainable Energy. There is also a Computer Science major.

UW-Platteville has experienced the highest percentage growth of all the System universities with a 48% growth rate the past 10 years. Figure 1 depicts the student headcount and full time equivalent at UW-Platteville. The campus is home to approximately 7,458, undergraduate students and 756 graduate students for a total student population of 8,214 students.



**Figure 1: UW-Platteville Student Headcount (HC) and FTE over time**

In Fall 2011, UW-Platteville enrolled a record number of 1,600 new freshmen and 400+ transfer students. Over 700 of the new freshmen enrolled in engineering (approximately 35%). The campus has a unique gender balance where 35% of the students are women and 65% are men; however in Fall 2011, the College of EMS enrolled the largest number of women in history (In 2000, 243/1655 and in 2011 336/2724). As a campus, the number of underrepresented minority (URM) applications increased 15% from Fall 2010 and the number of admitted underrepresented minority applications increased 32%. The number of enrolled URM in Fall 2011 was 136, up over 70 students from Fall 2010. Approximately 45% of new freshmen are first generation college students and the average ACT score for all campus admissions was 22.8. In the engineering programs, the average ACT score ranges between 26.5 and 30.2. Overall on the campus, retention between freshmen and sophomore year is 74% with a goal of 80%. The six-year graduation rate is 56%. These numbers compare to national statistics that indicate approximately 30% of students who enter college indicate an interest in a STEM major (HERI, 2010); however it is reported that only about 40% of those who indicate a STEM major will actually complete one (PCAST, 2012).

In December of 2009, UW-Platteville was notified by the National Science Foundation (NSF) that it was a recipient of a five-year NSF S-STEM grant. The team is composed of three faculty members from the College of EMS and the Senior Director, Women in EMS Programs and EMS Advising Office. The PLT works closely with First Year Experience, The

Office of Multicultural Services and Career Services for programming purposes and to provide advice when Scholars are underperforming.

The NSF S-STEM program “makes grants to institutions of higher education to support scholarships for academically talented students demonstrating financial need, enabling them to enter the STEM workforce or STEM graduate school following completion of an associate, baccalaureate, or graduate-level degree in science, technology, engineering or mathematics disciplines”(NSF, 2012). The NSF grant program requires that 85% of the funding is used for scholarships. Another 10% can be used to provide compensation to students who assist in the program. Two student assistants are hired half-time during the summer and four student assistants are working a few hours a week to provide administrative support for the program. Peer mentors are chosen for first year recipients and are given a small stipend as well. The final 5% is used to compensate two of the team members for administrative duties during the year. Additional funds for programming are covered by the university.

The STEM Scholars program employs an application process for selecting 10 students annually for half-tuition renewable scholarships. Students not only receive the scholarship but are required to participate in high impact practice programming. New scholars are required to be new to the University for each selection cycle. So both incoming freshmen and transfer students are allowed to apply for the scholarship. The scholarships are announced and promoted in several ways and additional attempts to promote the scholarship to women and racial/ethnic minorities are also undertaken.

UW-Platteville is currently in the third year of the grant. This paper will describe the STEM Scholar applicant solicitation, application process and evolution. High impact practices are described with observations of the impact on the STEM Scholars. At the end, there will be some discussion about plans for the third cohort and programming in this coming year.

### **SOLICITATION AND SELECTION: EVOLUTION TO PRESENT**

The primary objective of this grant is to select a diverse group of students who are talented, motivated and have demonstrated financial need. Several initiatives, some which have been targeted toward diverse applicants, have been successful in increasing the diversity of the applicant pool. The first solicitation efforts yielded the largest number of applications, but also the least diverse. Additionally, in looking at data showing admit rates to the College of EMS, one can see that the candidates for application over time have also changed; Tables 1 and 2 show the results of these targeted initiatives. Targeted marketing and collaboration with the Prospective Student Services Office has resulted in a more diverse candidate pool.

Once applications are received and recorded, the PLT narrows the pool of candidates based on completeness, Expected Family Contribution (EFC) score from the Free Application for Federal Student Aid (FAFSA) and cognitive variables such as grade point average and ACT score. The EFC score is a standard which Financial Aid offices use across the country to determine the needs and qualifications for students to apply and receive grants and funds. EFC measures the “family’s financial strength” and is calculated using a formula established by law. After narrowing the candidate pool, an external Scholarship Committee (SC) reviews the applications. Establishing an external SC separate from the leadership team increases scrutiny and reliability needed to select applicants. The role of the SC is to recommend a pool of applicants from which the PLT makes the final selection. Table 4 shows the applicant pool data for the SC over time.

**Table 1: Admitted Students to the College of EMS**

	2010		2011		2012		Percent Change 2010 to 2012
EMS Admitted students (Mid March timeline)	1005		1101		1110		10.45%
Women	121	12.04%	147	13.35%	166	14.95%	21.49%
URM	19	1.89%	23	2.09%	65	5.86%	242.11%

**Table 2: STEM Scholar Application Pool Demographics**

	2010		2011		2012		Percent Change 2010 to 2012
Number of Applications	300		101		130		-56.67%
Women	18	6.00%	30	29.70%	50	38.46%	178%
URM	1	0.03%	7	6.93%	17	13.03%	1600%

Over the last three years the PLT has had significant success in increasing the diversity of the applicant pool. The percent change in possible applications has increased only slightly between 2010 and 2012 (10.45%) and yet the number of women and URM students within this pool has grown, 12.93 and 182.61% respectively. Looking also at the demographics of students who applied for the program, the number of applications decreased by approximately 56%, while the number of women and URM applications increased by 178 and 1600% respectively. The decrease in applications was due to changes in solicitation mechanisms; in 2010, a letter was mailed to all students admitted to the College of EMS whereas in 2011 and 2012, a letter was not mailed. All students were notified of the application process through the campus scholarship web page and received notice from the College Dean in a letter congratulating admission to UW-Platteville. Additionally, in 2011 and 2012 there were significant changes on the campus and in the STEM Scholar solicitation in terms of targeted recruitment techniques for both women and URM students. It stands to reason, given results from Tables 1 and 2 that the “first cut pool” of applicants increased in diversity (Table 3). In a program where diversity is the focus, the first most critical part of the process is increasing the pipeline and application pool diversity.

**Table 3: STEM Scholar Applications First Cut Pool**

	2010		2011		2012		Percent Change 2010 to 2012
First Cut Number of Applications	104		47		74		-28.85%
Women	12	11.5%	18	29.70%	31	41.9%	158%
URM	2	1.9%	4	6.93%	10	13.5%	400%

The chair of the SC is a member of PLT and is deemed to be a facilitator between the two i.e. between PLT and SC. A representative from the Financial Aid office is part of the SC and assists in helping the SC committee understand financial aid processes, the eligibility criteria and help answer questions from SC members related to student finances. The PLT also invited a member from the Admissions Office to serve on the committee. This brings a holistic approach to the selection process. In the first year of the grant the scholarship

committee consisted of four members. In the later years, the membership was increased to five. It is also worth noting that besides the three members mentioned above, the other members of the SC are selected each year from different academic departments in the College of EMS. This effort has helped the PLT connect with the academic departments and in turn helped to promote the S-STEM program at the department level. Also, this connection has helped open a new venue to disseminate S-STEM program information to prospective students through various departments.

In the first year of selection process, a rubric was used to evaluate applications. A rating system was used to evaluate each category. The SC noted after the first selection cycle that this rubric needed modification. Generally speaking, it was observed that the applicants who were on the lower side of the EFC score may have other obligations and activities (non-academic) to financially support family and hence may put them at disadvantage in the selection process. In the second year the PLT revised the rubric. This new rubric re-defined leadership to not only include a student organization title, but also included workplace roles. For example, if the applicant had managerial responsibilities. The PLT decided to give the SC members a Reviewer's Choice category, which gives them the ability to rank an applicant higher based on other factors that the reviewer felt indicated potential success in the program. This criterion of evaluation worked well when the SC used this new rubric for the selection of the second cohort. The SC chair recommended that continued discussion of the rubric was necessary for improving the evaluation process and in the selection of the applicants who are motivated to be academically successful.

During discussions about the selection rubric, it was decided to look beyond the obvious norms of selection and incorporate non-cognitive variables in the evaluation process. Non-cognitive variables refer to skills associated with student adjustment, motivation, and perception; cognitive variables refer to traditional skill sets of verbal and quantitative skills measured by standardized tests. Non-cognitive variables include positive self-concept, realistic self-appraisal, tolerance of and coping with systematic challenges, preference for long-range to short-term or immediate needs, mentorship, leadership, community service, knowledge acquired about career fields, and resilience (Sedlacek, 998a,b;2004). Research regarding these variables was done to understand the meaning and importance of including non-cognitive variables as part of the selection rubric. Therefore for the third cohort selection process (currently underway), the PLT included non-cognitive variables as part of the evaluation rubric. The process of selecting exceptional applicants who are motivated to be successful and do well academically has evolved over the cycle of the grant and has yielded a more diverse and talented application pool. The PLT has made a commitment to revisit and improve the "solicitation and selection processes" each year in consultation with SC chair and based on the feedback received from SC committee.

### **HIGH IMPACT AND BEST PRACTICES**

In 2007, the National Governor's Association published a document that encouraged governors to "Identify best practices in STEM education and bring them to scale". (National Governors Association, 2007). In the February 2012 report by the President's Council of Advisors on Science and Technology (PCAST), recommendations included to "Improve the first two years of STEM education in college" and to "Provide all students with the tools to excel". (PCAST, 2012).

### **R is for Retention model**

The PLT had developed a retention model that brings in several high impact practices along with student development theory that encompasses both cognitive and non-cognitive variables (Sedlacek, 1998a,b;2004). Research conducted by Sedlacek, applies these variables to the selection process for admission to college or specialized scholars programs; however, the PLT decided to utilize these variables as components within the retention program. The professional development, retention practices and/or high impact practices in the STEM Scholars Program are mapped to these variables to ensure a full student learning experience and increased retention. In addition to these variables, the PLT utilized student development theory that focused on affecting a student's interpersonal, residential and academic environments in higher education (Zander, 2011). The combination of the Sedlacek and Zander research creates a unique retention model that guides the PLT in programming, implementation of high impact practices and professional development for the STEM Scholars. Appendix A illustrates this model of high impact practices and the corresponding cognitive and non-cognitive variables and environments where activities for STEM Scholars occur. In addition to the retention model, the PLT has developed a database to track student progress; essentially, each student has an individual retention plan, based on the model depicted below. The PLT is also examining, the future the use of Electronic Portfolios as a means to assess and track each student's progress within the retention model.

### **P is for Professional Development**

The PLT realized early on that to “affect a student's interpersonal development” it was necessary to provide/offer a venue to students which can help them to do so. Hence it was decided to offer professional development workshops, sessions on different topics. Some of the examples are time management, studying for finals, career advising, diversity training, etc. In the first semester, the workshops focus on skills to help the scholars succeed in school. It is also important to note that most of these students will do internships or co-ops before they graduate. After the first semester, the professional development workshops provide a head start in acquiring the skills (non-academic) needed for a job before they start their internship or co-op.

Each workshop is designed with a set of outcomes. Scholars are given the outcomes before the event to review. In many cases, the scholars are expected to set goals and act on the information and skills that they learned from the Professional Development session. Some Professional Development sessions are cohort specific while others are held with all cohorts participating. These Professional Development sessions also give the PLT an opportunity to communicate information about the program expectations. Currently, the expectation is that each cohort will participate in four, skill-appropriate sessions each semester that assist the scholars in being successful and also challenge them to serve as visible role model on campus.

As part of the professional development experience for STEM Scholars, the Leadership Team has made it a priority to include diversity as a topic every semester. It is critical within a diverse group of students, who are expected to cohort, to provide the students the necessary tools to understand how to interact with others who are different from themselves. These skills will serve them well as they enter the workforce upon graduation. Examples of diversity programming includes: presentation on Stop the Hate, skill development on how to deal with biased comments, and participation in the Dr. Freeman Hrabowski campus presentation.

### **G is for Goal setting**

As part of the professional development process for the Scholars, the students are taught to write effective and reasonable goals related to their personal, professional and academic lives over short, middle and long term time frames. Goals are shared with Champions and peer mentors so that scholars can be guided effectively on reasonable goals. In order to help define these goals, the scholars, starting in Fall 2012 will be developing academic plans to assist with very specific study skills and techniques and time management principles. The PLT has used Academic Action Plans with STEM Scholars who have not met the required GPA requirement; scholars are given one semester to rectify grade deficiencies and are monitored much more than scholars who are not on STEM Scholars probation. The plans have proven to be valuable to the Scholars on probation. Introducing the use of this type of plan early in a student's college career helps to establish patterns of success.

### **D is for Diversity**

Some STEM fields such as the medical professions, veterinary medicine, mathematics and chemistry have seen increases of women, however STEM fields such as physics, engineering and computer science have either not seen improvements in gender balance or have seen decreases. Additionally, all STEM fields have glaring low numbers of racial/ethnic minorities. UW-Platteville is not an exception to these national trends. The STEM Scholars program focuses not only on increasing the number of women and racial/ethnic minorities in STEM fields, but also focuses on providing support to first generation college students and students with disabilities. The National Science Foundation S-STEM program criteria for scholarships include talented students who have financial need.

Diversity of ideas, thoughts and solutions are all critical to the evolution of global innovation. Graduates from STEM programs are expected to work in a global and diverse world and must have experience working with various types of people. Because the STEM scholars program aims to create a more diverse STEM work place, efforts have been undertaken to increase diversity within the applicant pool. This was discussed in an earlier section of the paper. A continued focus on targeted marketing, partnerships with the admissions office, prospective student services, various school districts, The College of EMS Dean's Office and departments within the College of EMS will continue to improve the diversity of the applicant pool. STEM Scholars and student assistants are also a critical component to an increased diverse candidate pool. The student assistants are responsible for executing many of the recruitment initiatives and the STEM Scholars participate in outreach as part of their service requirements.

### **C is for Cohort Scheduling and Development.**

According to Niemi and Warke, cohort scheduling is one of the top three successful retention strategies in engineering programs (Niemi and Warke, 2011). Cohort course scheduling allows students to experience common class sections. The PLT works with the English, Math, Chemistry and General Engineering Departments to arrange for cohort course scheduling for Freshmen STEM Scholars. The goal is to schedule each scholar with at least two courses in common with other STEM Scholars. In many cases, up to four courses are in common; one course that students are scheduled in as a cohort is the Engineering Success Skills class, and for the non-engineering STEM Scholars a different first year experience course is offered.

The first year (2010), cohort scheduling was a huge success. STEM Scholars quickly aligned themselves with each other and on their own would socialize, study together and help each other. In some cases, they even made sure to select the same sections for spring courses. The second year (2011) did not see the students bond in the same way. This cohort is much

more reticent. Even though the PLT strongly encouraged them to see help from each other, they did not choose to do so nor did they socialize together.

Another way to cohort students is for study purposes. Early in the first year of the program, information about study groups and tutors is also presented to the scholars. Some of the students have chosen to create their own study groups with other students they meet in courses and some create study groups with other STEM scholars. Feedback indicates the scholars see the value of study group cohorts too.

In addition to cohort scheduling, first-semester, project-based, career-oriented, introductory engineering courses are also noted as one of the three successful retention strategies in engineering programs (Niemi and Warke, 2011). As a result, the PLT focuses on enrolling students as cohorts in the first year experience courses. These first year experience courses focus on helping new students adjust to college life and develop their problem-solving ability, critical thinking, and study skills.

### **F is for FSA (faculty, staff and administrator) Champions**

Engagement of students is an important high impact practice, especially in STEM fields. The PLT developed a programming model to keep STEM Scholars engaged with self-selected Champions. A champion fulfills the following roles for a STEM Scholar: provide constructive and positive feedback, assist with goal setting and assessment of goals, listener and confidant, assist in increasing student's professional network & social capital, maintain regular communication, provide emotional support & encouragement, assist in presenting options to solve problems, and serve as a role model and advocate.

First year students in the STEM Scholars program have a peer mentor and a Champion while the second year and beyond students select a Champion. The model for the first year students is slightly different than subsequent years. The transition from high school to college can be very difficult and challenging, even for high achieving students. Each of the new students get a chance to meet the Program Leadership Team and make some choices about which member of the team would be a good match for a Champion. After the matches are made, the first year scholars share goals they have set with their Champions and subsequent meetings are established to assist the scholars in setting realistic and attainable goals that not only help to keep students on track, but also help them to "stretch." Champions are also available to the scholars throughout the year for additional support. For STEM Scholars who have not maintained a cumulative 3.0 grade point average, meetings with Champions are required every other week. Along with goal setting, the Champion and Scholar walk through an academic action plan to assist in providing structure to the student's improvement process.

In the second year and beyond, Scholars are asked to identify three to five individuals whom they would choose as a Champion. The Program Leadership Team vets the choices and then the Scholars must personally ask the selected individual to serve as his/her Champion. Scholars and Champions meet regularly to discuss personal, professional and academic goals. Champions are updated on a regular basis regarding STEM Scholar program activities to reinforce professional development and learning experiences.

### **M is for Mentors (peer)**

It is known that peer mentors are an excellent way to assist students transitioning into life at an educational institution. (Niemke and Warke, 2011). First year STEM Scholars are required to meet weekly with their peer mentor. The STEM Scholar Program Leadership Team invites chairpersons from STEM majors to nominate students as mentors. These students are invited to apply for the positions. Mentors have no more than two mentees. The peer mentors are also required to attend a three-hour orientation at the beginning of the school year and during the year provide monthly status reports on the mentoring process.

STEM Scholars greatly appreciate peer mentors during the first semester. They are helpful especially during registration for the spring semester and for knowing who and how to contact resources on campus. Mentors are asked to provide feedback to the Program Leadership Team about concerns or ideas for what mentors can discuss with their mentees. Feedback with the second cohort suggests that more work needs to be done with the peer mentors about what to talk to their mentees about during the second semester.

### **S is for Service**

Another high-impact practice is service learning. Campus service learning is also a component of the retention programming. Participants are required to engage in service learning activities to expose other students to diversity concepts, ADA compliance issues, or other appropriate topics. In addition, students are encouraged to serve as College of EMS Ambassadors, talk to high school students at their schools or at UW-Platteville events about careers in STEM and the UW-Platteville support programs specifically targeted toward URM students and women. STEM Scholars serve as role models and assist in the recruitment of additional underrepresented students. Even though this activity directly impacts recruitment initiatives it also assists with retention of students, building confidence and excitement for the scholar's own career choices (Kuh, 2008)

The grant specifies that first year STEM Scholars will give a minimum of ten hours of service and each subsequent year the STEM Scholar must give a minimum of 15 hours of service. During the first year (2010), this practice did not work very well. Students tended to volunteer at home-town church and school events thus making it difficult for us to verify their hours. The events were often not related to STEM. In 2011, the PLT attempted to clarify service hours. The interpretation was that the hours needed to be University service. In some cases, students did volunteer for STEM related activities. First year students tended to wait until the last few weeks of the term and found they were short service hours. In most cases, students only reported hours and offered no reflection about that service.

This summer, the PLT will again be review the service component and will again work at providing better boundaries and guidelines for STEM Scholars. The team believes with the introduction of e-portfolios, the recording and reflection regarding service learning will be greatly enhanced. More effort will be made to find a cohort service project.

### **W is for Work experience (job shadow, internship, co-op, career fair involvement)**

A key component to the NSF SSTEM grant program is to retain students in STEM majors and to see them graduate and obtain STEM related jobs. Career advising plays a significant role in a retention program and assures that students are prepared for such jobs. Networking with potential employers, job shadowing, attending career fairs, obtaining internships and co-ops all lead to successful job placement. These best practices provide real-life connections that motivate and assist in retaining students. Engagement in career-related activities is one of the best practices to assist women and other underrepresented students, as reported by the American Association of Colleges and Universities (Kuh, 2008).

The STEM Scholar program has not been in place long enough to graduate any students. However, changes from 2010 to 2011 have led developing a career focused aspect of the program. Students in the 2010 cohort were encouraged to attend the career fair both in the fall and spring. From that, two students were offered internships (one accepted) and a third student was able to work on campus in the summer of 2011 as an intern/researcher. In 2011, all STEM Scholars were encouraged to attend the fall career fair. In the spring, one of the Professional Development workshops required students to work with the career center to prepare a resume, interview an alum of the campus (most often recruiters at the career fair are alums) and prepare for meeting recruiters at the fair. One 2010 scholar cohort received an

internship and one 2010 scholar is working for an engineering company this summer. One 2011 Scholar received a co-op, two 2011 Scholars have internships and one 2011 Scholar is going to Africa with the campus Engineers Without Borders chapter this summer. Some students accepted the offers and others felt they were not ready for that experience. This high impact practice seems to be on track.

### **A is for Assessment**

The PLT realized that a good assessment plan was necessary in order to document this program over the course of five years. In the summer of 2010, a member of the PLT applied for and received a campus Assessment Activity Fund grant in order to develop an assessment plan for the S-STEM scholarship program. NSF encourages the use of an external assessor as part of the program. The PLT decided that an external assessor would be used each year to assist in providing feedback about the program. NSF provides a format for compiling objective data about the students who are members of the STEM Scholar program too. Anonymous surveys and focus groups were used to gather data from the STEM Scholars. One-on-one meetings with each PLT member were used to get input from the team regarding the program. In 2011, the PLT reviewed the assessment plan and decided that some parts of the plan were not very helpful and others redundant. The PLT will be working this summer to modify the assessment plan.

The results compiled from the first year of the program (2010) were helpful. First, cohort scheduling was rated highly by all STEM Scholars. Peer mentors also received high ratings but there were also indications that the PTL needed to provide better guidance about topics and things for peer mentors to do with mentees. Another clear message that came from this first assessment was that the programs tended to be passive rather than engaging. This led to developing program outcomes for each professional development in 2011 and looking for programs that were more engaging and active.

## **FUTURE WORK**

### **Increased diversity in applicant pool**

The PLT has had success in increasing the diversity of the applicant pool. The team will continue to fine tune the marketing and selection process to ensure a diverse candidate pool. A partnership with Prospective Student Services, the STEM Scholar Student Assistants and the Office of Multicultural Student Affairs has had an impact on the increase in diversity within the applicant pool.

### **Cohort integration and leadership**

Cohort development is a critical component to retaining STEM Scholars. The first cohort of Scholars were active in creating opportunities for personal interaction and socializing; while the second cohort did not take advantage of shared courses or did not initiate any type of social cohort tendencies. The PLT will be researching about methods to encourage more cohort development. In addition, the STEM Scholars Program is designed to showcase high achieving students. There are expectations of leadership in regard to academics, professionalism and diversity on the campus. The PLT will continue to refine the retention model such that it incorporates all non-cognitive variables and heightens the leadership potential of the STEM Scholars.

### **Electronic portfolios**

In spring of 2012, the PLT began to investigate the use of e-portfolios for use of documentation purposes. There is a strong chance that this will be put into place this summer and students will be trained to utilize the e-portfolio for submitting goals, documenting internships, co-ops, study abroad, service etc. E-portfolio tools allow artifacts to be tied to reflections and over time provide a folder of documents that show the Scholar's progression during the time spent on camps. In addition to the e-portfolio, an Access database was created the first summer of the program. This database will continue to be used to enter data in order for reporting purposes as well. As the program grows and if it is continued beyond the granting period of five years, this use of an e-portfolio tool will be extremely helpful.

### **Future Funding**

Finally, the PLT is working with Administrators, the Foundation and the Office of Sponsored programs to assist in obtaining additional funding beyond the 5-year timeline of the SSTEM grant. The campus has already pledged funds to increase the number of scholars each year.

## **CONCLUSION**

The NSF SSTEM grant received by UW-Platteville in 2010 has a strong start and continues to evolve with each new group of scholarship recipients. The PLT has a strong commitment to assessment, continued scholarly review of retention best practices and practical implementation of these practices. The creation of a retention model this year provides a strong framework for building a solid program for graduating students in STEM majors.

Implementing high impact practices is not as easy as it may seem. Assessment is very important in order to make modifications to the implementation of high-impact practices. With only two years of data to evaluate with, it is still too soon to know if the high impact retention practices are helping to increase retention. Of the ten students in the first cohort, five are still in the program. Of the five who are no longer in the program, four have changed to non-STEM majors. All four have remained at UW-Platteville. The retention rate of the first cohort after one year was 70% and the retention rate after two years is 60%. Of the 16 students in the second cohort (three were replacing students who changed majors in the first year, and three were funded by the campus), twelve are still in STEM majors. Of the four that are no longer in the program, two are still on campus. So the retention rate of the second cohort after one year is 75%. Although the data pool is small it would appear that the changes made in the program have some effect

Future work includes continuing to provide strong programming for Scholars; Assessment must continue to be a priority as the PLT shapes the retention model. In particular, the team will be looking at ways to assess non-cognitive variables and the impact they have on student success. Marketing efforts to increase the diversity of the application pool are essential and will hopefully result in a more diverse selection of Scholars for the last three years. This work has far reaching implications. Targeting the most successful high impact practices and implementing them for the College of EMS is a long term goal for increasing retention of all STEM majors. And even further would be to implement these practices throughout the university to increase overall retention.

APPENDIX A

Strategy	Variables													
	Operating Spheres			Cognitive		Non-Cognitive								
	Academic	Interpersonal	Residential	GPA	Core Units	Positive Self-Concept	Realistic Self-Appraisal	Handles Systemic Change	Perfers Long-Range to Immediate Needs	Mentorship	Leadership	Community Service	Knowledge about field	Resilience
<b>A Solicitation and Selection</b>	X	X		X	X	X	X	X	X	X	X	X	X	X
1 Marketing		X		X	X	X	X							
2 Selection Rubric	X	X		X	X	X	X	X	X	X	X	X	X	X
3 Selection Process	X	X		X	X	X	X	X	X	X	X	X	X	X
<b>B Professional Development Sessions</b>	X	X		X	X	X	X	X	X	X	X	X	X	X
1 STEM Scholars Orientation	X	X								X	X	X	X	X
2 Zimbra Training	X	X	X					X	X					X
3 Note Taking Skills	X	X		X	X			X	X					
4 Implicit Bias	X	X	X			X	X	X		X	X	X		X
5 Handling Hurtful Remarks	X	X	X			X	X	X	X	X	X	X		X
6 Listening Skills	X	X	X			X	X	X	X	X	X	X	X	X
7 Career Center presentation/appt.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8 Stop the Hate	X	X	X			X	X	X	X	X	X	X		X
9 Strengths Quest	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10 Studying for Finals	X	X		X	X	X	X		X	X	X	X	X	X
11 Undergraduate Research Overview	X			X	X	X	X		X	X	X	X	X	X
12 Education Abroad	X	X	X			X	X	X	X	X	X	X	X	X
<b>C Individual Retention Plan</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 Database	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2 Goals/Values	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3 Parents and Family	X	X	X			X	X	X	X	X	X	X	X	X
4 Mentoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5 Champions	X	X		X	X	X	X	X	X	X	X	X	X	X
6 Internships & Co-ops	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7 Career Advising	X	X		X	X	X	X	X	X	X	X	X	X	X
8 Academic Advising	X	X		X	X	X	X	X	X	X	X	X	X	X
9 Student Organization Involvement	X	X	X			X	X	X	X	X	X	X	X	X
10 E-portfolio	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11 Academic Action Plan	X	X		X	X	X	X	X	X	X	X	X	X	X
12 STEM Scholar Probation	X	X		X	X	X	X	X	X	X	X	X	X	X
13 Freshmen Registration lunch	X	X				X	X							X
14 Grade Reports	X	X		X	X	X	X	X	X	X	X	X	X	X
15 Conference Presentations	X	X				X	X		X	X	X	X	X	X
<b>D Cohort Development</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 Cohort Scheduling	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2 Chancellor Reception		X						X	X	X	X	X	X	X
3 Polo Shirts		X				X	X			X	X	X	X	X
4 Social Events		X	X			X	X			X	X	X	X	X
5 Social Media		X	X			X	X			X	X	X	X	X
<b>E On Campus Resources</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 First Year Experience	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2 Career Services	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3 Math/Science Learning Center	X			X	X	X	X		X	X	X	X	X	X
4 TRIO Program	X			X	X	X	X		X	X	X	X	X	X
5 Multicultural Student Affairs	X	X		X	X	X	X	X	X	X	X	X	X	X
6 Teaching & Learning Center	X	X		X	X	X	X	X	X	X	X	X	X	X
7 Writing and Tutoring Center	X	X		X	X	X	X	X	X	X	X	X	X	X
<b>F UWP Service</b>		X	X			X	X		X		X	X	X	X
1 Campus presentations	X	X				X	X			X	X	X	X	X
2 Campus tours		X	X			X	X		X		X	X	X	X
3 Outreach	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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### REFERENCES

HERI. 2010. *Degrees of Success Bachelor's Degree Completion Rates among Initial STEM Majors*. Higher Education Research Institute.

<http://www.heri.ucla.edu/nih/downloads/2010%20-%20Hurtado,%20Eagan,%20Chang%20-%20Degrees%20of%20Success.pdf>

Kuh, G. D. 2008. *High-Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter*. Association of American Colleges & Universities. Washington, DC.

National Governors Association. 2007. *Innovation America: Building a science, technology, engineering and math agenda*. Washington, D.C.: National Governors Association Center for Best Practices.

<http://www.nga.org/Files/pdf/0702INNOVATIONStem.pdf>

National Science Foundation. 2012. NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM),

[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5257&org=DUE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257&org=DUE&from=home).

Niemi, D., Warke, R. 2011. *Facing our Retention Challenge: A Self-Portrait*. American Society for Engineering Education.

PCAST. 2012. *Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics*. President's Council of Advisors on Science and Technology.

[http://www.whitehouse.gov/sites/default/files/microsites/ostp/fact\\_sheet\\_final.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/fact_sheet_final.pdf)

Sedlacek, W. E. 1998a, Winter. *Multiple choices for standardized tests*. *Priorities*: 10, 1-16.

Sedlacek, W. E. 1998b. Admissions in higher education: Measuring cognitive and noncognitive variables. In D. J. Wilds & R. Wilson (Eds.). *Minorities in higher education 1997-98: Sixteenth annual status report*: 47-71. Washington, DC: American Council on Education.

Sedlacek, W. E. 2004. *Beyond the big test: Noncognitive assessment in higher education*. San Francisco: Jossey-Bass.

Shields, Dennis J. 2011. 2011/2012 Chancellor's Convocation. UW-Platteville, August 2011.

University of Wisconsin - Platteville. 2012. About the University of Wisconsin - Platteville. <http://www.uwplatt.edu/academics/catalogs/undergraduate/current/about.html#community>

Zander, D, Aviles, J. 2011. *Serving at Risk Students*. Platteville, WI: University of Wisconsin-Platteville presentation on retention best practices.

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