

# **The METS Center: A Place Where Community College Transition Students Encourage Each Other in Obtaining an Engineering Degree**

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**Abstract--**Many Engineering schools now recognize several groups of students that may need extra or special support in order to succeed in engineering and computer science: women, underrepresented minority students (African American, American Indian, and Hispanics/Latinos), physically challenged students, and older students. Another group of students that need special support are students who transfer from a community college to a four-year college or university. Historically this group of students has not been recognized as needing special attention; however these students report that transferring from a community college to a four-year college or university is just like being a first-year college student all over again. This can all be very intimidating to a student who should know what it is to be a college student. In order to encourage and to help community college students interested in engineering, a Maricopa Engineering Transition Scholars (METS) program, funded by the National Science Foundation, was established in 2003. This program targets women and minority students. This paper describes the METS Center at the Fulton School of Engineering at Arizona State University (ASU). Specifically, the paper explains the purpose and structure of the Center and provides pertinent data collected over a year with three case-studies illustrating the importance of the Center relative to general counseling that community college transfer students receive by ASU and/or the Fulton School.

## **I. Introduction**

During the past decade and a half, the movement of community college students into colleges and universities has been a major higher education policy focus in many states. The structures for assuring the success of transfer students have focused on making transfer an integral function of student services at both community colleges and colleges/ universities (Kane, 2001; Hendley, 1997; Zamani, 2001)). In addition, most states have set forth transfer-credit requirements, and in some cases GPA requirements, regulating what one needs to meet in order to obtain admission into four-year colleges and universities. However, all these regulatory requirements do not ensure community college student success in degree attainment at their upper-level institutions.

Research suggests that students experience significant post-transfer adjustment difficulties during their first term of enrollment at new institutions (Hills, 1965; Nolan & Hall, 1978). In fact, the whole first year is a time of adjustment for transfer students (Teleconference Series, 2005). One of the most important areas of the transfer function is the psycho-social challenges that community college students face in adapting to a new social setting at their advanced institution. These challenges can prevent transfer students from meeting their educational and career goals. Extremely important in the community college transfer groups are women and minority students, especially those transferring into engineering and science programs (Tsapogas, 2004). These groups represent a critical proportion of the labor force supply so underrepresented in the science and engineering labor force of the United States (CAWSMET, (2000).

Special programs to support and to help graduate engineering students were started around 25 years ago for women and underrepresented students. Not only were these students underrepresented in first-year engineering classes, but also a smaller percentage of them graduated in engineering. Special programs have helped to increase this percentage. The graduation rate of engineering students is estimated at 40% (Landis, 2001). In fact, nearly half of first-year students do not return to engineering for the second year (Loftus, 2005). A study in 1993 showed that engineering loses 53% of its students between the freshman and senior years (Astin & Astin, 1993) and increasingly engineering schools are designing help programs for all engineering students. Instead of using the “Weeding-out Principle: look to your left and look to your right, only one of you will graduate” in freshmen and sophomore courses (Landis, 1995; Huband, 2005), many engineering schools are now working to retain and to graduate their students.

Many Engineering schools now recognize several groups of students that may need extra or special support in order to thrive in engineering and computer science: women, underrepresented minority students (African American, American Indian, and Hispanics/Latinos), physically challenged students, and older students. According to a study by NACME in 1995, there are key actions that produce success in the retention of underrepresented minority students at an institution: 1) institutional commitment as measured by attitudes of faculty and staff, 2) integral minority engineering programs, 3) allocation of resources, 4) focus on removing hurdles to student success, 5) special attention paid to the early success of freshmen, and 6) delivery of special programs designed to help make the institution more supportive (NACME Newsletter, 1995). Another group of students that need special support are students who transfer from a community college to a four-year college or university. Historically this group of students has not been recognized as needing special attention, however these students report that transferring from a community college to a four year university is just like being a first-year college student all over again.

The literature on diversity issues regarding undergraduate women and minorities is new, but rich in insight in where college/ university structures should focus their energies on supporting these enrollments. Unfortunately, the literature about women and minorities does not necessarily specify such groups transitioning from community colleges into science and engineering programs. An in depth review of 300 diversity research studies by Daryl Smith (1997) (cited by Humphreys, 1998) suggests that: 1) involvement in specialized student groups, such as

residential theme houses, support centers, and academic departments appear to contribute to increased satisfaction and retention of those students and 2) interactions of various student groups are likely to be more beneficial when they are institutionally supported and validated to be equally valued and when they involve a common focus of goals and outcomes such as those of a disciplinary program.

Critics are skeptical about the educational benefits of campus diversity, where they state that self-segregation among students undermines the educational promise of a genuinely multicultural college community. However, recent research beyond Smith's (1997) work continues to expand or support suggestions that contrary to popular reports, it isn't surprising that college students today choose to live, socialize, or study together with other students from similar backgrounds. Contrary to many commentators' claims, however, research suggests that this clustering isn't widespread; it doesn't prevent students from interacting across racial/ethnic lines; and it may be an essential ingredient in many students' persistence and success in college (Antonio, 1999; Hurtado, S, et al., 1994; Humphreys, 1999 [for citing references]).

This paper describes the METS (Maricopa County Community College District Engineering Transition Scholars) Center at the Fulton School of Engineering at Arizona State University (ASU). Specifically, the paper explains the purpose and structure of the Center and provides pertinent data collected over a year with three case-studies illustrating the importance of the Center relative to general counseling that community college transfer students receive by ASU and/or the Fulton School.

## II. Origin and Focus of the Fulton School-ASU METS Center

Every fall over 300 community college students from the Maricopa County Community College District (MCCCD) transfer to the Ira A. Fulton School of Engineering at Arizona State University (ASU). Over the past ten years the School has developed successful recruitment and retention programs for women and minority students resulting in an increase in the percentage of undergraduate women to over 20% and of underrepresented minority students to over 17% (ASU, 2004). During the same time, the retention of first-year women and underrepresented minority students each increased by 10 percent. However, little attention was paid to the new community college transfers, who report that their experiences are just like being a first-year college student all over again.

In the summer of 2003, after two years of collaboration, the Fulton School of Engineering and the MCCCD were awarded a grant from the National Science Foundation for the METS, with a special emphasis on women and underrepresented minority students. "Creating strong transfer links to four-year colleges and universities" was identified as a best practice for community colleges at a National Symposium held by the National Science Foundation in 2001 at Estrella Mountain Community College (Community College Best Practices, 2001). The transition from the community college to the four-year institution should be as seamless as the transition from high school to the community college. This ideal includes articulation, content, competencies, and regular meetings between the community college and the four-year institution.

The METS project has the purpose of interesting more community college students in engineering, supporting that interest, assisting with the transition from the community college to the university, and supporting retention and graduation of the transfer students. Since at least 50% of the community college engineering transfer students to ASU only decided on engineering at the community college (Anderson-Rowland, 1996), programs are held each semester at five of the ten Maricopa Community Colleges to interest potential engineering students.

If an institution is serious about facilitating transfer student success, there are several implications. Two of these are that first, the institution will establish and/or strengthen transfer center/offices to assist students in the transfer process, and second, establish and/or strengthen support programs, including peer-mentoring programs (Cuseo, n.d.). Accordingly, a central focus of the METS assistance and support program for transfer students in the Fulton School is the METS Center, a physical set of offices and space as well a welcoming environment of support for transfer students. The METS Office area consists of two staff offices, a lobby, a small computer space, and a study room, with additional space for student assistants and storage (Anderson-Rowland, 2004a; Anderson-Rowland, 2004b).

The METS Center is used for Be An Engineer II events for potential transfers, described in a previous paper (Anderson-Rowland, 2004c), a study room, mentoring, computer support with free printing, workshops, a lunch room, a place to relax between classes, and close proximity to METS staff for support and guidance. The METS Center is not for academic advising, which is handled by Dean's Office or department advisors. The staff consists of the ASU METS co-director (who is an engineer) and a student assistant. During the past year and a half, a second engineer was in an office in the METS Center and also assisted with the program and in being available to the students. Other METS personnel not located in the METS Center include the project PI. It should be understood that the purpose of the computers and free printing is to entice transfer students to use the center. As they begin to use the center they form friendships, find study partners, and receive support from the METS staff.

New transfer students are very much like new first-year college students. First-year engineering and computer science students, in particular, independent of gender or ethnicity, need to: 1) get their life situation together so they are not overburdened with problems and distractions, 2) develop a high level of commitment and motivation to make the correct choices and personal sacrifices in a tough major, 3) know why they want to be an engineer so they can appreciate the value of a technical education, and 4) learn how to be effective as a student and negotiate the educational system (Landis, 1995). These four areas are also true for transfer students, especially items 1) and 4) as we shall discuss.

In a transition meeting with 15 community college students just before the Spring 2005 semester began, the new Fulton students were asked what their primary concerns were for the spring. Their list included: managing time (mentioned most often); adapting to a new atmosphere (class size, times of classes, and teachers who do not work one-on-one with students); finding a place and somebody to study with; dealing with traffic and getting to class; staying on track and on pace (the university class pace tends to be faster and more is expected of the students); balancing work, home, and children; learning higher level mathematics; reducing stress; learning logistics

(getting from class to class, how, what's due, space management); and having realistic expectations.

None of these concerns should be surprising. Time management is a problem for most students, but especially for new community college transfers, 80% of whom work and now realize that their class load is probably tougher (Community College Best Practices, 2002). A student recently related that his first semester in Fulton was very tough and he did not adjust well because previously he had not been required to do intensive homework assignments. He vowed that now that he understood the system, he would do much better. Also, community college students tend to be older and often have family commitments (Best Practices, 2002). In addition, many of these transfer students are now commuting a much longer distance than they were to their local community college. The classes at ASU at Tempe, with a student population of 50,000 for the university and 6,500 for the Fulton School of Engineering, do tend to be larger than in their community colleges. Since the physical size of ASU is much larger than a community college, beginning classes at the site can seem daunting.

Becoming familiar with at least one place, the METS Center, where transfer student can study and find answers to their questions is comforting. Other students in the transfer students' classes will tend to know each other since they have been in the same classes for the past two years. Because of this, it may be difficult for the new transfer student to find a good study group on his/her own. At this initial meeting the transfer students were given a new learning method that makes them more efficient with their time to reduce their stress and to do well academically. The transitioning students are invited to make use of the Center and its staff to help them and to help each other. It is important for the transfer students to share and to get to know others in the same situation so they will know that they are not the only one with challenges and can learn ways to overcome the challenges.

The mere presence of a METS Center for transfer students shows the institutional commitment of the Fulton School to welcome and to support transfer students. This is important to transfer students initially and was the first reaction by a transfer student when asked what the METS Center meant to him, as he was studying in the Center at the beginning of Spring 2005. His quick second thought was that the METS staff made the Center a helpful place. Potential visiting transfer students note the METS Center and are pleased to know that they are welcome and there will be a place for them to study, meet others, and get information and answers. This echoes what we learned when we established a Center for Women In applied Science and Engineering (WISE) in 1993 (Cosgrove, Blaisdell & Anderson, 1994). Although the WISE Center was established to retain women in engineering, it also became a recruitment tool for women considering enrollment at ASU since they and their parents were impressed that the School was committed to supporting women by providing space for them. Also we found that the women students were much more likely to ask for help if there were familiar, knowledgeable staff nearby. Having on-site staff is convenient and takes less effort since no appointment is necessary and a staff member is always present.

### III. Students Experiences with the METS Center

Since the METS program first began in Fall 2003, the majority of Fulton-ASU community college transfer students attending special events such as lunch with a professor, time management sessions, and meetings with industrial representatives rated the activities highly important and extremely informative. Center attendance grew from 35 students (with 11 regular attendees) in Spring 2004 to 74 students (with 30 regular attendees) in Fall 2004 (Table 1). Of the 67 students who have attended in Spring 2005, 56 are continuing students and 11 students are new to the Center for this semester. The Center has proved to be especially popular near the end of the semester when project teams are putting together final touches and study groups are preparing for finals.

Table 1. METS Center Attendance from Fall 2003 through Fall 2004.

Semester	No. of students	No. of students visits	Approx. No. Regular Attendees
Fall 2003	**	**	**
Spring 2004	35	133	11
Summer 2004	7	31	5
Fall 2004	74	755	30
Spring 2005 (7 weeks)	67	610	40

\*\* Startup semester for the METS Center

In the beginning of Spring 2005, 28 students surveyed as to what they thought about the Center, stated they especially liked the access to computers and printers and they liked talking with staff, who have been engineers in industry. One student stated, "Staff, both (names given) are a must (with 23 underlines)." In addition, students have said that the center is very important because they can meet others like themselves and they don't have to be concerned about being the oldest person in a study group. The gender and ethnicity of the 28 students is given in Table 2. The class standing of the respondents is given in Table 3. Table 4 displays the primary reasons that the transfer students attend the METS Center. It is interesting to note that the computers and free printing are the biggest draws for the METS Center as they are intended to be. Once the transfer student starts frequenting the METS Center for those reasons, they will soon learn that the Center also provides other kinds of support. The primary suggestions to improve the center were to make it bigger, since it is often crowded, and to have MatLab and other engineering software loaded on the Center's computers.

Table 2. Gender and Ethnicity of METS Center Respondents.

Ethnicity	No. of males	No. of females
African American	0	0
White	9	4
Hispanic	6	2
Native American	0	1
Asian	1	0
Multi	1	0
Unknown	4	0
Total	21	7

Table 3. Class Standing of METS Center Respondents .

<b>Class Standing</b>	<b>No. Students</b>
Freshmen	0
Sophomore	7
Junior	19
Senior	2
Total	28

Table 4. Reasons that Students Come to the METS Center

<b>Category</b>	<b>No. Students</b>	<b>% of total</b>
Computers	25	89
Free Printing	25	89
METS Staff	18	64
Study Groups	17	61
Meet New People	15	54
Tips on Employment	9	33

#### IV. METS Staff Experiences with the Community College Transfer Students

The METS co-director at ASU, working alone this semester, spends time with 20 students per day on average, with each student usually visiting with her two or more times a week. The students come to her office, located next to the MET's study room. The onset of the conversation is usually casual and light. After some opening chit-chat, the co-director asks the student how things are going. Then, usually, a question will be asked or a problem described. The most common topics are: communication (usually problems with an instructor or with a team member), resumes (how to improve by pulling out meaningful skills valuable to industry), an applied technical problem (the director's broad engineering background and experience is used), or an interaction with a professor (for example, the director writes a note to the professor requesting that the student be allowed to make-up work in a different lab or lecture section so she/he can participate as a speaker in a METS event either on campus or at a community college). Many times the students are unsure of their approach or solution to a problem and just need confirmation or their confidence boosted. Technical coaching by the director is often valuable to the students in helping them to understand applied analysis problems. Sometimes the help is very specific as in assisting a parent to apply for and to receive a reimbursement of tuition that was paid for their child.

There are several other hot topics that are brought to the co-director by the transfer students: how to pick classes; information on instructors; balancing work and school; administrative items about classes, majors, and documentation for their degree; meeting with advisors; what kind of credits count for certain majors; how do you negotiate the system, how do you handle an uncomfortable situation in a class or with a professor, what do you do when a class is not going well, what if you are not confident you can do engineering, how do you keep industry happy when you have two internship offers and have to turn one down. The students are always advised to go to their advisors for questions relating to their particular curriculum. However, the co-director is there and other students are there to help with information, resources, advice, and understanding.

The transfer students that come in the METS Center need a home away from home, as the next several examples will show. The help that the transfer student gets is usually through mentoring by the METS co-director or mentoring by a transfer student who has already ‘made it.’

One student came to see the METS co-director because he was having trouble in an upper division Engineering Core class in numerical methods. He said that he was repeating the class, but he still didn’t understand the material any better than he did the first time. He also said that he wasn’t very good with computers. When asked about his performance in the basic introduction to engineering class, which requires computer programming, he said that he got a B in that course. Since the co-director had taught the course at the community college, she knew that the computer skills portion of the course is critical in the homework and project assignments. The student said that although he had received a B, he did not turn in the computer assignment homework. Some of the assignments were done by a group of students, so he did things that weren’t the programming part of the assignment. Thus, he “played the points game” to get the desired grade without having to practice the necessary computer programming skills. Although the course requirements included a high school course in programming, somehow he was allowed to take the basic introduction to engineering class without a previous programming course. Now he is in a course where the computer programming skills are necessary to succeed in passing the course. The student was told that he knows what he has to do: take a computer programming course so that he can succeed in the numerical methods course. Students are more likely to talk to someone about their problems if a person is available in a close proximity, as the co-director was in this case.

The METS Center is a way of drawing in transfer students who admit to the co-director that they need help. Sometimes the help can come directly from the co-director and other times the help can come through a mentor through the METS Mentor Program. The METS Mentor Program has been able to help change transfer students in unexpected ways. In the spring of 2004, a transfer student was having a very difficult time in ECE 200, the introduction to engineering course for transfer students. The transfer student happened to be from one of the untargeted community colleges in the MCCC, but all transfer students are welcome in the METS Center. The co-director carefully selected a mentor for the student because the student was very shy and communication with him was difficult to ascertain what he understood about the material. The student was encouraged to request a mentor and did. The mentor selected was from the CIRC/METS program, and academic scholarship program funded by the National Science Foundation for transfer engineering students to support them to graduation and encourage them to go on to graduate school (Anderson-Rowland, 2004). The volunteer mentor was selected because he shared the cultural Hispanic family structure background and would be a complement to the mentee’s conversation style. It became a very good match. They have emailed each other regularly. The biggest difference the co-director noticed in the mentee is that he’s so much more relaxed. His face looks light and he smiles a lot and his grades improved. Every time the co-director sees him, he’s smiling. Whereas, in the spring semester, his head was always down and it looked like he was dragging. The mentor explained that because of the difference in Spanish dialect where he was raised, the mentee was very careful with sharing things because he feared that he was putting words together in the wrong context. So now the mentee has the mentor to help him with questions and answers to reframe them into something that is appropriate and this has made the difference along with the fact that he has an understanding friend. This story is an example of the common experience that the co-director sees among the mentees in the METS

mentor program: now I have a friend who understands. In fact, this is the main reason for the existence of the METS Center.

Most transfer students have difficulties when they first transfer and one transfer student was literally in tears when she met her mentor. At the first meeting of the mentor and mentee, the co-director is present. In this way she gets a first hand idea on how things are going and if the mentors and mentees can communicate. As the co-director watches them interact, they are given an activity to do. They have to communicate with one another verbally and non-verbally. The mentee was having a difficult semester. When she left she said that now she had someone to help her.

Another female transfer student was assigned a mentor with the same Hispanic heritage. The students also shared the same field and career interest. These two have hit it off so well that they have requested each other next semester, which is usually not the case. This mentee appeared to be shy at first when coming to METS Center. Now she's more outgoing and talkative. She meets with her mentor once a month.

The mentees feel comfortable with their mentors in that they have someone to help them. The new transfer students usually do not feel confident enough to ask for help of someone. It takes a special person to mentor the new community college transfer students. The CIRC/METS Scholars are chosen as mentors. They themselves are transfer students who receive mentor training and possess skills that have made them academically successful. The METS Center staff trains the mentors and act as brokers in matching mentors and mentees. In addition, the center provides a convenient place for the mentors and mentees to meet.

## V. Evaluation

Ultimately the success of the METS Program and Center will be increased retention and graduation of transfer students. The program and the Center have not been in existence long enough to have retention and graduation statistics. For example, of the 11 regular Center attendees in Spring 2004, a year later all of them are still attending the Fulton School of Engineering. Of those 11, 7 were transfer students and 5 (all upper division) of the 7 were in their first or second semester at ASU since transferring. The one-year retention rate for lower division transfers who entered the School in the Fall of 2003 was 63% and for upper division transfers, 82%.

It is difficult to evaluate the physical Center apart from the METS program staff. A Center adjacent to the program staff location is recommended as a best practice. It has been found to work in our engineering college with other programs and elsewhere. Besides the actual retention and graduation numbers, the METS Center exists to make the transition easier. After a semester or a year, a transfer student may no longer want or need the Center. The students' comments in this paper show that the students who use the Center say it has been helpful to them after their transition. The case-studies presented illustrate the type of support that the students have received as a result of having a physical METS Center with staff available. In addition the METS co-director regularly sees 20 students per day who ask for information or support that is

different than the usual help requested of academic advisors. The numbers of students finding the METS Center to be helpful is increasing each semester.

## VI. Conclusions

Researchers have found that there are two major times of change for students: one is when they start college and the second is when they begin graduate school (Lazarus et. al, 2001). The change from high school to college is traumatic for most students. Suddenly the new college student has no one checking to see if he attends class or does his/her homework, there is so much free time, there are many new people to meet and become acquainted with, homework needs to be done, knows no one, and doesn't understand the system. Many Engineering schools now recognize several groups of students that may need extra or special support in order to thrive in engineering and computer science: women, underrepresented minority students (African American, American Indian, and Hispanics/Latinos), physically challenged students, and older students. Another group of students that need special support are students who transfer from a community college to a four-year college or university. Historically this group of students has not been recognized as needing special attention; however these students report that transferring from a community college to a four-year college or university is just like being a first-year college student all over again. Although the community college transfer students has passed a filter just to make it to a four-year university, suddenly there are many new problems, including: paid parking; a larger campus; larger classes; more challenging classes; harder homework and more of it; more required commuting time; less time to balance school, work, and family; being a new student among classmates that have been going to school together for two years. This can all be very intimidating to a student who should know what it is to be a college student.

Learning that the other community college transfer students are going through the same difficulties and have survived can be very supporting and encouraging to the new transfer. The METS Center provides a place for transfer students to meet others like themselves for friends and study group partners, to receive mentoring from other transfer students who have already made the transition successfully, and to receive encouragement, advice, and a listening ear through the METS co-director.

## References Cited

- Anderson-Rowland, M.R. (1996). A First Year Engineering Student Survey to Assist Recruitment and Retention. *1996 Frontiers in Education Conference Proceedings*, Salt Lake City, Utah, November, 1996, pp. 372-376.
- Anderson-Rowland, M.R., Vanis, M., Zerby, D.M., Chain, E.L., Banks, D.L. & Mater, B. (2004a). METS Pilot Program: A Community College/University Collaboration to recruit Underrepresented Minority Students into Engineering. *Proceedings of the 2004 American Society for Engineering Education Annual Conference*, Salt Lake City, Utah, CD-ROM, 9 pages.
- Anderson-Rowland, M.R., Zerby, D.M., & Johnson, P.C. (2004b). CIRC/METS: A Scholarship Program to Assist Engineering Transfer Students to Graduate and to Attain a Graduate Degree. *34<sup>th</sup> ASEE/IEEE Frontiers in Education Conference Proceedings*, Savannah, Georgia, CD-ROM, 6 pages.
- Anderson-Rowland, M.R., Banks, D.L., Vanis, M.I., Mater, B, Chain, E.L. & Zerby, D.M. (2004c). METS: A Collaboration to Assist Students Transitioning into Engineering from the Community Colleges to University. *34<sup>th</sup> ASEE/IEEE Frontiers in Education Conference Proceedings*, Savannah, Georgia, CD-ROM, 6 pages.

- Antonio, A.L. (1999). Racial diversity and friendship groups in college: What the research tells us. *Diversity Digest* pp. 6-7. Washington, D.C.: Association of American Colleges and Universities.
- Arizona State University at Tempe Enrollment Summary*. (2004). Office of Institutional Analyses.
- Astin, A.W. & Astin, H.S. (1993). *Undergraduate Science Education: the Impact of Different College Environments on the Educational Pipeline in the Sciences*. Los Angeles: Higher Education Research Institute, UCLA.
- CAWSMET, (2000). *Land of plenty: diversity as America's competitive edge in science, engineering and technology*. National Science Foundation, Arlington, VA.
- Community College Best Practices: the Diversity Challenge in America's Science, Technology, Engineering & Math Workforce*. (2002). Estrella Mountain Community College.
- Cosgrove, C.R., Blaisdell, S.L., & Anderson, M.R. (1994) "Foundation Coalition Effort to Improve Retention of Women in Engineering at Arizona State University," *Proceedings of the ASEE Gulf Southwest Section Meeting*. Southern University, Baton Rouge, LA, March 1994, p. 436-439.
- Cuseo, J. (n.d.). *The transfer transition from two-year to four-year institutions: Critical issues and promising practices*.
- Hendley, V. (1997). Recruiters hear "Me Too!" from community college students. *Resources September 1996 – May/June 1997*. Washington, D.C.: The American Society for Engineering Education.
- Hills, J.R. (1965). Transfer shock: The academic performance of the junior college transfer. *The Journal of Experimental Education*, 33(2), 201-215.
- Huband, F.L. (2005). A Gentler Approach. *ASEE PRISM* 14 (5), pp. 24-29.
- Humphreys, D. (1998). *The Impact of Diversity on College Students: The Latest Research*. Diversity Ford Foundation Campus Diversity Initiative. Diversity Web (<http://www.diversityweb.org>)
- Humphreys, D. (1999). *Campus Diversity and Student Self-Segregation: Separating Myths From Facts*. Diversity Web (<http://www.diversityweb.org>)
- Hurtado, S.; Dey, E.; & Trevino, J. (1994). *Exclusion or Self-Segregation?* Presentation at the American Education Research Association Conference: New Orleans, LA.
- Kane, H.R. (2001). Honors programs: A case study of transfer preparation. *New Directions for Community Colleges: Transfer Students Trends and Issues N 114* (pp. 25-38). San Francisco: Jossey-Bass.
- Landis, R.B. (2001). *Studying Engineering*. Burbank, California, Discover Press, p. 1, p. ix.
- Lazarus, B.B., Ritter, L.M., & Ambrose, S. A. (2001). *The Woman's Guide To Navigating The Ph.D. In Engineering & Science*. New York, NY: Institute of Electrical and Electronics Engineers, Inc.
- Loftus, M.(2005). Lending A Hand. *ASEE PRISM* 14 (5), p. 24-29.
- NACME Newsletter, December 1995.
- Nolan, E.J. & Hall, D.L. (1978) Academic performance of the community college transfer student: A five-year follow-up study. *Journal of College Student Personnel*, 19, 543-548.
- Smith, D.G. (1997). *Diversity works: The emerging picture of how students benefit*. Washington, D.C.: Association of American Colleges and Universities.
- Teleconference Series. (2005) #1 *Facilitating Transfer Student Success: Creating Effective Partnership*. National Resource Center for The First-Year Experience & Students in Transition. University of South Carolina.
- Tsapogas, J. (2004). The role of community colleges in the education of recent science and engineering graduates. *Infobrief: NSF 04-314*. Washington, D.C.: National Science Foundation.
- Zamani, E.M. (2001). Institutional responses to barriers to the transfer process. *New Directions for Community Colleges: Transfer Students Trends and Issues N 114* (pp. 15-24). San Francisco: Jossey-Bass.

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