Results of the
2008 Undergraduate Research Survey

The results of the 2008 undergraduate research (UR) survey are attached. The survey was administered in April 2008 to students who participated in UR projects during fall 2007 and/or spring 2008. A second round of the survey was administered in mid-July 2008 for students who participated in a summer UR experience at MSU. All participants were students who received undergraduate research support from their colleges through funding provided by the Associate Provost for Undergraduate Education and Dean of Undergraduate Studies.

Survey Information

With the provost's funds and some of their own funding, colleges provided UR support for 331 students. This number represents a 37% increase from last year's effort that funded 242 students. Approximately 278 students were emailed the undergraduate research survey that contained a link and instructions explaining how to complete the survey. 186 students submitted usable surveys, which produced a 67% return rate.

This report contains six sections:

- Part I: Demographic data on the undergraduate researchers
- Part II: Elements of UR opportunities
- Part III: Impact of UR
- Part IV: Presentations and publications
- Part V: Recommendations
- Part VI: Student voices on the advantages and challenges of UR

For questions or more information about this survey or undergraduate research at MSU, please contact Korine Wawrzynski, Ph.D., Coordinator for Undergraduate Research in the Provost's Office at steinke7@msu.edu or 517-355-7635.

MICHIGAN STATE UNIVERSITY

Part I: Who are our undergraduate researchers?

The undergraduate researchers in this study were predominately White students (83%) with Asian/Pacific Islanders (6%) and Black students (4%) comprising the two largest minority groups. A few of these figures were slightly below the University profile for some ethnicity groups. Most participants were juniors or seniors. Approximately 13% were transfer students. The gender breakdown reflected University enrollment patterns with 58% of the participants being women and 42% being men. Nearly 84% were Michigan residents, while 16% were from out of state.

The students were academically strong with the average GPA being 3.58 (SD=.40). No students were affiliated with the Honors College. It appears that much of these funds are being used to expand research opportunities for students who are not eligible for the Professorial Assistant or Honors College Research Seminar Programs.

For 70% of the participants, this UR experience was their first. When asked why they participated in a UR experience, many students stated that they wanted to gain practical experiences or enhance their resumes; others thought it sounded interesting. Over half of the students indicated that gaining practical experiences for graduate school or a future career was the most important benefit of participating in UR, while a smaller group wanted to develop mentoring relationships with faculty.

Faculty members play an integral role in UR experiences. Mentoring relationships frequently become the defining factor when measuring the quality of students' overall UR experiences (Kinkead, 2003). Faculty also influence students before they even begin a UR experience, as 70% of the students learned about their UR opportunity through a faculty member. Furthermore, 45% of students decided to participate in UR because a faculty member encouraged them. It appears that one way to increase student participation in UR is to work more closely with faculty.

Ethnicity	Percentage
American Indian/ Alaskan Native	0.6%
Asian/Pacific Islander	6.1%
African American	4.4%
Caucasian	83.3%
Chicano or Hispanic-Other	1.7%
International	2.2%
Not Reported	1.7%
Total	100%

Class	Percentage
Freshman	1%
Sophomore	6%
Junior	22%
Senior	71%

Gender	Percentage
Female	58%
Male	42%

Why did you participate in UR?	Percentage*
Gain practical experiences	79%
Enhance resume	77%
Sounded interesting	72%
Prepared me for grad school or future career	71%
It was a paid position	58%
Faculty member approached me about UR	45%

**Students could select multiple options.*

Most Important Benefit of doing UR	Percentage
Gain experience for grad school or career	52%
Develop a mentoring relationship with a faculty member	14%
Gain practical experiences	12%
Develop skills for my academic discipline	8%
Build my resume	8%
Be paid for helping with research	6%
Total	100%

How did you learn about UR?	Percentage*
Faculty member	70%
Academic advisor	17%
In class	16%
Saw it advertised	10%
Word of mouth/friends	7%
Another staff member	6%
Venture	3%

**Students could select multiple options.*

Part II: What did their UR experiences look like?

The kinds of work completed and the structure of the UR experiences varied across the 14 colleges. We tried to obtain a picture of the compensation, the amount of time students spent on their UR each week, and how often students interacted with their faculty mentors.

Compensation

Approximately 78% of the students received a stipend or salary for their UR experience, while 7% received academic credit, 6% earned a salary and credit, and 9% volunteered. While monetary support was not the motivating factor for participating in a UR experience, it certainly helped. A majority of the colleges receiving UR support from the Provost used it to fund stipends. For students, UR was as an opportunity to gain valuable experience while getting paid.

Time on task

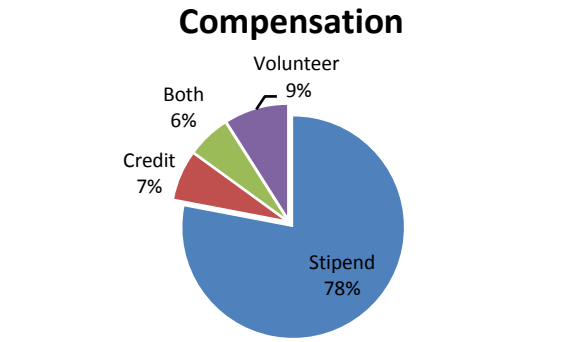
At the time of the survey, 52% of students had only been participating in their UR experience for one semester, while another 28% indicated that they had being doing UR for 2 semesters. Only 19% had been working on a project for 3 or more semesters. The amount of time students spent each week on the project varied greatly. During the academic year, 31% dedicated 5 or less hours to UR on a weekly basis, while half (51%) spent 6-10 hours/week, and 14% spent 11-15 hours/week. Approximately 36% of students also worked on their projects during the summer. The summer provided more time to work as 64% worked 21 or more hours/week on their UR projects.

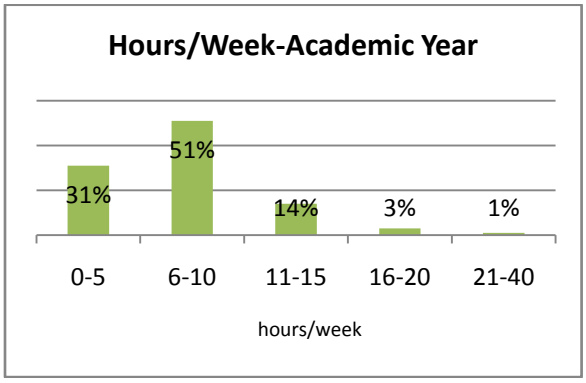
Mentoring and Training

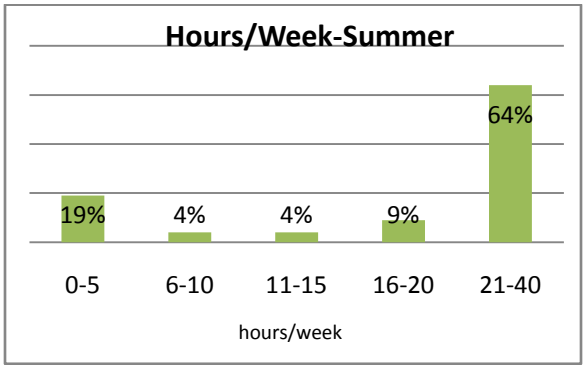
A good mentoring relationship is a critical component to the UR experience. The students reported that 77% were mentored by faculty, while 17% were mentored by a graduate or post-doctoral student. The amount of time faculty spent with students varied greatly. At least 67% of students indicated that they met with their mentors at least 3 or more times each month. In the open ended questions (see Section VI), students repeatedly remarked on how much they gained and valued these faculty relationships.

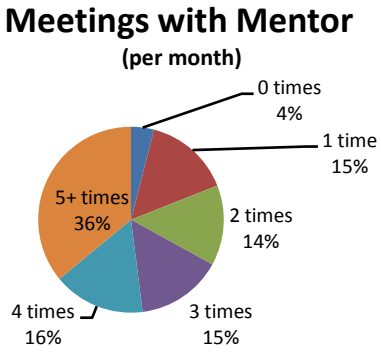
Student Satisfaction

Students were extremely satisfied with their UR experiences, as 93% felt that it met or exceeded their expectations, and 71% wanted to seek another UR experience after completing their current UR opportunity.









Part III: Impact of UR on Students' Experiences

By participating in a UR opportunity, students improved their academic abilities and developed important life and career skills. UR experiences also positively impacted how they perceived their MSU experience.

ACADEMIC ABILITIES

Students were surveyed on how their undergraduate research experiences contributed to their knowledge, abilities, or skills in several areas:

Strong Impact:

- 86% deepened their knowledge of their research areas
- 81% better understood the research process
- 81% increased their confidence in their research abilities
- 80% became more familiar with the literature of their field of inquiry

Medium Impact

- 73% developed skills or laboratory techniques necessary for research
- 70% learned to analyze data
- 66% learned how to interpret results

CAREER AND LIFE SKILLS

In addition to improving their academic abilities, students who participated in UR opportunities learned and refined important career and life skills.

Strong Impact

- 86% learned to work independently
- 75% learned how to overcome obstacles

Medium Impact

- 72% improved their time management skills
- 64% learned to work effectively with others
- 62% clarified career goals
- 60% developed or improved their presentation skills
- 60% understood the importance of ethical conduct
- 60% affirmed the choice of their major
- 57% indicated that their UR experience encouraged them to consider graduate school

Low Impact

- 49% developed or improved their writing skills
- 11% considered a different major

CONNECTIONS TO MSU

Classroom activities, living in the residence halls, and student organizations—these opportunities represent several spheres of activities that compose a student's total MSU experience. Undergraduate research is one of those activities that positively contributed to their experiences at MSU. It helped them to build connections with faculty and taught them how their research can have meaning beyond the walls of a classroom or laboratory.

Strong Impact

- 91% indicated that their UR opportunity positively contributed to their educational experience
- 85% had the opportunity to work closely with a faculty member
- 84% felt that UR was an important part of their MSU experience
- 76% learned how research contributed to society

Medium Impact

- 74% took what they had learned in class and applied it to a real-life setting
- 56*% met other students*

Further Discussion of Impact of UR Experiences

Gender and Class

Various statistical techniques were performed to investigate gender or class (i.e., sophomore, junior, senior) differences. There were no statistically significant differences ($p \leq .05$) between males and females for the variables that measured the impact of the UR experiences. Similarly, there were no statistically significant differences ($p \leq .05$) between classes in regard to the impact of the UR experiences. These findings indicate that students are having similar experiences, regardless of their gender or year in school.

Academic Abilities

Students who participated in an UR experience were more deeply engaged in their academics. They were provided additional opportunities to work with faculty and were given time to explore a topic in more depth. Accordingly, it was not surprising that 86% deepened their knowledge of their subject area and that 73% further developed laboratory or other research skills. Only 66% of students, however, indicated that they learned how to interpret results. Additionally, only 60% felt that this experience developed or improved their presentation skills, while only 49% developed or improved their writing skills. These lower numbers may be attributed to the short duration of the UR projects, as most students were seniors and had only been working on their projects for one semester. Essentially, these students may not be around long enough to practice the skills related to synthesizing and then disseminating the results of their work. Getting connected to UR projects earlier may help to increase students' skills and abilities in these areas.

Career Goals

Given that 71% of the participants were seniors, it was not surprising that only 11% of students considered changing their majors due to their UR experiences. However, it was slightly puzzling that only 62% felt that their participation in UR clarified their career goals and that only 60% felt that it affirmed their choice of majors. We expected this figure to be higher, since many of our undergraduate researchers have shared that gaining "hands-on" experiences have helped them to clarify what they wanted to do for their careers. Perhaps students were working in areas outside of their majors or did not perceive that their research related to future career plans. Other students may have felt that little time remained for them to make changes to their majors by their senior year.

Engagement

UR represents another way students can connect in the academic community. Many higher education experts (Boyer Report, 1998; Chickering & Gamson, 1987) have long called for increased faculty-student interaction, and UR provides this type of opportunity as 85% of participants in this study reported working closely with a faculty member. These types of engaged learning opportunities also positively affected students' perceptions of their undergraduate education. An astounding 91% indicated that their UR opportunity positively contributed to their educational experiences at MSU and 84% reported that UR was an important part of their undergraduate experiences. But education should also connect students to society at-large. Astin, Keup, and Lindholm (2002) asserted that higher education should produce students who are socially responsible and civically engaged. UR contributed toward this outcome as 76% of participants indicated that they learned how research could contribute to society.

Part IV: Presentations and Publications

Disseminating the results of one's research and understanding how it contributes to the profession are important goals for a UR experience. Students funded through this program were beginning to present and disseminate the results of their studies.

- 42% presented the results of their research
- 9% presented their results off campus
- 4% have published their research

These numbers were not surprising, given that 71% of the student researchers were seniors and had only participated in their UR project for one semester. The short duration of students' experiences may not allow them to see a project through to the dissemination of results.

While 63% of these students were aware of the annual University Undergraduate Research and Arts Forum (UURAF), only 37% participated in the event. This number is interesting, especially in light of the fact that UURAF had a 23% increase in student participation and a 31% increase in faculty mentors. Clearly other undergraduate researchers who are not receiving funding through the Provost's Office are participating in UURAF, which is good. However, we would like to increase the number of UURAF-participating students funded by the Provost's Office.

Part V: Recommendations

1. **Involve Faculty in Student Recruitment for UR**—86% of students learned about their UR opportunity from a faculty member or while in class, so faculty represent a key conduit for getting information to students. Additionally, encouragement from faculty was a powerful motivator for students to pursue a UR opportunity.

2. **Engage Students in UR Opportunities Earlier**—the national trend is to engage students in UR opportunities earlier in their academic careers. Three-quarters of students in this survey were seniors when they had their first UR experience. Engaging students earlier has three major benefits:
    a. **Longer Experiences**—many faculty mentors have indicated that it took at least one semester to train or prepare students to begin research. Since most of the students were seniors, they only had one semester to work on their projects. Beginning their UR experiences earlier would allow them to spend more time with their research.
    b. **Increased Productivity**—being in positions for a longer amount of time should make students more productive. Students could more fully participate in the projects because they would be around longer.
    c. **More Time to Appreciate the Impacts of UR**—UR experiences positively impacted students in numerous areas, but working on their research longer may increase the impact of UR as students would have more time to develop their skills and abilities (e.g., analyzing and interpreting data, writing skills). Students would also have more opportunities to present and publish their findings.

3. **Inclusiveness**—the individuals or committees who award the grants to students should continue to be conscious of creating inclusive learning environments. Although a number of programs on campus (e.g., McNair Scholars, Drew Science Enrichment Laboratory) assist with this purpose, we need to be mindful and proactive about encouraging faculty and academic staff to be inclusive.

Part VI: In their Own Words:
What Students Liked Most About Undergraduate Research

"This has been a most rewarding experience."

"I learned that self-discipline is the principle for research freedom. I learned about four different fields. I developed research skills to use in courses and other academic and professional pursuits. I learned through hands-on work outside the classroom."

1. **Students valued the opportunity to enhance their knowledge and skills as scholars, researchers, and learners.**
   - "I not only learned something that I would not have had the opportunity otherwise [to do], but it also gave me the confidence to seek out other opportunities."
   - "Being able to apply research techniques and ideas from classes in a non-class, non-credit setting has been a very positive experience. Knowing that what I have learned in class can actually be used and used for a job-related purpose is important."
   - "I learned how to critically think and overcome obstacles."

2. **Students frequently spoke of their appreciation for the relationships that they developed with faculty mentors and graduate students and the impact of these relationships on their personal, intellectual, and career development.**
   - "The respect and assistance given to me by faculty and graduate students in the department has been phenomenal. It has helped me narrow my interests and delve deeper into the knowledge base to prepare me for graduate school."
   - "Getting to know and working with faculty members has been great. It's nice to finally form a network at such a large university."

3. **Students indicated that they deepened their knowledge of their scholarly area and integrated knowledge across disciplines.**
   - "I was able to incorporate parts of my two majors and specialization in a way that my classes had not. It forced me to push each area deeper and question assumptions in each field that classes within the majors do not."
   - "The most positive aspect of my research experience was the ability to take what I learned in classes and apply it in a hands-on setting. The knowledge learned is actually understood far better when applying it."

4. **Engaging in undergraduate research resulted in students entering into and gaining an understanding and appreciation of a culture of inquiry.**
   - "I was able to gain more knowledge about the topic I researched which will help me develop my career now that I have graduated. Also of great importance was the relationship I was able to develop with the faculty member that I worked with throughout the semester."
   - "Having had the opportunity to work under a university distinguished professor whose main goal in his work is to teach young undergrads like myself to really appreciate the field and what it can do for society."

In Their Own Words:
Challenges Facing Undergraduate Researchers

Student often discussed the difficulty they faced in balancing their responsibilities as researchers with other academic and personal priorities.

- "I had a lot of things going on in addition to this, which made it extremely stressful at times. In the end I wouldn't have changed it for anything. I learned so much and will take a lot with me."
- "It was very time consuming and tedious and could be very stressful at times. As an undergrad you just don't have the hours available that grad students do, but sometimes people seem to expect you to put in as much, which is just not possible."
- "My classes got in the way. I wish that I had had more time to commit to the project."

One of the most frequently cited areas that students said would enhance the quality of their experience was increased time, interaction, and communication from their faculty mentor.

- "Communication with faculty advisor - everyone is busy. This could have been improved if a time had been established earlier for regular meetings."
- "I wish I had more communication with my mentor, although this was hard to improve because she frequently was out of the country for research talks. She is a wonderful mentor. I just wish I had more time to talk with her."

Undergraduate scholars viewed the research process itself as quite challenging, and at times tedious, but viewed their experience as nearly always worthwhile.

- "It [research] was tedious. I don't think that could be changed; it was the nature of the work."
- "The least positive aspect of the current research experience is messing up protocols or finding out that I should have done something differently. At the time it is negative, but it helps me learn and lessens my chances of making mistakes in the future. I believe some failure is necessary to notice and appreciate the rewards of success."
- "Everything either takes longer than it should or simply fails, and the resulting scolding makes me sad. Of course, these problems are completely my fault, which doesn't help."
- "I had to re-write the paper about 15 times. What made it that way was that I didn't really know how to write an academic paper before this year, and in all honestly I wouldn't have changed that because it taught me quite a bit."

Students believed that they would have benefitted from increased planning and organization—both from them and their faculty mentor—of their research project.

- "Lack of a solid plan that outlined which books and articles I wanted to read -though I had one, I often got sidetracked because something I read or ran across made me go off on a tangent."
- "They needed to be more organized in the beginning and make expectations more clear."
- "The project was unclear from the beginning, and did not come to any particular conclusions of worth. I feel my faculty mentor did not explain the concept of a research project well, and did not have specific outcomes in mind when beginning."

References

Astin, A. W., Keup, J. R., & Lindholm, J.A. (2002). A decade of changes in undergraduate education: A national study of system "transformation." *The Review of Higher Education, 25*(2), 141-162.

Boyer Commission on Educating Undergraduates in the Research University. (1998) *Reinventing undergraduate education: A blueprint for American's research universities.* Stony Brook, NY: Carnegie Foundation for the Advancement of Teaching.

Chickering, A. W., & Gamson, Z. F. (1987, June). Seven principles for good practice in undergraduate education. *Windspread Journal, 1987*(9) (Special Edition), 2.

Kinkead, J. (2003). Learning through inquiry: An overview of undergraduate research. In J. Kinkead (Ed.), *Valuing and Supporting Undergraduate Research,* (pp. 5-17). San Francisco: Jossey-Bass.