

## **KU BEARS Final Report – Summer 2017**

There were 21 faculty and 26 students involved in the second year of KU BEARS. All the faculty stated that they would involve students again in research and all of the students stated that they would participate in research again if provided the opportunity.

Below are questions and summaries from the final reports submitted.

### **Questions that the Student Answered**

**How has this experience contributed to your undergraduate education and your life goals?**

Main points students discussed in the reports:

- Developed research skills
- Greater appreciation of research
- Gained experienced that could not be obtained in the classroom
- Greater understanding of high-level equipment
- Made connections between lecture and its application
- Better prepared for graduate studies
- Confidence and motivation to conduct research
- Decided to continue research after graduation

Quotes from students:

“My ultimate goal in life is to teach chemistry, and this experience will allow me to present real-life applications of many of the concepts that my future students will be learning.”

“Not only was this experience rewarding, it is also something I can put on my resume, and will make me a more appealing candidate for internships and graduate programs.”

“The KU Bears Program was also a huge help because it provided me with time to write a research paper, which I presented at a conference. I ended up winning the Undergraduate Paper Competition with the paper.”

“This project gave me the opportunity to see how the scientific method is carried out in an actual laboratory setting, and how scientists apply it every day. It also gave me the opportunity to see that research is something that I could see myself doing in my future career.”

“This project gave me hands on experience that I can market to employers.”

“I have become less intimidated and more excited to find topics to research and continue the summer’s research.”

“This experience has helped transform me into a more mature student, better preparing me for work in the field once I graduate.”

“This experience has contributed a lot to my undergraduate experience education, helping me realize how the research world works and how to learn and apply a variety of different technique towards a specific research goal. It has also had an important impact in my life goals because now I know better what I would like to after graduation.”

**What experiences will you take from this summer's research that will impact your future in education, research, or professional career?**

Main points students discussed in the reports:

- Be prepared
- How to be a better writer
- Presenting at a national conference
- Note taking skills
- Flexibility
- Professional connections
- Critical thinking
- Problem solving
- Knowledge and experience to continue to conduct research
- Collecting, analyzing and interpreting data
- Laboratory techniques
- Research techniques and methods
- Survey development and implementation
- Teamwork

Quotes from students:

“This research experience also gave me an opportunity to see what it would be like to work in my field. I loved the work I did this summer and it is something I can see myself doing for the rest of my life and actually enjoy doing it.”

“...the skills I’ve accumulated through this personalized, hands-on experience will prove to be a valuable asset as I continue with my higher education. Compared to my peers, I will be at an advantage...”

“It really put me on the path that I want to be on and made me a better researcher and writer.”

“This summer’s research made me realize that I want to continue to do research and pursue further education. I will use field, interpersonal, analysis, and writing skills I have learned to aid me in getting accepted into a graduate school so I can achieve my professional career ambitions.”

“From this research experience, I have learned that working with a team is much better than trying to conduct research all on your own. I have found that I was able to improve my group skills and work with everybody to complete some really good research work. By working with a team, I also think I have become better at communicating, which has made me feel more comfortable presenting information to others if need be.”

**Has the research experience met your expectations? Why or why not?**

- Students indicated that the experience exceeded expectations

Quotes from students:

“This research experience has more than surpassed my expectations. I think that for the first time, I have actually gotten a feel for what real scientists do.”

“In all honesty, this research experience has exceeded my expectations. Being able to work in an individualized setting with my professor where research was my only concern was a priceless opportunity.”

“This research experience exceeded my expectations. I would recommend the KU BEARS summer research program to any student remotely interested in research here at Kutztown.”

“This research experience has met and exceeded my expectations in many ways. It has opened me up to different ways of thinking and problem solving that will help me academically and professionally.”

“It exceeded my expectations, I never thought that I would have had as much fun as I did.”

“My experience with this research has surpassed my expectations. This research experience has shown me how massively important research is to my education and future career.”

“This experience has met and in some ways exceeded my expectations. I knew prior to my acceptance to this program that I would gain experience in a multitude of areas, but I did not know the amount that I would truly gain.”

“This experience has surpassed my expectations because I did not realize that I would learn so many different skills while learning about new topics. I truly enjoyed working because there was something new to learn every day.”

**Would you participate in research again if given the opportunity? Why or Why not? What skills do you think you developed or strengthened through the research experience?**

- All students indicated that they would participate again if given the opportunity

Skills developed or strengthened:

- Critical thinking
- Problem solving
- Time management
- Responsibility
- Organization
- Attention to detail
- Information literacy
- Coding data
- Computer programming
- Leadership
- Formulating a research question to answer
- Communication
- Proposal writing for a conference presentation
- Presentation skills
- Research techniques specific to the field
- Techniques and procedures for equipment
- Reading literature and extracting information needed

Quotes from students:

“Overall, I learned that research will not always go as expected – as a result, it is important to evaluate the procedure, identify each step, determine a variable that may have gone awry, and to try, try, try again.”

“If provided the opportunity again I would without a doubt participate in more research in this field. My experience with this project has been very eye opening to me in ways I did not imagine and overall it was a great opportunity.”

“I believe that I have definitely improved my ability to communicate scientific information through writing, and my time management has seen an improvement as a result of this experience.”

“I am continuing research for the school year because I enjoyed the experience and want to get more results for future experiments.”

“During this research, I was able to develop more of a sense of security in myself when making decisions and forming conclusions. I feel that I gained these problem-solving skills that are very important for my academic journey and future career.”

“From my experience this summer, I gained analytical, communicative and leadership skills in applying different field methods. I would definitely participate in another KU BEARS grant if given the opportunity.”

“I would. Participating in this research gave me a lot of experience that I could not have gotten anywhere else.”

“If I had the opportunity, I would definitely repeat this experience because I think it is the foundation of a successful career based on the idea that the more experience, the more complete your education will become.”

### **Questions that the Faculty Member Answered**

**What skills did the student learn, what skills did they obtain, and can the student demonstrate those skills?**

- Students learned more about the research process; skills and techniques needed for research in their selected fields of study; how to use equipment; and programming.

- Increasing ability and confidence in reading literature
- Obtaining data, analyzing data and formulating results and conclusions
- Data organizing and archiving
- Problem solving
- Scientific writing
- Experimental design
- Critical thinking
- Critical reading
- Organization
- Leadership
- Decision making
- Project management
- Communication skills

Quotes from faculty:

“He has truly become an excellent researcher, able to work independently as well as most graduate students pursuing their Ph.D. research. Furthermore, he is currently writing a paper with me based upon this research for submission to one of the best international peer-reviewed journals.”

“The KU Bears Grant was instrumental in launching the student’s early scholarly career at Kutztown University.”

“Prior to joining my lab, the student had no experience working in a laboratory setting and conducting research. He undertook various responsibilities while working with me on this project, which provided him with a better understanding of the research process.”

“The student mastered the new techniques readily and quickly became very independent. As a result, we mostly worked as collaborators, conferring on his progress and results as I worked in the same lab on a related project.”

“The KU BEARS summer grant experience helped the students develop critical thinking skills and made a great scholastic progress, and it was a very rewarding experience as a teacher-scholar.”

“The students learned critical reading skills, APA style citation rules, and organizational skills when working with a larger amount of research coupled with communication skills- both orally and in writing.”

“It’s one thing to learn the skills in class, but it’s another thing to apply them in a real-life project such as the KU BEARS project.”

“The student has gained experience with troubleshooting research plans on the fly and learned to work out solutions to challenges on her own. I have seen her confidence in her skills and abilities increase, a process that is ongoing.”

“It was evident that the student also developed critical thinking and problem-solving skills needed for the progress of his research project.”

**Would you involve an undergraduate student again in your research? Why or Why not?**

- All faculty indicated that they would involve students again in research.

Quotes from faculty:

“I am a strong believer in almost everything there is no substitute for experience. Undergraduate research in an invaluable way for students to gain experience in the application of scientific principles in a way that is nearly impossible to replicate in the classroom.”

“I would readily involve an undergraduate student in research again. This was a valuable learning experience for both me and the student. I have learned from this experience, and look forward to future research collaboration with undergraduate students.”

“For students that have an interest in graduate school or field work, being involved in research is an invaluable experience. I will continue to involve students in research because I see that those that do rise to the challenge succeed in realizing their personal goals after they leave KU.”

“We are very close to having enough results to submit a manuscript for publication. This achievement would not have been possible without the KU BEARS grant. The grant enabled the student to devote large blocks of time to working on the project. Without the grant, he would have had to work at a nonscience-related job during the summer to earn the money that he needs to pay for school. The grant thus had a huge impact on the student.”

“Absolutely! I strongly believe this research prepared them to be future leaders in the field.”

“Undergraduate research is one of the most productive ways of educating students and fostering their interest in areas of science.”

“In part I see this as an extension of my teaching responsibilities, but more importantly I think that students gain an array of useful skills and experiences that will help them to be successful in whatever career they choose once they graduate.”

“Yes. For me including students serves three roles: 1) it trains the future cohort of researchers by giving them formal training in basic research design and methodology; 2) it connects students with the larger scientific community; and 3) it benefits the quality of my research.”