At the University of Saint Francis (USF) in Indiana, USA, a group of undergraduate science students are benefiting from a unique programme that takes its inspiration from an early scientist – Roger Bacon. Students in the University’s Roger Bacon Scholars programme are given opportunities to take the science they learn throughout their academic career and apply it to a wide range of activities, including: their industry-inspired research projects, teaching in schools, presenting at conferences, and talking to companies about how their research can be used in the real world.

Initiated in 2014, USF has supported 16 Roger Bacon Scholars in the programme. Students hoping to study an undergraduate STEM subject (such as biology, chemistry, science and entrepreneurship, environmental science and mathematics) at the University are given opportunities to take the science they learn throughout their academic career and apply it to a wide range of activities, including: their own industry-inspired research projects, teaching in schools, presenting at conferences, and talking to companies about how their research can be used in the real world.

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WHAT HAPPENS IN THE SCHOLARS PROGRAMME?

The transition from school to university can be a challenge for any student. However, the students accepted in the Roger Bacon Scholars programme receive lots of additional support. They’re mentored and tutored by professors and students at the university, and by people working in companies that are relevant to the subject of their research. They attend networking sessions and luncheons, run by USF’s Career Services Office, that focus on developing the communication skills required to be successful in scientific internships and careers. The students also visit industry sites to create relationships with potential employers.

Unlike traditional undergraduate degree programmes, the students aren’t just given information in a series of lectures that they’re expected to learn; they have chances to apply the science they’re taught both inside and outside the classroom to understand how it impacts the real world. In an environmental chemistry course, for example, Roger Bacon Scholar Tyler Lengerich worked with the Department of Health to collect...

WHO IS ROGER BACON?

- Roger Bacon lived from around 1214 to 1292 (his place and date of birth are unknown), and studied and taught at Oxford University in England
- He was an English philosopher and scientist – and was also believed to be a Franciscan Friar
- His research led to the development of glasses to improve eyesight
- He was imprisoned for having an interest in magic
- He believed that there is more to science than simply arguing about scientific concepts; science had to be experimented with and experienced. This idea forms the basis of the University of Saint Francis’ Scholars programme.

*Source: BBC History*
Roger Bacon capstone expectations, the scholars create an outreach project for an elementary, middle or high school class. The aim of this outreach project is to teach an important aspect of their scientific research to schoolchildren.

This unique approach helps the scholars develop their communication skills, gain experience working with a broad range of individuals or groups, and foster critical thinking and creativity. What’s more, these students are inspiring the next generation of scientists by sharing their enthusiasm for and knowledge in STEM subjects – skills that are helping Roger Bacon scholars maximise their employability.

Indeed, the Roger Bacon Scholars programme prepares graduates for a wide variety of career opportunities, enabling them to use their science degree to really make a difference in the world.

Kaitelyn has a BS in biology from USF with a minor in environmental sciences. She currently works for a local environmental waste management facility. When Kaitelyn was growing up, she was always fascinated by science, but it wasn’t until she took part in biomedical project-based learning classes in high school that her interest in biology was sparked.

Mentors: Dr Andrea Geyer and Mr Warren Pryor

Research Project: Studying the wider effects of pesticides on animals in the environment, beyond the insects that are pests

Outreach: Introducing sea anemones to kindergarten students to create an understanding of how they are affected by pollution

Read Kaitelyn’s Q&A on the next page.

Meet Two Roger Bacon Scholars

Kaitelyn Vachon and Peter Mitchell talk to us about the Roger Bacon Scholars Programme and how it has benefited them and the young people they have taught.
**WHAT IS CLOTHIANIDIN AND WHY ARE YOU RESEARCHING IT?**

Clothianidin is a very effective chemical that kills insects that eat the plants that farmers are trying to grow. It causes the bugs to become paralysed and then die. Unfortunately, it’s not only the unwanted insects that come into contact with such chemicals; there’s increasing concern that they’re affecting populations of bees, which are important for pollinating plants and producing honey.

**HOW CAN STUDYING SEA ANEMONES HELP US UNDERSTAND WHAT’S HAPPENING TO BEES?**

Sea anemones are easy to raise in the quantities we need for our research, and they aren’t mobile. This means that their central nervous system, which controls how they move, is simpler to study. Their system is also more simplistic than that of bees, allowing us to study how pesticides influence movement a lot easier. Then, we can use this initial model – sea anemones – to begin to understand how the more complex, endangered bee species may be influenced by pesticides. While we’re mainly trying to investigate the effects that pesticides are having on bee populations, the research is also meaningful for sea anemones because they can be influenced by pesticide exposure when chemicals are washed into the sea.

**WHAT HAVE BEEN YOUR MAIN RESULTS SO FAR?**

Our research has found that as levels of pesticide increase, the sea anemones move their tentacles more and more slowly until they become paralysed and cannot move them at all. If you watch the animals closely, you can see their bodies become still almost immediately after they are exposed to the pesticide.

I was hoping to be able to identify a ‘safe’ level of pesticide, but even using the tiniest amount of chemical (one drop diluted 3 billion times) still caused the sea anemones to display temporary paralysis. Further experiments will be needed to find the smallest amount of pesticide that causes paralysis.

**THE ROGER BACON SCHOLARS PROGRAMME ENCOURAGES YOU TO PRESENT YOUR WORK AT CONFERENCES, COMMUNITY EVENTS AND IN SCHOOLS. HOW IMPORTANT IS THIS OUTREACH?**

The outreach aspect of the research is the part that I get most excited about. There are hundreds of thousands of research projects going on around the world, but what’s the point of all that effort if no one can understand the importance? We unfortunately live in a society where science is still considered ‘scary’ and, because of that, I wanted to make sure I was able to present my research in a friendly way on several platforms.

**YOU INTRODUCED YOUR RESEARCH ON SEA ANEMONES TO KINDERGARTEN CHILDREN. WHAT DO YOU HOPE THEY GOT OUT OF THIS EXPERIENCE?**

My goal with the children was for them to understand what sea anemones were and how they interact with the environment. I wanted to take concepts that they understood, such as recycling, and link it to pollution to give them a ‘mascot’ to cheer for in nature. Not only did we talk about sea anemones, but the kids also had the opportunity to feed them and see how the animals protect themselves.

"The kindergarten students enjoyed the sea anemone experience. The hands-on activities were age appropriate and the presenter was very well prepared. This was a wonderful opportunity for my young students to learn about something that would not normally be part of our curriculum."

Virginia Simpson, kindergarten teacher at Queen of Angels Catholic PreSchool
When Peter Mitchell spoke about his college experience in pursuit of career possibilities, the high school students also began to envision possibilities for their own future. When young people are exposed to aspiring career professionals that are not much older than them, it is empowering in a sense that encourages self-actualisation.

Kelsey Pierce and Christina Lapham, teachers at DeKalb High School