As an undergraduate, a student is told what classes are best to take and what are the best things to do before graduation. More classes in calculus and statistics are best, and it never hurts to take an extra physics or chemistry course. Of course, one must also participate in at least one independent project or internship to complete their education. The reason for the extra classes is clear, but why is there such an emphasis on the independent experience?

Obviously, any independent project or internship at the undergraduate level has profound effects on a person’s resume or graduate school application. With more and more students continuing their education to the graduate level or beyond, it is no longer sufficient to simply obtain a bachelor’s degree. Therefore, entrance into graduate school becomes more and more competitive as each year passes. It is those students that show the drive and the ability to work and think independently that get the coveted spots at the graduate school of their choice as well as the research funding and assistantships to help finance it all. Independent research of any kind is a way to show a graduate school, or future employer, that you have the qualities that they want. Yet, just making yourself look good on paper is not the point of engaging in independent projects and internships.

Upon entering college, the typical undergraduate freshman gives very little to no thought to life after graduation. In many cases, a person may not even have a clue as to what to major in. The undecided major takes a variety of classes to perhaps narrow down what subject they like the most. For a few, that subject is geology. The next step is to dive into the classes required to complete the major. In the case of geology, that includes classes such as mineralogy, petrology, structural geology, sedimentology, and field studies. Suddenly the number of options increases exponentially. Do you want to be a seismologist? Or perhaps a hydrologist? Or a petrologist? Or maybe even a paleontologist? A decision may not seem so easy at this point. Yet, those are not all of the choices to be made. Do you want to work for the government? Do you want to become an educator? Which level would you want to teach? Do you want to work in the private sector and, if so, what type of work would you want to do? Do you want to have a career in research? What area of research do you want to study? Will you need to get your PhD? …..and the list of options continues. All of this can be overwhelming for an inexperienced undergraduate. The fear of making the wrong decision looms in the back any student’s mind.

This is when the true purpose of internships and independent projects comes in. Perhaps a geology student feels that a career of research might be the way to go. The best way to find out is to participate in a research internship, such as one of the National Science Foundation’s Research Experiences for Undergraduates (REU). By spending a summer working on a research project, a student receives the first hand experience of what it is like to do research. For
carry more water and lessen the chances of local flooding. However, channelization ultimately increases the velocity of a river by increasing the area and volume of water and by decreasing the slowing frictional effects of a rough and shallow bed. The burden of floodwaters downstream is greatly increased by allowing the river to gather power over the course of the straightened channel. As a result, channelization passes the flooding problem along to downstream communities. As these examples illustrate, technology that seemed ideal at the outset has shown that human attempts to overcome the power of Nature are, at best, temporary.

When structures designed to confine excessive stream discharge fail, the results are often devastating, both directly and indirectly. For example, the 1993 Midwest Flood resulted in 50 deaths and $15 billion in damages (Larsen, 1996). The Mississippi river basin is studded with numerous dams and levees built primarily for flood control by the Corps of Engineers. Despite sophisticated soil moisture and precipitation models used by the National Weather Service and hydrologists at the River Forecast Centers, the Great Flood of 1993 was one of the worst natural disasters ever recorded in the history of the United States. It is an extreme example of what can happen during a flood, and it illustrates that the best efforts of engineers and scientists are not sufficient to control all natural flood events.

The cause of the Great Flood of 1993 is simple – during June through August of that year, record rainfall amounts over a record duration of time saturated the soil and overtopped stream banks throughout the upper Mississippi river basin, resulting in massive amounts of water that overwhelmed the entire river system. The resultant flooding lasted over 200 days and affected as many as 150 rivers and tributaries (Larsen, 1996). Damages included the long-term flooding of water and power plants, massive sewer backup, the shutdown of major highways, airports, railways, and barge traffic, and the destruction of at least 10,000 homes (KDSK, 1993).

Though an extreme example, the Great Flood of 1993 provided a wake-up call for many cities in the region. In his presentation before the IAHS Conference in 1996, Lee W. Larson, the Chief of the Hydrologic Research Laboratory at NOAA, summarized key data that was obtained during the Great Flood of 1993: the unprecedented number and heights of the record crests of the Mississippi river at St. Louis, the lengthly duration of flooding at various cities along the Missouri and Mississippi Rivers, and the levee failure rates broken down between Federal levees (17.6% failed) and non-Federal (77.5% failed). Despite the knowledge that was gained from this event, human nature cannot be fully convinced that change is necessary to avoid a repeat of disaster. Even during the height of the flooding, victims appeared on news reports bemusedly stating that they had to live somewhere and would return to a flood-prone location (KDSK, Inc., 1993).

Mitigation

Individuals, and in some instances entire municipalities, often refuse to give up the fight against the floodwaters and simply move away. On a national level, flood damage costs are close to $5 billion annually (Kusler, 2004). With the partial success of the dam system initiative put in place by the Federal Government and the Corps of Engineers and the persistence of cities and communities in locating and remaining on floodplains, someone must pay this annual cost of damages. With the less-than-perfect results of the best technology that money could buy as far as physical controls to reduce flood loss, the next stopgap meas-

THE IMPORTANCE OF THE INDEPENDENT EXPERIENCE (continued from page 7)

some students, the data collection process can be tedious. For others, the constant paper and proposal writing is laborious. If a student were to spend a whole summer working in misery, then it is obvious which career is not for them. On the other hand, perhaps a student is instead interested in the private sector where they can practically apply the principles they have learned the in classroom. In this case, working for a local consulting company for a summer would provide valuable insight. Perhaps that student does not work well with the customers or perhaps they decide that they want something more academic than the private sector can provide. It is better to learn these things now than further down the road when it may be too late to make a career change.

Internships can also provide opportunities for a student to gain experience with equipment that they may otherwise never receive at their home institution. Not every school can afford a scanning electron microscope, for example, and understanding how to use such a tool can be invaluable. Particularly in academics, the use of expensive sophisticated techniques and equipment is commonplace. Skills developed during an internship can make the use of such equipment or techniques at a later time, such as in graduate school, easier and less stressful. Not only can a student learn how to operate equipment, but they can also develop an appreciation for what that tool can tell the researcher or private industry worker. No matter how many times you read or hear in lecture that an instrument is vital to the study of a certain topic, unless you use that instrument, you may never fully understand why that is so. With that appreciation, a student can better comprehend the work done by colleagues and the studies reported on in scientific papers.

Another important benefit of independent experiences, such as internships, can be the personal connections a student can make. In some cases, it is simply a foot in the door with a job offer as a possible result. It is a chance to show that you have what it takes to comprehend the task at hand and complete the job in a professional and timely manner. In the professional world, sometimes a good recommendation can mean more than all the experience that your resume has to show. Temporary superiors can, therefore, serve as reliable sources of recommendations for job and graduate school applications.

Independent experiences therefore are a vital part to any undergraduate’s curriculum. They can help fine tune a student’s ideas about the future and make decisions easier to make. A good internship experience can affirm a career choice and allay fears. It can turn interest in a subject into a real professional direction. A bad experience can turn a student’s ideas about the future and allay fears. It can turn interest in a subject into a real professional direction. A bad experience can turn interest in a subject into a real professional direction. A bad experience can turn interest in a subject into a real professional direction.

