GIS at a Liberal Arts College: Community Inspired Projects

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Abstract

College-level education provides students with a background in the theory, applications, and potential uses of GIS. Too often students are given hypothetical projects to work on with data that does not relate to their local area. Once the class is over, many students do not follow up with projects in their local area using GIS. The GIS program at Washington College, a small liberal arts college on the Eastern Shore of Maryland, strives to change that. The GIS Laboratory has developed an internship program for students who have completed the introductory GIS course and are well-versed in using ESRI's ArcGIS software. The students work on projects for various departments within the college as well as for community groups including local governments, nonprofit organizations, and for-profit companies. The real-world experience provides students with a meaningful learning opportunity.

Introduction

Washington College is a private liberal arts college located in the Chesapeake Bay region on the Eastern Shore of Maryland. Founded in 1782, Washington College is the tenth oldest college in the nation and was named after George Washington who served on its first board of governors. Home to 1,400 students and twenty-six majors, Washington College is a top-tier private liberal arts college. The size of Washington College presents students with a rare opportunity to enjoy a close-knit, community atmosphere while its academic diversity enables students to choose from a wide variety of pursuits, both inside and outside the classroom. Washington College offers a distinctive creative writing program, one of the nation's few undergraduate behavioral neuroscience programs, and an environmental studies major, while the beautiful Chesapeake region serves as an "outdoor classroom" for both the arts and sciences. The College's commitment to the liberal arts and sciences encourages students to explore many areas of interest and to develop the capacity to reason, to appreciate literature and the arts, and to make the connection between courses of study and their implications in society.

Washington College is home to three centers of excellence: C.V. Star Center for the Study of the American Experience, the Rose O'Neill Literary House, and the Center for the Environment and Society. The Center for the Environment and Society brings a significant new perspective to the study of natural and human-influenced systems, their mutual interdependence, and their reciprocal development past, present, and future. By using the Chesapeake Bay region as its prime example and natural laboratory, the Center is a catalyst for interpreting and sharing research information, provides a neutral academic forum for addressing difficult policy issues, and promotes interdisciplinary approaches to problem-solving. The Center encourages and supports the active involvement of Washington College students from all departmental majors.

Public outreach is a significant feature of the Center for the Environment and Society. The Center collaborates with other institutions, organizations, and centers to offer students first-hand experiences through research and service internships in the Chesapeake Bay region and beyond. Students are involved in developing special workshops for teachers and training programs for public officials on accessing, understanding, and applying the increasing wealth of environmental information made available through technology-based resources such as remote sensing, the Internet, and geographic information systems. Given Washington College's strategic location in the heart of Maryland's most productive and most threatened farmland, the Center has become a major information resource for the region's agricultural and land preservation enterprises. The Center for Environment and Society strives to give Washington College students the opportunity to understand fully the relationship between the human and natural environments and provide them with the technical knowledge, practical experience, and aesthetic perspective needed to advance that relationship for the benefit of future generations.

Washington College's Transdisciplinary Geographic Information System Program (Trans-GIS), funded in part by the Andrew W. Mellon Foundation, has been underway since January 2004. The goals of the TransGIS project are to establish a GIS program that can be used as a national model in innovative college education. A GIS program was set up at the college, including a GIS Laboratory, a full-time GIS Coordinator, and a

teaching classroom. The classroom and laboratory are equipped with state of the art equipment for use by students in the GIS program. The GIS program now offers three classes for undergraduates: Introduction to GIS, Intermediate GIS, and a GIS Internship. Additionally, GIS has been incorporated into existing courses with over twenty faculty members utilizing the GIS resources for their classes and research. The Alumni office, Development office, Office of Information Technology, the Library, and Buildings and Grounds department have made GIS an integral part of their operations.

Students from a variety of disciplines have been attracted to GIS. The courses are cross-listed under Environmental Studies and Anthropology. The Introduction to GIS course familiarizes students with geography and what GIS is. This course culminates with groups the students creating a map of campus using Global Positioning Systems and architects' drawings of campus. These final projects gather data that is used in the overall campus map, utilized by the Office of Information Technology and Buildings and Grounds department for their work. Each group of students selects a theme for their map such as handicap access to campus, a walking tour of campus for parents, a "green" map of campus, a map of the underground infrastructure, and a map showing the limitations of parking for students on campus. The "green" map of campus and the parking map were presented to administrators at the college.

The Intermediate GIS course continues from where the introductory course left off. This course again uses a real-world situation to facilitate student education. Students are required to complete a final project that looks at visioning opportunities for the campus and the town. Students are asked to read the comprehensive plan for the town and the college and identify commonalities and goals for the future. The students then created their vision of Chestertown for the future and created maps and sketches to support and present their scenarios. These projects have been shared with the town commissioners as possibilities and have been used in public presentations relating to a Sea Grant Coastal Communities initiative project.

One of the most beneficial aspects of the Trans-GIS program is the establishment of an internship program. After completing the introductory course, students may apply for an internship in the GIS laboratory. The first students worked on their internships during the summer of 2005. GIS Interns work on projects for the college and for the local community. GIS resources are rare on the Eastern Shore, so many of the interns work on projects for non-profit groups, local governments, and community organizations. The students may take the internship for credit, for pay, or both. A total of nineteen internships have been completed since the Trans-GIS program began.

The existing research into education and learning styles suggests that active learning and learning where students can work with real-world problems are beneficial (Fink 2003). GIS provides an excellent link from theories in education to real world problems. Using GIS across many disciplines can create unique and significant learning experiences for students.

Projects

A major focus of the Trans-GIS program is to incorporate GIS into existing courses at Washington College. Numerous faculty members from environmental studies, business, history, sociology, anthropology, economics, physics, political science, international studies, and American studies have incorporated GIS into their courses, whether it is a presentation on GIS for the students or specific assignments. Dr. Christine Wade of the Political Science department used GIS and the web in her course, the Politics of Development. Dr. Wade assigned her students a country at the beginning of the semester. The students were required to complete seven assignments where they looked for data pertaining to their country. These assignments were then sent to the GIS laboratory where GIS interns created maps and put them on the web. Dr. Wade then used the maps of the world in her class to look at overall patterns in the data[1]. The students then saw how their country fit in to the larger whole. Students were excited to see their data appear in map form and the GIS assignments are going to be repeated again next semester.

Management Information Science, a popular business course at Washington College used hands-on GIS exercises to familiarize students with GIS and with how GIS can be used in business. The students explored data about the local community and identified what businesses could be located in the town. The GIS interns developed a two-part assignment for future classes, with help from Professor Susan Vowels that allows students to identify a national company and map the locations of all of their stores. Students can then look at the stores with the highest sales and determine why this might be. Students can also witness the expansion of a company across the United States through maps.

GIS was introduced into a Natural Resources Economics class taught by Dr. Bob Dawson. Dr. Dawson required the students to read a paper by Leggett and Bockstael (2000) on hedonic modeling and GIS to evaluate the impact of water quality on housing sales. To help the students better understand the paper, they were stepped through the process from start to finish. They were then shown how to replicate the study at a much simpler level for the local area. Students in the Advanced Natural Resources Economics course then used GIS for a project that looked at the impact of chicken farms on housing prices in the local area.

Dr. Sherbondy's Doing Anthropology Course was also introduced to using GIS through in-class presentation and examples. In this case, the Salem Witch Trials were used as the focus. Students used pre-prepared maps to look for geographic patterns in the accusers, accused, and defenders, as suggested by Ray (2002). GIS was also utilized in the Sustainable Community Development Course taught by Dr. Wayne Bell and Dr. Phil Favero. Throughout the course students were exposed to using maps to ask 'what if' questions. Students had the opportunity to use GIS to explore the impacts of growth on the Eastern Shore of Maryland.

The GIS program has been used by numerous faculty members in their courses and also by several departments on campus. GIS students and interns are creating a map of the

campus, complete with the major features, such as buildings and roads, but also including the campus infrastructure, such as water and sewer lines and underground cables. Students have also begun mapping the Washington College Arboretum, home to hundreds of trees, many with historic value. Students use Trimble's GeoXT back pack GPS unit to gather points and then use ESRI's ArcMap program to create user friendly maps. These maps are created in hard copy and digital form for use by the various departments.

The Development Office is using GIS to put their Alumni information on the web. The Alumni Finder[2] allows people to view the distribution of Washington College Alumni across the United States. Initially presented with a map of the US, people can click on a state and get a detailed map. GIS Interns obtained information from the alumni office and created these maps based on zip codes. GIS interns also assisted with Staff Development Day, sponsored by the Human Resources Department. GIS interns created maps for a scavenger hunt and a poker walk. These activities helped to make the day a success for the Washington College Community.

GIS interns are also involved with many community-based projects. The GIS program at Washington College has been instrumental in assisting the Stories of the Chesapeake Heritage Area[3] attain state certification. The GIS laboratory created numerous maps detailing the locations of natural, cultural, and historical resources in Kent, Queen Anne, Talbot, and Caroline counties. Once these resources were mapped, the heritage area was delineated and presented for state certification. Numerous projects have resulted from this initial partnership. Stories of the Chesapeake Heritage Area assessed "favorite views" in selected landscapes of Caroline and Kent Counties as a follow-up to the comprehensive scenic and cultural landscape assessment completed on four counties. This "favorite views" project used volunteers to take photographs of their favorite areas in two counties. The volunteers were asked to record on a map where they were standing when they took the photographs. GIS interns then compiled all of the photos and hyperlinked the photos to their locations using ArcGIS 9. Viewsheds were calculated and statistical analysis was then conducted on the data. The results were presented to the

public and to administrators for the two counties. Recently, Stories of the Chesapeake Heritage Area created a multi-page brochure for tourism that utilized two maps crated by GIS interns. The centerfold of the brochure is a map showing the tourist resources within the heritage area.

The GIS program has also worked with the Upper Shore Regional Council (USRC) on numerous projects. The Council is a regional planning and development agency for Cecil, Kent and Queen Anne's counties. It exists to foster the physical, economic and social development of the region. Plans and projects are initiated for the development of the area's human and economic resources[4]. GIS interns have worked on two major projects for the USRC. The first project was to create a map for the Upper Shore Harvest Directory, a brochure that acts as a guide to local area produce, plant, and livestock farms. A Washington College student who was interning with the USRC identified all of the farms that were interested in being in the brochure and then passed the list to the GIS Interns. The Interns created the map for print and web use[5]. This map has been distributed throughout the Eastern Shore.

GIS Interns also worked on the USRC Infrastructure project for the Economic Development Offices of the three counties. This project is designed to provide the economic development offices with all the information they would need to present to a business or industry who is interested in locating Cecil, Kent, or Queen Anne’s counties. The GIS interns researched the three counties and created a series of maps showing the resources of the counties. The themes of the maps were population, transportation, commuter and workforce, county resources, culture and recreation, protected lands, and business and industrial zoning. The Economic Development offices were given numerous paper maps, electronic maps, and ESRI’s ArcExplorer program with all of the data so they could create their own maps at their desks. The GIS interns were responsible for data collection, map creation, and creating the final products. Interns have been involved with presentations to the economic development office staff and County Commissioners.

The GIS program at Washington College also works extensively with the Kent County Office of Planning and Zoning and the Kent County Water and Sewer Department. Students have been involved with projects to scan and digitize the critical area line for Kent County, a data set that is used frequently by the planning and zoning staff, but previously had only been available through paper maps. Interns have also helped to gather data and update the map of historical properties in the county. GIS Interns have worked with the Kent County Water and Sewer department to create maps of their resources in the unincorporated towns in the county. During the summer and fall of 2005, GIS interns used GPS to locate all of the manholes, wells, fire hydrants, and water valves in Worton, MD. This data was then mapped in ESRI's ArcMap software to create digital and hard copy maps. This data was then transferred to ArcExplorer for use in the Water and Sewer office. GPS work in additional towns has been planned for summer and fall 2006.

GIS Interns have also been involved with some unique local projects. WCTR 1530am, a local radio station, inquired about having an existing marketing map re-done and obtaining listener demographics based on their broadcast area. A WCTR representative provided the map that the radio station had been using to sell advertising time. This map was created from photocopies of an atlas that were hastily taped together. There was debris caught under the tape and the copies did not necessarily line up. The GIS interns created a seamless map for them that contained all of their original information created in a much more professional manner. The data from the original map was then used in combination with US Census data to provide WCTR with listener demographics based on their signal strength. This information was also utilized by the radio station for marketing.

Wye Grist Mill is a historic mill that is active today and used as an educational center. Staff at the Mill were interested in creating a display showing all of the mills that were once on the Eastern Shore. They had done some initial research and had limited data from many different sources. GIS interns took their initial research and expanded on it to identify 350 mills on the Eastern Shore – an impressive amount, but not even a third of

the estimated number of mills that were in existence. The information provided by the GIS interns was used for a display and to help attain grant funds. This project is on-going at the Washington College GIS Laboratory.

Conclusion

Students have enthusiastically received GIS at Washington College. The courses have consistently been over-enrolled and students often state that they enjoy the courses because of the real-world skills and experience they obtain. Internships provide unique opportunities for the students as well as for the organizations or faculty members who are looking for assistance with their projects. The pride reflected on the face of students when their work is acknowledged is well worth the effort it takes to supervise them and review potential projects. Numerous students have undertaken assignments and presentations that scare them at first, but then become a wonderful opportunity they tell their family, friends, and fellow students about.

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End Notes

[1]http://www.washcoll.edu/wc/departments/gis/developing_world/
[2]http://alumni.washcoll.edu/finder.php
[3] http://www.storiesofthechesapeake.org/
[4] http://www.uppershoreregionalcouncil.org/

[5] http://kentcounty.com/harvest/

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