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■ Cartography at the Grassroots: Fostering Research through Community-Based Mapping

A report published by the Association of American Colleges and Universities (2002) articulates the importance of the principle of empowering students to “become better problem solvers, to work well in teams, to use and interpret data more effectively, and to increase their understanding of the world” (Spurlin 2006, 6). This article considers how an approach known variously as participatory geographical information system mapping, community mapping, or counter-mapping can further these pedagogical goals. It describes the processes and outcomes of four mapping-research projects I organized at Gannon University to facilitate teamwork, community-based research, service learning, and analytical thinking among students in my Introduction to Crime Mapping and Service Learning courses.

These projects also facilitated a partnership between Gannon University and communities in Erie, Pennsylvania, by engaging students, faculty, and members of the community in mapping urban issues that the city of Erie and I were seeking to address. I believe this research demonstrates that this approach to mapping can be a form of empowerment as students learn the power of knowledge as they traverse spatial boundaries to create their own maps. Further, this community-based student research fits into the concepts of neoliberalism and “transformative justice learning.”

Teachers across the United States and advocates around the world have recognized the educational benefits of community mapping. As described by the Water Aid Program in the United Kingdom, “Community mapping is ... a development tool that aims to tap into and expand the breadth of knowledge and experience within communities, in order to empower them and develop their capacity to deal with a variety of issues and problems, developing solutions for themselves” (Water Aid 2005, 3). The process typically involves mapping the physical or social services in an area, including its people, to support social and economic change at the community level.

Indeed, school children as young as four have created community maps out of blocks, sand, and cardboard (Blanchet-Cohen, Ragan, and Amsdem 2003). From forests in Indonesia to the busy streets of Chicago, community mapping or counter-mapping as it is sometimes called, has become a means not only to address everyday spatial issues

but also to pursue “spatial justice.” For example, indigenous residents of Kalimantan, Indonesia, created their own maps “as a means of contesting state maps of forest areas that typically undermined indigenous interests” (Peluso 1995). The Counter Cartographies Collective in Chicago maps the “displacement of poor folk through gentrification” (Stallman and Mason-Deese 2010), and Youth Net in Brazil challenges the stereotype of slums as violent and marginalized communities by mapping the locations of their coffee shops, hospitals, and schools (Ramey 2009). The Water Aid Program in the United Kingdom addresses the lack of safe domestic water, sanitation, and hygiene education in Tanzania, Nepal, and Malawi through community-based mapping.

Students may arrive in classrooms with well-developed “cognitive maps,” which Ingold (2000) describes as “a comprehensive description of objects, features and locations and the relations between them” (220). Popular constructions of urban cartographies in the United States often visualize and characterize people and places in a city through stories about law and crime that locate identities and places that demarcate good and bad, safety and danger (Sherwin 2000). In this context, community mapping moves students across diverse urban spaces and populations as they create their own cartographies, hearing a much wider variety of local voices than they had heard previously as they developed their cognitive maps.

In Erie, Pennsylvania, the 2012 Community Action Plan indicated that signs of urban decay, weak security, cultural gaps among refugees and longtime residents, and lack of access to social services were contributing to poverty, crime, and community disorganization within the city. In response, my students at Gannon University organized four community-based mapping projects. Closing of industries, the major cause of urban deterioration in Erie, hit the city hard between 1980 and 2000. History books regard this period (Wellejus 1980; Muller 1991) as an era of stress, disorganization, and disorder. As jobs disappeared and companies closed or relocated, residents moved to other cities and suburbs, leaving hundreds of empty homes, buildings, and overgrown lots. This phenomenon is not unique to Erie. The economic crisis that hit what is now known as the “rust belt” in the United States brought financial decline due to job and population loss to many urban areas; their

infrastructures deteriorated and their populations faced new challenges to survival.

On the other hand, some schools, businesses, and people who stayed in the rust belt found in this period of deindustrialization opportunities for innovation, creativity, and empowerment. Some urban residents organized to save and revitalize their communities. In Erie, communities mounted revitalization programs to clean up neighborhoods, reclaim blighted property, improve street lighting, and promote urban farming. They also organized task forces and neighborhood watch groups to deter graffiti.

Mapping Projects

Erie GAINS (Erie-Gannon Alliances to Improve Neighborhood Sustainability) and the Service Learning Institute at Gannon University have been in the forefront of revitalizing neighborhoods in Erie. To contribute to their efforts and revitalization projects, as well as to realize the pedagogical potential of community mapping, in the spring and fall of 2013 students from my Introduction to Crime Mapping and Service Learning classes undertook and completed the following mapping projects:

1. The Urban Environmental Sustainability Survey: Students mapped signs of urban deterioration in Erie, Pennsylvania.
2. Mapping of Refugees: Students mapped the countries of origin and populations of refugees in Erie and the locations of incidents of violence that targeted refugees.
3. Mapping the Human Service Directory: Students created an online map of the locations of public and private social service providers in Erie.
4. Mapping Crime in Erie: Students mapped 10 years (2002-2012) of crime data gathered by the City of Erie Police Department.

We identified the lower west side of Erie as the appropriate geographic location for our surveys because Gannon University is located there. All of the areas that we surveyed were within walking distance of the campus. We also selected the area because it housed and was associated with organizations that could respond to the issues we mapped. Table 1 shows the geographic areas of each mapping project and the ways in which my students and I used various assets in implementing the projects. My students and I followed five simple steps in building each of the four mapping projects: (1) identify community issues/problems, (2) determine the appropriate geography and assets, (3) collect data, (4) create and analyze maps, and (5) use maps to promote neighborhood revitalization.

Identify Community Issues/Problems. Community or counter-mapping empowers students and residents of neighborhoods by mapping issues that members of the community have identified as their primary concerns. In this way urban dwellers can become “credible knowers” and students become credible creators of knowledge (Middleton 2010, 369). This step is an important beginning: If you map issues distant from the concerns of the community, it will be difficult to mobilize residents to address those issues. The digital technology of geographic information systems can enhance the experience of becoming a knowledge-maker, as well as a learner, among students.

Gannon assists faculty and students in identifying issues relevant to the people of Erie in several ways. Through Gannon’s community-service activities students can become immersed in various issues affecting the community; these activities include the annual Give Day, when hundreds of students and faculty go to community parks, medical centers, goodwill gardens, museums, and offices of non-profit organizations to donate portions of their weekends to service, and the annual Day of Caring when students and faculty engage in community service such as providing tutorials and other educational training to lower-income families, serving food in soup kitchens, and building houses with Habitat for Humanity.

Gannon also offers an annual one-week Summer Service Learning Workshop that engages selected faculty in the problems and concerns of communities in Erie. The ultimate objective of the workshop is to create a coherent working plan for engaging students in service-learning activities. Gannon also empowers communities through Erie GAINS. In addition to annual participation in the Service Learning Workshop, I have assisted ERIE GAINS in gathering information that can further understanding of issues affecting Erie’s communities by conducting surveys and facilitating focus-group discussions and meetings among residents of Erie, security agencies, social-service providers, and the Erie Police Department. Through students’ engagement in community service and my participation in workshops and community surveys, my students and I learned that urban deterioration, crime, and poverty are the three primary concerns of community residents.

Determine the Appropriate Geography and Assets

“Appropriate geography” refers to identifying the spatial boundaries of the mapping project; assets are resources that may be mapped within those spatial boundaries. These assets can include people who live or work in a neighborhood, such as community organizers, presidents of neighborhood organizations, church leaders, and police officers. In some projects, important assets could be stay-at-home mothers or fathers who are available to engage in conversation or who can be asked for help during surveys. A community asset

Table 1. Mapping Projects, by Community Issues, Assets, and Resources

Mapping Project	Areas of Concern and Boundaries	Assets	Support
Urban Environmental Sustainability Survey	Erie GAINS neighborhood	Neighborhood watch groups. Erie Police Department and Code Enforcement <i>Erie Times News</i>	Block captains of neighborhood watch groups served as students' contacts in the areas during the survey. Erie City Code Enforcement personnel oriented students on how to assess housing code violations and blighted property. We informed the police of the survey and our schedule for conducting it. The <i>Erie Times News</i> publicized the project.
Mapping of Refugees	The locations of houses of refugees in Erie and refugees' countries of origin.	Various organizations that respond to the interests and needs of refugees, including the International Institute, the Multicultural Center, Martin Luther King Center, and Catholic Charities for Refugees.	Various refugee institutions provided data on the countries of origin and local home addresses of refugees. Their offices became a venue for dialogue between students and refugees. Refugees living in Erie became resource speakers on topics such as genocide, ethnic cleansing, and violence. Refugees also shared stories about moving from their countries of origin to the United States and their lives in refugee camps.
The Online Mapping of Human Services Directory	The location of all public and private social services in Erie, Pennsylvania.	United Way, Erie GAINS, student interns in the Department of Criminal Justice and Social Work	The United Way of Erie provided technical support for gathering information on all social service providers in Erie. Students interning in the Department of Criminal Justice and Social Work gathered data through field and online surveys. Erie GAINS provided financial and logistical support in organizing, collating, finalizing, and launching the Human Services Directory.
Mapping of Crime	Locations where crimes were committed in Erie, Pennsylvania, from 2002 to 2012.	Erie Police Department	The Erie Police Department provided crime data on the incidence and locations of crime.

also could be a physical structure or place that students and community members can use for meetings or cultural/social events. Meetings and social events can build bridges across social gaps between community members and students. Assets also include services that students can utilize while collecting data, such as public transportation, sources of security if students feel threatened in the community they want to survey, or a community health clinic. Utilizing these assets will make project implementation safer, better, and smoother.



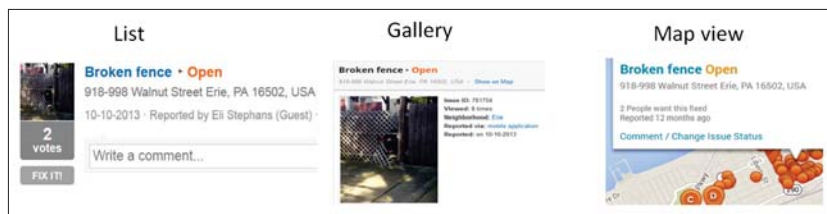
Gannon University students Eli Stephens, left, and Chaz Sparks, right, use their smart phones to document graffiti on a stop sign in the 900 block of Walnut Street in Erie on October 10, 2014. Sparks, Stephens, and about 20 other students in Gannon University are documenting urban blight around the Gannon campus in Erie.

Collect Data. Community-based mapping requires two types of data. The first is spatial data that specify and locate geographic areas and objects, as well as other boundary indicators of the community/city/county that you want to map. The second is *attribute data* that provide information about the characteristics, features, or traits of those areas and objects. Spatial data, such as census tracts and the names and boundaries of counties and their communities, neighborhoods, city blocks, towns, townships, and so on can be acquired from local mapping or planning agencies. Attribute data, such as data on poverty, health care, crime, and housing, can be collected by conducting a survey or can be retrieved from databases such as the online Census.gov or from local agencies that collect or archive their own data. Having up-to-date, complete, and accurate data is important in planning and developing programs that will address issues affecting the community. "If your data is out of date, incomplete, or inaccurate, you won't get a current, complete, and accurate picture of the area and issue you're examining," (Community Tool Box 2014).

Appropriate and effective tools and technologies facilitate data collection while linking data to the collaborative processes and larger goals of mapping. For the Urban Environmental Sustainability Survey, we used the 2013 version of SeeClickFix (<http://www.seeclickfix.com/>) created by TC Daily Planet. SeeClickFix is a web tool and mobile (cell-

phone) mapping application that allows “citizens to report non-emergency neighborhood issues” (SeeClickFix 2013). Some cities use SeeClickFix to alert local governments about neighborhood issues.

By installing SeeClickFix in our cell phones, my students and I turned them into surveying tools to photograph, describe, map, and report all visible signs of urban disorder in some Erie neighborhoods. See examples of mapping below.



Erie institutions that provide services for refugees assisted the Mapping of Refugees project with data related to refugees’ experiences of violence and their countries of origin. The Mapping of Human Services Directory project used data on the locations of service providers in Erie gathered by student interns from the Department of Criminal Justice and Social Work and the staff of Erie GAINS. The Mapping of Crime Project used Erie Police Department records that chronicled the incidence of crime in Erie between 2002 and 2012.

Create and Analyze Maps. My students and I used the geographical information system (GIS) intensively in mapping and analyzing all four projects. GIS is a computer-based tool for holding, displaying, analyzing, and manipulating large amounts of spatial data. The Environmental Research Institute (ESRI) produces various forms of GIS software that perform these functions. My students and I used ESRI’s ArcMap to map ten years (2002-2012) of crime data gathered by the City of Erie Police Department, as well as to map incidents of violence that targeted refugees and refugees’ countries of origin. We used ArcGIS online in mapping the Human Service Directory. These projects used the statistical and spatial analysis capability of ArcMap to address research questions such as:

- Do signs of urban disorder, such as vandalism, broken street lights, and dilapidated street signs and houses, cluster in the same places as violence and crime?
- Do the maps suggest relationships between crime and social service delivery?
- Does access to social services appear to mitigate the incidence of crime in Erie?
- Do relationships between poverty and crime appear through mapping?

- Do any relationships appear among an absence of social services, poverty, and crime?

Use Maps to Promote Neighborhood Revitalization. In the last step, in building the mapping projects my students and I used our maps to promote neighborhood revitalization. The maps we produced through the Urban Environmental Sustainability Survey were included in Erie’s West Bayfront Revitalization Plan, a project created by Erie GAINS in col-

laboration with neighborhood associations in Erie’s lower west side. We also donated our map of urban blight to Erie’s Housing Code Enforcement Authority and the Erie Redevelopment Authority. The map will help Erie residents discuss, recognize, and assess the extent and significance of community disorganization. A neighborhood leader, Candace Battles, spoke to the utility of

the maps in an Erie Times-News story headlined “Signs of Disorder: Gannon Students Survey Condition of West Bayfront Neighborhoods,” (Flowers 2013). Battles, a west bayfront resident and neighborhood watch block captain, said the student research “will be useful as it will help to identify and support the need for additional resources in the area as the revitalization plan is developed.” Eventually, the neighborhood revitalization plan will be used “as a blueprint for action,” Battles said, which gets neighbors even more involved in issues affecting the area (Flowers 2013, 4).

Mapping objects such as broken street signs helps members of the community see and share responsibility for the local environment. Mapping of urban blight increases awareness of environmental issues and deterioration of structures while challenging residents to organize and mobilize to address those problems. The maps also were effective tools in organizing clean-up-and-repair efforts among students and community members, including painting over graffiti and trimming trees and bushes that blocked sidewalks. Erie residents will be able to draw on the Urban Environmental Sustainability survey in mounting future revitalization projects, such as Do-It-Yourself Clinic workshops that educate residents on how to fix deterioration in their houses.

Refugee agencies now are using project maps of refugees’ countries of origin and locations of acts of violence that victimized refugees to raise multi-cultural awareness and design security measures for protecting refugees against all forms of violence. Nandu Subedi, program leader of the Refugee Resettlement Program, explained how the maps, in evoking memories, help refugees recall and reconstruct their personal histories. Said Subedi, “the maps always remind us of our country and experiences in refugee camps.” Dylanna Jackson, director of the International Institute, noted that the maps also assist the institute in “locating new resettlement houses for the incoming refugees.”



Gannon University students hand over the maps of refugees to the director and staffs of International Institute and Multicultural Center.

The Human Services Directory was launched as an online directory during the summer of 2014. Erie residents can use its easily accessible and convenient online maps to locate information on all social service providers in Erie. Access to social services will allow them not only to address urban disorder more effectively on an ongoing basis but also should promote greater confidence in their abilities to access appropriate community services. According to Mary Bula of Erie Together, "...it became very apparent that so many people in our community—from employers, to social service agencies, to churches, to individuals seeking support—could benefit from easy access to a directory of local human services" (Weiss 2014).

My students and I invited the public to our Crime Mapping Exhibit, through which we launched the results of the Mapping of Crime project. The crime maps have assisted the Erie Police District and neighborhood watch groups in planning projects to mitigate crime. The Erie Police District is currently designing patrol destinations on the basis of the crime maps my students created.

The people, places, and events on the maps of the four projects also signify for students the relationships they developed with each other and members of the community in the process of generating the knowledge their maps convey. Erie refugees shared with the students their stories of genocide, war, terrorism, and other forms of violence they had experienced. Students became aware of issues that members of Erie communities struggle with in their everyday lives, including poverty, crime, and a lack of social services. At the

same time, students went beyond the boundaries of their cognitive maps, attaining more fluid and malleable knowledge and seeing new relationships. The students also learned how to use GIS mapping software and acquired important skills for conducting community-based research. These service-learning experiences produced the following reactions among students in my Introduction to Crime Mapping course in fall 2013:

"I feel that the knowledge and skills I learned are extremely helpful as they allowed me to learn a new skill that is valuable in the job market. Learning how to map allows me to view the world in different ways."

"The community-based mapping exhibit was interesting. It was a good place to be able to meet people from the community and discuss with them the problems and struggles that our community faces."

"It is wonderful that the Erie Police are going to use the maps we created."

"The mapping projects open my eyes to many possibilities in my career and involvement in community projects."



Gannon University students Nikolay Bovkun, left, and Cameron Kobielski right, donating their map project titled "Erie Crime Hotspots and Downtown Security Cameras" to Chief Randy Bowers of Erie Police District, center.

I assessed how well technology facilitated course learning objectives and how community-based mapping research enhanced the development of community engagement among my students. The assessments I present here are results of a survey I conducted of students in my Introduction to Crime Mapping course during the fall of 2013. Students in that

course conducted the Urban Environmental Sustainability Survey (UESS) and Crime Mapping research.

When I asked students if those two mapping projects had assisted them in attaining the objectives of the course, the majority supported the statement that community-based mapping facilitated their learning. Seventy-five percent of students strongly agreed that the two mapping projects increased their awareness of issues related to poverty, crime, and the lack of social services in Erie. Fifty percent “strongly agreed” and 25 percent “agreed” that the projects enabled them to make plans to address these issues. Results of the student survey are summarized in Table 2.

Table 2. Development of Students’ Civic Engagement

Assessment Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Did the two mapping projects increase your awareness of issues of poverty, crime, and lack of social services in Erie, Pennsylvania?	75%	25%	0%	0%	0%
Did the two mapping projects (Urban Environmental Sustainability Survey and Crime Mapping) assist you in analyzing the issues of crime, poverty, and lack of social services in Erie, Pennsylvania?	52%	14%	19%	10%	5%
Did the two mapping projects enable you to make plans in addressing issues of crime, social services, and poverty in Erie, Pennsylvania?	50%	25%	20%	2%	3%

Forty-seven percent of my students agreed that the teaching technologies helped them become more knowledgeable in their fields. Forty-six percent of my students strongly agreed that they developed important new skills in their fields. No students disagreed or strongly disagreed with the proposition that they had developed important new skills. Forty percent of my students agreed and 20 percent strongly agreed that teaching technologies had helped them complete their assignments, quizzes, exams, and research projects. These results are summarized in Table 3.

Table 3. Students’ Assessment of Teaching Technologies

Assessment Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The teaching technologies in this course helped me become more knowledgeable in my field?	24%	47%	19%	5%	5%
The teaching technologies in this course helped me develop important new skills in my field?	46%	39%	15%	0%	0%
The teaching technologies in this course helped me complete my assignments, projects, quizzes, and exam?	20%	40%	25%	15%	0%

Analysis and conclusion

The combining of criminal justice and social work in one department at Gannon University corresponds with Loic Wacquant’s (2009) characterization of today’s era of neoliberalism as composed of two distinct components. One component of the state handles “social functions,” such as public health, housing, and welfare, while the other component enforces “the new economic discipline via budget cuts, fiscal incentives, and economic deregulation” (Wacquant 2009, 201). Wacquant continues that under neoliberalism, the state’s economic disciplinary practices—those that have reduced the regulatory role of the state—have been augmented by an increasingly punitive and disciplinary state use of police, courts, and prisons.

These shifts have implications for what urban populations and places signify on cognitive and visual maps. Kretzmann and McKnight (1993) point out that many city maps highlight community deficiencies such as criminal activity and poverty but not residents’ abilities to solve such problems. Geographical maps of cities place neighborhoods

and their residents at the center and on the peripheries. The boundaries and names they use to distinguish places, such as “Chinatown,” “Little Italy,” or the “Mission District” in San Francisco, highlight the segregation of populations while also creating ways that “types” of people can be “out of place” or transgressive in the urban environment.

Crampton (2001) points out that geographical maps always are relationships between power and knowledge. Maps are intersections of place with popular knowledge and narratives: “Representations, maps included, are tactile, olfactory, sensed objects/subjects mediated by the multiplicity of

knowledges we bring to them and take from them through our everyday interactions and representational and discursive actions” (Del Casino Jr. and Hanna 2006, 37). Urban residents become segregated neighborhoods of criminals and outcasts as geographical maps give locations and boundaries to ongoing media narratives of urban danger. Geographical

urban maps can lend authenticity to such stereotypes: “The trim, precise, and clean-cut appearance that a well drawn map presents lends it an air of scientific authenticity that may or may not be deserved ... every map is ... a reflection partly of objective realities and partly of subjective elements” (Wright 1942, 527). The overall effect of such maps is to obscure more of the urban environment than they reveal—to close doors rather than open windows on urban lives and neighborhoods.

Enrollments in the Department of Criminal Justice and Social Work at Gannon University also suggest the state’s movement away from responding to the rights of citizens through provision of social-safety nets and toward punitive disciplinary and legal processes. Gannon University has an average yearly enrollment of 120 criminal justice majors, compared to five to 15 students majoring in social work. Criminal justice courses typically prepare students to become law enforcers, criminal investigators, prison wardens, lawyers, and judges. Courses in social work are oriented toward producing community health workers, clinical social workers, social workers, school counselors, after-school coordinators, and case managers.


My pedagogical goals as a teacher and professor of criminal-justice studies are to open windows rather than close doors for the increasing number of students who will map the city for themselves and others through frameworks of “justice” and roles in the criminal justice system. Community mapping and mapping through participatory GIS offer the opportunity to engage these students in integrative mapping processes that can counter the emphases on discipline, crime, safety, and poverty on other urban maps. Integrative community maps and GIS mapping processes can help students and community members, as well as government officials, engage in educational relationships based on communication, cooperation, collaboration, and exchange. These are the relationships of democracy, and the maps they produce through GIS can facilitate geographic democratic decision-making at both local and state levels (Craig et al. 2002).

As my students created maps they moved across urban neighborhoods and met neighbors who had fought against and defied violence. They matched statistics with people who have histories and their own stories to tell. The students searched for and charted relationships among poverty, crime, social services, the people they met, and neighborhoods they traversed rather than just seeing crime and strangers in unknown places. They saw the resources of neighborhoods as well as their deficits.

Eli Stephans, a 22-year-old criminal justice major, has said that a class project mentioned above opened his eyes when he used a cell phone to photograph, catalogue, and map signs of urban decay in the West Bayfront neighborhoods rimming Gannon’s campus. He said he used to stroll past crumbling sidewalks, vandalism, dilapidated housing, graffiti, trash, and broken streetlights without a second thought. But, says Stephans, “Now whenever I drive around and walk around, I actually look at my surroundings. ... It’s about awareness ... and that is what we’re trying to bring by doing this. Maybe it can help other people see how much is out there and get something done about it.” (Flowers 2013, 1)

Maps accrue power through their makers and the technologies of their production. Teaching GIS and engaging my students in using it for mapping has challenged me to reflect on my own pedagogy and my role as a teacher/map maker. My students and I produce maps that convey a wide range of information relevant to community-based relationships, from the locations of refugees to the locations of crime, and our maps are accessible to diverse audiences, from the police fighting crime to the poor seeking social services. As Paulo Freire (cited in Torres 2008) has asserted, pedagogy can be transformative and emancipatory. It is a process of transferring learning into social action outside of the classroom. It is a process of learning that empowers students by breaking the culture of silence and nurturing students’ deep understanding of themselves and their society.

This type of pedagogy influenced me to create my own pedagogical philosophy in criminal justice: Criminal Justice is not only about studying crime but also, most of all, it is theory integrated with practice of justice. I organized the four mapping projects as research activities for my students within this framework of “pedagogical transformative social justice learning.”

As noted above, research using community-based mapping facilitates team-based learning and service learning. My students have made important social issues visible to others through their use of mapping software, mobile phones, and SeeClickFix. The triangulation of community-based mapping and research, technology, and service-learning produces not only better-educated, more highly skilled students but also has empowered them as citizens who have learned the possibilities of judiciously participating in shaping their communities and society. 

Acknowledgement

I am grateful for Gannon University’s Cooney-Jackman Endowed Professorship, which provided the time and resources I used in organizing the research projects discussed in this article.

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