RURAL INTERDISCIPLINARY SERVICE-LEARNING PROJECTS: FRAMEWORKS FOR ENGAGEMENT WITHIN REGIONAL RURAL DEVELOPMENT CENTERS

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1 ABSTRACT

In recent decades, design programs have engaged communities' tangible needs through service-learning, civic engagement, and participatory action research. These approaches offer experiential learning opportunities for students and provide services to underserved communities (Lee, 2008). Recognizing these benefits, academic programs employ these models of engagement in their pedagogical approaches at the project, course, or program levels. In the current era of urbanization, rural communities and their landscapes represent an array of large-scale design challenges. While landscape architecture maintains a body of work in the planning, design, and management of large-scale and rural landscapes, opportunities for allied design disciplines also exist. Relatedly, the urbanist paradigm that dominates the state of the art of contemporary design education has resulted in a reticence to equally engage in rural projects within the university studio setting. This paper showcases an alternative focus to the dominant urbanist paradigm by suggesting opportunities for university design programs to engage in rural projects. Land-grant institutions were originally conceived for applied teaching, research, and outreach, much of which was focused on rural and agricultural-based issues. Design programs situated at land-grant institutions are uniquely positioned to advance this mission. Using a content analysis of publicly available publications, we identify potential strategic opportunities for the design disciplines located at land-grant institutions within the region of the Western Rural Development Center (WRDC). We recommend ways in which design programs based in all four United States Department of Agriculture (USDA)-funded Regional Rural Development Centers (RRDCs) can enhance their engagement in rural issues while fulfilling the land-grant missions.

1.1 Keywords

Rural, service-learning, interdisciplinary, civic engagement

2   INTRODUCTION & BACKGROUND

What role could design programs housed in land-grant universities play in addressing rural design problems? How can existing university-community partnership frameworks facilitate involvement of the design disciplines in engaging rural issues? This exploratory study evaluates university landscape architecture, interior design, and architecture design programs' involvement in one of the four regionally located United States Department of Agriculture (USDA)-funded Rural Community Development Centers (RDCC), as reflected in the center's quarterly publication, *Rural Connections*, and recommends ways in which the four centers can provide an organizing framework for interdisciplinary service-learning endeavors. Through greater engagement of the design programs with rural issues, benefits may be realized for three constituencies: rural communities that would benefit from the creative resources of university design faculty and students, design faculty who would benefit from the availability of collaborative design and research opportunities around shared projects, and university design students— who through experience with rural-based design problems—might develop greater understanding of the unique design challenges of rural settings and empathy for those who inhabit these dynamic and critical built environments.

2.1   Rural Issues as Design Problems

Due to globalization, shifting demographics, and economic changes precipitated by the decline of natural resource based economic sectors, rural communities experience a unique set of challenges. These challenges include rapid growth and change within natural amenity-rich areas (Howe, McMahon, and Propst, 2012), shifting economic conditions, decline of natural resource extraction employment opportunities, depopulation in many areas, changes in food and energy production, and interdependent relationships between significant public lands and the communities that adjoin them (Winkler et.al, 2007). While these challenges often reflect economic and cultural dimensions (Smith and Krannich, 1998), they present in a geographic and spatial context that comprises a built environment ripe with design opportunities (Bartuska and Young, 2007). These challenges are not merely social or economic in nature—rather they are impacted by and manifested within the physical environment. The spatial dimensions of rural challenges present unique engagement opportunities for the design disciplines— landscape architecture, interior design, and architecture—particularly those situated at land-grant universities. As publicly funded universities founded for the purpose of furthering agricultural and technical knowledge, land-grant universities have a heritage of applied teaching, research, and outreach that is geared toward the unique challenges and well-being of rural places. Due to their complexity and scale, meeting these challenges often requires an interdisciplinary approach.

2.2   University Design Response

Many university design programs have responded to these challenges by offering collaborative service-learning models that synthesize the creative expertise of their faculty and students with community members' local knowledge to improve the physical conditions of rural communities—thereby facilitating positive economic and social change (Angotti, Doble, and Horrigan, 2012). Typically, these endeavors employ a co-design process (Lee, 2008) that collaboratively engages those who will use the space, place, or product of design in the design process itself. This partnership model differs from traditional design models in which designers assume the role of expert and design for, rather than with the client. The design team serves the client by sharing their professional knowledge, while their community partners share their expertise of the values and identity of their community. When successful, co-design involves generous knowledge sharing between two groups of experts. By identifying community members as experts, their contributions are empowered. In the same vein, participatory action research (Reardon, 2000) offers methods to engage community residents and designers in the identification and planning for community-defined issues. Although the specific steps of this process may differ depending on the type of issue being addressed and the unique context in which engagement occurs, participatory action research brings together diverse stakeholders to collaboratively identify and solve community-based problems. Notable examples include the East St. Louis Action Research Project (Reardon, 1998), which involves design students from the University of Illinois in urban issues and the Rust to Green NY Action Research Initiative (Horrigan, 2014).

Other notable collaborative models of design engagement in rural settings include the Rural Studio at Auburn University (Hinson, 2007), The Rural Communities Design Initiative at Washington State

University, and Extension Landscape Architectural endeavors at Utah State University, University of Kentucky, Cornell University, University of California Davis, and North Carolina State University, in which landscape architecture faculty fulfill extension roles (Evans and Anderson, 2016). Due to the scale and uniqueness of rural design challenges, some have even proposed that rural design should be defined as a new and distinct design discipline (Thorbeck, 2013). Many university design initiatives engage tangible design problems in urban communities; however rural-based design problems have fallen out of fashion among some design faculty (Ryan, Krikac, & Sleipness, 2015). Reflective of national demographic trends and urbanization, most academic design programs are instead oriented toward urbanism and there is much greater interest in engaging urban issues through design (Sleipness, Ryan, & Krikac, (2013, 02-07). Phone interview with T. Barrie). From the point of view of using design to impact large populations of people in their immediate physical context, an urban focus is a laudable and rational response to demographic patterns. However, vibrant urban areas still require functioning rural hinterlands to supply the food, energy, and other natural resources necessary to sustain large urban populations. Furthermore, rural communities provide urban dwellers respite and access to surrounding natural amenity-rich recreational landscapes. Consequently, the physical qualities of rural built environments must be holistically considered as part of an interrelated regional system of human settlements situated on a continuum of urban to rural. But independent of their relationship to urban populations, rural areas also possess intrinsic values, with meaning, significance, and senses of place that cannot be replicated elsewhere. The economic value and vitality of rural places is a central goal of the USDA and promoted through its system of land-grant universities.

Land-grant universities were first enabled by the Morrill Acts of 1862 and 1890, which allowed states to sell federally controlled land for endowment of public higher education. These land-grant institutions were originally purposed for teaching, research, and outreach of applied subjects, much of which was focused on rural economic development and agricultural-based issues. The USDA established four regional rural development centers (RRDCs) with the goal of aggregating common research initiatives conducted at individual member land-grant institutions in order to maximize their regional impacts. The RRDCs are housed at land-grant universities within each region in four regions of the United States; member land-grant universities for each of the RRDCs are illustrated in Table A1. The Western Rural Development Center (WRDC), housed at Utah State University, has 12 member institutions represented by land-grant universities in the western region of the United States. The Northeast Regional Center for Rural Development (NRCRR), housed at Pennsylvania State University; Southern Rural Development Center (SRDC), housed at Mississippi State University; and North Central Regional Center for Rural Development (NCRCRD), housed at Michigan State University, all mirror this organizational model. Tasked with providing economic and community development guidance to rural communities, the centers "form a one-stop shop to connect to the nationwide network of land-grant college and university researchers, educators, and practitioners to provide sound information and hands-on, community-level training. The trainings help rural communities make science-based decisions about their community and economic development investments" (WRDC, 2014 p17).

Influenced by unique rural dilemmas in the western, southern, north central, and northeast regions, the four RRDCs are a potential mechanism for connecting design programs at land-grant institutions with pressing rural issues within their respective regions. How can university design programs be more engaged in rural contexts? This study identifies ways in which design programs can increase their engagement with rural issues through collaboration with RRDCs, with an emphasis on the western region.

3   METHODOLOGY

An interdisciplinary team of faculty representing landscape architecture, interior design, and architecture used a grounded theory approach to analyze the content of publicly accessible publications of the four RRDCs to illuminate regional foci and to identify opportunities corresponding to each of these three design disciplines. The team assessed the apparent involvement of design disciplines in the RRDCs based on published materials available on the websites for each of the four centers. Based on the results of this initial assessment, the team identified opportunities for each of the three design disciplines to engage in the projects described in the examined publications. A preliminary review of the publications representing each of the four RRDCs revealed that while their foci often engage the built environment, design disciplines at each center's member schools were not overtly engaged within regional development center initiatives, as reflected in the publications.

Initial review of WRDC, NRCRR, SRDC, and NCRCRD public materials also revealed that each of the centers maintains distinct formatting of annual reports, publications, and presentations and emphasize unique information ranging from the number of website visits, listings of board members, and project highlights. Due to the wide variance and overlapping thematic content of each center's publication archives, the research team focused in-depth analysis on one center. We determined that the WRDC maintained the most prolific and extensive collection of online published materials describing its activities and the work of contributing institutions.

Due to its relatively high level of detail and thematically organized content, the research team selected the WRDC's publication *Rural Connections* for further detailed content analysis. According to the WRDC (n.d.), *"Rural Connections*, the magazine of the Western Rural Development Center, is published to inform the nation on timely research and activities by the West's land-grant institutions and regional/national agencies as it relates to rural development issues in the region. Contributors include researchers, faculty, extension researchers, specialists and agents, practitioners, and professionals from throughout the West with occasional contributions from outside the region."

3.1   Overview of Process

Archived issues of *Rural Connections* for the previous seven years (see table 3-1) were reviewed and closely examined for initial content themes and the presence of descriptions of the following design disciplines—landscape architecture, interior design, and architecture—particularly those housed at WRDC member institutions. Subsequently, each of the 125 articles within these issues of *Rural Connections* was searched for the presence of keywords associated with the three design disciplines. The presence of keywords within an article triggered in-depth analysis of the context surrounding these keywords. This contextual analysis highlighted opportunities for design engagement.

Table 3-1. Issues of *Rural Connections* and Thematic Content

Issue	Topical Theme
June 2015	*Extension in the West: Team Building*
May 2014	*Extension's Role in Sustainability*
Nov 2013	*Immigration*
June 2013	*Our Energy Future*
Jan 2013	*Drought and Wildfire in the West*
May 2012	*Local and Regional Food Systems Boost Local Economies*
Sept 2011	*The Rural West: Daring to Innovate Job Creation*
June 2011	*Climate Change Adaptations in the Rural West*
Sept 2010	*Healthy Communities*
May 2010	*Water in the Western U.S.*
Nov 2009	*Food Security in the Western U.S.*
April 2009	*Creating Sustainable Communities in a Changing America*

3.2   Initial Content Analysis and Keyword Search

Within each thematic issue of *Rural Connections*, subthemes were mapped out to determine where design disciplines could potentially engage. Following this initial thematic mapping, each volume of *Rural Connections* was analyzed for inclusion of keywords associated with the design disciplines. These keywords were derived from disciplinary descriptions published by professional organizations affiliated with each of the three design disciplines—landscape architecture, interior design, and architecture. Specifically, the research team surveyed the words each professional organization used to define and describe their respective design discipline in their webpages. These keywords were subsequently reviewed and augmented with additional keywords as deemed appropriate by the interdisciplinary research team (see Table 3-2). A preliminary keyword search was conducted to illuminate the relative frequency of keywords associated with each of the three disciplines. However, some of the keywords affiliated with each discipline were found to overlap and may be interpreted as more closely aligning with one of the other three disciplines; the research team determined these characteristics reflect the professions' overlap of project types and contested territories found within professional practice. To mitigate this effect, all keywords were thereafter treated as a collective list for all three disciplines, rather than specific to any one discipline.

Table 3-2. Keywords by Discipline

Landscape Architecture	Interior Design	Architecture
Landscape architecture	Interior design	Architecture
Landscape	Interior	Façade
Garden	Residence	Office
Exterior	Tenant improvement	Open space
Land	ADA	Downtown
Planning	Accessible	Infrastructure
Land use planning	Space planning	Motel
Parks	Education	Housing
Recreation	Institution	Sports
Site	Multi-family	Industrial
Streetscape	Design*	Design*
Public space	Sustainable*	Sustainable*
Urban design	Adaptive reuse*	Adaptive reuse*
Water resources	Retail*	Retail*
Greenway	Commercial*	Commercial*
Path	Residential*	Residential*
Trail	Building*	Building*
Campground	Transportation*	
Ecology		
Parking		
Storm water		
Pedestrian		
Design*		
Sustainable*		
Transportation*		

*Keywords overlap with at least one of the other design disciplines' self-descriptions

Each volume of *Rural Connections* was searched for presence of the keywords. Their presence within particular articles was noted and corresponding articles were flagged for in-depth content analysis. Articles containing keywords were then analyzed for potential engagement of the three design disciplines. During this analysis, potential projects were identified in which design disciplines could be involved to enhance an existing project, advance its progress in subsequent phases, or provide service-learning opportunities for design students.

3.3   Contextual Analysis

Following determination of the presence of keywords, these keywords were analyzed in the context of the individual articles and thematic volumes to illuminate potential for design engagement. Through a close reading of the contextual text and imagery, the research team assessed the applicability of the article content to the three design disciplines. These opportunities were evaluated rated on a scale ranging from low, medium, and high in terms of the strength of their potential relationship to one or more of the design disciplines in a service-learning context. Members of the research team first identified these opportunities during their individual evaluation of the articles. Subsequently, the team reviewed, corroborated, or challenged and collectively revised these ratings and developed recommendations for how university design disciplines might engage each of the opportunities highlighted in the *Rural Connections* articles. The research team's assessments of these potential relationships were informed by each member's knowledge of their respective discipline and pedagogical requirements and experience with interdisciplinary service-learning projects within academic settings. The applicability of the design

disciplines to each reviewed article is presented in summary (see Table 4.1), along with discussion of selected design opportunities generated by the interdisciplinary research team. The intersection of two emerging trends in design education: participatory design as a tool for service-learning through civic engagement and efforts to integrate the work of design disciplines at the university level are identified for each selected *Rural Connections* article.

4   RESULTS

4.1   Keyword Frequency
Initially, each issue of *Rural Connections* was searched for keywords by disciplinary category. Of the three design disciplines, landscape architecture keywords were used most frequently (55%), followed by interior design (14%), architecture (13%), and overlapping combinations (18%). Their presence within the articles triggered in-depth contextual analyses of the articles for potential design engagement opportunities for landscape architecture, interior design, and architecture.

4.2   Content Analysis and Design Opportunities by Thematic Issue
The following are analyses of each of the thematic issues of Rural Connections from June 2015 to April 2009. For each thematic issue, selected articles determined to have particular design relevance are discussed and arrayed in summary (see Table 4.1). The research team's assessments of potential design engagement for each article are also displayed in the Appendix, organized by thematic issue (see Tables A-2 through A-8). Design relevancies for each article were identified within the context of how they could be engaged by design programs, with emphasis on service-learning projects.

4.2.1   Extension in the West: Team Building

Colorado River Basin Agricultural Water Conservation Clearinghouse
Drought is becoming heightened in the Colorado River Basin and without adaptation, water will eventually be directed away from agriculture to meet other water demands (Plombom, Kallenberger, Waskom, & Smith, 2015). The design disciplines would be integral to the formulation of solutions, especially in reducing domestic water needs that will demand the use of agricultural water. These would be in the form water saving strategies, especially in the design and installation of drought resistant landscapes, which would provide service-learning opportunities for students within and outside the design disciplines.

Nevada's Living with Fire Program
Nevada has a high wildfire risk along the wildland-urban interface but risks can be minimized through building and site design strategies (Smith, Sistare, & Miller, 2015). The described program relies on educating landscape workers, who then share their knowledge on wildfire risk management. Design disciplines can work with authorities to develop strategies that reduce the risk of damage to sites and structures through landscape design, specification of materials, building design, zoning and codes.

4.2.2   Extension's Role in Sustainability

Extension Sustainability Outreach: Rising to Meet Public Sustainability Demand
This article discusses sustainability publications, programs, and an Extension Sustainability Summit. According to the article, the summit achieved benefits including educating "local officials and communities in fundamental principles of land use planning and zoning" (Brain, 2014 p4). Design disciplines would be a valuable asset in bringing clarity to principles of land use planning and zoning by providing graphic visualizations of different land use planning and zoning strategies, site development, building design, and materials selection. Service-learning opportunities could include engagement with the public during the summit, or design and implementation of sustainability demonstration projects.

Land Use and Sustainability in the West

"Extension educators from around the West gathered to present and discuss the relationship of land, air, food, water, and energy" (Apel, 2014 p11). This article focuses on land use and how it engages with sustainability as we face population growth, diminishing water, and climate change. "Extension agents are in a position to facilitate, consult with, and educate stakeholders on land use planning…" (Apel, 2014 p14). Examples of resources for these include GIS mapping and other web-based collaborative planning tools. The article identifies landscape architects and planners as a collaborative resource for helping extension educators engage these complex issues.

4.2.3   Immigration

LIFE (Local and Immigrant Farmer Education) in Hawaii

Underrepresented agricultural areas need education on responsible and sustainable farming, business, risk management, and environmental protection stewardship. In Hawaii, these are offered through the Local and Immigrant Farmer Education (LIFE) program (Sugano, Fukada, & Swift, 2013). The program in this article was determined to have a high potential for design involvement, particularly if these programs include design disciplines to help educate clients on spatial awareness.

4.2.4   Our Energy Future

The Energy Future of Rural America.

The article outlines large-scale multi-dimensional and complex problems dealing with energy scarcity, population growth, and food production amid a changing and urbanizing western U.S. (Oliver, 2013). Design disciplines have critical roles in addressing these issues, due to their emphasis on systems thinking. While the article does not define a specific project in which the design disciplines could engage, the broader issue of energy provides a framework within which multiple design and service-learning engagements could occur.

10-Year Energy Vision- Western Governors' Association Energy Initiative

The article on the Western Governors' Association Energy Initiative describes the array of conventional and renewable energy resources including coal and oil, wind, solar, geothermal, and biomass, and their role in a national energy policy (Herbert, 2013). The topic has great applicability to landscape architecture, particularly in visual analysis work inherent in siting and routing power transmission lines and pipelines.

In the Good Times and the Bad: Shale Gas Development and Local Employment

Housing shortages in shale gas development areas and the effects of gas infrastructure on landscape aesthetics and property values are described in the article (Weber, 2013). Design disciplines should be integral players in assisting energy development companies and the communities affected by booms to develop strategies for providing worker housing. Potential options include housing that could be quickly constructed, easily relocated, re-purposed, or recycled and sites that could be readily adapted for alternate uses after the boom has passed.

4.2.5   Drought and Wildfire in the West

Fire and Drought in Paradise- Say it Isn't So, Smokey

The article describes the relationship between native versus non-native invasive plant species, drought conditions, and wildfire in Hawaii (Cram et al., 2013). Design disciplines, especially landscape architecture would be valuable allies in promoting the planting of native species and illustrating a variety of options for using native species to obtain effects similar to the allure that leads to planting invasive non-native species.

Community Wildfire Planning as a Tool to Enhance Trust: Case Studies from Western Montana

This article details the study of wildfire in communities in the wildland-urban interface. Results of survey data are directly applicable for designers of residential communities, especially landscape architects and architects (Lachapelle & McCool, 2013). Siting of structures, selection of building materials and vegetation, and perhaps most importantly, areas where development should not be constructed are fundamentally design issues.

Extension Disaster Education Network Responds to 2012 Drought and Wildfires

The economic and financial costs of wildfire and other natural disasters are outlined in the article (White, Cain, & Cassel, 2013). Public awareness of wildfire and other natural disaster risks is key to preventing loss of life and loss of property. The Extension Disaster Education Network (EDEN) would have direct design relevance, particularly if the design disciplines were involved in the design of educational exhibits.

4.2.6   Local and Regional Food Systems Boost Local Economies

A Food Hub Challenge

Systems thinking, particularly the infrastructure necessary to produce, transport, process, and distribute food for human consumption is the focus of this article (Merrigan, 2012). Designers' routinely apply systems thinking to problems—especially landscape architecture and land use suitability analyses. Consequently, designers are naturally situated to think holistically about food systems. Also, the physical components of the food infrastructure system—such as gardens, transportation systems, warehouses, and markets—are opportunities for architecture, interior design, and landscape architecture.

Land Use Planning and Spatial Configuration Benefit Community Agriculture

Coordination of urban agriculture with recreational and green infrastructure development is the topic of this article by University of Idaho landscape architecture professor, Gary Austin (2012). The topic presents many opportunities for design, particularly in landscape architecture, planning, and development of underutilized land. While land suitability analyses provide clear opportunities for landscape architecture, interior design and architecture can also play critical roles in the development of urban agricultural systems, particularly in the design of buildings and other structures associated with agricultural production, processing, and sales.

Developing a Healthy Food Hub in Rural Nevada

Community gardening in the context of public schools and how the practice of sustainable gardening extends into the greater community are described in detail (Lakes, 2012). Naturally, the design of gardens and associated facilities is an opportunity for landscape architecture, and could also include interior design and architecture.

Rebuilding Alaska Foodsheds: No shortage of good ideas

Local food production and local food consumption in Alaska are described in the context of the biophysical challenges of growing food in harsh climates. The authors note "a striking lack of infrastructure for butchering, processing, and marketing the end products" (Gerlach and Loring, 2012 p24), as well as contributions of food infrastructure to communities' social functioning. The lack of supporting infrastructure is challenging for sustainable food production. While possibly unconventional, the infrastructure for butchering, processing, and marketing food products are clearly design opportunities for interior design and architecture, particularly to promote the humane treatment of animals.

Table 4.1. *Rural Connections* Thematic Issues and Selected Articles*	Planning Scale Projects and Broad Scale Topics	Focused and Site Scale Projects	Service-Learning Opportunities	Landscape Architecture	Interior Design	Architecture
Extension in the West: Team Building						
Colorado River Basin Agricultural Water Conservation Clearinghouse		•	•	•	•	•
Nevada's Living with Fire Program		•	•	•	•	•
Extension's Role in Sustainability						
Extension Sustainability Outreach: Rising to Meet Public Demand	•	•	•	•	•	•
Land Use and Sustainability in the West	•			•		
Immigration						
LIFE (Local and Immigrant Farmer Education) in Hawaii		•	•	•	•	
Our Energy Future						
The Energy Future of Rural America	•		•	•	•	•
10-Year Energy Vision- Western Governor's Association Energy Initiative	•			•		
In the Good Times and the Bad: Shale Gas Development	•	•	•	•	•	•
Drought and Wildfire in the West						
Fire and Drought in Paradise- Say it Isn't So, Smokey		•	•	•		
Community Wildfire Planning as a Tool to Enhance Trust	•	•		•		•
Extension Disaster Education Network	•	•		•	•	•
Local and Regional Food Systems Boost Local Economies						
A Food Hub Challenge	•	•	•	•	•	•
Land Use Planning and Spatial Configuration	•	•	•	•	•	•
Developing a Healthy Food Hub in Rural Nevada		•	•	•	•	•
Rebuilding Alaska's Foodsheds		•			•	•
The Rural West: Daring to Innovate Job Creation						
Creating Value for Place-Based Businesses		•		•	•	•
Agricultural Tourism and Rural Development	•	•	•	•	•	•
Climate Change Adaptations in the Rural West						
Assisting Arctic Inhabitants in Responding to a Changing Climate	•	•	•	•	•	•
Healthy Communities Improving Health and Well-Being						
Mental Health Outdoors: the Benefits of Nature		•	•	•	•	•
Poverty Reduction Project Increases Social and Natural Capital		•	•	•	•	•
Investigating Places for Active Recreation in N.C. Communities	•		•	•		
Health, Economy, and Community: USFS Managers' Perspectives	•		•	•		
Community Recreation and Healthy Living in Rural Settings	•	•	•	•		
Thermus aquaticus and You: Biodiversity, Health, and Interpretation		•	•		•	
Water in the Western U.S. Is There Enough?						
Constructed Wetlands for Wastewater Treatment as Landscape Amenities		•	•	•		
Food Security in the Western U.S.						
Food Insecurity and Stress Among Children in the West		•	•	•	•	•
Creating Sustainable Communities in a Changing America						
Providing Workforce Housing While Preserving Natural Character in N.H.	•	•	•	•	•	•
Local Decision Maker	•			•	•	•

*Titles of selected articles are abbreviated for efficiency.

4.2.7 The Rural West: Daring to Innovate Job Creation

Creating Value for Place-Based Businesses
Extension economic development agents advocate for small business clients in a broad range of business models and outcomes (Falen, Gray, Sluder, & Westerndorf, 2011). The authors emphasize that working with small business owners is an organic process. Because of the open co-learning process, extension and small-business owners were able to collaborate. Business models that require physical facilities would benefit from early input from the design disciplines so that they are not caught off-guard by the requirements associated with new construction or renovations.

Agricultural Tourism and Rural Development— Developing Value-Added Farm and Ranch Resources to Diversify Operations Beyond Agricultural Production
Evolution of rural agricultural economies from conventional farming to agricultural tourism are described in the article (Burr, 2011). "Agritourism" is identified as providing a rural experience for those living in urban centers. The allure of agritourism relates to urban-dwellers' desires to have immersive experiences in a rural lifestyle (Phillip, Hunter, & Blackstock, 2010). In their efforts to improve their economic stability, agricultural entrepreneurs participate more heavily in alternative business models. In developing branded products that fit into the gourmet food market, agricultural entrepreneurs provide on-site experiences for tourists, and greatly increase the diversity of their product development. Many modifications are necessary to accommodate tourism in existing agricultural operations. Many of these modifications are site and structure issues such as parking, signage, restrooms, and creative ways of illuminating agricultural processes while providing visitors with a positive experience. Consequently, design disciplines should be involved in the early planning stages so that business plans include necessary physical modifications. Additionally, if students had exposure and experience in preparing business plans for the enterprises for which they design, they would develop empathy for future clients and enhance their design skills.

4.2.8 Climate Change Adaptations in the Rural West

Assisting Arctic Inhabitants in Responding to a Changing Climate
The effects of climate-change have already impacted coastal village locations, and promises to impact many economic sectors. Authors (Gamble, Trainor, & Fresco, 2011) identify collaboration efforts between governmental agencies and residents in Alaska as they confront increasingly warmer winters. Design disciplines could be involved in helping plan new communities in danger of becoming submerged or developing strategies to protect existing communities from rising waters. Additionally, the design disciplines could contribute valuable visualization skills during envisioning of new economic opportunities.

4.2.9 Healthy Communities Improving Health and Well-Being

Mental Health Outdoors: the Benefits of Nature
Biophilia and Kaplan's Attention Restoration Theory (ART) are described in conjunction with other recommendations for improving mental health. This project defines the classic use of ART and biophilia to support environmental psychology benefits of nature (Beil, 2010). The benefits of the natural environment can be supported through both activities outside, and through development of architectural and interior design that support humans' intrinsic desire for exposure to the natural environment. There are multiple opportunities for the design disciplines to develop opportunities in the built environment— including site and interior design—that promote human interactions with nature and views to the outdoors.

Poverty Reduction Project Increases Social and Natural Capital
The author (Kollock, 2010) describes a project that involved community clean-up efforts. These efforts were successful in bringing residents together in a dedicated effort to improve the townscape. The successes encouraged the community to tackle larger design issues in town, including a marina. The design disciplines could partner with the community restoration efforts to upgrade local site resources such as the marina, community garden, and other site improvements.

Investigating Places for Active Recreation in Rural North Carolina Communities

The authors reported a lack of clarity in standards about what features to include in local recreational areas (Henderson, Edwards, Casper, Bocarro, & Floyd, 2010). This provides a clear opportunity for the design disciplines, particularly landscape architecture. The importance of forming partnerships was a main finding from rural recreation directors in order to achieve goals. Design disciplines are typically structured to function best as a part of a team assembled to address issues related to the built environment. Design disciplines' involvement beginning early in the process of problem identification, using participatory or co-design methods, would help identify a range of options for recreational opportunities to assist stakeholder subsequent decision-making on standards of recreation provisioning.

Health, Economy and Community: USDA Forest Service Managers' Perspectives on Sustainable Outdoor Recreation

This project primarily focused on a survey of USDA Forest Service managers on "perceptions of sustainable recreation" (Bricker, Winter, & Schultz, 2010 p39). The authors identified that Forest Service managers indicated that residents should be involved in the process. Most felt that there was poor communication between the Forest Service and residents. Design disciplines are versed in participatory or co-design methods that include stakeholder input early in the development process, and provide graphic and written communication material that is easily disseminated to garner public feedback.

Community Recreation and Healthy Living in Rural Settings

This project addressed Louv's (2008) "nature-deficit disorder" regarding rural children, sedentary lifestyles, dependency on technology, and limitations for bicycling or walking long distances. The project refers to the "recreation road - a rural route to planning" as an important resource for rural community planning related to recreation activities (Goodwin, 2010 p45). The author notes that many recreation planners do not gather input from recreational users and recommend ways of generating greater involvement from residents. Design disciplines are well versed in participatory or co-design methods. These present excellent opportunities for involving stakeholders in identifying and prioritizing recreation amenities.

Thermus aquaticus and You: Biodiversity, Human Health, and the Interpretive Challenge

Interpretation of scientific principles behind geologic factors at Yellowstone National Park are described in the article. The authors identify the importance of employing "creative approaches to interpretation" (Dustin, Schwab, & Bricker, 2010 p50). With their emphasis on graphic communication, the design disciplines would be natural partners for scientists who desire to communicate scientific information to the general public in an engaging format. The design disciplines have experience in partnering with experts to interpret complex issues in interpretive centers, museums and other public educational venues. Development of graphic visuals and texts would tell the story of these complex scientific concepts to a general audience through exhibit design.

4.2.10 Water in the Western U.S.: Is there enough to meet the region's needs?

Constructed Wetlands for Wastewater Treatment as Landscape Amenities in Rural Communities

According to the article, small communities with populations fewer than 2,000 residents can use biological treatment systems such wetlands or tanks in greenhouses for sewage. (Austin, 2010). These constructed wetlands can not only treat wastewater but also provide public amenities. The article describes in detail how constructed wetlands are implemented and conceptually illustrates how their principles could be applied. Opportunities for the design disciplines are apparent in the design of constructed wetlands as well as in the educational illustration of their benefits.

4.2.11 Food Security in the Western U.S.

Food Insecurity and Stress Among Children in the Western U.S.

According the authors (Gunderson & Garasky, 2009), children from rural areas are at greater risk for obesity due to the stress brought on by poor quality housing. Housing stressors including living in low quality accommodations, moving in with others, and being sent away from parents, are correlated with issues of food insecurity. Quality housing for seasonal and year-round workforces are suitable design problems for both architecture and interior design.

4.2.12 Creating Sustainable Communities in a Changing America

Providing Workforce Housing While Preserving Natural Character in New Hampshire Communities

Legislation in New Hampshire requires the provision of workforce housing that is affordable and conserves land (Gagne, 2009). This legislation requires that communities consider affordable housing while preserving the natural character of the land. Design disciplines have a clear role in teams collaborating to achieve these complex goals through design of housing and impacted landscapes. The topic provides clear opportunities for design engagement with rural stakeholders as well as interdisciplinary collaboration opportunities for university design programs.

Local Decision Maker

A program developed by Purdue University assists planning decision makers in developing comprehensive plans. It uses assessment of existing conditions, development of a vision for the future, development and comparison of development strategies, and selection and implementation of the preferred strategies. The program is focused on informing and integrating natural resource and economic development decisions (Farnsworth, Kumar, & Nolan, 2009). The article describes database and planning workshop programs, which could benefit if designers could assist community planners in identifying potential design opportunities. This could include the development of solutions with various options that can be easily assessed for impacts on quality of life as well as economic impacts.

4.3   Summary of Research Findings

Content analysis of the *Rural Connections* articles revealed a wide variety of opportunities for design to engage with rural issues. Selected articles revealed opportunities for all three disciplines to engage in broad scale topics and planning-scale projects, as well as focused site-scale projects. Many service-learning opportunities were observed throughout each thematic issue. A graphic summary of these opportunities is presented in a matrix (see Table 4.1).

5   IMPLICATIONS & DISCUSSION

Many of the rural dilemmas engaged by the RRDCs—and embodied within the rural built environment—would benefit from the creative and technical expertise of landscape architects, interior designers, and architects. Within these rural dilemmas, there are opportunities for design to be involved in the projects described, either immediately or in subsequent steps that further develop the project in the future. Concurrently, incorporating rural service-learning projects into design studios promotes several pedagogical benefits including valuable real-world learning experiences for students, and potential for instilling empathy in students for populations and communities with which they would otherwise lack experience. Within land-grant universities, rural community design projects provide opportunities for students to engage with issues of community participation, green infrastructure, regional connectivity, and food security, all while involving students in the institutional mission of service and outreach (Cameron, Forsyth, Green, Lu, McGirr, Owens, & Stoltz, 2001).

Given their expertise in collaboration, visualization, and design thinking, one may wonder why design programs housed within member land-grant institutions are not more apparently involved in these featured projects? One possible explanation resides in previous research indicating the persistence of challenges for engaging in interdisciplinary rural design engagement in an era of urbanization (Ryan, Krikac, and Sleipness, 2015). As urbanism draws research funding and faculty interest, one may reason that rural design issues seem less alluring in academic design cultures, even in programs housed within

land-grant universities. Or perhaps those engaged in rural issues from a non-design discipline perspective have not considered how design thinking could be leveraged within a project that may seem unconventional—or even inappropriate—for landscape architects, interior designers, or architects.

5.1   Frameworks for Engagement

If university design programs were more involved in rural issue-based activities of the RRDCs, both rural communities and design programs' faculty and students could realize a range of benefits. As discussed earlier, rural issues are inherently design opportunities; involving design programs within the context of interdisciplinary teams could substantially advance the RRDC's aims for collaboration and aggregation of project benefits on a regional scale. Design could help the RDDCs achieve their goals of maximizing projects' regional impacts through interdisciplinary collaboration. Additionally, shared service-learning and research projects could catalyze collaboration among faculty within and across academic institutions. Design involvement would mutually benefit both students and those who inhabit rural places. Due to their urban and suburban upbringings, many university students do not have familiarity of rural communities and are unaware of the challenges, and unique assets that rural communities provide.

Because of the complex and interdisciplinary nature of professional practice, university design programs wrestle with how to equip their students with a comprehensive foundation of knowledge and experience. Through rural design service-learning experiences, students will have opportunities to develop empathy for those who inhabit rural areas and the challenges they face. By engaging in rural design issues, at the level of academic programs, future and emerging design professionals would be initiated into a culture of professional service to communities in need. While we do not anticipate nor recommend that design programs shift their priorities to the exclusion of urban issues, engagement with the RRDCs is one potential way that programs may educate more well-rounded future design professionals.

5.2   Study Limitations

This study is not without limitations. First, while the WRDC promotes *Rural Connections* as a showcase of its highest priority projects, it is possible that engagements among extension, design programs, and communities do occur, but were not showcased in this publication. Relatedly, this study does not evaluate design programs' involvement in rural issues at non land-grant universities. Additionally, due to the overlapping nature of professional design practice, opportunities assessed as most appropriate for one discipline may not preclude the involvement of additional design programs.

While this study evaluated opportunities for interdisciplinary engagement by landscape architecture, interior design, and architecture, it does not explicitly assess the potential for other allied design disciplines such as environmental design, bioregional and community planning, industrial design, art, construction management, or engineering. Future studies could further the exploratory research of this study by including these disciplines in a similar evaluation of collaborative opportunities.

5.3   Directions for Future Research

Given that topical priorities engaged by the RRDCs can originate from Extension directors, agents, and faculty, future research might include a survey of Extension individuals to more completely assess their familiarity with the expertise of design faculty and students, and their receptiveness to collaborating with design. Concurrently, future research could also include an in-depth inquiry into the urbanist inclinations of contemporary design education at land-grant institutions in order to assess levels of interest in engaging in rural projects among design faculty. While design programs' urban emphases are apparent and corroborated by previous exploratory research (Ryan, Krikac, & Sleipness, 2015), a more comprehensive review of this issue would contribute to the literature and potentially illuminate willing rural design collaborators at the regional level.

In addition to these future research directions, design programs and their faculty should self-reflect on whether they are missing opportunities for rounding out their students' learning experience and building capacity for empathy. Design programs should evaluate how they can effectively market their core skills to unconventional design partners and projects. Through exposure and networking with Extension directors and staff, design programs and their faculty might build relationships and establish professional rapport with rural partners.

As universities place greater emphasis on funded research, design disciplines must adjust to this new paradigm. The four RRDCs are a potential organizing framework for design disciplines to engage in nationally recognized and funded research and engagement priorities through service-learning studio projects. For landscape architecture, interior design, and architecture to fully engage human settlement on a regional scale, rural built environments must be holistically considered as part of an interrelated system of design challenges. While rural settings present an intriguing array of opportunities for design thinking, the greatest challenge may be to shift conventional conceptions of the work designers can do.

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