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Extending an Inquiry Model to Enhance Geographic Education in Chile

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Abstract

The Geo-Inquiry Process developed by National Geographic engages students in geographic inquiry that starts with students formulating a question based on a problem in their local community and leads to taking informed action through advocating for a tangible solution. Originally designed for a primarily North American audience, this research describes how this geographic inquiry process can be adapted to a Chilean educational context and then ideally more broadly across Latin America. This article provides a background on Geo-Inquiry, an overview of the adaptation process in Chile, and includes example sustainability and environment focused projects from the Chilean pilot school cohort.

Keywords: inquiry, National Geographic Society, Chile, sustainability, geography education, Latin America

Introduction

Regardless of country or culture, people want to make their communities and neighborhoods better places to live by solving local problems and enhancing positive aspects of their local area. This commonality drives the fundamental tenet of the Geo-Inquiry Process, a framework designed by the National Geographic Society to instill the confidence, habits of mind, and skillset for students to identify, operationalize, and solve geographic issues in their community or neighborhood. This paper discusses how a North American curricular framework was adapted to Chile, despite differences in content standards and school contexts. While the Geo-Inquiry Process can encompass projects with either a social science or environmental science basis, it is ideal for enlisting students in solving local problems that have a human-

environmental foundation and that connect to the same or similar issues nationally or globally. The focus of this research is geographic inquiry in that context, particularly, sustainability. This article begins with an overview of the Geo-Inquiry Process, followed by a review of the literature related to inquiry in geography, science, and social science education, as well as sustainability education more generally. Next, the paper describes the American context for this process, followed by how the researchers extended it to Chile. The paper provides a series of examples for how the Geo-Inquiry process was adapted into secondary schools in Chile as evidence of student work. Ending with a discussion, the paper focuses on the response to and implications of this instructional shift in Chile.

Introduction to the Geo-Inquiry Process

Contemporary geography draws on a range of tools and techniques to address complex and multi-faceted issues. These include rapidly evolving newer technologies such as remote sensing, computer-based spatial analysis, and geographic information systems as well as mainstays of geographic research such as mapping, interviewing, photography, sampling, and writing. The Geo-Inquiry Process can bring all of these to bear, while also providing a systematic structure for students to identify, analyze, and provide solutions for local issues that have a geographic component. This standards-based, wholly geographic process encompasses five phases: ASK, COLLECT, VISUALIZE, CREATE, and ACT. Together these steps form a process that is different from most other curricular processes in geography, science, and social studies, despite drawing elements from citizen mapping, the scientific method, and the Inquiry Design Model (Schlemper et al, 2018; Swan, Lee, & Grant 2018), Geo-Inquiry begins with students formulating their own question and ultimately leads to students taking informed action to address or solve the question they identified.

The ASK phase of the Geo-Inquiry Process has its origins in project-based learning (PBL) as well as the Right Question Institute's Question Formulation Technique (QFT), both created to foster student agency and to recognize the critical importance of question formulation for students' future college and careers. While students collectively generate the ASK question, the teacher's role is critical to help provide a context and parameters, such as ensuring that the question is actionable, feasible, geographic, connected to curricular standards, and leads to taking informed action. The COLLECT phase is next, a stage ideally drawing from a variety of geographic data that are appropriate to addressing the initial question that drives the process. Linking with the architecture of many state standards, this phase is couched in a compelling/supporting question format with the compelling question being the lead Geo- Inquiry question and supporting questions framed for students as "need to know" questions.

Split into two parts, the VISUALIZE stage first extends data collection by providing a structure for students to engage in data mining their spatial data, including creating draft maps to better see patterns in the data. The second element of the VISUALIZE phase prompts students to begin thinking about how they can best communicate their findings through effective data visualization techniques. The CREATE phase leverages data visualization towards the construction of a storyboard that also brings in narrative, photos/videos, and other key components to tie it all together. Students need to consider their audience, the group of stakeholders they are asking to make a positive change, during this phase. The CREATE phase could conclude with a poster, website, simulation, report/narrative, or some combination of these. The final stage of the Geo-Inquiry Process is ACT, the critically important culmination of students' work. This phase is where students have the opportunity to take informed action, transcending a simple presentation or report like a student might have in a science fair or classroom capstone project. The ACT phase must center on a concrete action, large or small, that goes beyond simply informing an audience about a concern or raising awareness.

Literature Review

In North America, inquiry has replaced earlier models of secondary teaching and curriculum design, both in the social sciences and the sciences. This shift is represented in the United States by the *C3 Framework* in social studies and *Next Generation Science Standards* in science, a marked departure supported by education research. The importance of children formulating their own questions, fundamental to inquiry, is well documented in research on learning (Bruner, 1960; Piaget [1929], 2007; Vygotsky, 1986). In science and science education, the centrality of inquiry is well documented (Duschl & Grandy, 2008; National Research Council, 2012). So too in social science where research demonstrates the vital importance of inquiry including creating opportunities for students to ask questions, pursue answers to those question with the guidance of teachers, and convey their findings to take informed action on the solutions they identified (National Council for the Social Studies, 2014; Torney-Purta, Hahn, & Amadeo, 2001). Other national curriculum elevate inquiry, including Australia where inquiry is embedded within geography (Kidman, 2012).

Inquiry is fundamental to project-based learning (PBL). Research published by Parker, Mosborg, Brandford, Wilkerson, and Abbott (2011), Thomas (2000), and other scholars demonstrates that PBL has an overall positive impact on student learning. These effects include increasing social science competencies and improving science learning outcomes (Duke, Halvorsen, Stachan, Kim, & Konstantopoulos 2017; Rivet & Krajcik, 2004). In environmental education, project-based learning had a positive effect on students' environmental attitudes (Genc, 2015).

Despite the fundamental importance of inquiry in contemporary geography education, research in this area remains limited. Existing scholarship is more often found in the context of geographic information systems (GIS) in education, particularly professional development for teachers (Hong & Melville, 2017; Hong & Stonier, 2015; Oda, Herman, and Hasan, 2019; Ridha and Kamil, 2021). Maddox, Howell, and Saye (2018) differentiate between various types of inquiry in geography and advocate for constructing knowledge that leads to positive change and has value beyond the classroom. More recently, *The Geography Teacher* dedicated a special issue to geographic inquiry. This includes articles that highlight the value of student thinking and students' lived experience as part of geographic inquiry and note the connections between geography and the inquiry arc that is part of the *C3 Framework* (Mohan, 2018; Paska, 2018). Research on the Geo-Inquiry Process specifically demonstrates that this method of geographic inquiry has the potential to advance students' fundamental geography skills and capacity to structure inquiry (Oberle, 2020). This is particularly the case in middle school level education where the process clearly articulates with national and state standards in the United States as exemplified through high quality student projects (Oberle, Bess, Ehmke, Rath & Robbins, 2019).

The North American Context

The team who developed the Geo-Inquiry Process designed the framework to be malleable and adaptable to a variety of situations and contexts. For example, while created with middle school students in mind, it is easily modified for both high school and upper elementary school classrooms. While geographic, Geo-Inquiry is regularly carried out in classes that are not solely geography courses, including other social science classes, earth or environmental science courses, and enrichment classes. The process is adaptable to a variety of schedules and timelines, including short classes that meet for under an hour, classes that meet irregularly, and longer block courses.

In North American schools, Geo-Inquiry projects have ranged across geographic themes and subdisciplines to include historic preservation, providing social services, and environmental science. For example, in Hawaii students identified the risk that common sunscreen poses to corals and coral ecosystems and their project led to the creation of a native plant-based sunscreen that was effective and could be distributed to beachgoers in their community. A group of Iowa students in a low-income school recognized the hardships many students endured because they lacked transportation to a new city recreation center and sports complex. The project centered on the importance of physical fitness and advocated for local leaders to make minor adjustments to a bus route to provide students access to the recreation center.

A California project addressed the issue of plastic pollution culminating in taking informed action that led to city leaders pledging to install bottle filling stations in all new city parks, thus reducing the community's reliance on plastic bottles.

Geo-Inquiry in Chile: Process and Methods

This project extends the Geo-Inquiry Process to Chile, using best practices developed by educators in the United States to disseminate the framework within Chile and to other Latin American countries that have similar national standards to Chile. Building on existing collaboration and expertise among the research team, the project began with site visits to prospective partner schools, speaking to teachers and administrators about the nature of the process and its value to students and communities (Oberle & Araya, 2012; Araya, 2010). A few months later, once funding was secured, the project director lead a Geo-Inquiry workshop for the four partner schools and teacher education faculty. Participating schools represent the continuum of school types and demographics in Chile: one urban private school, one public school in a regional center, and two public schools in rural areas. In addition to these partner schools, teacher education students contributed to this project, building a required curriculum development component of their student teaching around the Geo-Inquiry Process. With this project team, new resources and best practices in integrating Geo-Inquiry within the Chilean curriculum and context can be disseminated to schools across the country and to teacher education programs.

Educators on the project team facilitated six Geo-Inquiry projects, one in each of their respective schools. Two of the projects were in a partnership between the school and the university, developed by student teachers with the support of their student teaching cohort and geography teaching methods instructors. Students Geo-Inquiry questions were shaped by project ideas from North America, but with consideration of key issues in students' communities. Two projects focused on social science questions: historic preservation and archeological conservation. The other four projects squarely address geographic aspects of environmental science issues, most significantly tackling both human and physical elements of the problem they selected.

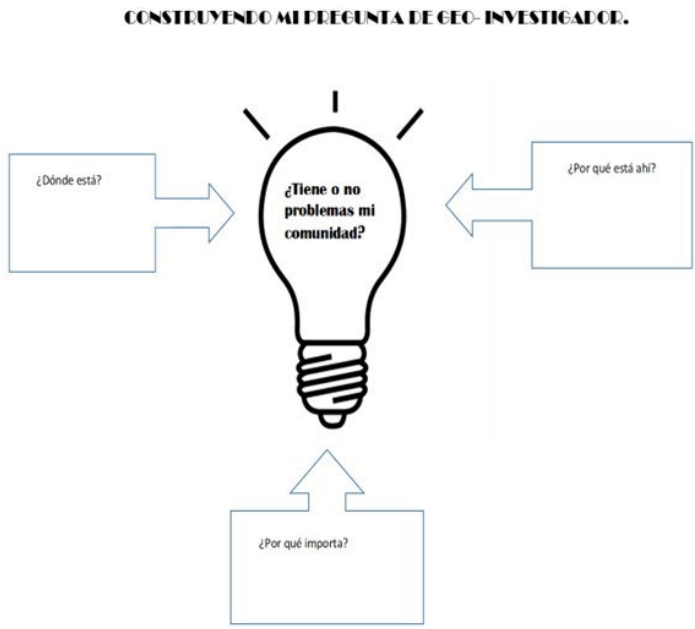


Figure 1. Constructing My Geo-Inquiry Question diagram

Methods

There were two in-service educator workshops, one at the start of the initiative and the second just prior to the completion of student Geo-Inquiry projects. Each of these incorporated participating educators as a method for data collection. This consisted of both free form discussions as well as targeted questions, all relating to the process of extending a geographic inquiry framework from America to Chile. Topics included using and adapting Geo-Inquiry teacher and student guides, articulating with Chilean national standards, and modifying and aligning instructional practices. In the second workshop, occurring just prior to the end of the academic semester and near the Geo-Inquiry projects, the workshop served to solicit in-service teacher opinions regarding primary obstacles and opportunities with the Geo-Inquiry model as well as to convey teachers' perceptions of student learning through this novel process.

Later in the academic year, within a geography teaching methods class, pre-service teachers presented their students' projects from their student teaching responsibilities as part of a videoconference. This forum provided the opportunity to collect data on both pre-service teachers' assessments of the geographic inquiry framework as well as their perceptions of student learning. Specific discussions included student work

products related to each of the Geo-Inquiry phases as well as pre-service teachers' assessment of student collaboration. Like the final workshop for in-service teachers, the pre-service teacher audience was asked to discuss obstacles and opportunities related to the Geo-Inquiry Process in their student teaching classrooms. Because pre-service teachers do not yet have a mastery of either pedagogy or content, their presentations included an expanded discussion of the topic their students pursued for Geo-Inquiry, chiefly how the pre-service teachers organized and presented content that would serve as the knowledge base for student inquiry.

Central to this research and serving as a primary method, the project team directly evaluated materials created through this project. Each teacher was required to lead their students through the creation of a Geo-Inquiry capstone video that was designed for summative assessment and to disseminate as an exemplar. As such, the project team evaluated the capstone videos based on a set of criteria that included evidence of project question formulation as a group effort, correct alignment between student work and the Geo-Inquiry phases, linkages with national curriculum, documented student collaboration, and demonstrated taking informed action. Teachers also provided examples of instructional materials they created to facilitate the geographic inquiry process as well as samples of student work.

Results

Students were encouraged to create Geo-Inquiry projects from the broader topics of water stress and seismic risk, in addition to tackling critically important local issues at the forefront in their communities. With a key goal of this project being to pilot this new process in the Coquimbo region of Chile and then to disseminate it nationally and across Latin America, seismic risk can serve as the basis for geographic inquiry across Chile and northward from Peru to Colombia to Mexico. Similarly, water stress is an ideal topic in several Latin American nations including Argentina, Bolivia, Peru, and Mexico, among others. Since the Geo-Inquiry Process has global appeal, a focus on these themes and model project exemplars created in the Chilean pilot, can additionally transfer to South Africa and Turkey (water stress), to Japan and New Zealand (seismic risk), and to a host of other countries (Amahmid et al., 2019; Gouramanis & MoralesRamirez, 2021). The four case studies described here are particularly transferable across Latin America, while the other two case studies, not highlighted in this paper, are more place specific, focusing on historical preservation and archaeology.

Geo-Inquiry Project: Humedales

The term *humedales* in this arid part of Chile refers to areas where underground rivers that carry snowmelt from the Andes rise to the surface in the broadening channel and alluvium where the river meets the sea. These wetlands typically cover only a small several acre area and are prone to pollution and disturbance because they are often adjacent to new coastal development (Zuleta & Piñones, 2015). Students in a private urban school identified the ecological importance of these wetlands, often the only areas of surface freshwater in this desert region. The Geo-Inquiry project built a case for the importance of wetlands, advancing through the steps in the process.

Students began the process with a field trip to coastal wetlands, the first step in preparing to form a series of viable Geo-Inquiry questions. As part of this, a naturalist specializing in bird life guided the students through the landscape and the visit was supplemented with recent Google Earth imagery that shows affluent subdivisions and condominiums encroaching on the wetland areas. Before formulating a Geo-Inquiry question, the lead teachers established a short session for students to generate supporting questions, those questions that one needs to know to pursue inquiry in this topic (Figure 2). After selecting a Geo-Inquiry question based on the role of responsible citizenship in promoting ecological and community values, students moved to the collect phase of the project.

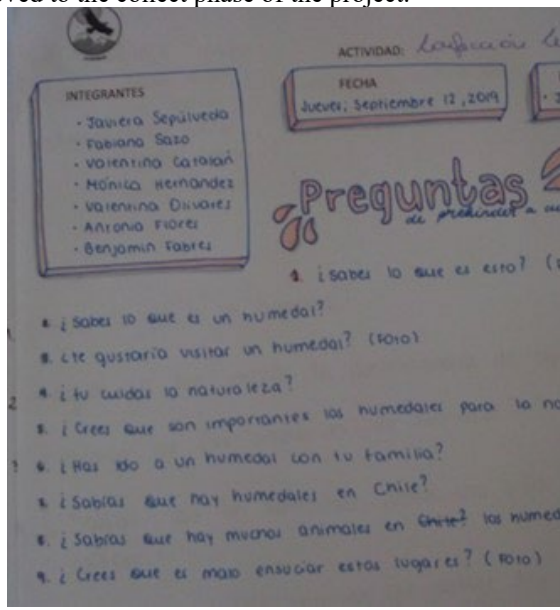


Figure 2. Supporting questions for wetlands conservation project.

Student research and data collection included traditional research in the school library that helped establish a survey that was designed to determine baseline knowledge about wetlands in general as well as *humedales* in the community. Because the project goal of promoting responsible citizenship included an audience of elementary students, the surveys were created for different elementary grade levels. Once the elementary students were surveyed, those responses became part of the collect phase data. The class returned to the wetlands for an additional fieldtrip, collecting conservation data with the assistance of a naturalist guide. Throughout this process students worked in task teams to answer key supporting questions for the project, such as documenting the location and formation of the wetlands, as well as identifying threats associated with encroaching development and illegal dumping.

Differing from other Geo-Inquiry projects that typically employ maps for the visualization stage, this project instead focused visualization on the data analysis from the elementary student surveys in addition to interviews and surveys of naturalists working to conserve the wetland areas. In any Geo-Inquiry project, a critical part of the create phase is to identify the audience for the act stage, the person or organization the students will lobby to take action to solve the issue central to the project. In this case, students elected to further responsible citizenship by advocating for wetlands conservation among three different audiences: elementary school students, residents in specific neighborhoods, and the public at large.

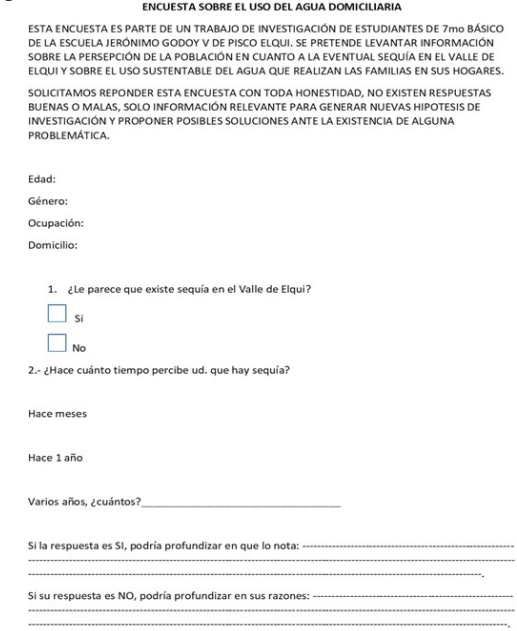
Extending the create phase to the act phase to take informed action, students established multiple ways to reach the public at large. This included an Instagram site that showcased more visual elements of their work to include narratives superimposed on photos of *humedales*. Students also spoke on two regional radio stations, sharing their informed and compelling case for wetland conservation. Recognizing the importance of neighborhood organizations in a larger metropolitan area, the students convened for a presentation at a local community center. Students themselves can be a powerful force when they enlist other students in taking informed action. In this case, the Geo-Inquiry students presented their project and held workshops for students at the same or similar grade level at other schools, as well as visiting an elementary school and kindergarten. By sharing their project in this manner and encouraging younger students to tackle wetlands conservation, the students provided an enriching educational opportunity and enlisted parental support since elementary age students would ask their parents to help further this cause.

Geo-Inquiry Project: Water conservation in the Elqui Valley

The Elqui Valley of Chile is a premier grape, papaya, and avocado growing area and the students in the rural school here chose to address water

conservation in this vital agricultural area as their Geo-Inquiry project. Residents of the valley have worked diligently to balance water usage by wealthy landowners and corporate farms with the water needed by family farmers and communities, but this has become more challenging due to a multi-year drought. The students designed a Geo-Inquiry project that would both inform and take concrete action, as well as enlist all the valley's residents. Key aspects of this project are a campaign to let residents know how much water is lost through common occurrences like malfunctioning household plumbing fixtures and damaged irrigation pipes.

Unique to this project, the collect phase was intertwined with the ask phase as well as early elements of the act phase, as taking informed action included an extensive survey of residents that both collected data on conservation efforts, but also served as a means to remind home and property owners to check for sources of water loss that can be prevented or solved without much money or effort (Figure 3). As part of this survey, respondents are asked to denote the amount of time they think the area has been stricken by a drought, initially raising awareness of the issue and then the survey solicits respondents' prioritization of water conservation. Prior to this point, students had identified water conservation as their topic for Geo-Inquiry, but the survey instrument helped refine the leading question that drove the research project.



ENCUESTA SOBRE EL USO DEL AGUA DOMICILIARIA

ESTA ENCUESTA ES PARTE DE UN TRABAJO DE INVESTIGACIÓN DE ESTUDIANTES DE 7mo BÁSICO DE LA ESCUELA JERÓNIMO GODOY V DE PISCO ELQUI. SE PRETENDE LEVANTAR INFORMACIÓN SOBRE LA PERSEPCIÓN DE LA POBLACIÓN EN CUANTO A LA EVENTUAL SEQUÍA EN EL VALLE DE ELQUI Y SOBRE EL USO SUSTENTABLE DEL AGUA QUE REALIZAN LAS FAMILIAS EN SUS HOGARES.

SOLICITAMOS REPONDER ESTA ENCUESTA CON TODA HONESTIDAD, NO EXISTEN RESPUESTAS BUENAS O MALAS, SOLO INFORMACIÓN RELEVANTE PARA GENERAR NUEVAS HIPOTESIS DE INVESTIGACIÓN Y PROPONER POSIBLES SOLUCIONES ANTE LA EXISTENCIA DE ALGUNA PROBLEMÁTICA.

Edad:

Género:

Ocupación:

Domicilio:

1. ¿Le parece que existe sequía en el Valle de Elqui?

☐ Si

☐ No

2.- ¿Hace cuánto tiempo percibe ud. que hay sequía?

Hace meses

Hace 1 año

Varios años, ¿cuántos?_____

Si la respuesta es SI, podría profundizar en que lo nota: ----------
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---.

Si su respuesta es NO, podría profundizar en sus razones: ----------
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Figure 3. Water conservation survey instrument.

Geo-Inquiry Project: Socioeconomic Vulnerability to Tsunamis

Coquimbo, Chile is a working-class community where many of the lowest income residents live in poor quality and crowded housing, sometimes just meters away from the line that demarcates the highest tide. As such, these Coquimbo neighborhoods are extraordinarily vulnerable to even minor tsunamis, a phenomenon made worse by the morphology of the bay that has historically concentrated tsunami wave dynamics. This pre-service teacher facilitated Geo-Inquiry project demonstrated exemplary work in educating students about the causes, consequences, risks, and vulnerabilities (geologic and socioeconomic) of tsunamis in this community, leading to a strong Geo-Inquiry question and a framework for taking informed action.

Approaching a seismic hazard from the perspective of socioeconomic vulnerability, this Geo-Inquiry project redirected students' understanding of such phenomenon away from being something purely environmental towards a more realistic, holistic, and geographic assessment of the risk and the means of taking informed action to address this risk. Since pre-service teachers in this course were both enhancing their geography content knowledge, in this case the regional geography of Chile and seismic hazards, they engaged in research that would allow them to set up a context and framework for their secondary students whom they would soon be working with as part of a student teaching practicum. Their research included a deeper investigation of the causes and history of tsunamis as part of physical geography, as well as identifying areas at high risk for tsunamis because of socioeconomic vulnerabilities, specifically the Baquedano neighborhood of Coquimbo. This included noting the history of tsunami damage from recent tsunamis, defining the concepts of socioeconomic and organizational vulnerabilities, assessing local risk factors like common materials for home construction in this neighborhood and population density, and evaluating the tsunami alert system and the organizational capacity of this at-risk neighborhood. The pre-service teachers generated maps, analyzed data, and engaged in fieldwork to better address these risks, all while noting different types of potential tsunami damage to include flooding, direct wave damage to structures, and the erosion of foundations.

In their classrooms, to provide foundational knowledge, the teacher education students began with a lecture on plate tectonics and earthquakes, leading to a discussion of the range of seismic hazards, and then to tsunamis specifically. Elements of socioeconomic risk were then conveyed to students through the use of maps and imagery, photographs, data, and narrative. Students formed a strong Geo-Inquiry question that led to taking informed action. While not completed due to the pandemic, the students endeavored to advocate by writing a letter to city leaders to do more to support these vulnerable communities as well as meeting with neighborhood councils to share concerns

about risks specific to that area and ideally be the starting point for both neighborhood council and city administrators to create management plans.

Geo-Inquiry Project: Combatting Long Term Drought in Salamanca

Much of central Chile is in a long-term drought, compounding water stress in an already semi-arid/arid region. Situating a Geo-Inquiry project within this context, two pre-service teachers and their students at an urban private school first established a foundation through outlining the Geo-Inquiry steps, generally discussing the issue of drought in a larger context, and speculating about the social, environmental, and economic impact of drought. As part of this, students created a short video on the overview of drought and its impact to add to their baseline knowledge and allow the pre-service teachers to identify any gaps in their understanding of the larger phenomenon. Students agreed on a broader Geo-Inquiry question regarding how to engage residents in mitigating the impact of the drought. As a component of the collect phase, students decided to focus their efforts on the Salamanca area, a part of the region that is more severely affected by drought, made worse by mining activities that have drawn down the water supply so much that farmers lack adequate irrigation for crops. After collecting and visualizing additional data, the create phase centered on designing detailed and polished infographics that would be used with a letter that called for renewed water conservation efforts (Figure 4).

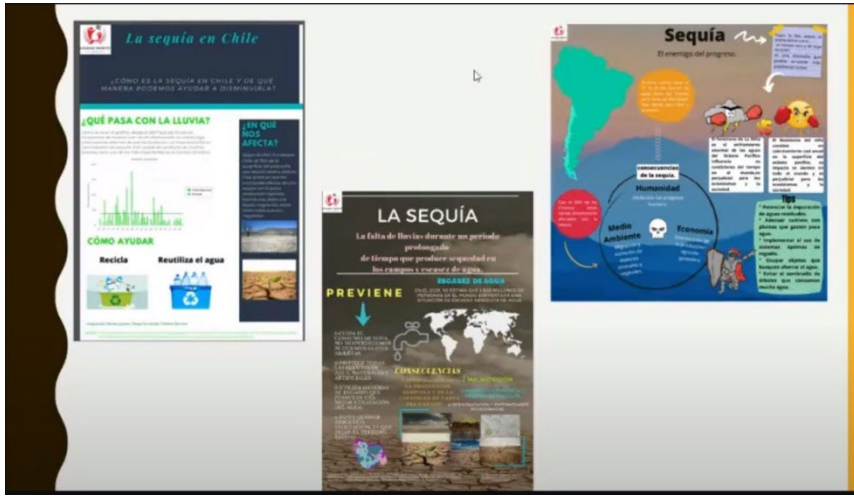

Figure 4. Drought infographics developed by pre-service teachers and their students.

The infographics include three components: the history of the drought, how to conserve water, and the consequence of drought. Student task teams created variations of the same infographic using different designs, visual elements, and narrative. The pre-service teachers leading the project established opportunities for students to provide feedback on infographics created by other student task teams, thus enhancing the learning experience and further refining the infographic. Once completed the infographics were paired with the 'request letter' that asked residents to conserve water. Like the infographics, students collaborated to draft the letter ensuring that it included key points, was polite and professional, and reflected the students' consensus in terms of how it should be worded.

Discussion

At its core, the Geo-Inquiry Process relies on geographic perspectives, offering students a unique lens to analyze space, place, and interconnections of systems in our world. The overall goal of this method is for students to learn the perspectives and skills of a geographer and apply them to a local problem. As a result of this work, the next generation is expected to have the inspiration, confidence, and skills to enact real and positive change locally, nationally, and globally. While there are numerous examples of successful student outcomes in North American schools and classes, this research documents and discusses important considerations in implementing the Geo-Inquiry Process for the first time in Chile and in a Latin American context. This discussion includes aspects of the process that easily translated into the Chilean education system and context, as well as elements of the process that were more challenging to incorporate. Similarly, this section discusses comparisons in student learning between Geo-Inquiry and the existing Chilean curriculum and includes perspectives from teacher education students and teacher education faculty.

Advantages and Challenges in Incorporating Geo-Inquiry into the Chilean Curriculum

The essence of the Chilean national curriculum is to promote the study of local areas and regions so that students can achieve a greater understanding of their surroundings in a regional and national context. As such, Geo-Inquiry aligns with this existing curriculum, enlisting students in investigating local issues, such as drought and natural hazards, that are fundamentally important in this particular region and across the country. Furthermore, the structure of the Geo-Inquiry Process generally aligns with existing curriculum and instructional strategies. In a ninety-minute class -- standard across the country -- teachers follow a structure that includes three phases: introduction, development/elaboration, and closure. Thus, the five phases of Geo-Inquiry align well with the existing timeline and phases already in place in Chilean

classes.

In other ways, Geo-Inquiry proved challenging to incorporate. The pilot cohort of educators in Chilean schools expressed some apprehension about adopting this novel educational process, thinking that National Geographic designed it solely for a North American context. The project team led two workshops, as well as translating the teacher and student materials into Spanish, thereby providing the teacher cohort with the foundation and confidence to incorporate the process into their courses, addressing the group's concerns. An additional challenge of this innovative way to teach geographic inquiry was evident in some Chilean pilot schools, just as it was in some schools in the United States, the tendency to frame the process as a research project or science project. Rather than simply research, the Geo-Inquiry Process asks students to tackle a real-world geographic issue that leads to taking informed action, which transcends just sharing research results. Regardless of the country context or curriculum, teachers and students are not often trained to design projects that lead to advocacy, including how to formulate the right research question to ask or identifying the best suited audience for students to enact positive change.

The project team observed that the Geo-Inquiry Process helps re-assert the teaching of geography in the Chilean national curriculum, especially as geography has recently been demoted from a stand-alone discipline to one integrated with history and other social sciences or existing as only an elective course. In this context, Geo-Inquiry serves an important role in strengthening the teaching of geography in the many combined courses taught in secondary schools in Chile. There are several identified geographic competencies within the national standards that align directly with the foundations of the Geo-Inquiry Process to include multiple perspectives, multiple scales, sustainability, and project-based learning leading to problem resolution (Ministerio de Educación, 2019).

Geo-Inquiry as a Means for Addressing Risks and Challenges in Chile

One of the most important challenges today in Chilean education in the 21st Century is the need to understand the country's opportunities and challenges as they relate to geography, most significantly water stress and seismic risks (Caruso, Schofrin, & Bachmann, 2019). The Geo-Inquiry process invites students to tackle these issues, elevating the importance of these topics within Chile and the Chilean educational system, to include understanding how events like droughts and earthquakes occur, understanding the processes that generate them, and assessing the consequences of the intertwined physical and social repercussions (Arenas, Fernández, & Pérez, 2016). Establishing this process as a model in teacher education courses at the University of La Serena, such as 'Methods in Geography Education' and 'The Regional Geography of Chile', generated key knowledge about water stress and seismic risks that was

seamlessly incorporated into teaching guides and related curricular materials.

Chile currently suffers from a series of challenges related to natural hazards risks and vulnerabilities, especially seismic events. Despite a specialized institutional structure within the national government to mitigate such hazards, there is little communication among agencies and organizations, limiting their effectiveness in preparing for and responding to what are, in reality, socio-natural disasters. In the educational arena in Chile, traditional curricular frameworks are ill equipped to integrate skills and disciplines to address hazards, particularly the combination of content, abilities, and tools necessary to create what amounts to a preventative mindset rather than just simply disaster response.

Conclusion

Despite differences between Chile's and the United States' curriculum and the standards that guide curricula, the Geo-Inquiry Process resonates with Chilean teachers and educators, centering on an interest in addressing local issues to enact positive change. This method of geographic inquiry promotes student research, builds on geographic themes and concepts, and provides an avenue for meaningful learning through students performing progressive tasks. Modeling a true research process, students formulate research questions, develop or adapt research instruments, collect data, and draft visuals, all while constructing student knowledge in geography and the related geographic theme of the Geo-Inquiry project.

Making local and regional problems visible should drive geography curriculum, connecting to students' lived experiences and nascent research abilities. In a fast changing and at-risk world, this is necessary for developing student knowledge and for cultivating the habits of mind to take informed action. This type of learning experience allows young people to readily acquire inquiry skills as well as prepare pre-service teachers in teacher education programs. With the focus on citizenship, fostering inquisitive and reflective young people, the Geo-Inquiry Process aligns with the interests of students and the larger community in the Coquimbo region of Chile and nationally, providing means for students to identify real problems and propose pertinent and feasible solutions to solve those issues.

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