

A Powerful Geography Approach to the Curricular Transformation of the Undergraduate Geography Program at the Universidad de Costa Rica

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Abstract

The school of geography at the Universidad de Costa Rica started in 2015 a revision of the undergraduate geography program, ending in 2018 with the approval of a new and renewed curriculum. This process involved a “bottom-up” participatory method led by the “teaching committee”, where faculty members, administrative staff, students, potential employers, and international external reviewers offer their knowledge, opinions, and feedback. This approach ended up in the epistemological definition of the discipline, the challenges in which geographers are called to actively participate at different scales and contexts, the objectives of the geography’s undergraduate program, and the potential employment opportunities of future professionals. The committee ended up proposing the curricular structure and organization that will allow student’s knowledge acquisition, and the pedagogical approach that will guide geographic learning. The purpose of this article is to analyze how powerful geography concepts and ideas can contribute to understand the changes that the school implemented in this new curriculum. In this way, we discuss on how powerful geography arguments are useful to understand the nature of the changes made to the undergraduate geography program.

Keywords: powerful geography, geography, curriculum, higher education, geography education

Introduction

The school of geography at the Universidad de Costa Rica started in 2012 a process for obtaining the national accreditation of its undergraduate geography program (UGP). This distinction is awarded by the “Sistema Nacional de Acreditación de la Educación Superior” (SINAES), the official institution that certifies a set of standards assuring the quality of any program at Costa Rican universities. The certification is achieved by performing an in-depth analysis of the administrative, infrastructure, curricular, and pedagogical components of any program. In Costa Rica, the accreditation means a prominence of the program among universities and a wider recognition by the society. In addition, employers in public and private sector tend to appreciate better the students graduated from accredited programs.

The most prominent issue in our school was the analysis of the undergraduate program curriculum. After an intense participation and debate of faculty, staff, current and graduated students, and potential employers, three alternatives appeared about the future of the UGP. One group of participants wanted to continue with the same curricular structure, while a second group proposed only partial changes to the existing program. However, the third alternative—a complete transformation of the UGP curriculum—was finally embraced by the school of geography, who appointed the “teaching committee” as in-charge of conducting a process that ended with the new UGP curriculum, effective as of 2019.

The purpose of this paper is to show how powerful geography concepts and ideas can be used to explain the development and outcomes of our UGP transformation, although we acknowledge that the new curriculum was not developed by making explicit references to this theoretical approach. In this way, we aim to address through the presentation of the new curriculum, relevant discussions about what is the role of geography in higher education, and how does this science prepare better citizens and professionals for improving our world. The article delves into the process of developing the new curriculum, by looking through the lenses of the powerful geography approach in the context of higher education. At last, we show the structure of the new UGP and how the school envisions a new professional prepared for contributing to the advancement of geography and the society.

The context: the school of geography at the Universidad de Costa Rica

The University started offering a geography bachelor’s degree in 1973, as part of the school of history and geography. There was a change in 1997, as the degree was offered by the recently founded school of geography. In 1998, the Universidad de Costa Rica approved a substantial UGP change, in which the

School proposed then new theoretical foundations, an updated purpose of geography in higher education, curricular components, learning outcomes, and geography courses.

The school realized—after 15 years—that it was necessary to develop an analysis of the undergraduate program. In 2012 the school approved a partial curricular reform; however, those changes were insufficient to cope with the demand of several groups for a program renewal. Therefore, the school of geography began a curricular transformation in 2015, aligning the social, professional, and educational changes and demands that our discipline experienced in recent years.

We believe that at this point it is necessary to provide a brief explanation about the specificities of our program. The—former and current—UGP is composed of a four-year bachelor program, followed by an additional—an optional—fifth year in which students obtain a “licentiate degree”, after approving their coursework and a geographic research under the guidance of geography faculty. The school also offers a master’s degree in geography and geographic information systems and remote sensing (which is a shared program with school of geographical sciences at the Universidad Nacional of Costa Rica). There are currently 14 faculty members, as well as five administrative staff. In addition, the program had 460 students enrolled in the undergraduate program in 2019, with 80 new students entering every year.

The structure of the UGP curriculum is comprised of a combination of mandatory and elective courses. The school of geography determines the type and characteristics of the mandatory courses, being some of them requisite for enrolling in further courses. The students can also choose from a pre-defined list of elective courses to complement their geographic preparation. The Costa Rican higher education system differs from the United States in the way students engage in their respective undergraduate programs. In our case, students choose since the beginning their program. This situation allows students to enroll in geography courses since the first year, having an organized and structured sequence of geographic learning for up to five academic years. This is the context in which the school implemented the curricular transformation of the undergraduate program.

Why do we want students to learn Geography?

The development of a new curricular framework started by questioning the kind of geography students should learn. When students enroll in higher education, they begin a process of acquiring a greater understanding of how the world works (Stoltman, Lindsey, and Kidman 2015). Since universities are at the frontier of knowledge production, Lambert, Solem, and Tani (2015) suggest that they offer a function of providing access to methods and procedures of any discipline, such as geography, which will help them to become, as Walker and

Boni (2013) proposed, critical thinkers, democratic citizens, capable of understanding their role in society and the responsibility of their actions.

This disciplinary knowledge takes the students beyond their everyday experience, and it is not possible to acquire unless you access to formal educational settings, such as a university (Slater, and Graves 2016). A discipline “provide(s) a way to enter complex forms of discourse and perspectives that have arisen in communities using procedures of argument and contestation. Includes abstract and theoretical knowledge, which almost by definition is beyond the experience of the everyday” (Lambert, Solem, and Tani 2015, p. 725).

Following Butt’s (2017) concern of whether disciplinary knowledge is still important in schools, we consider that in the context of our curricular reform geography still has an important role in student’s life, because it provides opportunities to “acquire, develop, and apply a range of key geographical ideas and principals, and ultimately to make judgements about particular issues” (Solem, Lambert, and Tani 2013, p. 220). We agree on the fact that students should be enabled to think geographically, so that they can analyze and actively act in social and environmental issues (Boehm, Solem, and Zadrozny 2018), and manage uncertain futures (Brooks, Butt, and Fargher 2017). In this way, the new curriculum pretends to update which type of geographic knowledge would help students to become better geographers, so that they don’t become deprived of the capabilities to think and act in our world (Solem, Lambert, and Tani 2013).

Developing a new curriculum: Powerful Geography Perspectives

The definition of what, how, when, and why students will learn to think geographically about a myriad of social, political, cultural, economic, and environmental issues is an integral, gradual, and complex task. In our context, this process involved three years of intense work. This was a significant transformation in our school, which had to be aligned with the trends of geography’s development in Costa Rica, in academic and professional settings.

The teaching committee followed a participatory approach, involving staff, faculty, students—both active and graduated—, and potential employers as key actors of this process. The collection and analysis of information involved the development of workshops, interviews, meetings, focus groups, as well as the results from surveys questionnaires. In addition, the school geography received feedback from international external reviewers, who gave valuable insights for improving the final curricular outcome.

The participatory approach aimed to avoid the limitations of what Null (2017) calls a “top-down” curriculum, by focusing on developing a bottom-up approach to curriculum making (Solem and Boehm 2017), considering the needs, aspirations, and requirements of the different actors and the society, as well as the scientific advancements. The curricular transformation combined theoretical and

epistemological debates in our discipline with the ideas, concerns, and propositions of faculty, students, staff and other stakeholders.

The committee also conducted a review of former curricular frameworks, analyzing the following components: development of the discipline, the role of professional geographers, and the pedagogical foundations. In addition, special workshops with the school's faculty contributed to a deeper understanding of where those components will be heading in the upcoming years.

The outcome of all these methodological procedures was a renewed UGP, approved by the university authorities in 2018. We argue that the new curriculum aligns with powerful geography principles, because:

- It is socially constructed, as it is framed into the local context and the social conditions, the workforce needs and expectations, and the recent geography's scientific advancements.
- Enable students to think differently, by introducing them to an updated vision of geographic thinking, when compared to the former curriculum.
- Allow students to acquire powerful geographic knowledge, as they go through their different year-levels.
- It is based on a consensus of what geography stands for, as well as what the school thinks the discipline will be heading in the future.
- Considers the school's possibilities and limitations for offering students with the best learning experience possible.

The definitive version of the updated curriculum included: the purpose of the program, the learning outcomes profile, and the program's structure and organization. Since we cannot explain a full detail of all these components in this article, we want to expand into two key elements from a powerful geography perspective: the framework supporting the new UGP, and the structure and organization of the geography curriculum.

What kind of geography will students learn in the new curriculum?

Defining what geography is about often becomes a challenging task. The local and academic context, recent scientific advancements, the existence of several paradigms and historical traditions converging in our school, along with the social and professional context, are some of the factors that shaped our discussion. Thus, reaching a satisfactory consensus was set as an important priority. The committee performed an in-depth analysis of the participant's opinion, the analysis of recent epistemological geography debates, and the recent scientific advancements in different geographic fields. As a result, the committee defined nine challenges where geographers are called to have an active role, because they affect the functioning of the society at different scales and contexts.

Those challenges are:

- The extent to which spatial and territorial transformations occur at different scales in a globalized world.
- The analysis of changes, measurement and assessment of environmental systems, as well as the factors leading potential environmental crisis.
- The understanding of how social structures disarticulate, by looking at how cultural and territorial patterns link to people's identity and perceptions.
- The observation and assessment of changes in political and territorial structures.
- The analysis of different sustainable development models, and their adjustments to different scales and contexts.
- The contribution of geography to a new culture of analyzing, planning, and managing systems, in which the inclusion of environmental, spatial, and territorial indicators and projections are essential.
- The extent to which geography will place itself in multidisciplinary, transdisciplinary, and interdisciplinary debates.
- The understanding of how geography will cope with the changes and advancement of geospatial technologies.
- The development of a better geographic education, integrating recent knowledge, pedagogical and curricular advancements in our discipline, as well as the technological progress in geography.

The school's aspiration is to prepare citizens contributing with actions to solve issues that might arise from these challenges we experience as a society. Thus, it is necessary to provide students with geographic knowledge that empowers them to actively take part in issues at different scales and contexts.

In response to these challenges, it is necessary to think about a geographic science broad enough so that it is possible to articulate multiple ways in which students can address different social and environmental issues in Costa Rica or other parts of the world. In this way, the school defined geography as:

- A multidisciplinary, holistic, and integral science.
- The study of the dynamic and reciprocal interaction between humans and the environment, as well as the territories, landscapes, places, and regions where those interactions happen.
- Descriptive, exploratory, correlational, predictive, and explanatory, in which geographers describe, quantify, analyze, and organize space and spatial phenomena at different scales and time; aiming towards a more rational and organized land use.
- A science in which maps are the most important tools of representation, management, modelling, and analysis of spatial information; where

cutting-edge geospatial technology contributes to prepare, manage, and represent spatial databases and cartography according to international standards.

- A science where student’s learning involves technical, technological, scientific, and practical—including fieldwork—processes for producing and applying geographic knowledge.
- A proposing science, in which geographers offer—through powerful knowledge and skills— practical solutions to critical issues that our world is facing for reaching a sustainable environment.

The new UGP proposes as geography’s main objective to prepare professionals contributing with the environmental, social, and economic sustainability of Costa Rica and the world, based on learning experiences involving the three cornerstones of the Universidad de Costa Rica: teaching, research, and social service. The new curriculum offers a multidisciplinary, holistic, and integral approach, where students will assume an ethical commitment with social and environmental causes. The aspiration is that new professional geographers will become leaders taking part in decision-making tasks in a national, regional, and global scale.

The additional fifth year of the undergraduate program expands the student’s opportunities to identify, inquiry, and analyze geographic issues, through the application of updated geospatial methods and techniques. The school expects from students to be capable of applying geographic knowledge and developing research, by using qualitative, quantitative—or mixed—methods and techniques, cutting-edge technology, and fieldwork practices. In this way, the curriculum offers students the possibility of acquiring powerful geographic knowledge, enabling them to engage in the social and environmental challenges of our time.

The students will be capable of getting jobs in public and private sector positions, as well as in consulting services. In fact, our research has shown that Costa Rican geographers are often employed in a variety of areas, such as:

- Conservation: development and analysis of projects and programs in conservation and biodiversity sustainable management; national park management programs; development of environmental and climate change policies; ecosystem services analysis.
- Geospatial technologies: use of geographic information systems for cadastral services, development and management of spatial databases; digitalization of spatial information; use of global positioning systems and field data collection; map-making; remote sensing processes; photogrammetry and photo-interpretation; development of “geo-apps”; web-mapping and geovisualization.

- Environmental analysis: Landscape ecology; ecosystem analysis; environmental monitoring; environmental impact studies; water resources and watershed management.
- Land planning: national and municipal census; risk management assessment and programs; wastewater management; zoning and land use programs.
- Human geography: geomarketing; population geography; electoral geography; real-estate analysis; geography education in formal, informal, and no-formal settings; participatory mapping.

The school's expectation is that professional geographers will continue working on these areas, while expanding their actions into new ones. To accomplish this goal, the UGP establishes a re-organization of the courses in which students will enroll each semester during their five years of undergraduate education.

The challenge of selecting what will be the student's geographic knowledge

The curricular framework establishes the epistemological foundations that support the new curricular organization of the five years of undergraduate education. The development of the final stage of the new UGP involved a tough and complex task: what will be the nature and characteristics of the geography courses that students will take? and, Will these courses provide students with an adequate geographic knowledge?

We consider that the organization of the UGP offers the students the possibility to access powerful knowledge, which according to Young (2008) enable students to understand and think beyond what their everyday experiences offer to them, engaging in new ways of thinking about our world through reliable explanations, allowing them to "become active citizens and workers in the complex modern world" (Lambert, Solem, and Tani 2013, p. 128). The students will access to a geographic knowledge that is very unlikely to be acquired outside academic settings.

However, defining what geographic knowledge will become part of the new curriculum is a complex task. In fact, the teaching committee debated about this issue extensively. We found helpful to describe this process by analyzing Young's questions about the subject communities and curriculum: "1) In what ways is (subject) knowledge powerful knowledge? 2) What aspects of (subject) knowledge do we want people to acquire? 3) How should this knowledge be organized within the school curriculum? 4) How should we recognize the historical and social basis of (a subject) as an academic discipline?" (Young 2009, cited in Butt 2017, 18).

We initiated the curricular transformation by addressing Young's fourth question, as it is a mandatory requirement from the University authorities. However, answering that particular question was indeed necessary in our school for defining the nature of the geographic knowledge that students will learn in the following years.

Although the school of geography did not engage into a "powerful geography" debate in the curriculum, however, the curricular proposal embraced some theoretical arguments for answering young's first question. We consider that the geographic knowledge proposed in the new UGP curriculum aims to develop what Maude (2018) referred as the five types of powerful geography knowledge. First, we expect students will acquire new ways of thinking—through geography's major concepts—about the world, by changing their "perceptions, values, and understandings, the questions they ask and the explanations they explore" (Maude 2018, p. 181). The gradual process of knowledge acquisition from the first year to the fifth-year level attempts to change the student's mind on how they perceive the world by using a geographical perspective.

Second, the school's aim is to empower students with the knowledge to analyze, explain and understand phenomena and events even beyond their everyday experiences. For doing this, Maude (2018) argues that geography knowledge can use analytical methods to identify and test relationships between phenomena, variables, or places; explanatory concepts that have the power to show how the world works, and geographic generalizations, because students can synthesize facts and processes that state a relationships among several concepts and phenomena that "allow students to apply what they have learned to new settings and to transfer prior knowledge to new situations" (Maude 2018, p. 182). The new geography courses are design with an increasing level of complexity, so that students can have the opportunities and conditions to achieve a higher-order geographic thinking once they finished their undergraduate program.

Third, the new curriculum enables students to acquire power over their own geographical knowledge. This means that they can achieve a high-level of thinking independence, by using coherent and disciplined-based arguments in order to critique others opinion. Maude (2018) argues that "students need to know something about the ways knowledge is created, tested, and evaluated within geography, and about geographical reasoning" (p. 193).

Fourth, the new curricular organization offers a solid geographic education, in which students become professionals contributing to the society by defending their own arguments and proposing actions, based on the mastery and application of geographic knowledge. The "subject's ability to integrate knowledge from the natural and social sciences can help people to analyze and evaluate [different phenomena]" (Maude 2018, p. 183), allowing professional geographers to actively take part in local, regional, national, and global scale issues.

At last, the geography courses offering will allow student to acquire a knowledge about the world that goes beyond their everyday experiences. This means understanding the “diversity of environments, peoples, cultures, and economies, and the capacity to make sense of events anywhere around the world” (p. 183). The new curriculum attempts to give students the opportunities to learn about different geographic phenomena at a local, regional, national, and global scales. If these elements define what powerful geography knowledge is about, then, how did we materialize such elements in the proposed curriculum? Figure 1 shows the learning profile structure of the undergraduate geography program, composed by a transversal and cognitive dimension.

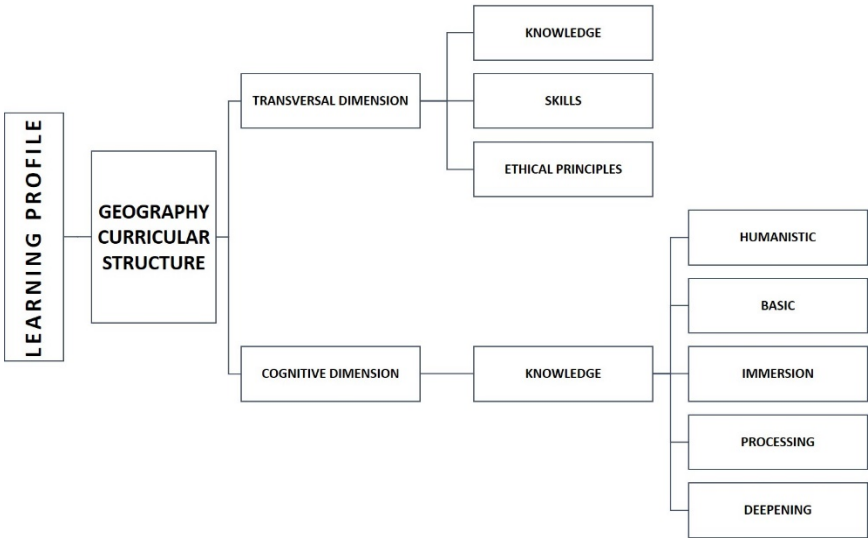


Figure 1. Learning profile structure of the undergraduate geography program

The transversal dimension refers to the knowledge, skills, and ethical principles that students will acquire throughout the courses and year-levels: geographic knowledge that is built on concepts, processes, the historical tradition, and recent geography scientific advancements around the world; skills that enable students to apply geographic knowledge by using the discipline’s specialized tools; ethical principles that guide students in the scientific and professional decisions they must take.

The cognitive dimension describes how the school of geography structured student’s knowledge acquisition into five categories:

- **Humanistic knowledge:** The University requires students to enrolled in a mandatory set of humanistic courses throughout any undergraduate program. The humanistic preparation provides students with tools for understanding the social context in which they live, promotes a greater commitment with the society, and attempts to prepare students for having a transformative role in the society.
- **Basic knowledge:** It includes the development of a quantitative and qualitative logic, developed through the collaboration of auxiliary disciplines, the use of specific tools in geography, and learning a second language.
- **Immersion knowledge:** Students are introduced into geographic concepts, theory, and the analysis of geographic issues from an integral perspective. This type of knowledge introduces students into the practical and axiological components of geographers' work in biophysical, social and cultural systems at different scales.
- **Processing knowledge:** Promotes the comprehension of geographic processes—biophysical, social and cultural, local, and regional—by developing skills to build scenarios, manage probabilities, and comprehend geographic data. Students learn about geostatistics, spatial analysis, the use of technology, and the development, design, use and representation of spatial databases.
- **Deepening knowledge:** This type of knowledge is based upon geographic issues where students analyze four main geography areas: social and environmental development (i.e. sociocultural systems, the relationship environment-food-water-energy, the rural-urban system, and global change); land use planning (i.e. landscape analysis, natural resources and environmental management, sustainable development, zoning, social and environmental risks, ISO standards, and environmental regencies), geosystems (i.e. climatology, applied geomorphology, hydrology, biogeography, applied geology, and applied ecology), and geomatics (i.e. collecting, handling, storing, analyzing, interpreting, diffusing, and representing geographic information).

The students will gradually engage in these stages of geography knowledge acquisition. In the first and second-year level, students will access to basic and immersion knowledge. They will learn about geographic concepts and theories through deductive, inductive, analytical, and synthetical pedagogical activities. The transition from second to the third year will take students to link geographic theory to practice. Case studies and application of geographic techniques will allow learners to acquire processing knowledge. The fourth and fifth-year level students engage in deepening knowledge, by strengthening critical

thinking through research activities—i.e. the application, analysis, and solution proposals to factual issues—. In this way, students will confront their geographic preparation with the reality in which they live.

We cannot provide a detailed explanation of each geography course from the renewed UGP. However, Table 1 shows the curricular organization of such courses. We expect that students will engage in a learning process of the human, physical, and technological components of geography through the immersion, processing, and deepening courses. One of the most significant changes in this curriculum is the special attention place to the development of geomatics, where students will count with several geospatial technology courses that will help them to cope with the current job market needs. In addition, fifth-year level students must enroll in a professional practice, which will enable them to develop their final research projects in order to obtain their “licentiate” degree. The students will have an opportunity of applying their geographic knowledge into local, regional, national, or even global contexts before finishing the undergraduate program.

Table 1. List of courses according to the type of knowledge

Knowledge	List of courses
Humanistic	Humanities course (I and II); sport activity; art course; general elective (other than a social science course); national reality seminar (I and II)
Basic	Reading strategies in English (I and II); math for geographers (I and II); fundamentals of physics; fundamentals of geology; general chemistry (lecture and lab); general biology (lecture and lab); fundamentals of geography; geographic data processing; qualitative methods and techniques
Immersion	Cartography and field techniques; geographic thought; analysis of geographic data (I and II); economic geography; hydroclimatology; cultural geography; historical geography; geomorphology; geodesy and GNSS system; geography, population, and society; geography and power; rural geography; soils geography; biogeography; urban geography.
Processing	Geography research (I and II); global biophysical systems; global sociocultural systems; photogrammetry and remote sensing; land planning and management; geographic information systems (I and II); local, regional, and global challenges; multivariate cartography and geovisualization; space-time modelling.
Deepening	Professional practice; advance research (I and II). In addition, there is a list of elective courses on the following areas:

	<ul style="list-style-type: none"> • Geomatics: Digital images processing; remote sensing and environmental modelling; dynamic cartographic and geospatial intelligence; exploration and use of geodata; design and use of apps in geography; GIS and social-spatial analysis; programming in GIS. • Biogeosystems: Tropical ecology, advance climatology; fluvial and coastal geomorphology; systematic soils geography; hydrological morphodynamical modelling; volcanic and structural geomorphology; applied environmental hydrology. • Land planning and territory management: Risk management; rural planning and development; urban planning and management; marine and oceanic environments management; watershed management; transportation planning and management; protected areas management. • Social and environmental development: Contemporary urban development; indigenous territories governance; migration and territorialities; environmental change modelling; environmental management practice; spatial econometry and geomarketing; climate change and social-environmental challenges.
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Conclusion: What will be the pedagogical approach of the new UGP?

University teaching, as conceived in the new curriculum, has the potential to transform undergraduate students (Walker and Boni 2013). However, students need to be exposed to powerful teaching methods that enhances student's geographic knowledge and skills (Roberts 2014), because they do not simply "absorb" the knowledge as it is stated in a document. It is important to think about how geography teaching should be in higher education. We believe that our school has the professional expertise, which Slater and Graves (2016) argued educators should have for selecting those geographic concepts, skills, and principles that will guide students learning in their context and beyond the everyday experiences.

The school of geography proposes a pedagogical approach placing attention to both instructors and students. We expect from students to engage in the learning processes, where they can question, propose, and analyze information and phenomena, that could eventually transform their everyday knowledge into a more scientific understanding of their lives. Thus, faculty members need to

develop pedagogical strategies that will strengthen their responsibility, commitment, and respect to other people's way of thinking. In addition, the instructors should emphasize the student's development of problem-solving tasks and research, and to enhance their capacity of observation and analysis of geographic issues. Furthermore, the instructors will help students to make the link between disciplinary knowledge, workforce needs, and social challenges of our society.

Both students and professors have at the Universidad de Costa Rica with the infrastructure and resources to reach the program goals. The school of geography has had an emphasis in fieldwork activities throughout its history. This tendency has allowed students to engage in an experiential learning that links powerful disciplinary knowledge with the local and social context. Most of the geography courses have at least one fieldwork activity, and the new program will continue offering these opportunities to students. In addition, geographic learning will be strengthened by including laboratory practices (e.g. in physical geography and geospatial technologies), as well as access to multimedia and geography literature from Latin America and other parts of the world. The resources exist for putting into practice the new curricular changes that *Universidad de Costa Rica* approved. Hopefully, we will be able review our curricular structure again in the following years, after having the first generation of graduated students. We expect that they, as in-service teachers, will use powerful geography knowledge to make positive contribution to the Costa Rican young people and, ultimately, to Latin America as well as the global society.

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