

- Ward, J. V. (1996). Raising resisters: The role of truth telling in the psychological development of African American girls. In: B. J. R. Leadbeater, & N. Way (Eds.), *Urban Girls: Resisting Stereotypes, Creating Identities* (pp. 85–99). New York, NY: New York University Press.
- Ward, J. V. (2018). Staying woke: Raising Black girls to resist disconnection. In: N. Way, A. Ali, C. Gilligan, & P. A. Noquera (Eds.), *The Crisis of Connection: Its Roots, Consequences, and Solutions* (pp. 106–128). New York, NY: New York University Press.
- Way, N. (2011). *Deep Secrets: The Landscape of Boys' Friendships*. Cambridge, MA: Harvard University Press.
- Way, N., Gilligan, C., Noguera, P., & Ali, A. (2018). Introduction: The crisis of connection. In: N. Way, A. Ali, C. Gilligan, & P. Noguera (Eds.), *The Crisis of Connection: Its Roots, Consequences, and Solutions* (pp. 1–62). New York, NY: New York University Press.
- Way, N., Hernández, M. G., Rogers, L. O., & Hughes, D. L. (2013). "I'm not going to become no rapper" stereotypes as a context of ethnic and racial identity development. *Journal of Adolescent Research*, 28(4), 407–430.
- Way, N., & Rogers, L. O. (2015). "[T]hey say Black men won't make it, but I know I'm gonna make it": Identity development in the context of cultural stereotypes. In: M. Syed, & K. McLean (Eds.), *Oxford Handbook of Identity Development* (pp. 269–285). New York, NY: Oxford University Press.
- Way, N., Santos, C., Niwa, E. Y., & Kim-Gervey, C. (2008). To be or not to be: An exploration of ethnic identity development in context. *New Directions for Child and Adolescent Development*, 2008, 61–79.
- Yip, T., Seaton, E. K., & Sellers, R. M. (2006). African American racial identity across the lifespan: Identity status, identity content, and depressive symptoms. *Child Development*, 77, 1504–1517.

In N.S. Nasir, C.D. Lee, R. Pea, & M. McKinney de Royston (Eds.),
Handbook of the Cultural Foundations of Learning. NY: Routledge, 2020.

5

INNOVATION AS A KEY FEATURE OF INDIGENOUS WAYS OF LEARNING

Individuals and Communities Generating Knowledge¹

Francisco J. Rosado-May, Luis Urrieta Jr.,
Andrew Dayton, and Barbara Rogoff

Indigenous ways of learning in the Americas have important lessons for scholars and practitioners far from Indigenous communities, in addition to their importance for ensuring that the next generations benefit from and contribute to the knowledge and worldviews of Indigenous American communities. Understanding Indigenous ways of learning can foster relations of mutuality and construction of new knowledge (Grande, 2015) in which Indigenous knowledges and ways of learning play a critical role, especially in relation to achieving sustainability worldwide (Tom, Huaman, & McCarty, 2019).

We aim to delineate the nature of some Indigenous ways of learning, the philosophies that undergird them, and how they can be used in broader communities (and schools). We also hope that making these learning processes explicit will serve Native communities, where they may be widely used but not often articulated in everyday life.

There have been some efforts to incorporate Indigenous ways of learning into schooling systems, such as in bilingual intercultural education in Mexico, Native language revitalization immersion programs in North America, and intercultural inductive education in Brazil and Mexico (da Silva, 2012; McCarty & Nicholas, 2014; Nigh & Bertely, 2018; Schmelkes del Valle, 2009). However, Western schooling in the Americas seldom meaningfully incorporates Indigenous knowledges, languages, worldviews, or ways of learning (Barnhardt & Kawagley, 2005; Battiste, 2010; Bolin, 2006; Lomawaima, 2015; Kirkness & Barnhardt, 1991; Rogoff, 2011; Schmelkes, 2012).

There are many complex reasons for the lack of inclusion of Indigenous ways of learning; one is a general misunderstanding of what Indigenous ways of learning entail (Grande, 2004). Another is the often difficult relations that many Indigenous communities have experienced between colonial/government schooling and their local ways of learning and constructing knowledge. Western schooling commonly employs a model of didactic instruction usually imposed or adopted from the United States and Western Europe, often as part of colonialism and empire-building with the goal of eradicating or changing Indigenous values and practices (Rogoff, 2003; Arenas, Reyes, & Wyman, 2009; Sandoval-Forero & Montoya-Arce, 2013). Indigenous ways of learning in the Americas rest on deep epistemological understandings that contrast with the assumptions and ways of learning

that are often the basis of Western schooling (Bang, Marin, Medin, & Washinawattok, 2015; Dayton & Rogoff, 2016; Mejía-Arauz, Rogoff, Dayton, & Henne-Ochoa, 2018; Rogoff, 2016).

This article examines Indigenous ways of learning that are inherent in the Indigenous Knowledge Systems employed in the Americas. Indigenous Knowledge Systems are empirical, normative ways of knowing and ways of being in the world that guide everyday relational life between living and nonliving things and protect cultural continuance in many Indigenous communities (Barnhardt & Kawagley 2005; Bates, Chiba, Kube, & Nakashima, 2009; Battiste, 2002; Cajete, 1994; Chilisa, 2012; Lee, 2009; Little Bear, 2009; Lomawaima & McCarty, 2006; Morales Velázquez & Lepe Lira, 2013; Okakok, 1989; Teuton, 2012; Thomas, 1972; Tippeconic, 1999; Urrieta, 2015).

The ways of learning employed to pass knowledge to future generations and to ensure the continuance of Indigenous cultures are important in Indigenous Knowledge Systems. First Nations scholar Battiste (2002) described how Indigenous knowledge is conveyed across generations:

Often oral and symbolic, it is transmitted through the structure of Indigenous languages and passed on to the next generation through modeling, practice, and animation, rather than through the written word.

(2002, p. 2)

Scholarship regarding Indigenous Knowledge Systems highlights ways of learning that include observation, early involvement in family and community activities, responsibility, learning at an individual pace, and learning by contributing and gaining experience.

In this article, we discuss characteristics of Indigenous ways of learning in the Americas, including a framework that articulates key features of these ways of organizing learning: *Learning by Observing and Pitching In to family and community endeavors* (LOPI; Rogoff, 2014). We then expand the LOPI framework by discussing the importance of innovation as an important feature of Indigenous ways of learning. We counter the common misconception that Indigenous ways of learning only teach what is already known.

The chapter then examines a successful effort to make use of Indigenous ways of learning, through the Yucatec Maya concept of *iknal* in an intercultural university in Mexico. This case study reveals innovations resulting from combining Indigenous ways of learning with the ways of Western universities, exemplifying the co-creation of new knowledge.

What Characterizes Indigenous Ways of Learning?

Although we believe that Indigenous ways of learning have important commonalities across a wide variety of Indigenous communities of the Americas, we refer to Indigenous ways of learning in the plural, because we do not assume that these complex processes are general to all Indigenous communities. Ways of learning in Indigenous communities change over time and circumstances (Madjidi & Restoule, 2008; Rogoff, Najafi, & Mejía-Arauz, 2014). As in other communities, people mix processes deriving from their experience of a variety of models. For example, many people in Indigenous communities of the Americas now have extensive experience with the model common in Western schooling; for some of them, certain aspects of Indigenous ways of learning have become less common (Chavajay & Rogoff, 2002; Dayton & Rogoff, 2013; McCarty & Nicholas, 2014; Rogoff et al., 1993). In addition, Indigenous individuals or groups do not always use the community philosophies or processes that we refer to as Indigenous ways of learning; just as people do not always employ community ideals.

Nonetheless, many research observations of learning in Indigenous American communities share some features that suggest underlying precepts that may be held in common about learning and the role of children and youth in many communities. Here are some examples of such observations.

Some Research Observations of Indigenous Ways of Learning

Research indicates that Indigenous ways of learning often involve guidance using nonintrusive approaches towards children and other members of the community: Explicit focus on instructing children or youth in how to do something is rare. Rather, Indigenous ways of learning emphasize observing, listening, and contributing to activities in social and cultural context (Battiste, 2002; Chavajay & Rogoff, 1999; Correa-Chavez, Mejia-Arauz, & Rogoff, 2015; Gaskins & Paradise, 2010; Paradise & Robles, 2015; Rogoff, 2003), including through play (Lancy, 2016).

Indigenous ways of learning often flow with everyday life rather than dividing activities into isolated, sequential steps as in school-style teaching (Rogoff, 2014; Paradise et al., 2014). Learning is generally productive, for “real” purposes (Brayboy & Maughan, 2009; Fortes, 1938; Paradise & Rogoff, 2009). For example, for Hector Sueyo Yumbuyo (Sueyo, 2003), an Arakmbut man from the Peruvian Amazon, it was through going on childhood hunting trips with his father and family that he learned to recognize animal tracks, and the sounds, songs, and smells of birds and animals; he learned that not all animals can be eaten and that spirits inhabit all of the natural world.

Children and youth in a number of Indigenous communities of the Americas generally engage in household practices in holistic and purposeful ways that are integrated within family and community social, cultural, political, and economic realities (Alcalá et al., 2014; Ames, 2013). Children are generally not segregated or excluded from participation in collective events, even when that participation is intense, such as during moments of crisis, funerals, or festivities dealing with death and loss (Gutiérrez, Rosengren, & Miller, 2015; Morelli, Rogoff, & Angelillo, 2003). In such instances, Indigenous children not only learn skills, but also broader concepts about life itself and worldviews that are important in their community and in the broader contexts of Indigenous life (Chilisa, 2012). Everyone has a place in the community, including children.

Adults tend to encourage children to take initiative in mature activities. With the understanding that mistakes are steps that help children become competent and respectful members of the family and community, adults allow children to engage in most collective endeavors (Cajete, 1994; Bolin, 2006). Not-learning is generally not an option—children are expected to learn how to contribute to the family’s and community’s needs and they are generally interested in doing so (Alcalá et al., 2014; Coppens, Alcalá, Mejia-Arauz, & Rogoff, 2014; Paradise, 1985; Thomas, 1993; Urrieta, 2015).

All children are expected to learn, but not necessarily in the same way. The initiative and pace of learning are based on the child’s, family’s, and community’s needs and interests, in highly specialized, meaningful, individualized learning opportunities (Battiste, 2002; Bolin, 2006). Indigenous ways of learning build on children’s strengths and capacities, as children routinely take initiative in everyday activities and thereby advance their own learning as they improve their practice, with the understanding that each person eventually learns how to accomplish cultural activities in their own way (Alcalá et al., 2014; Bolin, 2006; Cajete, 1994; Scollon & Scollon, 1981; Swisher, 1990).

A Framework Building on Observations of Indigenous Ways of Learning: LOPI

A conceptual framework that articulates related precepts of Indigenous ways of learning has been developed by an international consortium of scholars living and working in Indigenous communities in many parts of the Americas. (Many members of the consortium also grew up in Indigenous American communities.) The consortium is interdisciplinary, building productive conversations across fields, including education, psychology, anthropology, linguistics, and history, to understand Indigenous ways of learning. The framework is based on the consortium’s lived experience and research, responses to presentations of the framework especially by members of Indigenous communities, and published ethnographies, autobiographies, and comparative research.

Our own experience in Indigenous communities of the Americas is a part of the basis of the present article, along with our diverse disciplinary and cultural backgrounds: Rosado-May (PhD in

biology) is a member of the Yucatec Maya community that receives special focus in this article; he founded the Intercultural Maya University that serves it. Urrieta (PhD in Education) is of P'uhre descent and has lived and done research for many years in the P'urhépecha community of his forebears in Mexico. Dayton (PhD expected in Developmental Psychology) is an enrolled member of the Cherokee Nation of Oklahoma and does research in his home community where he has years of involvement in immersion schooling and community leadership. Rogoff (PhD in Psychology and Social Relations) grew up in mostly European American communities, and has lived and done decades of research in a Tz'utujil Maya community of Guatemala.

The framework that attempts to articulate the defining features of a way of learning that appears to be especially prevalent in Indigenous communities of the Americas is currently known as *Learning by Observing and Pitching In to family and community endeavors* (LOPI; previously called Intent Community Participation; Paradise & Rogoff, 2009; Correa-Chávez et al, 2015; Rogoff, 2014; www.learningbyobservingandpitchingin.com).

LOPI is defined by a multidimensional prism composed of seven related features ('Facets'; Rogoff, 2014). The features of LOPI are based in a community structure in which children are included as contributors, like anyone else, in family and community endeavors (Facet 1), and are interested in doing their part (Facet 2). The organization of groups is also collaborative, with fluid coordination and initiative and leadership from children as well as adults (Facet 3). In LOPI, the goal of learning is for people to develop their skills, knowledge, and attitudes as contributors to family and community activities, with consideration and responsibility (Facet 4). Wide, keen attention and pitching in to ongoing events are key means of learning, along with guidance provided by other people and by community expectations (Facet 5), and communication is based on the shared context of the ongoing activity (Facet 6). Evaluation of learning is for the purpose of improving learners' contributions, in the ongoing context of the activity, and focuses not only on the learners' contributions but also on how guidance and supports can better foster learning and the success of the ongoing endeavor (Facet 7).

In this chapter, we extend the idea of LOPI to emphasize how Indigenous ways of learning not only assist people in gaining existing skills and knowledge, but also support their creation of new knowledge. Learning existing skills and knowledges and innovating new ones are essential for Indigenous communities' survival, sustainability, and futurities.

Innovation and Continual Change as Key Features of Indigenous Ways of Learning

Indigenous ways of learning and LOPI are not simply ways of learning what is already known, but also generative ways of advancing knowledge through innovation. Construction of new knowledge is a vital and collaborative community endeavor, developed by Indigenous communities to create the knowledge needed for life.

As indicated by Facet 4 of LOPI, a central goal of learning is the ongoing transformation of one's participation in family and community endeavors, to improve one's ability to make contributions to the family and community (Rogoff, 2014). Sharing new knowledge is an important motivation for community members. For example, to Maya peoples, and likely in other Indigenous communities of the Americas, learning by itself without a goal to serve the community makes little sense (de León, 2015; López et al., 2012). Ingenuity and innovation feed new knowledge in Indigenous communities.

The epistemologies of Indigenous knowledge systems connect learning with innovating, with the foundational assumption of continual change. Even when things appear to be static, they are part of a larger changing system. Little Bear (2000, 2011) calls this process "dynamics without motion," in which a momentary look at events makes them seem unchanging, but the moment is a part of a larger changing system, in "constant flux," forever changing. Little Bear (2011) gives

this example, attributing it to a conversation about dynamics without motion he had with a Haida Native from Queen Charlotte Islands:

Go out on the ocean in a canoe, and when you're far enough away from the land where you can't see the land and use it as a reference point, you know your canoe is moving because you're rowing it. But 360 degrees around you, you're always the same distance from the horizon... That's dynamics without motion. (2011, 28 minutes from the beginning of the video)

According to Little Bear, the flux notion in which "things are forever dissolving, reforming, transforming" is one of the most important tenets of Native paradigms.

Individuals' momentary decisions to follow customary approaches are themselves part of what maintains a community's cultural practices in a state of dynamics without motion, until an accumulation of practices and knowledge are enough to produce a more noticeable change, like the creation of a new variety of crop or a shift in medicinal practices. For example, in a Guatemalan Maya community, Marta Navichoc Cotuc observed that the maintenance of millennial knowledge of traditional midwives in her town depends on the ongoing decisions of many individuals to continue using their services (rather than relying on Western medical personnel; reported in Rogoff, 2011).

Decisions to continue with traditional practices may seem like an unchanging static situation, but viewed in the larger scheme, they are moments of apparent stability in a constantly dynamic community process. Cultural practices are constantly in motion, with moments in which an untrained eye might not see any change.

Constructing knowledge in Indigenous communities is a system of "dynamics without motion." Contact among different cultural communities often contributes both to the need for adjustment and as a basis of new knowledge. An example of innovation stemming from reconfiguration of knowledges from distinct cultural communities is provided by the case of Andy Dayton's great-grandmother, who was a Cherokee seminarian—a member of a consciously created group of female Cherokee leaders focused on mastering University education as well as maintaining Cherokee cultural continuity. She used the skills she learned in the Seminary and re-configured them to create Cherokee traditional community along matriarchal clan kinship principles that used modern "white ways" (such as legal and land dealing, negotiations with railroads and developers) to create community-based economic sustainability and renewal. All of this (along with the entire world of cattle ranching practices) was learned through LOPI by her sons, daughters, and extended clan family. They all built the Claremore, Foyil, and Chelsea Oklahoma Cherokee/Shawnee communities together, learning together as they went, and re-configuring the skills that any of them brought to the task, in order to maintain older, more "stable" cultural community values.

Such innovative approaches highlight Native communities' dynamism in knowledge co-construction, where Native wisdoms provide guidance for the future. Such ingenuity is a creative process, using pieces or parts of processes and re-configuring them to suit other, perhaps more durable culturally valued processes, such as group harmony and relational accountability, renewal and temporal cycles, and reinvigoration across generations (Dayton & Rogoff, 2013; Wilson, 2008). Learning, teaching, and creating new knowledge are all one process in this kind of ingenuity.

Innovation in Indigenous ways of learning happens in fractal form, across micro and macro scales, as argued by Dayton and Rogoff (2016), extending from tones of voice and subtle movements of the hands, head and torso, all the way to ongoing interactions between members of Indigenous communities across lifespans and generations. Learning as processes of transformation of people's participation (Rogoff, 1998, 2016) involves the mutual adjustments that occur in

synchronous attunement with the relations that form the web of all life, in ensembles. For example, transformation of participation extends from the attuned movements of everyone's hands when Andy is engaged in some task with his aunts and daughters, all the way to Cherokee deliberate, careful re-configuration of conventional Western practices across generations. These are re-cycled through Cherokee communities from moment-to-moment and generation-to-generation in order to maintain harmonious relations and to ensure community renewal. Thus, Indigenous knowledges involve embodied engagement in which ongoing family and community practices bear qualitatively and quantitatively structured patterns of interaction at all temporal scales simultaneously.

Such fractal relationships are open to perennial, asymmetrical change across scales. "Noise" contributes to innovation, resulting in constant emergence of new patterns that are similar but not identical to earlier patterns (an idea that also appears in Dynamical Systems theories). The creation of Indigenous knowledge via the recreation of patterns in community resemblance, through constant, innovative change, is fundamental to the very existence, continuance, innovation, and renewal of culturally patterned behavior itself.

In Indigenous ways of learning, several features support innovation. The initiative of children as well as adult flexibility in adapting to each child's learning pace and way of learning often lead to distinct individual approaches. For example, in the community of Nocutzepo in Mexico, women claimed to have developed their "own" individual tortilla style when they were girls learning to make tortillas; they asserted that they could identify who made the tortillas by looking at their shape, size, and girth (Urrieta, 2013). The process of learning and creating knowledge includes some specialization in adulthood that tends to be appreciated and encouraged. Community members acknowledge who is a good cook, who is a skilled dressmaker, or who is the finest farmer of a given crop. The person who develops a new form of planting or dealing with insect pests, for instance, is recognized and acquires an esteemed sense of belonging in the community. These community specialists are especially respected for sharing their co-constructed knowledge, and their generosity with new knowledge reinforces and advances learning systems developed by the community over millennia.

Such community-based innovation is apparent in agroecology, for instance, where a wealth of knowledge based on cultural processes among different Indigenous groups in various parts of Mexico contributed to the origin and diversity of maize (González Jácome, 2004, 2009). Corn, an important grain for humanity, was developed out of a sophisticated process of analysis and synthesis created and modified over millennia through Indigenous ways of learning and knowledge production based on cultural values and generosity with new knowledge. According to González Jácome (2011), the cultural processes involved in the origin and diversity of corn are similar throughout the impressive array of plants grown and used by Mesoamerican Indigenous groups and eventually shared with the world (e.g., tomatoes, peppers, squashes, and pumpkins).

In Indigenous Knowledge Systems, phenomena such as the creation of a new variety of crop, a new taste in food, a new technique in hunting or construction of a house, are framed as cyclical rather than linear in progression and perennial rather than progressive in evolution. Hence, in Indigenous ways of learning, these patterns of cultural practice are not "learned" or "taught", as separate acts, but continually renewed in everyday practice from microseconds to centuries in continuous, interconnected contingency. From this perspective, learning and innovation are just something people do in the process of living in families and communities across generations.

Conflicts and Innovations in Schooling in an Indigenous Region of Mexico

In this section, we first describe the problems brought by the imposition of colonial schooling in Maya communities of the Yucatan region of Mexico. Then we turn to observations of a successful effort to include Maya ways of structuring learning, in a university program.

Schooling Imposed on the Maya of the Yucatan

Among the Yucatec Maya, Indigenous cultural ways of learning and facilitation of learning are not reflected in the official, government schooling system (Gaskins, 2003; Gaskins & Paradise, 2010). Differences in ways of structuring learning processes may help to explain Yucatec Maya people's hesitance, even today, to participate in the official school system, including in higher education.

Cultural aspects of education were a major issue discussed before the signing of the peace agreement in 1929 to end the long and brutal Casta War that the Yucatec Mayas fought against the Mexican Federal government (Reed, 2001). In the peace agreement between the Mexican government authorities and the Yucatec Maya leader, Francisco May (the first author's great grandfather), the Maya allowed schoolteachers to work in the central part of what is now the state of Quintana Roo. However, the Mayas, and Francisco May, did not follow through with the agreement (Ramos Díaz, 2001) because the government's education system, brought via the teachers, was foreign to the local system and was taught in a nonlocal language.

An important part of the resistance to the government school system was rooted in distinct concepts of education (Flores Escalante, 2010). The education system that was imposed by the government was (and is) based on a vertical unilateral approach with the teacher at the top. To the Yucatec Maya, education is based on the combined and dynamic process of both passing on knowledge and learning/constructing knowledge through everyday activities. In Yucatec Maya, the word *kaanbal* means to learn; two other words complement the process—they have the same root, *kaan*, and mean to teach: *kaans* and *kaanbes*. Both the learner and the experienced one, sharing knowledge, work in a participatory process that involves passing on knowledge and learning/constructing knowledge. Any new knowledge is thus the result of a coordinated effort; it is co-constructed, unlike the typical vertical unilateral system common to schooling.

Resistance to the government's education system was, and still is, often expressed through school absenteeism, desertion, and by low school completion rates (Everton, 2016; see also Urrieta, 2016). Nation states have not desisted from imposing conventional schooling on Indigenous communities (Mato, 2012).

The right to an education that acknowledges, values, and is consistent with local cultures and languages has been at the center of several Indigenous struggles (Urrieta, 2016). These include the 1994 Zapatista Maya rebellion in Chiapas, which set in motion political and social processes that included improvement in living conditions related to land, health, jobs, and schooling for Indigenous people. The Zapatistas sought to have a formal education suited to everyday Maya community life and they took a stance against an institutionalized system of knowledge that did not represent Indigenous precepts nor Indigenous ways of constructing knowledge (Mato, 1996; Vargas-Cetina, 1998).

The Zapatista rebellion, in part, led to the creation of public Intercultural Universities in Mexico (Ávila Romero & Ávila Romero, 2016). One of them is the Universidad Intercultural Maya de Quintana Roo (UIMQRoo, in the Yucatan Peninsula), which serves this chapter as an example of university-level institutionalization of Indigenous ways of learning. Over 90% of UIMQRoo's student population is of Maya origin, and until 2015, around 80% of students were the first in their families to achieve a university education.

Recognizing the Need for Indigenous Ways of Learning in School

The Intercultural Maya University of Quintana Roo implemented Indigenous ways of learning and construction of knowledge by means of a system known as *iknal* in Yucatec Maya communities (Rosado-May, 2012). The governing body of UIMQRoo decided to incorporate *iknal* as a basis for designing learning opportunities for Maya students to accomplish their goal of obtaining a university degree.

The need for this was recognized when, using conventional forms of university instruction, above 90% of the inaugural class of UIMQRoo students failed their first midterm exam (Fall 2007); the prognosis for successfully completing their first semester was not good (Rosado-May, 2012). Assuming that the students had hidden skills and capabilities that would allow them to successfully complete their university degree, UIMQRoo staff and faculty directed their focus towards how Maya students learn and under what community system they learn.

Thus, *Ikmal* was re-cognized, recovered, re-created and introduced as a concept in UIMQRoo's structure and function that semester. As became apparent—by talking to Maya elders from different villages and closely examining how the Maya-origin faculty learned in their own communities, as well as through intensive participatory action and observation with students and communities—the university was not making use of longstanding local Maya practices in the learning process. One of the most important realizations was that the university did not even minimally approach providing students with the opportunities for assistance routinely available to them in their home communities to fulfill their goals, in *ikmal*.

***Ikmal*: A Zone for Learning**

Ikmal is a platform that provides the basis for a well-articulated combination of practices, where people accompany, follow up, work with, guide, help to learn and carry out duties using words as well as body language and actions, assess tasks, pass on knowledge and help to create new knowledge through innovation, and team up to accomplish a task with togetherness. Linguistically, the word *ikmal* represents “someone's place” (Hanks, 1993, p. 148). For Yucatec Maya, and implicit in Hanks' linguistic work, someone's place represents a space where activities (such as accompaniment and togetherness, following up on an activity, guiding with conversations and other means of communication, and collaborating) are carried out and allow for the emergence of results needed by a community, including new knowledge.

Ikmal rests on the notion that any community member, across the lifespan, can tap into the knowledge of anybody else in the community. Parents are not the only people responsible for passing on concepts, skills, responsibilities, and respect to their children; the entire community is. For instance, in a family with five children, the parents cannot provide all of the answers and skills needed by each child along their path to adulthood. Children, or anyone, can make use of the guidance of whoever else has knowledge and skill in the area they need and would like to acquire. *Ikmal*, thus, is critical in the process of creating places and spaces for the exchange of knowledge, including learning, in a community. It is an efficient way to ensure continuity in the diversity of skills and expertise needed in the development of that community.

Ikmal provides conditions for generating innovation across generations, whether it is for new ways of farming or hunting, better techniques for building houses or for midwifery, or new ways to cure illnesses with medicinal plants. Adults have the responsibility to further develop their learning and specialized knowledge, and to transform this into innovative knowledge, which is then passed on to new generations. In the process of creating and sharing this new knowledge, adults gain respect and recognition, and their sense of belonging is strengthened. Learning and co-construction of knowledge occur together, for the wellbeing of the community.

Learning in Indigenous communities like the Yucatec Maya means co-constructing knowledge that will be shared and perfected through strong relations and identity with the community. For example, Maya farmers in an area called Los Chunes in Quintana Roo, Mexico, developed new and more successful ways of farming dragon fruit (pitahaya), and claimed that their success resulted from the application of their own childhood learning system, especially by carefully observing the crop's response to different stimuli during its development. The process of sharing knowledge by the most successful farmers, who thereby achieved great recognition in their

community, was an important aspect of their success (Cálix de Dios, Castillo Martínez, & Caamal Canché, 2014).

For the Yucatec Maya, *iknal* functions as a community platform that allows *Learning by Observing and Pitching In to family and community endeavors* to lead to Indigenous knowledge. The motivation of community members to contribute and to receive recognition based on the creation of innovated knowledge is the driving force behind the platform. *Ikmal* facilitates the participation of people of different ages to support the ways of learning in childhood to continue in older ages, providing conditions for the functioning of Indigenous ways of learning articulated by LOPI.

Key Features of *Ikmal* and Their Relation to LOPI

Since the institutionalization of *iknal* at UIMQRoo, observations of students and their performance have identified at least nine features in the learning of Maya young adults at UIMQRoo that relate to activities present in the place/space created by *iknal* in Maya communities (Rosado-May, 2017). Brief descriptions of the nine *iknal* features follow, organized in order of their relations with the seven defining features of LOPI. Clearly, each of these features is related to the others. The features are not separate components; rather, they are aspects of the multidimensional phenomena described as *iknal* and LOPI.

There is inclusion, not exclusion

In community activities, as well as in learning and constructing knowledge, no one is excluded; even young children contribute through helping, asking questions, or even playing. The community creates places and spaces that allow learners to tap into knowledge from anyone in the community. When new knowledge is gained, the community expects to know about it, to learn from it, and, if needed, to use it.

This feature of *iknal* is related to LOPI's central feature, Facet 1, in which community organization includes children as contributors in families and communities' endeavors, like anyone else. (This feature of *iknal* is also related to LOPI Facet 4, which emphasizes learning to contribute with consideration and responsibility to the family and community.)

Mutual Help

The social fabric involves a web of social interactions in which community members help each other; the driving concept is cooperation rather than competition.

This aspect of *iknal* relates to LOPI Facets 2 and 3, which explain individuals' motivation as deriving from their interest to contribute as valued family and community members, collaborating alongside other people who are trying to accomplish an activity.

Multiple Leadership and Individual Responsibility

Depending on the context and activity, different people provide leadership. One person might lead hunting, another may lead house construction, and someone else can lead community meetings. Leaders are people with recognized expertise in certain activities. In community activities, there is often little margin for error, so expertise is essential as is the need to fully rely on everybody's responsibility. For instance, when building a house, the guiding leader must be confident that the person setting the beams will do so with expertise and care. The person doing the roofing will be

sure that the beams will properly support the roof, and the family living in the house will trust that the house was well built.

This feature of *iknal* relates to LOPI Facet 3, which calls attention to the collaborative social organization of groups as people coordinate fluidly with each other, with anyone taking initiative as they see a way to contribute.

Horizontal Organization

Community organization includes multiple leadership. Community leaders understand that earning and sustaining respect from their community depends on how they promote horizontal leadership and community participation in decision making.

This feature of *iknal* also relates to LOPI Facet 3.

Self-Discipline

Within community endeavors there is a high level of individual responsibility, which usually is not supervised but is guided by self-discipline, yielding achievements and success for both individual and community goals. Thus, anybody in the community can rely on and trust other community members, in reliable interdependence.

This feature of *iknal* connects with LOPI Facet 4, which points out that the goal of gaining information and skills—including learning to collaborate with consideration and responsibility—is transforming one's participation in order to better contribute and innovate for the good of the family, the community, and the broader world.

Learning by Doing

Yucatec Maya emphasize experimentation and accumulated experience. They use the same root word for looking for (or searching) and finding: *kaxan* and *kaxti*. It is a way of saying that searching is an ongoing process; even if what has been looked for is found, it is only considered temporary—the search continues. These Maya words also reflect a preference for practical experiences to build concepts, explanations, and general knowledge. There is learning in each action, whether successful or not. The phrase, *kaambal yetel kanan* means looking for and learning, which can be interpreted as experimentation and accumulation of knowledge.

Some accounts use the erroneous concept of “trial-and-error” as an explanation of creation and innovation of knowledge in Indigenous communities (e.g., Gadgil, Berkes, & Folke, 1993). The concept and words, “trial-and-error,” do not exist in the Yucatec Maya language and culture when explaining knowledge creation; the words “*ma'alobi*” and “*ma'beyi*” do not mean error, they mean that something did not result as expected. In the process of *kaambal yetel kanan*, meaning “searching and learning,” failed efforts are not errors; they are accumulated knowledge that supports the continuation of the process. The idea of trial-and-error implies that there is no progress in the search for new knowledge; an error leads to starting all over again. Rather than trial-and-error, the processes of co-creating knowledge in Maya communities involve experiment-and-build-on-results.

This aspect of *iknal* relates to LOPI Facet 5, which focuses on how learning occurs through wide, keen attention and contribution to endeavors, with guidance from community expectations and sometimes also from other people.

Observational Analysis

Observation is wide and holistic and remains focused. A colloquial expression to define these skills is that through complete and broad observation, people must always be ready to make sound decisions. Observation is not only based on seeing but also includes the skill of abstraction, making sense from several aspects of the social and physical context. It is a sophisticated and complex exercise of analysis and synthesis for all sorts of decisions, short- and long-term, strategic or simple.

Learning by observing is often assumed to be a passive process that results in rote learning (imitation), but in Indigenous ways of learning, observation is very active (Rogoff, 2003). In learning vicariously from the activities of other people and making sense of them and the contexts in which they are used, people learn both to apply them *and to innovate them* in small and major ways. Innovation is central to both the moment-by-moment use of observation and the use of observation in changes across years and generations.

This feature of *iknal* also is a key feature of LOPI Facet 5.

Transparency and Accountability

Learning and evaluating learning are public, in the process of ongoing activities. People's property is not fenced or walled in to prevent the public's street view, and doors are usually open. People eat, cook, and do laundry openly where anyone can see what they are doing or eating. In this system, any wrongdoing or lack of participation in community endeavors is noticeable.

This *iknal* feature relates to LOPI Facet 6, which focuses on the contextual basis of coordination and communication (whether verbal or nonverbal), based in participants' shared, mutual coordination of endeavors. This feature of *iknal* also relates to LOPI Facet 7.

Recognition of Extraordinary Contributions

The highest regard by a community to any of its members is when complex knowledge is transformed and shared publicly in the most understandable way so that everybody can benefit. Achieving this type of knowledge is not frequent, but the reward—community recognition—provides strong motivation to work for it. Such recognition is observed, for instance, when a new variety of corn, resistant to a highly damaging pest, or a new management technique that enhances agricultural production, is shared with the community.

This feature of *iknal* is related to LOPI Facet 7, which points out that assessment includes appraisal of individuals' success in contributing, as well as appraisal of others' supports for individuals' contributions, with feedback available from the outcome of the efforts as contributions to the endeavor.

The collaborative process described in LOPI, and triggered by *iknal* in Yucatec Maya communities, is not visible to an untrained eye. This process can be either reinforced or destroyed by government impositions, such as schooling. Scientific research, oral tradition, and examples from many Indigenous communities support this statement (Battiste, 2010; Little Bear, 2009; Rentschler, Bridson, & Evans, 2015). The next section describes what happened when Indigenous ways of learning, including *iknal*, were applied in university instruction.

Indigenous Ways of Learning in a University

In its initial eight years, the incorporation of Indigenous ways of learning in UIMQRoo's pedagogy and university setting resulted in remarkable success with its student body of about 600, including the following: Over 70% of the enrolled students successfully finished their university degree (over 50% of each cohort completed all requirements for graduation within a four-year academic program), and alumni employment was over 90%. The percentage of alumni continuing on to graduate degree programs was the highest in the Mexican intercultural university system (Rosado-May, 2017).

Understanding the learning process and knowledge construction in Maya communities was critical for UIMQRoo's success, through merging aspects of both Indigenous and non-Indigenous ways of learning. The working concept driving the institutional processes was that intercultural education is the result of the university providing a safe space for different systems of constructing knowledge (e.g., Western and local) to co-operate, significantly increasing opportunities for synergies to create new, intercultural knowledge (Rosado-May, 2013a, 2013b).

Important aspects of UIMQRoo's intercultural model include the use of a system resembling the *iknal* platform of Maya communities. This involves students working in multidisciplinary teams connected with their communities, and faculty and administrators working in a relatively horizontal and open structure that acknowledges and encourages the cooperation of different ways of constructing knowledge (Rosado-May, 2012, 2013a, 2013b, 2018).

Starting in 2008, UIMQRoo implemented a tutorial system closely aligned to *iknal* in Yucatec Maya communities. In addition to having an academic tutor, students also receive help from other faculty, from fellow students, and a mentor referred to as *nool-iknal*. *Nool-iknal* is a community elder (male or female) from the student's community, chosen by the student based on the elder's reputation or expertise. The elder's role is to contribute to and follow the student's learning process, including sharing knowledge and assessing the student's community work, the student's respect towards community members, and use of the local language. At the end of a semester, the *nool-iknal* would provide an important assessment about the student's community performance; this evaluation is critical to determine whether a student with good academic performance was also performing well at the community level, or needed to strengthen that part of their training. For students with poor academic performance, the *nool-iknal*'s opinion would be critical in the decision of whether to grant another opportunity or fail the student.

In addition to the tutorial system with the *nool-iknal*, UIMQRoo's bylaws were designed to allow the hiring, as faculty, of elders who have no formal schooling but who are highly regarded in their communities for their knowledge and their success in sharing that knowledge with the community. These faculty elders co-taught with faculty who had graduate degrees and conventional training, in classrooms or, often, in the field.

Students thus had the benefit of learning the local knowledge, in the local language, and also of learning Western knowledge. This provided the opportunity to create new knowledge that combines both sources, for not only technical matters but also philosophical issues such as understanding social processes and developing new worldviews. For example, the Community Health students had classes and field practice with both a professor and a *nool-iknal* at the same time. The professor, with a graduate degree in advanced botany, taught the scientific name, physiology, anatomy, and secondary compounds from medicinal plants; the *nool-iknal* taught them, in Maya, the local name of the plants, how they grow, how the elders use the plant for medicinal or ceremonial purposes, how to collect and prepare the plant for medicinal use, how to care for the plant, at what stage of growth the plant can be used, and the like. The students then had the opportunity to discuss in the classroom both approaches to understanding plants and human affairs. This included philosophical topics like how both knowledges can coexist and how to create something new by combining both visions, both knowledges. The same sort of exercise was carried out in all majors, whether

business, information, and intercultural

In addition, we carry out a project of graduation requirements in connection with the needs of young men and women in the community.

The student is accepted by the community with clear indicators of the student's needs. The governmental and non-governmental organizations are the design and evaluation of the conditions for relationships for the language in schools.

The organization is possible, not just for Schools of Education or decision-making. Potential faculty members from the community are invited to the faculty to pass on their knowledge.

UIMQRoo's learning are relevant to avoidable government decisions at the University of Indigenous Knowledge of the idea that the transmission of knowledge

Conc

The process of UIMQRoo—millennial and learning with community creating conditions but the complex settings.

Keeping a community of communities learning new knowledge transmission. Atran, Medina. Indigenous and ecological

business, information technology, or politics, and resulted in publications on intercultural business and intercultural leadership.

In addition to the *nool-iknal* and elders as faculty at UIMQRoo, students had to successfully carry out a project around a subject of interest in their own community in order to complete graduation requirements. This was primarily designed to keep students from losing contact and connection with their communities. Through the years, Maya communities have witnessed the loss of young members leaving the community to pursue university degrees, losing connection with the community's ways of life.

The student projects had to be aligned with community needs, and thus negotiated with and accepted by the community. Students often worked on interdisciplinary projects in teams but with clear individual responsibility. The nature and topic of a project also depended on whether the student's interest included a professional career in academia, business, public service, or non-governmental organizations (Rosado-May & Cuevas Albarrán, 2015). Some examples of projects are the design and implementation of a workshop on natural childbirth and breast feeding; the evaluation of chile varieties; a business plan for marketing a local product; the description of local dances for religious ceremonies; and the limiting factors for amplifying the use of the Maya language in schools.

The organization of the administration and management at UIMQRoo was as horizontal as possible, not pyramidal. The basic unit of administration was the Department, with no Divisions or Schools or Colleges. Transparency, accountability, and participation were prioritized in the decision-making process and in the administration of all university assets and financial resources. Potential faculty and staff members were evaluated by hiring committees integrated by senior faculty from UIMQRoo and other universities, one or two students, and one or two community members. This participatory process assured community members that they would have the best faculty to pass on knowledge to their children, with respect for local culture.

UIMQRoo is a successful but exceptional case where Indigenous pedagogies and ways of learning are respected and implemented at a public university level in Mexico, coexisting with unavoidable government regulations and policies. There is further work to do to innovate actions and decisions at UIMQRoo, to take optimal advantage of the Indigenous ways of learning that sustain Indigenous Knowledge Systems. However, UIMQRoo's *iknal* experiment provides a powerful test of the idea that Indigenous ways of learning can benefit university instruction, and that a combination of knowledge across cultures can be fertile for innovating new knowledge.

Conclusion: Co-Constructing for Innovation Across Cultural Systems

The process of co-constructing Indigenous knowledge—even within an institutional context like UIMQRoo—may play a critical role in Indigenous peoples' continued survival as simultaneously millennial and modern communities. Combining the know-how of Indigenous ways of learning with conventional Western schooling provided positive outcomes for Indigenous students by creating conditions in which not only were their ways of learning recognized and encouraged, but the combination also allowed the emergence of skills and knowledge needed in multicultural settings.

Keeping and improving the ways knowledge is created, passed on, and innovated in Indigenous communities, throughout generations, is crucial in the cultural survival/resilience of Indigenous communities. There is a great need to understand and foster the processes for learning and creating new knowledges by Indigenous people. Evidence indicates that erosion in the creation and transmission of Indigenous knowledge can be correlated to a community's loss of well-being. Atran, Medin, and Ross (2004) argue that the extinction of experience, due to the extinction of Indigenous ways of constructing knowledge, is a devolutionary process that neglects cultural values and ecological features that directly affect a society's manner and possibility of survival.

Knowledge co-creation, involving different cultures, requires that different systems of creating knowledge and of ways of learning work together. Potential synergies in interaction across systems help to build stronger bridges of understanding among different cultures with distinct knowledge, worldviews, and ways of learning. In a world that is increasingly interconnected, it is critical to understand cultural differences in processes of learning and of constructing knowledge, for many reasons—peace being the most important. Interculturalism results from the process that emerges when different ways of supporting learning and creating knowledge work together, in a safe environment, to understand a situation or to solve a problem (Rosado-May, 2015).

Respecting and using Indigenous ways of learning and Indigenous Knowledge Systems, in conjunction with Western approaches, offer advances in learning and innovation for all communities. Indigenous Knowledge Systems have begun to be acknowledged and praised (such as in the recently released special United Nations report by the Intergovernmental Panel on Climate Change, on climate change and land, August 2019, <https://ipccresponse.org/home-en>).

Of course, Indigenous ways of learning are not unique to Indigenous communities. For example, *Learning by Pitching In to family and community endeavors* is likely to be practiced to some extent in all communities (such as in first language learning; Rogoff, 2014). Similar approaches to learning have also been employed in some schools, such as an innovative school in Utah, United States (Rogoff et al., 2001).

However, LOPI's strength in many Indigenous communities of the Americas provides an important model of how such learning can be organized as a coherent, multifaceted way of supporting learning. The ways of learning and of supporting learning that have been examined in this article provide guidance not only for the improvement of learning opportunities for Indigenous children and youth of the Americas, but also for advancing knowledge of instruction and learning more generally, in an iterative process involving exchange between different cultures in a context of mutual respect.

Note

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References

- Alcalá, L., Rogoff, B., Mejía-Arauz, R., Coppens, A.D., & Dexter, A.L. (2014). Children's initiative in contributions to family work in Indigenous-heritage and cosmopolitan communities in Mexico. *Human Development, 57*(2-3), 96-115.
- Ames, P. (2013). Niños y niñas Andinas en el Perú: Crecer en un mundo de relaciones y responsabilidades. *Bulletin de L'institut Français d'Études Andines, 42*(3), 389-409.
- Arenas, A., Reyes, I., & Wyman, L. (2009). When indigenous and modern education collide. In: J. Zajda, & K. Freeman (Eds.), *Race, Ethnicity and Gender in Education*, pp. 59-84. Melbourne: Springer.
- Atran, S., Medin, D., & Ross, N. (2004). Evolution and devolution of knowledge: A tale of two biologies. *Journal of Royal Anthropological Institute (N.S.), 10*(2), 395-420.
- Ávila Romero, L.E., & Ávila Romero, A. (2016). Las universidades interculturales de México en la encrucijada. *Revista de Ciencias Sociales y Humanidades, 25*(50), 198-215.
- Bang, M., Marin, A., Medin, D., & Washinawatok, K. (2015). Learning by observing, pitching in, and being in relations in the natural world. In: M. Correa-Chávez, R. Mejía-Arauz, & B. Rogoff (Eds.), *Children Learn by Observing and Contributing to Family and Community Endeavors. Advances in Child Development and Behavior*, vol. 49, pp. 303-313. San Diego, CA: Elsevier-Academic Press.
- Barnhardt, R., & Kawagley, A.O. (2005). Indigenous knowledge systems and Alaska native ways of knowing. *Anthropology and Education Quarterly, 36*(1), 8-23.

- Bates, P., Chiba, M., Kube, S., & Nakashima, D. (2009). *Learning and Knowing in Indigenous Societies Today*. Paris: UNESCO.
- Battiste, M. (2002, October). Indigenous knowledge and pedagogy in first Nations education. National Working Group on Education and the Minister of Indian Affairs. Indian and Northern Affairs Canada (INAC), Ottawa, Ontario, http://www.afn.ca/uploads/files/education/24_2002_oct_marie_battiste_Indigenousknowledgeandpedagogy_lit_review:for_min_working_group.pdf.
- Battiste, M. (2010). Nourishing the learning spirit. *Education Canada*, 50(1), 14–18.
- Bolin, I. (2006). *Growing up in a Culture of Respect: Childrearing in Highland Peru*. Austin: U of Texas Press.
- Brayboy, B.M.J., & Maughan, E. (2009). Indigenous knowledges and the story of the bean. *Harvard Educational Review*, 79(1), 1–21.
- Cajete, G. (1994). *Look to the Mountain: An Ecology of Indian Education*. Durango, CO: Kivaki Press.
- Cálix de Dios, H., Castillo Martínez, R., & Caamal Canché, H. (2014). Caracterización de la producción de pitahaya (*Hylocereos* spp.) en la zona Maya de Quintana Roo, México. *Agroecología*, 9(1y2), 123–132.
- Chavajay, P., & Rogoff, B. (1999). Cultural variation in management of attention by children and their caregivers. *Developmental Psychology*, 35(4), 1079–1090.
- Chavajay, P., & Rogoff, B. (2002). Schooling and traditional collaborative social organization of problem solving by Mayan mothers and children. *Developmental Psychology*, 38(1), 55–66.
- Chilisa, B. (2012). *Indigenous Research Methodologies*. Thousand Oaks, CA: Sage Publications.
- Coppens, A.D., Alcalá, L., Mejía-Arauz, R., & Rogoff, B. (2014). Children's initiative in family household work in Mexico. *Human Development*, 57(2–3), 116–130.
- Correa-Chávez, M., Mejía-Arauz, R., & Rogoff, B. (Eds.) (2015). Children learn by observing and contributing to family and community endeavors: A cultural paradigm. In: *Advances in Child Development and Behavior*, vol. 49, pp. 91–112. San Diego, CA: Elsevier-Academic Press.
- da Silva, L.J. (2015). El método inductivo intercultural y el calendario sociológico como estrategias para el fortalecimiento de una formación crítica e intercultural de profesores indígenas de los estados de Minas de Gerais y Bahía, Brasil. *Revista ISEES*, 10, 79–94.
- Dayton, A., & Rogoff, B. (2013). 'On Being Indigenous' as a process. *Human Development*, 56(2), 106–112.
- Dayton, A., & Rogoff, B. (2016). Paradigms in arranging for children's learning. In: D.S. Guimarães (Ed.), *Amerindian Paths: Guiding Dialogues with Psychology*, pp. 133–142. Charlotte, NC: Information Age Publishing.
- de León, L. (2015). Mayan children's creation of learning ecologies by initiative and cooperative action. In: M. Correa-Chávez, R. Mejía-Arauz, & B. Rogoff (Eds.), *Children Learn by Observing and Contributing to Family and Community Endeavors: A Cultural Paradigm. Advances in Child Development and Behavior*, vol. 49, pp. 153–184. San Diego, CA: Elsevier-Academic Press.
- Everton, M. (2016). *Los Mayas contemporáneos. Incidencias de viaje y amistad en Yucatán*. José MA. pp. 224–253. Morelos, Quintana Roo, México: Universidad Intercultural Maya de Quintana Roo, Capítulo IV.
- Flores Escalante, J.M. (2010). La resistencia Maya en las escuelas rurales en Quintana Roo, 1928–1934. *Historia Unisinos*, 14(2), 161–176.
- Fortes, M. (1970 [1938]). Social and psychological aspects of education in Taleland. In: M. Fortes (Ed.), *Time and Social Structure*, pp. 201–250. New York, NY: University of London, The Athlone Press.
- Gadgil, M., Berkes, F., & Folke, C. (1993). Indigenous knowledge for biodiversity conservation. *Ambio*, 22(2/3), 151–156.
- Gaskins, S. (2003). From corn to cash: Change and continuity within Mayan families. *Ethos*, 31(2), 248–273.
- Gaskins, S., & Paradise, R. (2010). Learning through observation in daily life. In: D.F. Lancy, J. Bock, & S. Gaskins (Eds.), *The Anthropology of Learning in Childhood*, pp. 100–140. Lanham, MD: Alta Mira Press.
- González Jácome, A. (2004). Ambiente y cultura en la agricultura tradicional de México: Casos y perspectivas. *Ciencia Ergo Sum*, Julio-Octubre, 11(2), 153–163.
- González Jácome, A. (2009). El maíz como producto cultural desde los tiempos antiguos. In: C. Morales Valderrama, & C. Rodríguez Lazcano (Coords.), *Desgranando una mazorca. Orígenes y etnografía de los maíces nativos. Diario de Campo*, Suplemento Número. 52, Enero-Febrero, pp. 40–67. Mexico, D.F.: Instituto Nacional de Antropología e Historia.
- González Jácome, A. (2011). *Historias varias. Un viaje en el tiempo con los agricultores mexicanos*. México: Universidad Iberoamericana.
- Grande, S. (2004). *Red Pedagogy: Native American Social and Political Thought*. Lanham, MD: Rowman & Littlefield.
- Grande, S. (2015). *Red Pedagogy: Native American Social and Political Thought*. Tenth Anniversary Edition. Lanham, MD: Rowman & Littlefield.
- Gutiérrez, I.T., Rosengren, K.S., & Miller, P.J. (2015). Día de los muertos: Learning about death through observing and pitching in. In: M. Correa-Chavez, R. Mejía-Arauz, & B. Rogoff (Eds.), *Children Learn by Observing and Contributing to Family and Community Endeavors: A Cultural Paradigm. Advances in Child Development and Behavior*, pp. 229–252. San Diego, CA: Elsevier.

- Hanks, W.F. (1993). Metalanguage and pragmatics of deixis. In: J.A. Lucy (Ed.), *Reflexive Language: Reported Speech and Metapragmatics*, pp. 127–158. New York, NY: Cambridge University Press.
- Kirkness, V.J., & Barnhardt, R. (1991). First nations and higher education: The four R's—Respect, Relevance, Reciprocity, Responsibility. *Journal of American Indian Education*, 30(3), 1–15.
- Lancy, D. (2016). New studies of children's work, acquisition of critical skills, and contribution to the domestic economy. *Ethos*, 44(3), 202–222.
- Lee, T. (2009). Language, identity, and power: Navajo and Pueblo young adults' perspectives and experiences with competing language ideologies. *Journal of Language, Identity and Education*, 8(5), 307–320.
- Little Bear, L. (2000). Jagged worldviews colliding. In: M.A. Battiste (Ed.), *Reclaiming Indigenous Voice and Vision*, pp. 77–85. Vancouver: University of British Columbia Press.
- Little Bear, L. (2009). *Naturalizing Indigenous Knowledge*. Synthesis paper. University of Saskatchewan, Aboriginal Education Research Centre, Saskatoon, Sask. and First Nations and Adult Higher Education Consortium, Calgary, Alta. Available at www.fnahec.org (Accessed September 26, 2017).
- Little Bear, L. (2011). *Native Science and Western Science*. Arizona State University, ASU Library, The Library Channel, posted on May 16, 2011. Available at: https://lib.asu.edu/librarychannel/2011/05/16/cp114_littlebear.
- Lomawaima, K.T. (2015). Education. In: R. Warrior (Ed.), *The World of Indigenous North America*, pp. 365–387. New York, NY: Routledge.
- Lomawaima, K.T., & McCarty, T.L. (2006). *"To Remain Indian": Lessons in Democracy from a Century of Native American Education*. New York, NY: Teacher's College Press.
- López, A., Najafi, B., Rogoff, B., & Mejía-Arauz, R. (2012). Collaboration and helping as cultural practices. In: J. Valsiner (Ed.), *The Oxford Handbook of Culture and Psychology*, pp. 869–884. New York, NY: Oxford University Press.
- Madjidi, K., & Restoule, J. (2008). Comparative Indigenous ways of knowing and learning. In: K. Mundy, K. Bickmore, R. Hayhoe, M. Madden, & K. Madjidi (Eds.), *Comparative and International Education: Issues for Teachers*, pp. 77–106. New York, NY: Teachers College Press.
- Mato, D. (1996). The Indigenous uprising in Chiapas. *Identities*, 3(1–2), 205–217.
- Mato, D. (Coord.) (2012). *Educación superior y pueblos indígenas y afrodescendientes en América Latina. Normas, y prácticas*. Caracas: IESALC/UNESCO.
- McCarty, T.L., & Nicholas, S.E. (2014). Reclaiming Indigenous languages: A reconsideration of the roles and responsibilities of schools. *Review of Research in Education*, 38(1), 106–136.
- Mejía-Arauz, R., Rogoff, B., Dayton, A., & Henne-Ochoa, R. (2018). Collaboration or negotiation: Two ways of interacting suggest how shared thinking develops. *Current Opinion in Psychology*, 23, 117–123.
- Morales Velázquez, J.J., & Lepe Lira, L.M. (2013). Parankuecha, diálogos y aprendizajes: Las fogatas de Cherán como praxis educativa comunitaria. *International Journal of Multicultural Education*, 15(3), 61–75.
- Morelli, G., Rogoff, B., & Angelillo, C. (2003). Cultural variation in young children's access to work or involvement in specialized child-focused activities. *International Journal of Behavioral Development*, 27(3), 264–274.
- Nigh, R., & Bertely, M. (2018). Indigenous knowledge and education in Chiapas, Mexico: An intercultural method. *Dialogos sobre Educación, Temas Actuales en Investigación Educativa*, 9(16), 1–20.
- Okakok, L. (1989). Seeing the purpose of education. *Harvard Educational Review*, 59(4), 405–422.
- Paradise, R. (1985). Un análisis psicosocial de la motivación y participación emocional en un caso de aprendizaje individual. *Revista Latinoamericana de Estudios Educativos*, 15(1), 83–93.
- Paradise, R., Mejía-Arauz, R., Silva, K.G., Dexter, A.L., & Rogoff, B. (2014). One, two, three, eyes on me! Adults attempting control versus guiding in support of initiative. *Human Development*, 57(2–3), 131–149.
- Paradise, R., & Robles, A. (2015). Two Mazahua (Mexican) communities: Introducing a collective orientation into everyday school life. *European Journal of Psychology of Education*, 31, 61–77.
- Paradise, R., & Rogoff, B. (2009). Side by side: Learning through observing and pitching in. *Ethos*, 37(1), 102–138.
- Ramos Díaz, M. (2001). *Niños Mayas, maestros criollos. Rebeldía indígena y educación en los confines del trópico*. Chetumal, Quintana Roo: Universidad de Quintana Roo, México, Chapters VII & VIII.
- Reed, N. (2001). *The Casta War of Yucatan*. Revised ed. Stanford, CA: Stanford University Press.
- Rentschler, R., Bridson, K., & Evans, J. (2015). Civic pride and community identity. The impact of the arts in regional Australia. *Stats and Stories – Theme 4*. Australia: Deakin University. Available at: <http://regionalarts.com.au/wp-content/uploads/2015/05/Stats-Stories-4-Civic-Pride.pdf>.
- Rogoff, B. (1998). Cognition as a collaborative process. In: D. Kuhn, & R. S. Siegler (Eds.), *Cognition, Perception and Language: Vol 2. Handbook of Child Psychology*, 5th ed, pp. 679–744. New York, NY: Wiley.
- Rogoff, B. (2003). *The Cultural Nature of Human Development*. New York, NY: Oxford University Press.
- Rogoff, B. (2014). Learning by observing and pitching in to family and community endeavors: An orientation. *Human Development*, 57(2–3), 69–81.
- Rogoff, B. (2016). Culture and participation: A paradigm shift. *Current Opinion in Psychology*, 8, 182–189.

- Rogoff, B., Goodman Turkanis, C., & Bartlett, L. (2001). *Learning Together: Children and Adults in a School Community*. New York, NY: Oxford University Press.
- Rogoff, B., Mistry, J., Göncü, A., & Mosier, C. (1993). Guided participation in cultural activity by toddlers and caregivers. *Monographs of the Society for Research in Child Development*, 58(7, Serial No. 236).
- Rogoff, B., Najafi, B., & Mejía-Arauz, R. (2014). Constellations of cultural practices across generations: Indigenous American heritage and Learning by Observing and Pitching In. *Human Development*, 57(2–3), 82–95.
- Rogoff, B., with Pérez González, C., Chavajay Quiacáin, C., & Chavajay Quiacáin, J. (2011). *Developing Destinies: A Mayan Midwife and Town*. New York, NY: Oxford University Press.
- Rosado-May, FJ. (2012). Una perspectiva intercultural al concepto de tutoría académica. El caso de la UIMQRoo. In: I. Deance, & V. Vázquez Valdés *Aulas Diversas. Experiencias sobre educación Intercultural en América*, pp. 65–90. Quito: ABYA/YALA Universidad Politécnica Salesiana, Deance-Vázquez y Universidad Intercultural Maya de Quintana Roo.
- Rosado-May, FJ. (2013a). *Indigenous Education. Which Way to Go? The Intercultural Model for Higher Education Developed in Mexico*. Canada: II International Meeting Canada-Mexico On Indigenous Education, University of Lethbridge, June 22nd.
- Rosado-May, FJ. (2013b). Experiencias y visión de futuro de la Universidad Intercultural Maya de Quintana Roo. Aportaciones del modelo intercultural a la sociedad. In: A. Wind (Ed.), *Experiencias y visiones para el futuro de las Universidades Indígenas en el mundo*, pp. 157–172. La Paz, Bolivia: Instituto Internacional de Integración- Convenio Andrés Bello.
- Rosado-May, FJ. (2015). The intercultural origin of agroecology: Contributions from Mexico. In: V.E. Méndez, C.M. Bacon, R. Cohen, & S.R. Gliessman (Eds.), *Agroecology*, pp. 123–138. Boca Raton, MA: CRC Press/Taylor and Francis, Chapter 8.
- Rosado-May, FJ. (2017). Los retos y oportunidades de guiar inteligencia con inteligencia. El modelo de educación superior intercultural en Quintana Roo. In: F. González González, FJ. Rosado-May, & G. Dietz (Coords.), *La gestión de la educación superior intercultural en México. Retos y perspectivas de las universidades interculturales*. Chilpancingo, Guerrero, México: Universidad Autónoma de Guerrero y El Colegio de Guerrero A.C.
- Rosado-May, FJ. (2018). Participación comunitaria en educación superior intercultural en el contexto de la construcción de identidad en un mundo global. In: FJ. Rosado-May, M. Chan Collí, & H. Cáliz de Dios (Eds.), *Sin memoria no hay historia. El Rostro humano en la creación de la Universidad Intercultural Maya de Quintana Roo*, pp. 503–522. José Ma. Morelos, Quintana Roo, México: Glocal Bej.
- Rosado-May, FJ., & Cuevas Albarrán, V.B. (2015). El programa educativo “Ingeniería en Desarrollo Empresarial” de la Universidad Intercultural Maya de Quintana Roo. ¿Qué justifica su creación? In: E.E. Brito Estrella (Ed.), *Empresa, sostenibilidad y desarrollo regional*, pp. 51–53. José María Morelos, Quintana Roo, México: Universidad Intercultural Maya de Quintana Roo.
- Sandoval-Forero, E.A., & Montoya-Arce, B.J. (2013). La educación indígena en el estado de México. *Papeles de Población*, 19(75), 239–266.
- Schmelkes, S. (2012). Educación para un México intercultural. *Sinéctica*, 40. Recuperado de: http://www.sinectica.iteso.mx/articulo/?id=40_educacion_para_un_mexico_intercultural.
- Schmelkes del Valle, S. (2009). Interculturalidad, democracia y formación valoral en México. *Revista Electrónica de Investigación Educativa*, 11(2). Consultado el 8 de julio de 2016, en: <http://redie.uabc.mx/vol11no2/contenido-schmelkes2.html>.
- Scollon, R., & Scollon, S. (1981). *Narrative, Literacy, and Face in Interethnic Communication*. Norwood, NJ: Ablex.
- Sueyo, H. (2003). Educational biography of an Arakmbut. *Comparative Education*, 39(2), 193–197.
- Swisher, K. (1990). Cooperative learning and the education of American Indian/Alaskan Native students. *Journal of American Indian Education*, 29, 36–43.
- Teuton, C. (2012). *Cherokee Stories of the Turtle Island Liar's Club*. Chapel Hill, NC: University of North Carolina Press.
- Thomas, R. (1972). Indians and white people. In: H. Bahr, B. Chadwick, & R. Rowe (Eds.), *Native Americans Today: Sociological Perspectives*, pp. 30–40. New York, NY: Harper and Rowe.
- Thomas, R. (1993). Childhood. Unpublished chapter. *Selected Works of Robert K. Thomas*. Available at: https://works.bepress.com/robert_thomas/.
- Tippeconic, J.W. III (1999). Tribal control of American Indian education. In: K.G. Swisher, & J.W. Tippeconic III (Eds.), *Next Steps: Research and Practice to Advance Indian Education*, pp. 33–52. Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools.
- Tom, M.N., Huaman, E.S., & McCarty, T.L. (2019). Indigenous knowledges as vital contributions to sustainability. *International Review of Education*, 65(1), 1–18.

- Urrieta, L. Jr. (2013). Familia and comunidad-based saberes: Learning in an Indigenous heritage community. *Anthropology and Education Quarterly*, 44(3), 320–335.
- Urrieta, L. Jr. (2015). Learning by observing and pitching in and the connections to native and Indigenous knowledge systems. In: M. Correa-Chávez, R. Mejía-Arauz, & B. Rogoff (Eds.), *Children Learn by Observing and Contributing to Family and Community Endeavors: A Cultural Paradigm: Advances in Child Development and Behavior*, pp. 357–380. San Diego, CA: Elsevier.
- Urrieta, L. Jr. (2016). Native and indigenous education in the Americas: Indigenous knowledge systems, equity, and economies. In: G. Noblit, & W. Pink (Eds.), *Education, Equity, and Economy: Crafting a New Intersection*, pp. 161–174. Switzerland: Springer International.
- Vargas-Cetina, G. (1998). Uniting in difference: The movement for a new Indigenous education in the state of Chiapas, Mexico. *Urban Anthropology and Studies of Cultural Systems and World Economic Development*, 27(2), 135–164.
- Wilson, S. (2008). *Research is Ceremony: Indigenous Research Methods*. Halifax, NS Canada: Fernwood.

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