

Human Food Education: Multidimensional, Complex and Situated Perspective

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Abstract

The way any human group eats is a complex phenomenon that tightly knits biological and sociocultural dimensions in such way that they are mutually conditioned. In Mexico, as in different parts of the world, nutrition is part of the basic school curricula. However, it is generally approached from a regulatory point of view. In this chapter, we describe a theoretical framework that uses the notion of interdisciplinary islands of rationality and educational reasonability and present two cases in different contexts in which this framework is used. In the first case, we analyze how a preschool teacher, in a school setting of disadvantaged students, constructs a teaching sequence about food and nutrition to establish a dialogue between traditional and modern family practices. In the second case, we use the framework as an analytical and research tool to propose how the agroecological system '*milpa*', where maize and other crops are traditionally produced could be incorporated into school, to generate dialogues that promote social justice. We aspire to expand the conceptualization of topics traditionally associated with health education by placing them in specific sociocultural contexts.

Resumen

La forma en la que cualquier grupo humano se alimenta es un fenómeno complejo que incorpora nociones biológicas y socioculturales al punto de que se condicionan mutuamente. En México, como en distintas partes del mundo, la educación alimentaria es parte del currículo de educación básica. Sin embargo, su abordaje suele hacerse desde un punto de vista normativo. En este capítulo proponemos el marco teórico de islotes interdisciplinarios de racionalidad y razonabilidad educativa. Presentamos dos casos para discutir las formas en las que los elementos culturales y contextuales determinan estos islotes. En el primer caso, analizamos la forma en la que una maestra de preescolar utiliza el marco teórico para construir una secuencia didáctica acerca de la comida y la nutrición, que dialoga con las prácticas alimentarias familiares del presente y del pasado en una escuela de un entorno desfavorecido. En el segundo caso, utilizamos el marco teórico como una herramienta analítica y de investigación para proponer la forma en la que el sistema agroecológico milpa (en el que se cultivan maíz y otros productos) puede incorporarse en la escuela generando diálogos que buscan promover la justicia social. Buscamos expandir la forma en la que se conceptualizan los temas relacionados con la educación para la salud situándolos en

contextos socioculturales específicos.

1. Introduction

Human nutrition (or human feeding) is an everyday fact, part of any cultural identity; it is a complex phenomenon that entails social, cultural and biological dimensions. In different countries in Latin America food education has entered basic education classrooms as part of the topics covered in Biology or Natural Sciences. However, the most common educational approaches consider only the biological/nutritional dimension, generating reductionist proposals for its study and dissemination. On one hand, school curricula presents basic notions about nutrition and, on the other hand, prescribe a healthy diet directed specifically to prevent obesity and diabetes (Hernández, et al, 2003; Salinas, et al, 2014), leaving aside cultural and social dimensions.

In general terms, when curricular guidelines are enacted in Biology textbooks, they present a narrative of “good eating” (Cano Muñoz, 2015): prescribe recommended portions and daily intake of nutrients; emphasize the importance of physical activity and provide information about obesity, overweight and its consequences. This approach, centered in individual actions (see Elisa Meinardi’s chapter in this book), blames individual mal praxis and barely considers aspects that do not depend of individuals: social, cultural, economic and political issues, and that affect nutritional habits. Such an approach does not promote comprehending food as a complex phenomenon with biological, social, economic and political dimensions (Meek y Tarlau, 2015).

From our point of view, and as a guide of the vision we discuss in the present chapter, incorporating complexity and multidimensionality in food education in school is valuable. Therefore, we need to consider a situated approach that considers regional differences, integrates community knowledge, values the cultural wealth of food, and integrates its’ socio-cultural and nutritional-biological aspects.

This chapter presents an alternative for food education in school that considers multidimensionality, complexity, and incorporates the wealth of sociocultural practices related to food and nutrition. It is organized in two sections: in the first one we present a theoretical approach for food education that involves constructing islands of disciplinary rationality and educational reasonability (Bahamonde, 2007; 2009, Fourez, 1997). In the second section, we present two cases in which this theoretical approach is used: first, we exemplify how a pre-school teacher can appropriate this theoretical framework and enact it when planning an educational intervention to teach about food and nutrition to her students.

In the second case, we use this framework to analyze the way in which milpa, an agroecological system fundamental for food sovereignty in Mexico, and the knowledge associated to it, can be taken to school.

2. A multidimensional and complex theoretical framework for food education in school

2.1. Food as a historical and culturally situated fact

As we have previously stated, we conceive food as a complex phenomenon that tightly knits biological and sociocultural dimensions until the point of conditioning each other (Contreras Hernández and Gracia Arnaiz, 2005). In Latin American societies, food is traversed by globalization and, at the same time, framed by community and traditional reference practices. Therefore, we need a multidimensional and complex approach that considers the study of food within a culture. Food is one of a number of activities that configures quotidian life in any social group, either from the present or the past, and because its specificity and polyvalence, it plays a central role in the biological, psychological, and cultural characterization of human species (Bahamonde, 2007).

Food is a lot more than a set of nutrients chosen only on the base of biological nutritional criteria, and food choices do not answer only to economic reasons. This is why we consider valuable to specify two perspectives that configure human nutrition and that could be integrated to its' study in schools. On one hand, the historical perspective, fundamental to understand food in the past and inquire in its roots looking for elements to interpret the current phenomenon. Food is a situated fact, nourished by a set of slowly elaborated traditions (throughout the centuries), therefore not only what is eaten has changed, but also when, how, where and with whom. "Neither the way of preparing food changes from one town to the next for a whim but due to technological, economic and social differences present in such communities" (Flandrin and Montanari, 2011, p.11).

On the other hand, the cultural perspective, that acknowledges the fact that the same biological condition has taken different forms in different societies, either from the past of the present. Beyond survival and the satisfaction of biological and physiological needs, similar for all human beings, food preferences and the frontiers established between what is edible and what is not, are one of the main supports for communities' cultural identities and worldviews. Food is traversed by aspects of ethnicity, class and social justice that should be considered in the school (Meek and Tarlau, 2015).

2.2. Disciplinary rationality and educational reasonability islands for food education

In Latin America science education based in socioscientific issues has gained a relevant space (cita cap. En este libro). From such space we promote the development of scientific competencies and knowledge that enable students to make decisions related to health and feeding in a specific social and cultural context. Such competencies also enable the critical reading of mass media in contemporary debates related to scientific and technological issues.

Authors such as Sadler (2011) and Zeidler et al (2011) underscore the relevance of approaching science content that is relevant and frequently controversial in students' and communities' everyday life promoting a situated and context-based learning. Socioscientific based education is characterized for considering ethical questions and the construction of moral judgments about scientific topics through social interaction and discourse. This perspective is embedded in a scientific education that considers the exercise of a full, informed and responsible citizenship.

In a similar sense, we advocate, with other authors, for the conceptualization of topics associated to health education, such as food, from an ample perspective (Bonil et al, 2004; Pujol, 2003; Toscano et al, 1994). Bahamonde (2007; 2009) has proposed a theoretical construction of interdisciplinary islands of rationality and educational reasonability for school science (Izquierdo et al, 1999). She revisits the metaphor of interdisciplinary islands of rationality elaborated by Fourez (1997) but transcends it incorporating new elements such as multidimensionality (scientific-technological and sociocultural practices of reference), cultural and historical perspectives, students' interests and needs and everyday and school models. These elements provide the island with educational and didactic reasonability.

This construction lets us tackle real (complex) problems in educational contexts, for which an approach of disciplinary or interdisciplinary rationality is insufficient, through the construction of *ad-hoc* models. Such construction has a double functionality because it can be used for research and for teaching.

This is a new curricular 'framing' that can be adjusted to specific problems and educational contexts without giving up theoretical thinking. This obliges us to borrow, selectively and subjectively, concepts and ideas from different disciplinary fields and to combine them according to the objectives of every educational project (Fourez, 1997). In a similar vein, Astolfi (1998) proposes the development of a multireferentiated curriculum to face the complexity of this kind of learning.

The interdisciplinary island of rationality and educational reasonability for food education is an *ad hoc* model built from conceptualizations that come from explicative

models in different disciplinary areas as well as everyday models. These conceptualizations recombine to explain phenomena, or to look for solutions to meaningful problems for students. Its construction puts into play notions such as culture, society, production, consumption and technological processes in interaction with those of biology and health.

The new conceptualization surpasses classic disciplinary perspectives, and provides students with the possibility to communicate and discuss about complex problems within a framework. In these discussions, complex problems can be interpreted according to the theoretical model that has been agreed upon and constructed *ad-hoc*. However, it is important to point out that this interdisciplinary dialogue around a problem or object of study should assume the challenge of moving from the disciplinary to the global perspective in order to avoid reductionisms and allow the translation from one reference framework to the next without losing its explanation potential.

This multidimensional approach considers different referential practices. Such practices are the source for scientific-technological and sociocultural actions and activities, for example, handcraft or industrial production, research and domestic activities. These activities include a number of different social profiles such as anthropologists, nutritionists, but also, cooks, food growers, housewives, among others. In this sense, it becomes indispensable to consider a temporal and spatial axis (including diachronic and synchronic aspects) when analyzing the selected problems because they bring dynamism to the *ad hoc* model, by promoting ideas as change/evolution/diversity. Another inescapable condition is that the island is plausible and meaningful in order to be reasonable for students (Izquierdo and Aliberas, 2004). This is why the problems or defined situations are real, motivational, close to the students and connect with their everyday models.

We schematize the interdisciplinary island of rationality and reasonability in Fig. 1. This includes school science models: living being (MLB), health (MH), cell (MC), chemical change (MCCh) and ecosystems (ME). From the social science areas, we consider models of society (So), culture (Cu), the binomial production and consumption (Co) and from the technology area, technological object (TO) and technological project (TP). School disciplinary areas support selected conceptualizations to construct the *ad hoc* model and at the same time, they are supported in everyday models as the inescapable starting points. The model becomes dynamic by considering the temporary and spatial axis (diachronic and synchronic) and includes social practices of reference that exceed and amplify those that are exclusively scientific, incorporating and giving value to domestic, artistic and technological actions.

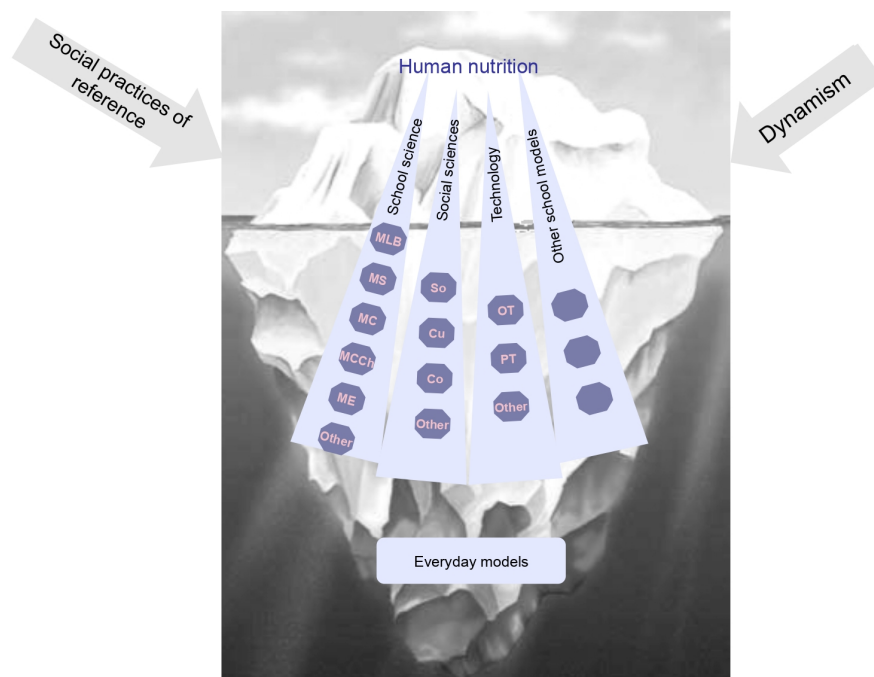


Figure 1: Schematization of elements integrated in the construction of an interdisciplinary island of rationality and educational reasonability for food education (Taken from Bahamonde, 2007)

3. Two cases of use of the interdisciplinary island of rationality and reasonability for food education

This proposal, originally conceived as a theoretical construct oriented to the interpretation of data in a research project (Bahamonde, 2007), could also be a reference framework to interpret data in other educational research projects, as well as a foundation for the design of educational plans, curricular materials, or professional development programs.

We exemplify the use of this construct using two cases. The first one describes the reconstruction and appropriation of this theoretical framework by a preschool teacher when planning and implementing a didactical sequence as part of her masters' research project. The second presents an intercultural science education project in which milpa is a social practice of reference that allows incorporating traditional knowledge in school.

To reconstruct both cases, we pose a guiding question, related to the transposition of the framework to specific cases. We retrieve empirical information constructing an ecology of data. In the first case, we retrieve teachers' reflective exercises, students' productions and photographs of activities and products. In the second case, we retrieved work related to milpa undertaken by students in schools situated in indigenous communities, and interviewed the

teachers involved¹. The ideas that we put forward emerge from a process of organization and revision of collected data. Key ideas from the theoretical proposal of rationality and reasonability islands were refined through a hermeneutical cycle (Weiss, 2017) in a continuous process from data to theoretical reflection. This process allowed us to organize the complexity involved in each case.

3.1. Design of an innovative teaching-learning sequence for food education in preschool

As we have pointed out, the interdisciplinary and multidimensional approach developed can orient teachers' didactic transposition according to the project and context, without giving up theoretical thinking that contributes to professional development.

Teacher Sabrina planned her teaching sequence as part of her thesis project in the Master of Biology Education in Cinvestav, Monterrey, México. She worked in a public preschool in which students started at 8:30 in the morning and left at 15:00. They had breakfast and lunch in the school. When she started her master's studies she was worried about students' nutrition because she noticed they were very thin and could be malnourished.

During the first year of the master (2017-2018), Sabrina designed and implemented an innovative teaching sequence on food education. Sabrina and her two advisors (first and third authors) undertook a process of interchange and feedback in which Sabrina consulted and discussed different texts².

Sabrina started with a traditional perspective about food education with a regulatory approach about the nutritional recommendations that kids should follow in order to accomplish a healthy nutrition. This perspective was aligned with current curricular proposals and dominant representations about food education in the school. We briefly describe three stages of the work she undertook in order to exemplify how she integrated this alternative theoretical framework.

Stage 1: Problematization of teacher's work under a new perspective.

Once the teacher presented an initial proposal, the advisors recommended reading different theoretical materials that could amplify her perspective about the subject. These readings were analyzed during advisory meetings, which lead to contrast different approaches and assess their adequacy in relation to the didactical problem. Once the teacher started

¹ In order to maintain anonymity we have changed teachers' names. The three teachers involved have given us their informed consent for using the information, interviews and photographs that we present in this chapter.

² One of the main references were the food education materials developed by the Argentinian Ministry of Education for primary schools in the project TCP/ARG/3101 with the technical cooperation of FAO (2009)

appropriating the theoretical framework, she could problematise her own practice, posing questions and proposing activities more consistent with the adopted framework. See, for example the didactical problem she identified as point of departure for the innovation:

“That preschool students in my group are able to dialogue between school and family practices regarding food and nutrition. That students can build new knowledge that helps them make decisions from a perspective that incorporates biological, sociocultural and health aspects. That students be aware of the relevance of a good nutrition for their integral development and learning”

It is interesting to observe that Sabrina enriched her original proposal, centered in a regulatory approach about nutrition, and aimed to establish a dialogue between students’ and their families’ daily practices and the school knowledge they were set out to build. This intention can be seen operationalized in Photograph 1, taken during the implementation of the sequence; the teacher considers students’ everyday practices and takes them as social practices of reference for subsequent activities.



Photograph 1. A student’s drawing made during the teaching sequence. Student’s comment reads: “it is my mother offering me an apple to eat when I come home”

We underscore the potential of Sabrina’s teaching strategies to promote the reconstruction of students’ practices. These strategies are informed by disciplinary rationality, but are also reasonable, attend to students’ motivations, interests and contexts. This approach starts to be operationalized in the teacher’s definition of the innovation goals’.

Stage 2: Defining goals for the educational innovation

Taking the didactical problem as starting point, Sabrina defined the goals she expected students could achieve in the innovation, and came to the following:

“It is expected that when completing this sequence, the students be able to:

- 1 Amplify their perspective towards food and try new food.
- 2 Identify at least two cultural changes in the way their families eat, in the past and present.
- 3 Recognize at least two emotions associated to food.
- 4 Recognize at least two aspects that are characteristic of their feeding habits, that relate to the place where they come from and that are influenced by traditions and festivities.
- 5 Identify at least two food choices that are healthy for their everyday life and recognize two healthy food that are necessary for their growth and development”

These goals emphasize Sabrina’s interest to approach food education from a complex and multidimensional perspective, integrating theory and practice when proposing that students amplify their perspective and try new food. She incorporates dynamism in the conceptualization of food through the introduction of temporary and spatial aspects, diachronic – changes in the food taken by their families in the past and present – and synchronic – characteristic aspects of food in their places of origin that are influenced by traditions and festivities-. This can promote that students compare and establish similarities and differences between what they and other students eat, and recognize particularities.

Moreover, the teacher formulated a goal related to the identification of his or her own emotions related to food. This is a crucial aspect of any reflection related to taste, but also related to food choices and their eventual modification.

Last, we also identify that the teacher recognizes students’ freedom and self-determination, giving them chances to choose, but considering that food choices are a possible path towards health, growing and development.

Stage3: Design of activities and implementation in the classroom

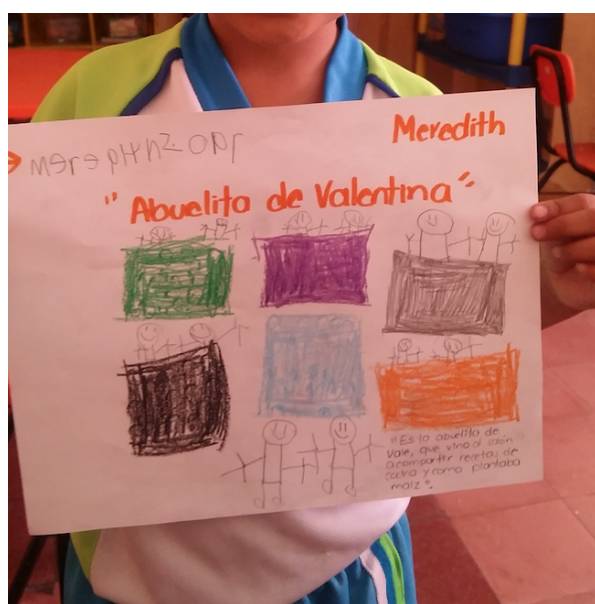
Sabrina designed activities according to the adopted approach, aligned with the didactical problem and the proposed goals. She defined strategies, purposes, instructions, resources, and implemented activities in the classroom. In these activities the theoretical proposal is materialized. We will use the activity: the food of my grandparents and my food as an example.

In this activity, the teacher sets out to:

“Ask students to construct a collage (in a cardboard or piece of paper, with photographs or images) with the support of their grandparents where they answer: What did my grandparents ate when they were my age? What did they like and what did they not like when they were kids? Ask fathers and mothers help with the drawings”

In this activity, we can identify that the social practices of reference are incorporated through the consideration of the domestic activity of cooking. Diachronic and synchronic axis are incorporated to enhance reflection about what was eaten before and what we eat now, introducing ideas of changes in food practices to emphasize their dynamism. The teacher proposed that the kids talk about what they like to eat with the family, recognizing that every person has different tastes within a culturally defined range. This allows the recognition that food has also a social function related to affective bonds, commensality and communication in the family.

After this first activity, the teacher invited grandparents and grandmothers to prepare a family meal in the classroom. Boys and girls collaborated in the preparation and ate what they prepared. They made a drawing about the event and the teacher wrote students' explanations in every drawing. In Figure 3 we present the drawing of one of the students about the visit of Valentina's grandmother who prepared lemon pie, a dessert that is common in their house. This activity retrieves women's knowledge and values their role as bearers of cooking practices.



Photograph 2. Drawing about the visit of Valentina's grandmother, showing students in their table and the grandmother and teacher in the front preparing the dessert. (Taken by the teacher's group).

The three stages of the teaching-learning sequence that we have discussed evidence Sabrina's process of gradual appropriation of alternative approaches for food education. She was able to reflect on the theoretical framework and incorporate it in the design of a

didactical innovation that considers food education as multidimensional, complex and situated.

3.2. Milpa as a social practice of reference to build islands of disciplinary rationality and educational reasonability.

In this section, we retrieve elements of a project we have undertaken (second and third authors) with teachers and students of schools in Indigenous communities in the Chiapas' Highlands in southeastern Mexico. In these communities, most families plant *milpa*, where they obtain food mainly for self-consumption. Food education that considers Indigenous communities' knowledge requires the identification of practices of reference as well as an approach from a complex perspective. Planting milpa generates a set of knowledge and practices that have been traditionally excluded from school. Here we point out how this knowledge can relate to school knowledge to construct an island of disciplinary rationality and educational reasonability. This would allow students to construct an *ad hoc* model about milpa, one that integrates their communities' and school knowledge.

Considering *milpa* as a social practice of reference allows us to incorporate biology, ecology, and chemistry knowledge, as well as sociocultural, economical, and everyday knowledge relevant for students (Garcia Franco, 2015). *Milpa* is a polyculture with three main species: corn, squash and beans; its agrological cycle, as well as activities related to food preparation, festivities and practices for biodiversity conservation are exemplary of food's multireferentiality.

To start conceptualizing this island we need to recognize that *milpa* is considered as a sustainable agroecological system that guarantees the families' feeding because it provides food during the whole year: from the first squash flowers until the grains of dry corn (Linares and Bye, 2011). Therefore it is deemed fundamental to achieve food sovereignty. The agrological calendar combines with the festive calendar giving the rationality island its temporary dynamism. It also includes diachronic aspects recognizing how the milpa has changed with time, and synchronic aspects identifying different *milpas* in different communities.

The three main species in milpa – maize, squash and beans- establish symbiotic relations. Beans grow surrounding the maize's stem; bean's roots provide the nitrogenated compounds that are used as fertilizers by the maize; squash, with its big leaves provides moisture to the soil and keeps some insects away. On the other hand, maize, bean and squash, along with chili, complement each other for a balanced nutrition; maize provides

carbohydrates that, when consumed with beans, provide good quality proteins; lipids are obtained from the squash seeds; and chili, which normally accompanies all food preparations, aids in the intake of nutrients. In the milpa, along with these three main species it is possible to find other vegetables such as tomatoes, medicinal plants, and non-cultured edible plants known as *quelites*, that are relevant for nutrition (Linares and Bye, 2011).

The rationality and reasonability island can integrate the models of living being (MLB), and ecosystem (EC), alongside the evolutionary perspective (Evo) associated to the artificial selection of maize (Gómez Galindo, et al, 2019). Using native maize in *milpa* is related to diversity conservation and to traditional practices of interchange and selection of seeds for the next crop cycle (Gómez Galindo, et al, 2021). This favors the incorporation of social practices of reference that we need to know and value.

Students in the communities we have worked show a vast knowledge about cultivation in milpa: different kinds of maize, instruments used in sowing, the crop cycle, food and festivities. In their initial drawings, students incorporate the diversity in milpa and also recognize parts of the plants in both their mother tongue (Tsotsil or Tseltal) and Spanish (Figure 2).

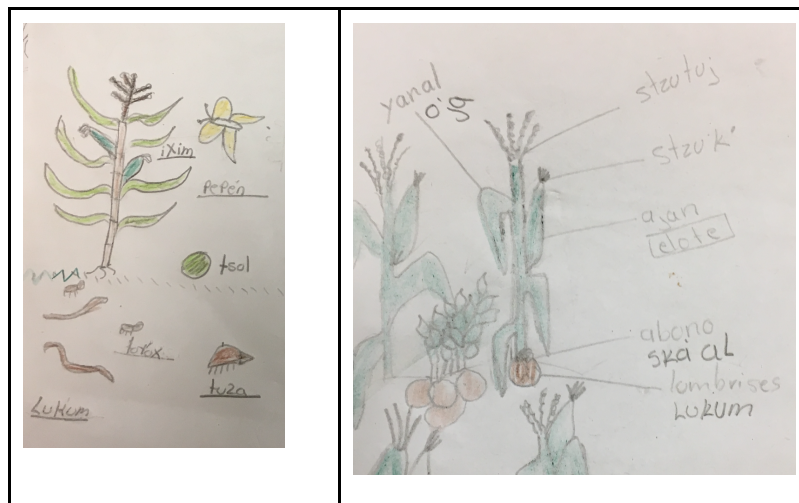
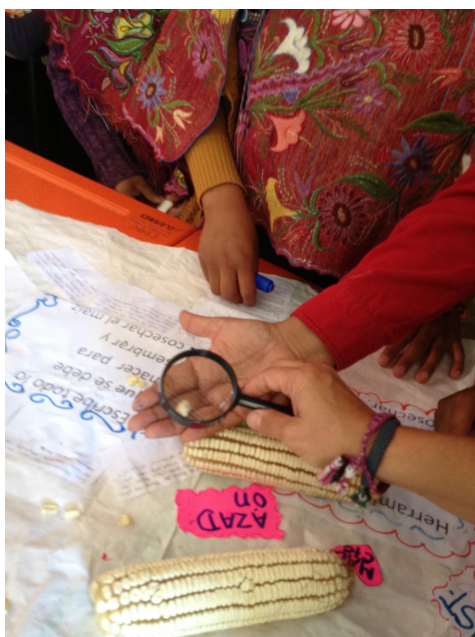


Figure 2. Students' drawings during the initial activities about milpa



Photograph 3. Students observing details in the maize grains, from the cobs they brought to the classroom and that their families cultivate. (Photo: Adrianna Gómez Galindo)

However, this knowledge is not considered in school. Students and teachers regarded the introduction of maize and milpa as topics in the classroom as motivating and innovative. For example, observing the seed's morphology with detail (Photograph 3), drawing, talking, and making tables about their milpa provided with opportunities for reconstructing and amplifying their own experiences.

We contend that, in this case, rationality and reasonability islands are enriched by key elements such as identity and emotional components. *Milpa* is very relevant for Indigenous students and this close relation should be considered when constructing the interdisciplinary island. Emotional aspects are also related to food, its diversity, the appreciation of its flavor and the spaces where it is consumed.

We present some examples of this strong relation in students' answers to the question: what does maize mean to you?

"It means life to me, it gives us *tortilla*"

"Maize is a healthy food, when we eat *pozol*, we do not get sick"

"Maize is a part of our life, without maize we could not live because it nourishes us"

"Maize means that it gives life, if there is no maize, we die".

Introducing *milpa* in the classroom can provide students with tools to take actions related to their food, the conservation of biological diversity and the recognition of the relation between biological and cultural diversity. It is also necessary to incorporate a critical perspective to these reflections. Meek and Tarlau (2015) advise that when planning

pedagogical strategies and topics for food education it is necessary to look beyond how food grows or how healthy choices should be taken. A radical critique of the current system of global food production and recognizing social movements aiming to transform such system could be pertinent. *Milpa* is recognized as a key strategy to achieve food sovereignty in Mexico and its introduction in the classroom, as part of a complex and multidimensional food education approach, could be relevant for the whole population and not only for Indigenous students.

4. Final reflections

In this chapter, we have problematized food education in school and presented the theoretical proposal of disciplinary rationality and educational reasonability islands as a potent alternative to design teaching situations in the classroom and in professional development environments, as well as an analytical tool for research process.

First, we showed how this perspective could work in professional development and the design of teaching sequences. This framework seems fruitful to transcend the reductionist perspective for food education that is integrated in the curriculum and textbooks. It has also been useful to enhance reflection processes that amplify and inform teachers' perspectives leading to put aside the normative vision and incorporate a more reflexive and critical perspective, in line with the current trends about food education and health in Latin America.

The project of the *milpa* has taken several years of research, and collaborative work with teachers in the Chiapas Highlands. Tackling the complexity and multidimensionality in this case can be a long-range enterprise that allows us to consider different practices of reference that are valuable from the cultural and personal viewpoint of the students. Results from this research are used in the collaborative design of professional development projects and didactical materials that consider the promotion of social justice. In this sense and to finalize this chapter, we echo with the following reflection:

“...we are well aware that school practices are undertaken in a space and time where deep inequalities subsist. Food education is situated in a space that is particularly sensible to these inequalities. Our bet is to contribute to overcome them, in a modest sense, knowing that there are problems that are beyond the school and in which the pedagogical design cannot have any influence. However, we are convinced that we need to face this challenge and hope to contribute to visualize teachers as able to guarantee students' access to knowledge” (Proyecto EAN, Ministerio de Educación de

Argentina., 2009. p 4).

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