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LET'S GO GREEN! THE POSSIBILITIES FOR SUSTAINABLE AGRICULTURE IN THE SOUTH OF BRAZIL AND THE ROLE OF ENVIRONMENTAL EDUCATION



Master Thesis | Nikki Veerman, 5949424

Master Thesis

THE POSSIBILITIES FOR SUSTAINABLE AGRICULTURE IN THE SOUTH OF BRAZIL AND THE ROLE OF ENVIRONMENTAL EDUCATION



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Abstract

One of the growing problems in this world is food security due to a growing population, land scarcity and environmental challenges. This increases the dependency on agriculture, and therefore sustainable agriculture becomes more important. Education is a useful tool to work towards sustainable agriculture. In Brazil monocultures provide for export products, however these monocultures do not contribute to the food security of the peasants who live in the rural areas in Brazil. These people depend on their small pieces of land which decrease in fertility due to the use of pesticides and chemical fertilizers. This research sees environmental education (EE) as a tool to help the people in the rural areas. So far the possibilities of EE are investigated in developed countries and in big scaled agricultural practices. This research sees EE as a useful tool to help small scaled farmers to get the most out of their land in a sustainable way. This research took place in the rural areas of Rio Grande do Sul in Brazil where several educational platforms were examined. These platforms are formal and informal, reaching beyond education at schools. This research found that there are big differences of EE in place depending on the platform. These differences are partly due to the social actors who influence, mostly financial, the educational platform. EE exists of five components (*Awareness, knowledge, attitude, skills and participation*) that need to be fully in place for EE to be effective. This research states that the theory of the oppressed of Freire (1968) is the best way to enable a change in society. Freire describes four steps (*1. The importance of dialogue, 2. Objectify the reality, 3. Critical view and problem posing, 4. Reflection and action*) which work towards a movement. Education can direct this movement towards sustainable agriculture integrating the 5 components of EE in the 4 steps that Freire describes. This is not a movement that happens overnight. In the field it became visible that this is a transition rather than an event. This transition contains more than just a movement towards sustainable agriculture; an important movement is towards empowerment of the small farmers. Generating social capital for these farmers and empowering them is a key element for generating change.

Contents;

1. Introduction	8
2. Theoretical framework	11
2.1. Environmental Education	11
2.2. Sustainable Agriculture	13
2.3. Agroecology	14
2.4. Agroforestry	14
2.5. Critical Pedagogy	15
2.6. Presentation MST	17
2.7. Pedagogy of Alternation	19
2.8. Rural Family Houses and Agricultural Family Schools	20
3. Conceptual Framework and Research Questions	21
3.1. Conceptual Framework	22
3.2. Research Questions	22
3.3 .Operationalization EE	24
3.4. Explanation Freire	25
4. Regional Thematic Framework	26
4.1. Political History	26
4.2. Agricultural Landscape	27
4.2.1. Green revolution	29
4.3. Education system	33
5. Methods	35
5.1. Data collection.	36
5.1.1. Selection educational platforms	36
5.1.2. Chosen respondents and interviews	37
5.1.3. Focus group discussion	40
5.1.4. Observation	40
5.2. Data Analysis.	41
4.5. Presentation Host Organisation	44

6. Results	45
6.1. Educational Platforms	45
6.2. Presentation Primary Platforms	45
5.2.1 Escola Minicipal de Ensino Fundamental	45
5.2.2. Escola do Campo Ivoti	48
6.3. Vocational Education; EFA Santa Cruz do Sul.	51
6.4. University Education; UFRGS	59
6.5. Informal Education; UVAIA	63
6.6. Summary	68
7. Conclusion	68
7.1. Sub question 1	68
7.2. Sub question 2	69
7.3. Sub question 3	72
7.4. Research question	74
7.4.1 The role of EE in social movements	74
8. Discussion	76
8.1. Social influences	77
8.2. Empowerment	78
9. Reflection	79
9.1. Bias	79
9.2. Representation	79
9.3. Ethics	80
10. References	82

List of Abbreviations;

CFR	Casas Familiares Rurais (Rural Family Houses)
CNE	Nacional de Educação (National Education Council)
CONTAG	National Confederation of Agricultural Workers
EE	Environmental Education
EEFS	Environmental Education for Sustainability
EFA	Escolas Famílias Agrícolas (Agricultural Family Schools)
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization
GR	Green Revolution
IFAD	International Fund for Agricultural Development
LDB	Lei de Diretrizes e Bases Educação Nacional (Law of guidelines and bases National Education)
MEC	Ministério da Educação (Ministry of Education)
MST	Movimento dos Trabalhadores Sem Terra (Landless Workers Movement)
NGO	Non Governmental Organization
OECD	Organisation for Economic Co-operation and Development
PHD	Philosophiae Doctor (Doctorate of Philosophy)
POA	Porto Alegre
RGS	Rio Grande do Sul
SDB	Social desirability bias
SESU	Secretaria de Educação Superior (department of higher education)
UFRGS	Unversidad Federal Rio Grande do Sul (Federal University of Porto Alegre)
USA	United States of America
UU	Utrecht University
UVAIA	Uma Visão Agronômica com Ideal Agroecológico (An Agronomic View with an Agroecological Idea)

1. Introduction

"Education is fundamental to development and growth. The human mind makes possible all development achievements, from health advances and agricultural innovations to efficient public administration and private sector growth. For countries to reap these benefits fully, they need to unleash the potential of the human mind. And there is no better tool for doing so than education." (Worldbank.org, 2017)

The quote above describes in the most direct and to the point way the importance of education for development. Education is a tool for all countries, underdeveloped or developed. The Worldbank (2017) explains that growth, development, poverty reduction and an increase in welfare depend on the knowledge and skills people have and obtain. As a result, government officials all over the world and development partners establish education projects. (Worldbank, 2017)

However, There are different types of education, and with these different types come different outcomes. This research has its focus on Environmental Education (further referred to as EE). There are several reasons for this. The first being the strong focus of EE on critical thinking (EPA.gov 2017). This is in line with Breiting (2009) and Jóhannesson and colleagues (2011) who argue that education should focus on empowerment for democratic engagement and on teachers becoming capable of handling controversial issues with learners rather than only providing information.

The second reason is that according to Tilbury (1995) there is a need to combine environment and development concerns. Development is needed on a variety of different aspects. This research has chosen to have a focus on agricultural production because agriculture is a source of livelihood for over 80 per cent of rural people in the world. Both the World Bank (2017) and IFAD (2011) see agriculture as of great importance to fight poverty (World Bank, 2017 & IFAD, 2011) In line with the Malthusian theory (1978) that the world population will continue to grow exponentially studies agree that there is a positive relation between population growth and food production. Hence, there is a positive relation between population growth and agriculture. (Boserup, 2017; Suweiss, Carr & Maritan, 2015). This opinion is shared by Beddington et. al. (2011), but he emphasizes that population growth is not the only challenge agriculture will face.

"Business as usual in our globally interconnected food system will not bring us food security and environmental sustainability. Several converging threats – from climate change, population growth and unsustainable use of resources – are steadily intensifying pressure on humanity and world governments to transform the way food is produced, distributed and consumed." (Beddington et. al., 2011)

The quote above emphasises that changes towards a more sustainable form of agriculture are necessary and this research states that EE can be used as a tool to work towards this sustainable form of agriculture. There is a sufficient amount of literature on EE, how it should work and in return there are studies that criticize these programs (Hungerford & Volk, 1990; Kopnina & Meijers, 2014; Kopnina, 2014). However, these studies focus on governmental programs. There is a knowledge gap on Environmental Education programmes implemented by nongovernmental actors in states where the government is highly unstable.

Education is not only a tool for governments. Education, and therefore EE, as a tool for development can be used by different actors. Social movements are using education to generate critical consciousness towards development, regardless if this is with government programs or without. (Meek et. al., 2017) This research aims to find the optimum way of using EE in a state where education programs are formed by both the government and other actors, and why this is sometimes difficult to achieve. This finally resulted in the following research question;

"How can Environmental Education contribute to the effectiveness of learning and implementing of sustainable agriculture in the rural areas of Rio Grande do Sul in Brazil?"

As stated in the research question; this research will have its focus on Brazil. Due to the turbulent history of this country, the government is often absent in developmental issues in Brazil. This resulted in a lot of initiatives of peasants and nongovernmental actors who tried to establish their goals. These actors used education to form, without governmental support, a movement towards change, making Brazil an interesting country.

"From the mosaic of resistances and political struggles in Latin America, a variety of educational projects have emerged, which have over time been inserted into the realm of political dispute, with their own concepts of education, pedagogy and pedagogical practice." (Barbosa, 2017)

One of the most important movements that took place in Brazil is the Brazil Landless Workers' Movement (further referred to as MST) that started in the south of Brazil in Rio Grande do Sul. This Movement addresses the social and environmental unsustainability of the current food system and agricultural processes (Meek et. al., 2017). The MST was the result of inequality in land distribution forced by a military regime in 1964. This movement mobilized a lot of small households and is the strongest example of successful effects of social movements in Brazil.

Furthermore, In Brazil, agriculture is the main driver of the economy and currently 33.36 % of Brazils land is used for agricultural purposes. Brazil stands out from other developing countries by the fact that it created a wide-ranging institutional apparatus to stimulate production in the family farming sector. 84.4% of all farm production units are family farms (Flexor and Grisa, 2016). This makes Brazil an important player in the future agricultural field where sustainable development can contribute to a higher yield with less environmental damage.

The obstacles that especially small farms and therefore family farms encounter include but are not limited by bad infrastructure, overexploited land, and difficult access to credits, tools and markets. Another obstacle is the growing frequency of extreme weather events due to climate change. However, with these problems countered, the agricultural activities in Brazil covered by family farms might be a great productive force to resolve hunger and poverty. These farms already produce 70% of the food products that the Brazilians consume. Furthermore, improving those family farming activities will promote an increase in agricultural production that is more economically, socially and environmentally sustainable. (FAO, 2017)

This research will investigate the role of Environmental Education for development in agriculture and how this can be optimized on with the help of Freires (1986) theory "The pedagogy of the oppressed" on social movements. Hereby revitalising the agricultural production of these small family farms so they can face current problems will play the key role. The goal of education is to ensure their production so the families can face the increase of the growing problems as population growth, climate change and the retreating of rural livelihoods. This includes decreasing the vulnerability against shocks and improving the quality of life. (Nehring & McKay, 2013)

By researching rural education in different life stages, the impact of education will become clearer. To sum up, Sustainable agriculture is necessary, and therefore this research will focus of the role of Environmental Education in agricultural education. Since agriculture is the number one export product in Brazil, Brazil is the perfect country for this research. As elaborated later in this research, EE will not only contribute to sustainable agriculture but also encourages towards more critical thinking, a necessary tool in all aspects for development.

This research will start with the theoretical framework where literature review will contribute to answering some of the questions. This framework will outline different theories concerning education processes, development and sustainable agriculture. This is followed by the chapter that explains the conceptual framework and the questions that derived from this framework. The

conceptual framework will shed some light on how different actors and movements interact, working towards the research question. This is followed by the sub-questions that will help answering the research question and the operationalization of Environmental Education. The next chapter provides more insight in the regional landscape of where this research took place. This chapter is divided in a part describing political history, agricultural landscape and educational landscape. The goal is to gain an understanding of Environmental Education, find out how Environmental Education is included in education and how this can contribute to a movement towards more sustainability in agricultural processes. In other words, in the end the goal of this research is to find out what the opportunities are for Environmental Education in increasing knowledge and motivation for sustainable agriculture in the rural areas of Porto Alegre and how to counter the occurring problems.

2. Theoretical framework

The theoretical framework will shed some light on important theories and key concepts relevant for this research. As briefly explained in the introduction, this research will first investigate if and to what extent EE is implemented in the current forms of education. This will be elaborated later in this research but first the concept Environmental Education should be understood fully. Environmental Education may come across as a straight forward concept. However, the concept is more complex than one might think, therefore the theoretical framework will dedicate a few paragraphs to explaining this concept. Full understanding is necessary before this research can conceptualize it.

2.1 Environmental Education

The concept Environmental Education (EE) was only accepted as a concept in its own right in 1970. Before this year EE was dispersed in a diversity of disciplines that use the environment as a vehicle for teaching (Tilbury, 1995). Movements around EE become most clear in the United Kingdom. Here there are four movements who are, even though they are obviously linked, very different from each other. These movements were; environmental studies, outdoor education, conservation and urban studies. According to Cooper (1992) they all had their '*distinctive movements with their own particular philosophies*'. The same Cooper (1992) however states that even though they have their particular philosophies, together they promoted the introduction of an environmental dimension into the curricula. The existence of these different traditions however, resulted in differing interpretations of the term 'environmental education' (Tilbury, 1995).

With the beginning of the concept sustainability, the education for sustainability began and this can also be seen by the changing of the concept Environmental Education. The concept sustainability

finds its roots in the Brundtland rapport published in 1987. In this rapport it is linked to development and the definition of sustainable development as follows;

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Our common future, Brundtland et al, 1987).

According to Tilbury (1995) this refers to

- (a) the need for reconciliation between economic development and environmental conservation
- (b) the need to place any understanding of environmental concerns within a socio economic and political context;
- (c) the need to combine environment and development concerns.

After the term 'sustainability' became popular, the interpretation of 'Environmental Education' changed. The new meaning it carried out differed significantly from the apolitical, naturalist and scientific work that was carried out under the environmental education banner in the seventies and early eighties. (Tilbury, 1995)

"Most significantly, the links between economic growth and environmental preservation are explored. It linked poverty, development and the environment and described the dilemma of rural people in some developing countries destroying natural resources in order to free themselves from starvation and poverty. In the report, education is seen as playing a key role in remedying such matters." (Tilbury, 1995)

The quote above stresses the link between EE and environmental preservation, and the importance of the adaption to the current relation with the environment. Today EE is described as *"a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment."* (EPA.gov 2017)

The goal is, that as a result, individuals develop a deep enough understanding of environmental issues to make informed and responsible decisions. It is important to acknowledge that Environmental Education does not advocate a particular viewpoint or course of action. The goal of EE is to teach individuals how to weigh various sides of an issue reflecting in a critical way. By doing so EE enhances their own problem-solving and decision-making skills. In this way EE not only complements Environmental Information, it differs from it. Environmental Information provides facts and opinions about the environment, EE has as main goal to increase public awareness. Environmental Information does not necessarily aim to teach individuals to think critical about the

issues that concern the environment. It does not enhance their problem-solving, decision making capacity because it just provides information. And above all, Environmental Information might advocate a particular viewpoint where Environmental Education is very restricted in doing so.

According to EPA (2017) environmental education has the following components;

- **Awareness and sensitivity** to the environment and environmental challenges
- **Knowledge and understanding** of the environment and environmental challenges
- **Attitudes** of concern for the environment and motivation to improve or maintain environmental quality
- **Skills** to identify and help resolve environmental challenges
- **Participation** in activities that lead to the resolution of environmental challenges

The components above show the different goals of EE. Even though the link with agriculture is not specific mentioned, every component contributes to developing sustainable agriculture. Therefore, it seems only logic that the new concepts that emerge also make this link. Indeed, there are new concepts like Environmental Education for Sustainability (EEFS) that change the focus for EE but not necessarily stresses the value EE can have for sustainability in agricultural activities. However, EEFS does add relevance to the curriculum as it adopts an issue-based approach which stresses participation what also can be seen in the current definition of EE (Tilbury, 1995). The action-orientated dimensions in learning about EE are focused around schools and students regardless of these students become productive in agricultural professions. However, for this research the value of EE in agricultural professions is important. A description of sustainable agriculture will be given in the next paragraph.

2.2 Sustainable Agriculture

First the definition of agriculture will be explained. According to the OECD agricultural land is defined as the land area that; *"is either arable, under permanent crops, or under permanent pastures. This includes land under temporary crops such as cereals, temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow"* (OECD, 2017). When we apply this definition of agricultural land, Sustainable agriculture is agriculture that meets the needs of the present, without losing its fertility what would compromise the ability of sufficient yields for further generations. Here the needs are defined as sufficient production for maintaining the basic need of the present. The ability for further generations is to produce in the same amount from this land. In other words, the land should not decrease in value as a result of the agriculture activities that are executed.

2.3 Agroecology

There are different ways of sustainable agriculture. The form most encountered in this research, both in theory and in the field is agroecology, and later in this research it will become clear that the goal of EE should direct agricultural practices towards agroecology. However, agroecology is a difficult concept because it includes a wide variety of aspects and ideas.

“Loosely defined, agroecology often incorporates ideas about a more environmentally and socially sensitive approach to agriculture, one that focuses not only on production, but also on the ecological sustainability of the production system” (Altieri, 2018)

This quote defines how ‘Loosely’ agroecology can be taken. However, this description is unsettling in terms of a full understanding of the concept. Agroecology can best be described as an approach that integrates the ideas and methods of several subfields, rather than as a specific discipline. The main fields that influence the ideas in agroecology are agricultural sciences, social sciences, environmental movements, ecology, the analysis of indigenous agroecosystems, and rural development studies. Each of these areas has different aims and methodologies and perspectives on agroecology. However, they have all been legitimate and had important influences on the agroecological approach. Since this research has its focus towards agricultural practices and sustainable agriculture, the following quote is found to be more directed towards the field of research.

“Agroecology is an approach that relies on ecological understanding and the use of ecological principles to design semi closed and resilient farming systems with high environmental services.” (Snapp & Bound, 2017)

This quote reflects the central idea of Altieri & Nicholls (2017) that a tropical agroecosystem should mimic the functioning of local ecosystems. This means tight nutrient cycling, complex structure, and enhanced biodiversity. The idea behind this is that these systems can be productive, pest-resistant, and conservative of nutrients, just like natural systems are. The next step is that by understanding these processes and relations, agroecosystems can be manipulated to achieve an increased production with fewer negative environmental or social impacts, more sustainably, and with fewer external inputs. (Altieri, 2018) As described further in this research the Green Revolution had a big impact in the current agricultural landscape, with both positive and negative results. Agroecology can decrease negative results of pesticides or chemical fertilizers.

2.4 Agroforestry

Agroforestry is an example of agroecology and is used a lot in Brazil. This type of agriculture is a result of a close interaction between scientists and farmers which resulted in modifying existing land care systems, mostly used in the production of coffee. Agroforestry is a collective name for 'land-use systems' and technologies where plants with a wooden base (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same land as the land that is used for agriculture (FAO, 2017). This is not limited to land used for cultivating crops, It is also applicable to land that is used for the grazing of animals. The key element of agroforestry is that there are both ecological and economical interactions between the different components. The FAO defines agroforestry as a *"dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels."* (FAO, 2017).

The FAO also states the importance of agroforestry for smallholder farmers and other rural people because it can enhance their food supply, income and health. (FAO, 2017) With this system the two core properties of sustainable agriculture; land regeneration and degradation prevention, are ensured; the soil fertility might even be improved (Gruhn, 2000). The next step is to find out how to implement these techniques into the current educational systems. Changing towards sustainable agriculture is only possible with the knowledge of how information, and in particular, agricultural information, is passed on in Brazil. According to the FAO:

"Agricultural Education is the teaching of agriculture, natural resources, and land management through hands on experience and guidance to prepare students for entry level jobs or to further education to prepare them for advanced agricultural jobs." (FAO, 2017)

Due to the turbulent history and absence of the government in Brazil there is a significant amount of education without governmental support (Barbosa, 2017). The following paragraphs will elaborate on how education in agriculture is formed according to the theory of Paulo Freire (1968) and how it is adapted to the current landscape.

2.5 Critical Pedagogy

Just like the political processes in Brazil, the educational processes are defined by movements and struggle. One of the biggest influences in education is Paulo Freire with his book Pedagogy of the oppressed (1968). In this book Freire describes that in the prevalent system, education is viewed as *"act of depositing' piecemeal information which is divorced from reality and disconnected from each other."* (Freire, 1968). He describes the role of the student with a metaphor of a bank. Within this metaphor the only thing the students need to do is *"receiving, filing and storing the deposits"* (Freire,

1968). Freire describes that this form of education turns students into passive receptors that will make them accept and adapt to the oppressive reality of the capitalist structure. This is highly undesirable for development. As a result, Freire (1968) argues that Critical pedagogy is necessary to enable the oppressed actors to look at the oppressor's ideologies in a critical way. The role of education here is very important because the students are seen as the oppressed. Where traditional education will make the students accept and adapt to the current reality, critical pedagogy views all education theory as influenced by ideologies shaped by power, politics, history and culture. Within this view, the role of the educator is to "empower the powerless" by teaching students to look at the ideologies in the educational system critically. Summarizing; the formulation of pedagogy of the oppressed, is the problem of the "oppressed consciousness" and the "oppressors consciousness". Their behaviour is driven by their different perspectives on the world, themselves, their beliefs, ethics, and fears. And it is the role of the teachers, to make their students critical towards this consciousness. (Freire, 1968)

However, this may seem logic today, and especially in the Dutch culture of education, this was a new concept in the 1970's. Especially in Brazil. And the question arises; how to create this critical pedagogy. Freire (1968) describes in his book some key elements of how to achieve this and they will be described in the following paragraphs.

The first element that cannot be emphasized enough is *The Importance of Dialogue*. Without dialogue education just provides information which may or may not be in line with the reality and this 'reality' is disconnected from the student. Here the metaphor of the 'student as bank' becomes visible. The role of the student is limited to "*receiving, filing and storing the deposits*" (Freire, 1968). Instead of providing information through a monologue teachers should be having dialogues. By having those dialogues both the student and the teacher can together make an attempt to unveil reality and co-create new knowledge.

The second element is based on the discovery of the oppressor within themselves and the learning that they need to consider the oppressor outside their selves. In other words, they need to learn to *Objectify the Reality*. The students need to learn to separate their selves from their context in objectifying the world. This consciousness already empowers them, even though they might not notice this.

The second element, where the students consider the world objectively, is an important step towards the third element; *Critical View and Problem-posing*. As described above they already experience some empowerment, and this empowerment lies in their renewed ability to look to their situation with a critical eye. In this way they can see that they are oppressed and that their

conditions are limited. As the students increase their power to perceive critically, their perspective will change towards a perspective where they not merely exist in the world and need to adapt, but they are able to change their world. This changes the pedagogy where the students are perceived as a 'bank' since the students no longer perceive their situations as simple facts, they perceive their situations as changeable.

According to Freire (1968) this will automatically lead to the fourth and last element; *Reflection And Action, Together*. Freire (1968) states that 'true reflection' automatically will lead to 'action'. In the situation in Brazil during that time, this action is defined as overcoming the oppression of the oppressed. In this way the oppressed perception of their oppression, their limiting conditions and their problems, in other words, their reflection, is a necessary but insufficient condition for liberation. This because it will lead towards action. (Freire, 1968)

Freire (1968) and his Pedagogy for the oppressed had a great influence in the educational processes in Brazil. Critical pedagogy formed the base of both governmental education as nongovernmental education. His book came out in a time that education was not a normal right for everybody, and especially not for the more rural population. In family farms, illiteracy was the standard. There were simply no schools nearby or no money available for education. Once the literacy campaign started, illiteracy decreased. Freire (1968) discussed education and his critical pedagogy in a context with emancipation and decolonization, which are to him results of the oppression. He kept emphasizing on the relationship between work, the capitalist mode of production and education. Groups of land workers in Brazil began to organize their selves realizing their reality could be changed. They often had the support of the progressive Church, with its links to liberation theology and the Pastoral Land Commission. They also aligned with the political sectors of the resistance, including trade unions within the framework of the National Confederation of Agricultural Workers (CONTAG). And as Freire predicted, their reflection became action when in 1980 the Landless Workers Movement (MST) arose. (Leher & Vittoria, 2015)

2.6 Presentation MST

An important aspect that had a big influence on the development of education, especially in the rural areas, is the social movements Brazil encountered. According to Meet et. al. (2017) Social movements are using education to generate critical consciousness regarding the social and environmental unsustainability of the current food system. As a result, social movements advocate for more sustainable ways of production in agriculture. In Brazil the biggest social movement is the Movimento dos Trabalhadores Rurais Sem Terra; The Brazil Landless Workers' Movement (further

referred to as MST). This movement is not directed towards more sustainability per se but it is directed towards agrarian reform. By trying to achieve this the MST has mobilized for access to and control over a range of educational programs, from infant education to universities, to train students of all ages and social movement activists since the 1980's (Meat et. al., 2017). This movement contributes in a large matter to the current agricultural landscape and the current educational landscape, especially in the more rural areas. Therefore, the next section is dedicated to the history and objectives of the MST and how this affects the research.

According to De Almeida (2000) the origin of the MST was a result of at least three important processes. The first being the strong capitalist modernization that ruled the agriculture in Brazil. Agricultural land became distributed under big foreign companies that turned it into monocultures. This triggered conflicts over land, and intensified the existing conflicts during the 1960's and the 1970's. The second process is that the Christians aligned with Liberation theology and that they converged with the ideas of the Marxist left. The third process is the military take-over in 1964. During the military regime, the rural farmers engaged in the struggle of the landless workers to obtain land by organized invasion and occupation of land. Combined with the theory of Freire (1968) these struggles, in combination with reflection, led to action, in this case the MST. These three processes are not the only reasons of the start of the MST in Rio Grande do Sul in 1997, but they were the trigger points.

The movement is a product of the really poor people in Brazil. Bales (1999) even describes them as 'disposable people'. Those people have no land anymore, neither other rights of citizenship (Diniz-Pereira, 2005). In other words, these people were oppressed. According to the official website of the MST; <http://mstbrazil.org> (2017) the MST has 3 objectives being:

1. Fight for land

This refers to fair distribution of land, mainly for those who work it.

2. Fight for agrarian Reform.

This is considered to be much broader and more complex than just land redistribution and therefore an extension on the first objective. This entails the attainment of the full scope of social rights that define full citizenship.

3. Fighting for a more just and fraternal society.

This is a very important objective of the MST. Striving for a more just and fraternal society means that the workers and landless people support and engage in initiatives that seek to solve the serious structural problems of Brazil. These problems include but are not limited to social and income

inequality, discrimination that is both ethnicity and gender related, and the exploitation of the urban workers. In other words, the last objective strives for reforms towards an utopic society.

As described above, The MST has identified education as the key element in obtaining these objectives. The most simple and straight forward reason for this were the high rates of illiteracy and low rates of schooling in the more rural areas that Freire (1968) also pointed out. However, the education program of the MST goes beyond teaching children how to read and write. The education of the MST has been developing since the 1980s when the MST's education committees began discussing educational issues with the landless communities. These discussions led to the conclusion that education is not only linked to reflection. Education is also closely linked to a collective work ethic and the construction of humanist and socialist values. (Diniz-Pereira, 2005) Hence, education contributes in strengthening peasant resistance and sharpens the focus to political projects for the countryside, and how they may or may not contribute (Barbosa, 2017).

2.7 The Pedagogy of Alternation

A very important form of education in the rural areas of Brazil, especially in combination with agriculture is the pedagogy of Alternation. The Pedagogy of Alternation articulates practice and theory into use and finds expression in times and spaces that alternate between school and property, community, settlement, camp or social movement to which the student is linked (Ribeiro, 2008). The objective of the pedagogy of Alternation is to capture the experiences that are generated by rural social movements and to implement those in the education. Hereby the focus lies on the differences in conceptions and practices and their contradictions over time and space. In other words, it focuses on the different methods of education over history and takes these into account by creating new methods of education. In Brazil, the pedagogy of alternation has raised the interest of researchers since the late 1970s and as a result of this there emerged different types of schooling. This are the Casas Familiares Rurais (Rural Family Houses) (CFR) and Escolas Famílias Agrícolas (Agricultural Family Schools) (EFA). (Ribeiro, 2008).



Figure 1. Pedagogia da Alternancia. Retrieved april, 2018, from <http://efaitapirema.org>

2.8. Rural Family Houses and Agricultural Family Schools

The EFAs arrived in Brazil before the CFRs in the State of Espírito Santo. However, the movement does not come from Brazil but is from French origin and dates from 1935 (Ribeiro, 2008). In Brazil, the absence in the history of Education of policies specific for rural education is recognized by many authors (Damasceno, 2004) and it was not until 1969 that the first EFA's came to Brazil. The EFA's are a result of a small group of French farmers that were not satisfied with the education system their country had at that moment. As a result they formed an education system without governmental support. In their view there was little and insufficient attention for the specific needs of education for the rural environment. Hence, the rise of EFA's. The initiative was to bring technological development to the field and to provide young people with general and technical knowledge of the agricultural reality. This was done in two weeks at school and two weeks in the rural properties of the region where they could bring into what they learned. Nowadays the EFA's are widespread in the northern and southern states of Brazil. (Ribeiro, 2008)

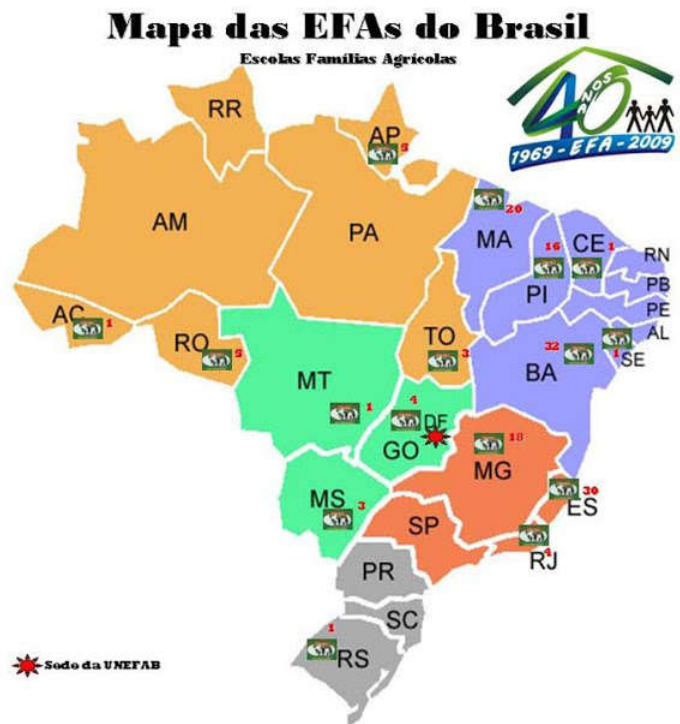


Figure 2. Mapa de EFAs do Brasil. Retrieved March, 2017, from <http://efasantacruz.blogspot.com>

The movement of CFR's, which is very much in line with, and a result of the EFA's has its beginning in Brazil in 1981 in the Northeast. The differences between CFR's and EFA's is where they place their focus. The EFA's are more focused on formal schooling but with a stronger focus to agricultural work compared to normal schools. The CFR's place their main focus on agricultural work without neglecting the importance on the school formation. The CFR's started with the creation of a CFR in Arapiraca, in the State of Alagoas. In 1987, a CFR is created in the State of Paraná, municipality of Barracão, and in 1991, another one is set up in Quilombo, Santa Catarina. The CFR's offer fundamental education similar to the education our children perceive at primary school. However, with the CFR's agricultural professional training is added. This is managed by community leaders, the parents of students and even some NGO's. In the State of Rio Grande do Sul, the CFR's of Frederico Westphalen, Santo Antônio das Missões, Alpestre, Ijuí, and Torres are active. (Teixeira, 2008)

The educational landscape formed by the pedagogy of the MST shares the same principle of combining practice and theory as the EFA does. However, in contrast with the EFA's, the MST focuses on the landless people becoming subjects of their own pedagogy. This means that the people who educate about agriculture reflect about their own relationship they have with agriculture. This emphasises the importance of the relationship between theory and practice. (Diniz-Pereira, 2005) Even though the MST is focused on education beyond the school, school occupation forms the most important part of education about agricultural reform. Today, education is obligatory, every child has to go to school. Hence, schools in rural areas form an ideal platform for agricultural reform. Education about agriculture is a normal subject in most rural schools, and since children go there from a very young age, this is the first place where they learn about agriculture outside of their family. These schools form a part of this research, but this will be elaborated in the methods.

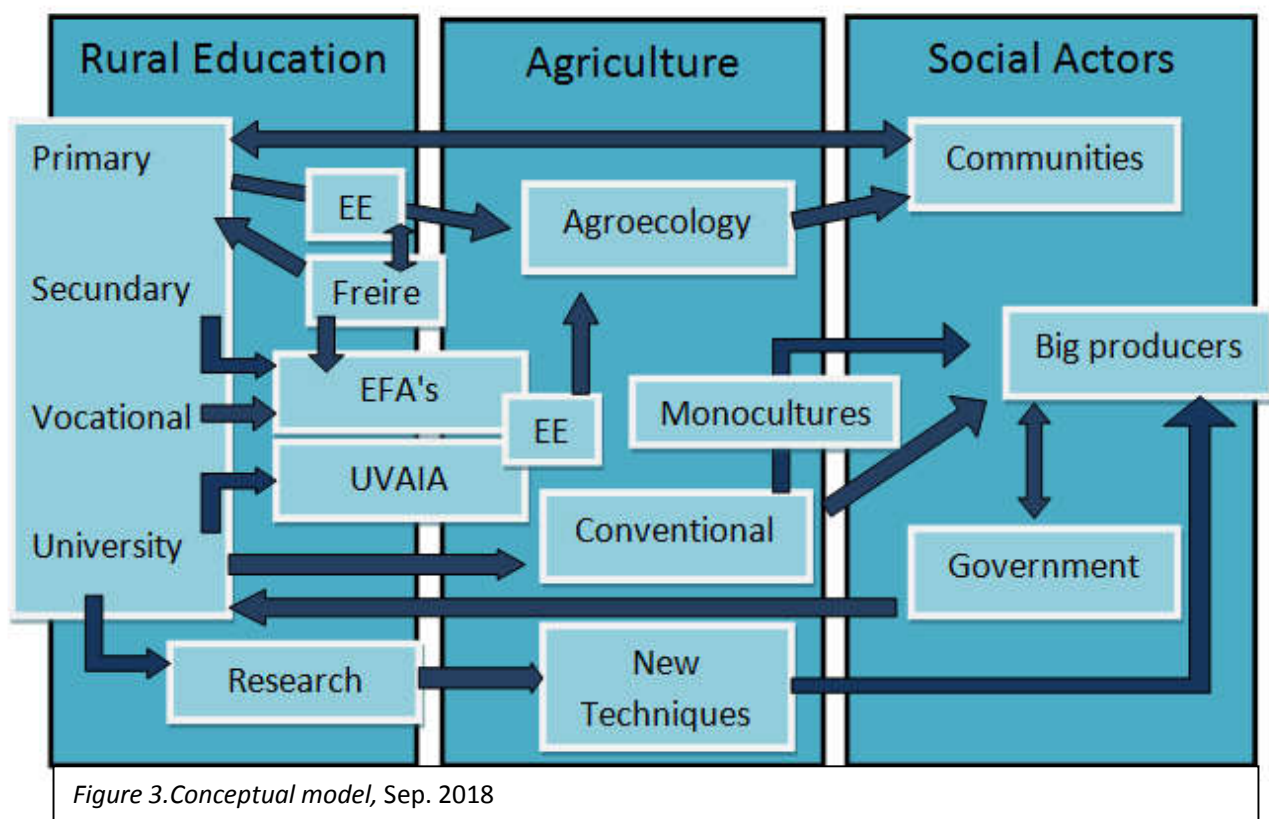
When looking at those methods of education it is important to acknowledge the relative absence of the State. The absence of the state for rural education in Brazil is an essential element to understand the contradictions expressed in the practices of the Pedagogy of Alternation that come across (Teixeira 2008). This is one of the debates that triggered this research. Throughout the research the importance of the state should not be neglected. However, the influence of social movements on education, especially agricultural education is very strong due to the turbulent history of Brazil that is marked by dictatorships, military coups and corruption. This unstable government has its influence on how education is developed and there is little known of how EE can reach its full potential with this unstable support of the government. This research wants to find out how EE can contribute to reach its optimal use in the current educational and political landscape. This research will elaborate more on the history of Brazil in chapter four but before that a conceptual framework is formed. This will help to work towards the research question and the sub questions of this research.

3. Conceptual Framework and Research Questions

This research structured a research proposal and a conceptual framework before going to Brazil, these were based on information conducted by reviewing literature. During the fieldwork different concepts, problems and theories came to the surface and different questions arose. It is difficult to obtain full insight in a situation just by reviewing literature, therefore, flexibility was necessary. The conceptual framework, questions and theories are applicable on the forms of education, actors, challenges and agricultural practices in Rio Grande do Sul.

3.1 Conceptual Framework

The figure below reflects the relationships between theoretical concepts, and concepts found during the fieldwork. With help of this framework the main and research questions are formed and can be answered.



In the conceptual model there are three main boxes that form the base of this research. These boxes being; Rural Education, Agriculture and the Social Actors. These boxes are filled with concepts. Some of these concepts are straight forward, other are explained in the theoretical framework. These concepts influence each other which is displayed by the arrows. Some work in one direction and other are reflective. These connected concepts make that the three boxes are also connected with each other. The following paragraphs will outline the research questions.

3.2 Research questions

The primary goal of this research is to find out in what way education influences agricultural activities in rural areas in which the government has fewer interest. This goal is caused by the interest of implementing more sustainable techniques in those areas. As a result, the interest is especially

focused around Environmental Education because this may encourage sustainable agriculture. With this goal in mind the following research question arose;

How can Environmental Education contribute to the effectiveness of learning and implementing of sustainable agriculture in the rural areas of Rio Grande do Sul in Brazil?

As mentioned above, the conceptual model helped to form the sub-questions. This because this framework displays the relationships between education, agricultural practices and their actors. By finding out which factors are more or less important, the most effective way of implementing Environmental Education can be explored. The following questions will contribute to answer the research question.

Sub questions;

1. How is knowledge passed on in the rural areas of Brazil and what are the different educational platforms?
2. How is knowledge of (sustainable) agriculture generated and what is the role of EE in generating this knowledge.
3. Which are the different types of agricultural actors in the rural areas of Porto Alegre.

The above questions should provide a clear preamble towards answering the main research question. Education in agriculture is not limited by schools. There are meetings of communities where they share knowledge and there are different actors contributing to this, as will become clear later in this research. The paragraph below will elucidate how these questions will help the research towards the main question. Hereby it is important to keep the conceptual model in mind.

Question 1; The theoretical framework provides information about different learning methods, especially in line with the system of Freire (1968); *The pedagogy of the oppressed* (p. 13). This is because different methods provide different ways of knowledge distribution. This research is focused on rural education and therefore the educational methods in the rural areas should be examined. A significant part of this examination is based on literature but in the field this research encountered different methods. It is also important to acknowledge that there are informal ways of learning. Learning goes beyond school and beyond models. There is a high possibility that a lot of learning is done within the family. This learning is just as important as are the more formal ways of education. Obtaining basic knowledge about the educational platforms is the first step to learn how agricultural knowledge is distributed.

Question 2; This question builds further on the first question. Again, this question is about the passing on of knowledge, and therefore the first sub question contributes in a large matter to answering this question. However, with this question there is more attention for agricultural schools and the role of Environmental Education is more important. The role of EE in different ways of learning is established which will help finding out the effectiveness of the EE.

Question 3; During the fieldwork it became clear that education and social aspects are closely related. Therefore, the actors in this research are of vital importance. Even though sustainable agricultural production is the goal. How this is perceived by the actors is important. Education is a social concept, especially in Brazil as is described in paragraph 2.6. The third question should work towards not only an overview, but an understanding of the actors in the field. These actors have a continuing effect on the forms of education, the perception of education, the critical thinking and, in the end, how they use their obtained knowledge when it comes to agricultural practices. Therefore, this research divides its focus on actors of different ages in different life stages and different social roles. This is difficult in the short time span but very important.

3.3 Operationalization EE

There are two concepts in the conceptual model that need more attention. Both EE and 'Freire' have an important role in this research. To define whether or not EE is in place, and if so, to what extent, the following operationalization is established. As described in the theoretic framework EE consist of five major aspects;

- **Awareness and sensitivity** to the environment and environmental challenges
- **Knowledge and understanding** of the environment and environmental challenges
- **Attitudes** of concern for the environment and motivation to improve or maintain environmental quality
- **Skills** to identify and help resolve environmental challenges
- **Participation** in activities that lead to the resolution of environmental challenges

During the interviews these aspects are rated between 0 and 5. 0 being not present and 5 being very strong. The rating is partly done by asking questions where the participants rate their own aspects of EE. However, there is a strong possibility this is biased because participants tend to give desirable answers. Brace (2018) describes this as follows;

“Social desirability bias (SDB) arises because respondents like to appear to be other than they are. This can occur consciously, because respondents want to manage the impression that they are giving of themselves in terms of social responsibility, or subconsciously, because they believe themselves to be other than they are, possibly a form of denial. Thus, SDB can manifest itself both in stated

behaviour, with, say, an over-claiming of environmentally friendly behaviour, or in the attitudes that someone expresses.” (Brace, 2018)

To counter SDB the elements of EE are interwoven in the in-depth interviews where the participants explain what knowledge they have about the current and future challenges, where they explain what skills they have, how they are obtained and how they participate in activities. By answering these questions, it is possible for the researcher to indicate if their answers are in line with their own ratings (Brace, 2018). This rating is more explained in chapter 5.2. These questions also give insight in the current challenges the participants experience which are not limited by challenges in the environmental area.

3.4 Explanation Freire

Freire and his theory of the oppressed (1968) are already explained in the theoretical framework. However he not only plays a very important role in the passing on and generating knowledge, his theory also explains how this knowledge leads towards action. As explained there are four steps that need to be taken for a movement towards change. These steps being;

1. The importance of dialogue
2. Objectify the reality
3. Critical view and problem posing
4. Reflection and action

During the fieldwork it became clear that these steps are important for implementing sustainable ways of agriculture. Just generating knowledge is not sufficient. This importance will be elaborated in the discussion and conclusion.

It is important to keep in mind that this research took place in Rio Grande do Sul. Therefore, the agricultural methods should be adapted to the climate and culture. The climate will be discussed in the regional thematic framework as will the agricultural landscape. Because this research focuses on education, a description of the educational system is also given in the following chapter. However, before this research focuses on Rio Grande do Sul, the state politics will be discussed. Brazil as a country stands out because of its turbulent political practices, and this is the starting point of the next chapter.

4. Regional thematic framework

Brazil is a very interesting country with a very interesting and turbulent history. Barbosa (2017) describes the Brazilian political history as *"a mosaic of experiences of resistance and political struggle whose protagonists are diverse organizations and social movements"*. This quote emphasizes in an almost poetic way how difficult it is to capture the political history of Brazil. This historical asymmetry and inequality is the major reason why social movements became a powerful force in forming the Political context in Brazil. The history will show a relative absence of the state in Brazil and this forms



Figure 4. Brazil-Locator Map. Retrieved Jan, 2017, from [http:// www.awesomestories.com](http://www.awesomestories.com)

an essential element to understand social movements such as the Pedagogy of Alternation. Following is a short overview of the history that finally evolved in the federal, presidential, democratic republic the country is today.

4.1 Political History

This research starts explaining the history in 1500 when Brazil was claimed by the Portuguese diplomat Pedro Alvares Cabral. Brazil was made a Portuguese colony and was ruled from Lisbon. The Portuguese discovered the land was incredibly fertile which increased the demand for labour. In the beginning this was done by enslaved indigenous people but later the Portuguese used slaves from Africa to expand and enhance their workforce. Next to the fertile land Portugal discovered more valuable export products like gold, diamonds and emeralds. In 1808 the Portuguese royal family moved to Rio de Janeiro, fleeing the military force of Napoleon. In 1821, the royal family returned to Portugal and they left prince Dom Pedro as regent of Brazil. (Vilhena, 2018)

In 1822, Dom Pedro proclaimed Brazil's independence from Portugal and declared himself the emperor. His son, Dom Pedro II, ruled from 1831 to 1889. After 1889 Deodoro da Fonseca enforced a bloodless and unchallenged coup that lead to the United States of Brazil as a federal republic.

This federal republic was a constitutional democracy for 40 years. But in 1930, another coup established by Getulio Vargas made him president. Vargas remained a dictator until 1945, he got overthrown by the military forming a democracy. Vargas gets elected as president in 1951 but due to the strong opposition he decides to kill himself rather than be overthrown again. After the second

World War Brazil experiences an economic downturn causing growing social instability. As a result, the military intervened once again in 1964. Humberto Castelo Branco led a bloodless coup against the left-leaning administration of President Joao Goulart and he becomes president. Once again this led to a dictatorship where all political parties were banned. Successive military governments ruled Brazil until 1985 when a majority faction in the electoral college chose Senator Tancredo Neves as the next president, the first civilian to occupy that office since 1961. (Bruneau, 2018)

In 1989, direct presidential elections were held for the first time in 29 years due to the constitution of 1988. Since 1985 Brazil moved quickly to re-establish fundamental democratic processes and after 3 years of work this resulted in a document of 245 articles and 70 transitional provisions. The 559 framers were unable to resolve whether Brazil would be a monarchy or republic, and if the latter, a presidential or parliamentary regime. These fundamental decisions were left for a referendum in 1993 and Brazilians elected Fernando Collor de Mello. However, he became corrupt and had to resign when his Vice President Itamar Franco completed his term. This smooth transition was hailed as a rebirth for the nation and in 1993 the Brazilians favoured a presidential republic at the referendum. In the beginning the term for a president was established to be 5 years but in 1994 this term was changed to 4 years. (Bruneau, 2018)

Since then the regime in Brazil is that a president gets democratically elected every 4 years with the possibility to serve more than one term if to be chosen again. However, in practice this regime fails and is marked by both violent and nonviolent coups, ministers and presidents resigning, and cases of corruption and violence against both humanitarian and environmental rights.

This is only a brief political history to illustrate the low confidence the Brazilian people have in their government. For Brazilians this has led to diverse attitudes. Some Brazilians feel powerless since their actions fail to succeed in this political regime. However, for others this resulted in taking matter into their own hands, forming one of the most important pointers of this research

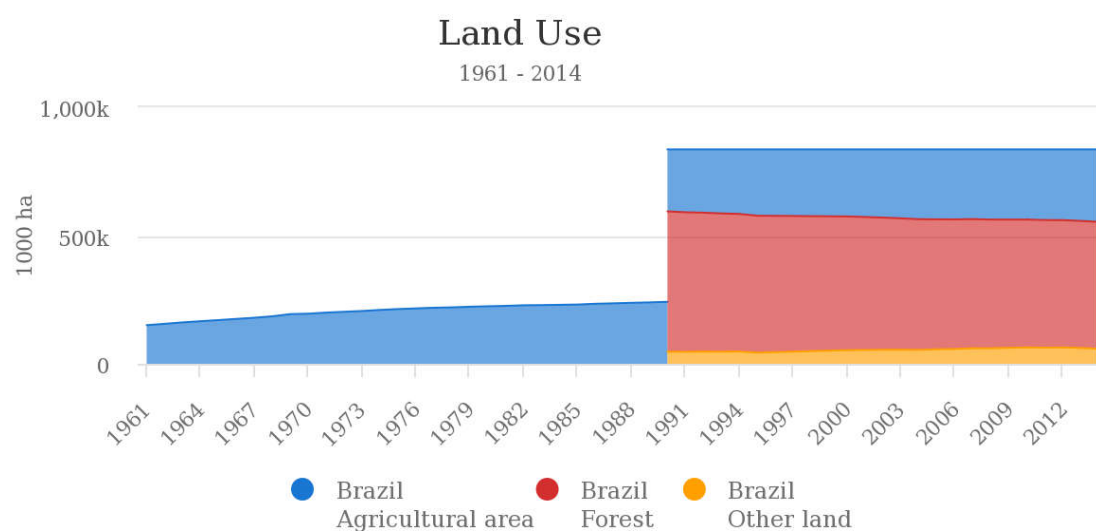
4.2 Agricultural landscape;

Above gives a 'short' overview of the turbulent history of Brazil from 1889 until 2016. Not every happening is linked to this research but this background information provides insight in and understanding of the culture. The turbulent history described is important because it emphasizes the importance of social movements. This paragraph will shed more light on the agricultural landscape in Brazil.

The FAO (2017) states that the total physical cultivated area is estimated at 80 million hectares. 91 percent of this area consist of annual crops and the remaining 9 percent consist of permanent crops. Some Key statistics in 2017 in Brazil are;

- Country Area; 851577000 hectares
- Land Area; 8835814000 hectares
- Agricultural Area; 282589000 hectares
- Forest; 494522000 hectares

These numbers are visualized in fig (..), where also the change of land use over the years is made visible. Even though this graph only shows the other use of land since 1990, the growth in agricultural land use is visible. The same figure also shows that this rise in agricultural areas goes in line with a decrease of forest areas in Brazil.



Source: FAOSTAT (Nov 06, 2017)

Figure 5. Brazil Land Use. Retrieved Nov, 2017, from [http:// www.FAOSTAT.org](http://www.FAOSTAT.org)

The figure above shows the rise in agricultural land use. The next figure is more specific and defines three types; arable land, permanent crops and permanent meadows and pastures. Needless to say, the climate plays a big role in forming the agricultural landscape. The climate in Rio Grande do Sul can be described as cool with relatively dry winters and warm and relatively humid summers. The characteristics in this area are the homogeneous rainfall within the region and the uniform climate. Due to this climate, Rio Grande do Sul has few opportunities for out-of-season winter irrigation. The agriculture in this region is mostly based on typical summer crops like maize, beans and soybeans. The agriculture in Rio Grande do Sul is highly commercially oriented where there are both small and big farmers involved. Irrigation development is mostly focused in summer where the lowlands are

flooded for rice production. Most of this is large-scale and mechanized. It is closely integrated with cattle production who can control the weed. Lowlands are typically planted with rice only once every three years and kept under non-irrigated pasture for the other two.

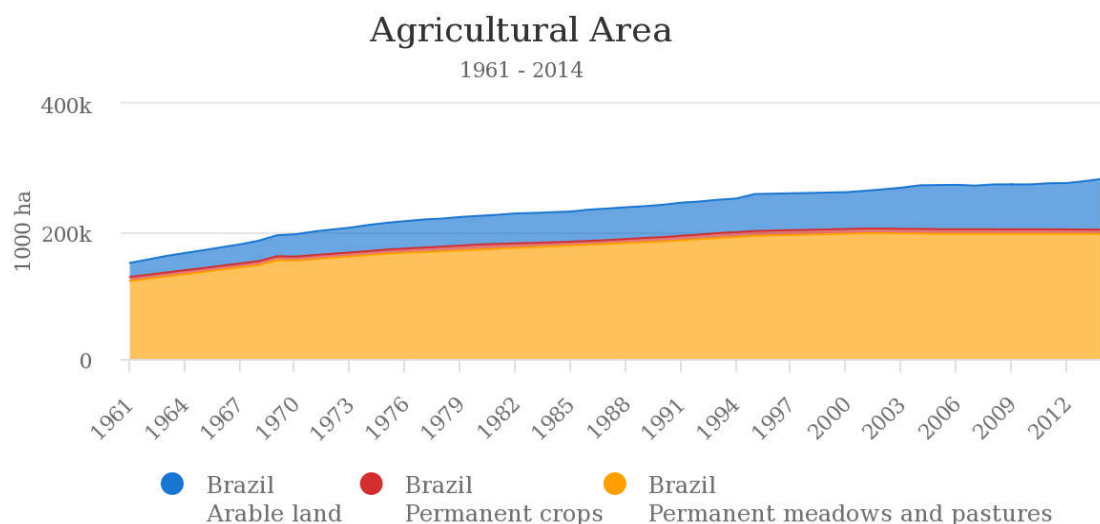


Figure 6. Brazil Agricultural Area. Retrieved Nov, 2017, from [http:// www.FAOSTAT.org](http://www.FAOSTAT.org)

This figure shows a rise in arable land, but the biggest rise is visible in land that is used for meadows and pasture. In other words, animal production. An interesting aspect of this figure is that there is almost no sign of growth in land that is being used for permanent crops. This, while there was a significant rise in crop production. This trend can be explained by the Green revolution, a movement that also left a big footprint on the development of the agricultural landscape in Brazil.

4.2.1 The green revolution

The Green Revolution refers to a period when the productivity of global agriculture increased drastically because of a renovation of agricultural practices. This started in Mexico in the 1940's. A set of research and development of technology resulted in new developments increasing the agricultural production, especially in developing countries (such as Brazil). This research and development resulted in new chemical fertilizers and synthetic herbicides and pesticides. The chemical fertilizers made it possible to grow crops with more nutrients. So not only the yield increased resulting in an increasing amount of calories an acre of agriculture could produce, the amount of nutrients per acre increased as well. This increase in productivity made it possible to feed

the growing human population. And since the productivity increased, food prices-lowered to a price where food became more available for poor people. (Thrupp, 2000)

Because of its success in increasing yield this revolution spread worldwide around the 1960's. Although the population had more than doubled, the production of cereal crops tripled during this period, with only a 30% increase in land area that was used for agriculture. (Thrupp, 2000) In relation to Brasil the green revolution had a huge impact. Before this revolution the inland of Brazil was unfit for farming because the soil was too acidic and did not contain sufficient nutrients. Since the 1960 the farmers started pouring quantities of lime in the soil, and this reduced the acidity. This made the soil fit for a large agricultural production, making Brazil the second biggest exporter of soybean today. Since soybean is mostly used for animal feed, this also helped increasing the animal, and therefore meat, production in Brazil. As described, agriculture is the biggest economic driver of Brazil nowadays, and it is no surprise that the green revolution contributed in a large amount to this.

So, to summarize, the Green Revolution reduced widespread poverty and hunger. And because less land could produce more, it avoided the conversion of thousands of hectares of land into agricultural cultivation. In Brazil the green revolution became largely adopted by farmers who increased their production. Hence, farmers see this revolution as modernization and development. This is still very visible in their ways of agriculture today. Pesticide, agro toxics and synthetic fertilizers are seen as modernization and development. And downscaling or ecological production are seen as less productive and old-fashioned. However what a lot of people fail to acknowledge is that even though the Green Revolution increased production, it also had its share of unintended negative consequences. (Pingali, 2012) These negative effects were often not the result of the technology itself but of the policies that were used to promote rapid intensification of agricultural systems and increase food supplies. Especially in Brazil, where the government is corrupted and more concerned with their own income then the income of the population. Due to the increase in technologies some areas were left behind, and even where it successfully increased agricultural productivity, the Green Revolution did not necessary solve the poverty or increased food security. One of the biggest negative effects that occurred in Brazil is that technologies result in inequitable land distribution. Ownership rights became more insecure leading rich (foreign) people to buy land against low prices. Policies occurred that discriminated against smallholders. Pingali (2012) even argues that "*The only result was a transfer of poverty rather than true poverty reduction associated with agricultural transformation*".

As described, unequal land distribution is one of the biggest problems in Brazil, leading towards the MST. Therefore this is the first negative effect addressed here, however there are a lot more

negative effects that cannot be neglected and that are a direct or indirect result of the Green Revolution. The biggest negative effect to be found in literature is biodiversity losses. This obviously damages ecosystems and the environment. However, especially in developing countries it is often overlooked that this also damages agricultural production. The next table will outline some problems that link agricultural processes to losses of biodiversity and shows how they interact (Thrupp, 2000)

Table 1.

Problems	Effects	Causes
Erosion of genetic resources (livestock and crops)	<ul style="list-style-type: none"> - Threatens food security - Increases risks - Prevents future discoveries 	Dominance of monocultures, biases in breeding methods, weak conservation efforts
Erosion of insect diversity	<ul style="list-style-type: none"> - Increases susceptibility - Ruins pollination and bio control 	Heavy use of pesticides, use of monoculture / uniform species, degrading habitats harbouring insects
Erosion of soil diversity	<ul style="list-style-type: none"> - Leads to fertility loss - Reduces productivity 	Heavy use of agrochemicals, degrading tillage practices, use of monocultures
Loss of habitat diversity including wild crop relatives	<ul style="list-style-type: none"> - Loss in crop diversity 	Intensification in marginal lands, drift and contamination from chemicals
Loss of indigenous methods and knowledge of biodiversity	<ul style="list-style-type: none"> - Crooked ethical effects - Loss of biodiversity 	Spread of uniform 'modern' varieties and technologies

Table 1. Problems, effects and Causes Green revolution, Thrupp 2000

The problems stated above are real problems. Problems that decrease production and profits for both small farmers and big farms with a large production. However, they are often not acknowledged by farmers be they small scaled or big monoculture producers. The perception that technology is

modernization and therefore development is a hard belief to challenge. This research does not want to counter that belief, but it wants to show that there are other ways of development that have less negative influences. The table shows the causes of the problems. However, there are some underlying causes that need to be emphasized. These causes are not problem specific, they form, in to a bigger or lesser extend the underlying causes. And, more importantly they are also in a bigger or lesser extend related to the Green Revolution.

The most predictable cause related to the Green Revolution is that this stresses uniform monocultures. This results in inequitable distribution of land and resources. Another underlying cause are the policies in Brazil that support the use of chemicals. These are policies like subsidies, credit policies and market standards. However, the policies of the government are not the only policies that form a cause. There are also international policies like trade liberalization and market expansion. These policies neglect social and ecological factors making it easy for big corporate companies to influence the agricultural landscape. These corporate companies include the agrochemical companies that pressure and influence farmers to use their seeds and their chemicals.

All the above is partly possible due to a lack of awareness of these effects by the farmers, next to a lack of awareness of the merits of agro ecology. Because in contrast to what might seem, there are actions that counter the negative effects of the Green Revolution without decreasing production. There is sufficient local knowledge and other techniques that are possible. The following points can create rural development without damaging natural resources.

- * application of agro ecological principles that can conserve, use and enhance biodiversity on farms, maintain or increase productivity and enable sustainable intensification

- * participation and empowerment of farmers and indigenous peoples, protection of their rights, and respect and use of their knowledge on biodiversity and resources, to help conserve agro biodiversity in research and development processes;

- * building upon existing successful methods and local knowledge about biodiversity and genetic resources in farming, and adapting sustainable practices (e.g. integrated pest management, integrated crop management) to local situations;

- * conservation of plant and animal genetic resources-especially in situ and community-based efforts- to protect biodiversity for current livelihood security as well as future needs and ecosystem functions; (Trupp, 2000)

These points are not easy to implement. Creating awareness and critical thinking are important tools to turn the above points into practice, emphasizing the importance of education. Policy coordination towards these sustainable agriculture is a shared goal, but realizing it is difficult because of all the different institutions that try to establish this, with their own perceptions of what is the best way of establishing it.

"The different spheres of the state, especially the Ministries of Agriculture, Agrarian Development, Social Development and the Environment have programs and policies that do not always connect with each other. Although policy coordination is a shared goal, different ministries and federal institutions sometimes pull in different directions and do not always co-ordinate their work." (Schneider et al, 2010)

This is difficult enough as it is, but because the government in Brazil is always changing and subjected to coups, this only becomes more difficult. The unreliable government contributes to an insecurity by not only institutions, but also by farmers. Taking steps towards a form of development is taking a risk because it is very possible that you lose the support of the state within a short time. This is visible while talking to different farmers (or people in other work fields for that matter). There is little to no confidence in the government and their actions. It is very important to understand this because it makes realizing change a lot more difficult. This only emphasizes how social movements can play an important role in coordinating development.

4.3 Educational system

The next section gives an introduction in the educational system of Brazil. By explaining this it becomes more visible how social movements interact with this system. The current education system in Brazil started in the 1988 constitution and in the 1996 *Lei de Diretrizes e Bases Educação Nacional* (LDB). The LDB is the law where the regulations for education system are stated. The National Education Council *Nacional de Educação* (CNE) is responsible for matters that relate to education. Finally there is an education council in every state that supervises the schools and universities that are funded by the state. The programs taught at these universities are evaluated by the Ministry of Education, *Ministério da Educação* (MEC) and the department of higher education *Secretaria de Educação Superior* (SESU). (Nuffic, 2017) Education is compulsory up to age 14. The language of education is Portuguese. The academic year runs from March until December.

Just like in the Netherlands Education is compulsory starting from age 4/5 when children start in primary school. In Brazil the children stay here 9 years until they are 14. After primary school education is not compulsory anymore but a lot of children continue to secondary education or

secondary vocational education. With the latter you can enrol into higher, more professional, technical education, and later into University or become more technical. If the student chooses to start University straight from secondary education there is a big examination they should pass before they can start with their bachelor. Just like in the Netherlands a student can continue after a bachelor with a master and later with a PHD. This is all visualized in the Following Figure. (Nuffic, 2017)

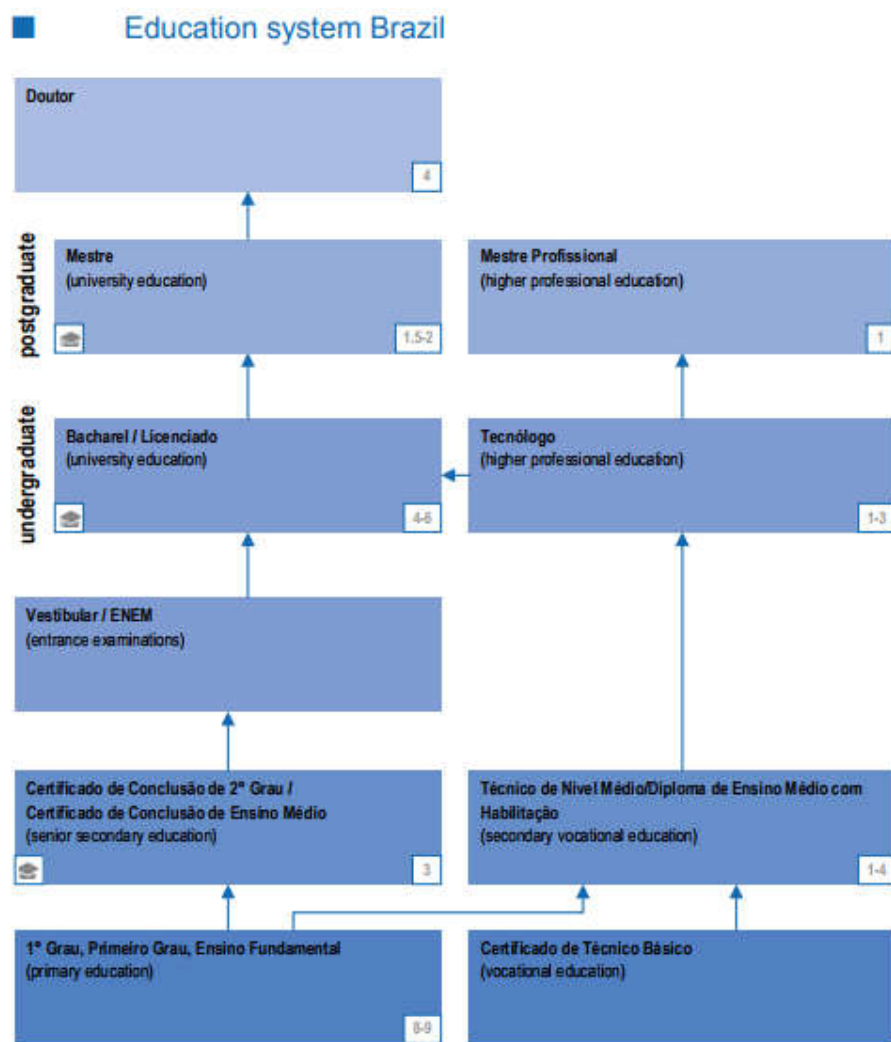


Figure 7. Education System Brazil. Retrieved Nov, 2017, from Nuffic, 2nd edition, version 3

A trend that becomes visible in Brazil and in Rio Grande do Sul is that students value rural education fewer and fewer. Especially vocational education attracts fewer students (this will be elaborated while explaining the educational platforms in paragraph 6.1.3). Students feel more attracted to urban area's which is also visible by the increasing urban population while the rural population is decreasing.

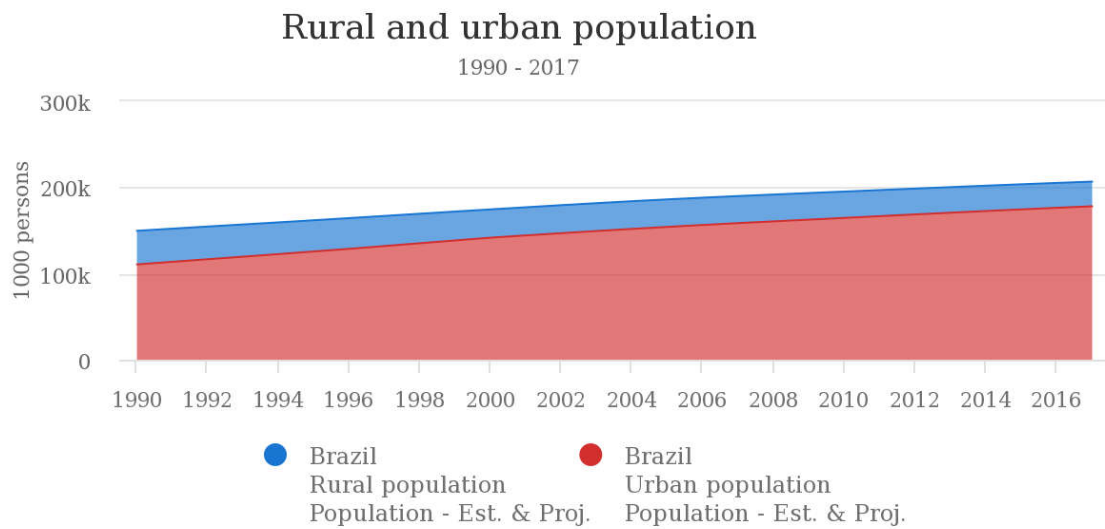


Figure 8. Brazil Rural and Urban population Area. Retrieved Dec, 2017, from [http:// www.FAOSTAT.org](http://www.FAOSTAT.org)

With all the information above, it is time to get deeper into the research in the field. The following chapter will give an overview of the methods and how the information described in the results is obtained.

5. Methods

The research is qualitative and divided in two parts; a literary review and fieldwork. The fieldwork started in the first half of February and continued till the end of May 2017. The research in the field found its base at the Universidade Federal do Rio Grande do Sul but mostly took place in the rural areas of Porto Alegre, state of Rio Grande do Sul in Brazil. According to Ribeiro (2008) the rural workers in the State of Rio Grande do Sul have kept the concept of rural education which is important for this research. This fieldwork took place after an intensive study of literature. The relevant information is displayed in the theoretical framework. This study of literature continued in Brazil because of the knowledge obtained there.

It was necessary to establish in the beginning of the fieldwork where education of agriculture is given to make a clear time frame of how much time was needed to spend in different rural areas and how much time at the university. Once in the field the details became visible and after a few weeks it was possible to collect the required data.

5.1. Data collection.

Collecting the right data starts with gathering information from studying previous research and literature on the subject. This includes information about the region, environment, agricultural activities, history, political and social structures. These data are displayed in the theoretical framework and in the regional thematic framework. By analyzing these data it is possible to gain a better understanding of the information available. However, it should be considered that studying literature can never fully prepare you for research in the field.

After studying literature the researcher needs to establish what education platforms need to be investigated. This research wants to obtain information on different levels of education. Meaning that it wants respondents of different ages, different life stages and different financial possibilities. The similarity between the respondents is that they are working in the agricultural field. This is not limited by practicing agriculture. Especially for this research, teaching and therefore teachers in the agricultural field are covered too.

5.1.1. Selection Educational Platforms

As stated above this research wants to cover different ages and levels of education. In the regional thematic framework the educational system is displayed. On this base a selection of educational platforms has been made, starting with the obligatory primary education. Here is chosen for rural schools. On primary level two schools have been visited. One school that became a 'rural school' ten years ago and one school that turned rural recently. By visiting these two schools it created the possibility to compare them and their challenges. On both schools both teachers and students were interviewed. This to create an idea of the differences between teachers and students. These respondents are selected through snowball sampling, this technique will be elaborated later. The next educational platform was on secondary level. Here is chosen for vocational education because this type of education is more specific, and in this case directed towards agriculture. Here is chosen for an EFA since this is the most common way of education in agriculture (see 2.8). On university level is chosen for the university of the region; UFRGS. This university is a federal university and has a department on agriculture as will be elaborated later. These three types are examples of formal education. To include informal education UVAIA is also investigated. This is an informal educational platform and reaches poorer communities. It is important to note that this platform educates about sustainable agriculture and is therefore biased. However, the value of this platform is not only that it includes students of older age with fewer financial possibilities, it also explains how these types of

agriculture are spread among farmers who lack the ability of obtaining informing themselves. Because of their financial status they often lack connections.

5.1.2. Chosen respondents and interviews

As described above the respondents for the interviews are chosen through Snowball-sampling. With this technique participants recruit other participants for a test or study. It is used where potential participants are hard to find (Coleman, 1958).

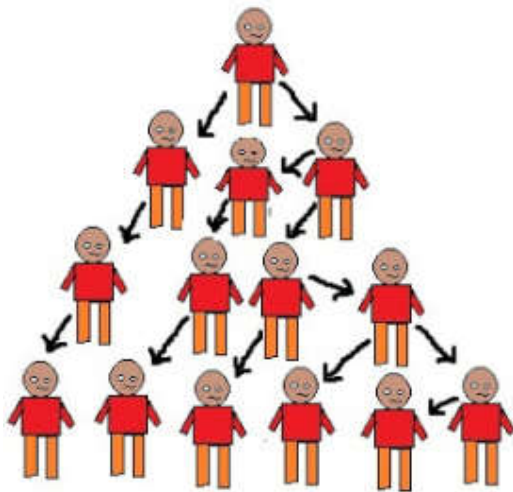


Figure 9. Snowball-sampling. Retrieved march, 2019, from <http://towardsdatascience>.

Flavia Marquez was the first contact in Porto Alegre. She is a teacher in Agriculture at the UFRGS and therefore the first respondent. She invited me to a social gathering with Agronomia students where more contacts were made. This is how the first seven interviews with students were planned, and one of these participants invited me to UVAIA. Later, one of these participants took me to rural farmers where I met respondents who practiced agriculture. Here one focus group discussion was held. Two teachers of the agricultural department of the Universidade Federal do Rio Grande do Sul were contacted. They provided me with contacts of

different schools on different levels in different communities. In the end six communities were visited. Some included schools, other were visited to obtain a better view of the lives of small farmers

Age; 5-14

Educational platform; primary school

19-04 Ivoti (school exists for more than 10 years)

11-05 Nova Santa Rita (school just started)

Age; 14-19

Educational platform; EFA

25-04 Santa Cruz, rural area

Age; 19+

Educational platform; University Rio Grande do Sul

01-04 - 25-05 Porto Alegre (Both interviews and Focus Group discussion).

Visiting projects;

25-03 - 12-05 Several family farms working with UVAIA towards agroforestry

21-03 - 09-05 UVAIA meetings at the Agronomia faculty (Both interviews and Focus Group discussion).

11-05 Research project different ways of managing pasture for rural development

A Semi structured interview was developed. This interview was developed to reach all the parts of the conceptual framework developed in chapter three.

A semi structured interview consist of three main parts; opening questions, to generate a broad idea of the situation of the participant. These questions also build an environment where the respondent feels safe to answer the questions truthfully. Key questions, where the answers of the participant are of value in answering the sub and research questions. These questions are related to the research topic. And finally closing questions. Even though there might be already enough information, it is possible that the respondent wants to add something to his or her story. closing questions are broader questions to distance of the research topic and let the interview 'fade out'. These questions also give the respondents the possibility to ask the interviewer some questions.

Before starting the interview it is important to create a safe environment where the respondent feels motivate to answer questions truthfully. It is important to establish a researcher respondent distance while making sure the respondent feels encouraged to talk. This is not only done by creating a safe environment but also by asking open questions. These questions can be answered by follow up questions to provide additional information if the researcher feels this is useful. It is important to state that later in the field the interviews were more elaborated because some interviews provided information and raised questions useful for this research. *Appendix A* is a template of the interview held in the field. The questions in the interview should follow each other in a logical order. However, it is more important that this is logical for the respondent than for the researcher (Hennink et. al., 2011). It is possible that during the interview questions are asked in a different order than displayed in *appendix A*. The following table provides a list of the 28 respondents (N=28).

Table 2.

Name	Position	Education type	Profession	Age	Date of Interview
Carine	Resp. 1	Primary	Principal / Teacher	45	19-04-2017
Jorge	Resp. 2	Primary	Teacher	56	19-04-2017
Camilla	Resp. 3	Primary	Teacher	38	11-05-2017
Lucas	Resp. 4	Primary	Student	9	19-04-2017
Maria	Resp. 5	Primary	Student	9	11-05-2017
Otávio	Resp. 6	Primary	Student	6	11-05-2017
Antonio	Resp. 7	Vocational	Principal / Teacher	37	25-04-2017
Diego	Resp. 8	Vocational	Teacher	24	25-04-2017
Jonas	Resp. 9	Vocational	Teacher	29	25-04-2017
Adiar	Resp. 10	Vocational	Teacher	27	25-04-2017
Eduardo	Resp. 11	Vocational	Student	18	25-04-2017
Gabriella	Resp. 12	Vocational	Student	16	25-04-2017
Gomez	Resp. 13	Vocational	Student	18	25-04-2017
Fiona*	Resp. 14	UFRGS	Professor	38	23-03-2017
Carlos	Resp. 15	UFRGS	Professor	49	25-03-2017
Tatiana	Resp. 16	UFRGS	Professor	35	19-04-2017
Kadi	Resp. 17	UFRGS	Student	30	22-03-2017
Eduardo	Resp. 18	UFRGS	Student	29	05-04-2017
Casio	Resp. 19	UFRGS	Student	24	08-05-2017
Amelia	Resp. 20	UFRGS	Student	23	07-05-2017
Amanda	Resp. 21	UFRGS	Student	22	07-05-2017
Karlla*	Resp. 22	UFRGS	Student	27	10-05-2017
Casio	Resp. 23	UVAIA	Student	27	21-03-2017
Ivan	Resp. 24	UVAIA	Researcher	24	21-03-2017
Adriana*	Resp. 25	UVAIA	Student	28	11-05-2017
Thiago	Resp. 26	UVAIA	Post Graduate	33	11-05-2017
Maria	Resp. 27	UVAIA	Farmer	43	21-03-2017
Carlos	Resp. 28	UVAIA	Farmer	48	11-05-2017

Table2. List of respondents. (*name is changed for research)

5.1.3. Focus group discussion

To create more discussion and explore more topics this research included two focus group discussions. This use of focus groups was a method to stimulate discussion and the interaction of different opinions, perspectives and ideas which otherwise might not have been unveiled. (Hennink et al, 2011) One focus group discussion was at the EFA and included both teachers and students (N=6). The other focus group was with UVAIA participants and farmers (N=8). It should be noted that both groups included participants that were biased towards sustainable agriculture. Therefore the discussion was biased too. These discussions revealed different insights into why it is difficult to implement different agricultural techniques in some areas. The information obtained through these focus groups is paired with the data obtained during the interviews and was reason to include some questions in the interview. *Appendix B* is the focus group discussion guide used by the moderator. This guide contains the questions asked for this research. Both focus group discussions stimulated discussion and interaction. The discussions took longer than expected and touched topics that were not mentioned in the literature and therefore not mentioned in the guide. *Appendix E* provides a list of 14 focus group respondents (N=14).

Another beneficial aspect of these focus group discussions is that it allowed the researcher to create more insight into the lives of the participants. There is a big cultural difference between the Netherlands and Brazil and this manifested itself in many different ways. This will be elaborated in paragraph 9.3.

A focus group discussion includes a moderator and an observer who takes notes. In this case the researcher is the observer. Even though both focus group discussions were recorded, the observer can write down key issues and non-verbal communication. For the participants to feel free in their discussion it is useful for the observer to be placed outside of the discussion circle (Hennink et. al., 2011).

The moderator is the person who conducts the discussion and has as task to address the key issues. Furthermore the moderator make sure the discussion does not drift too far away of these issues and everyone participates in the discussion (Hennink et. al., 2011).

5.1.4. observation

A significant time in the field is spent observing. Where the respondents provide a lot of information in the semi-structured interviews and the focus group discussions, the significance of observations of the researcher cannot be overlooked. By observation it is possible to obtain a better understanding

of the underlying motivations of the respondents. A lot of information is provided in an informal setting. In Brazilian culture it is expected to dine with each other and interact before coming to the actual point of your visit. These meeting that go previous of the real discussions and interview are of great value in understanding the lives and the environment of the respondents.

Next to understanding the motivations and respondents observation can also be useful to confirm or deny the answers of the respondents. This to check if the answers are reliable and valuable for the research.

5.2. Data Analysis.

After conducting the interviews and focus group discussions the required data is analyzed. This is done by coding and recoding using de guidelines of Saldana (2015). According to Hennink et al (2011) coding is done for two purposes. Codes make the range of issues in the particular research field visible and help to categorize similar data. When the codes and sub codes are categorized the main categories emerge. These categories can be compared with each other. Combined they can work towards thematic and conceptual theories. Our ability to show how these themes and concepts systematically interrelate and lead toward the development of theory is called the codes to theory model (Saldana, 2015) and displayed in figure 10.

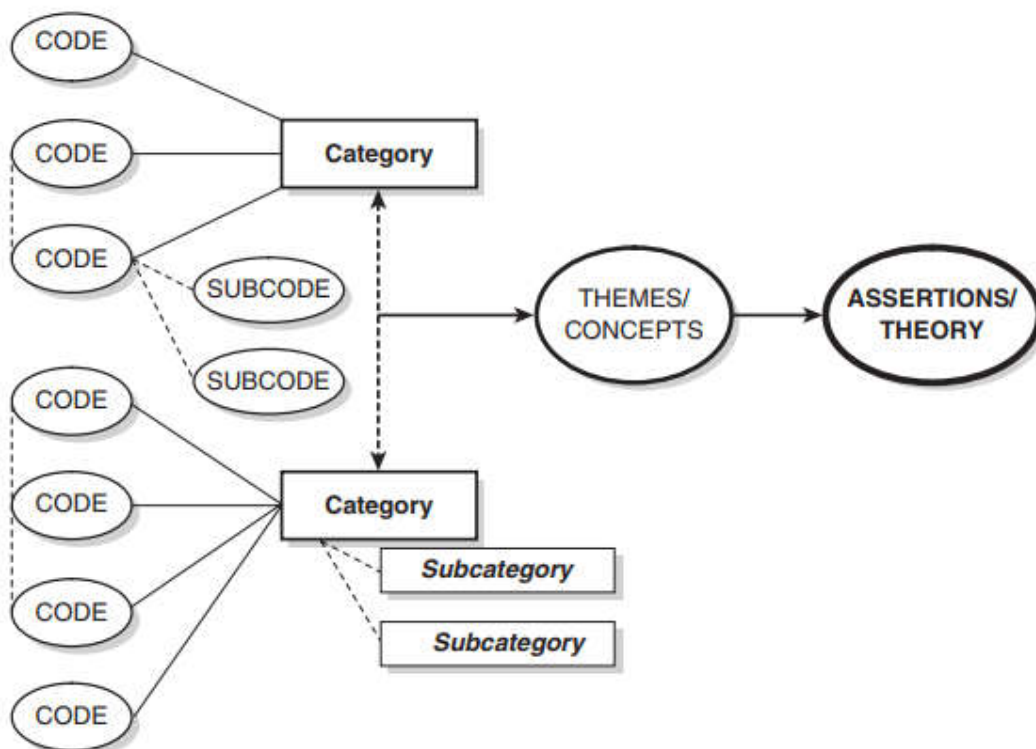


Figure 10. codes to theory model, retrieved march 2019, Saldana (2015)

It should be noted that this process displayed in figure is a cycle and not just a path. In other words, developing codes, comprising of similarly categorized information, categorization of these codes, and the development of a theory based on the results will continue to take place. This until the information is comprehensive and forms the same theory over and over. (Hennink et. al., 2011)

To increase the trustworthiness, this research used multiple sources to check the findings. There were three different collection methods and multiple sources of data collection. The methods are described above and a significant amount of literature was conducted before going to Brazil.

A codebook includes the codes and the categorization of these codes. Using the techniques of Hennink et. al. (2011) these categories included themes from the theoretical framework. The codebook of this research includes the themes described in the conceptual framework. This research has three main themes as described in the chapter three and in figure 3. This research revolves around Environmental Education what resulted in the fourth theme. During this research another theme arose namely 'empowerment'. This brings the total on five main themes in this research that worked with concepts towards the theories described in the conclusion. The codebook for this research is displayed in *Appendix E.*

The main theme of this research is Environmental Education and therefore the first thing is to establish the degree of EE in every platform. As described in the theoretical framework and conceptual framework EE consist of five components. In the codebook these components are defined as categories. Every category consist of five indicators that indicate if that specific component of EE is in place, and to what degree.

For example, the first component of EE , *Awareness and sensitivity* has the following five indicators; *description environment, local issues, local development, environmental encounters in daily life* and *food production is family centred.*

When all of these indicators are encountered in the interview the participant is assigned a score of five. When four of these indicators are encountered the participant is assigned a score of four. etc. The minimum score that can be assigned is zero. During the interviews it occurred that some indicators were not specifically encountered, but not left out completely either. These participants were assigned a score 0.5 for this indicator. An example; some participants did not have environmental encounters in their daily lives, but only in the weekends.

Every component of EE works following this method, having different indicators. These indicators are chosen on their relevance in the research. This means that the base comes from the literature but that some indicators are derived from observations in the field or previous interviews. Simply because the researcher had no knowledge of certain aspects before entering the field. When we compare this to figure 10, displaying the codes to theory model theme EE will look as follows

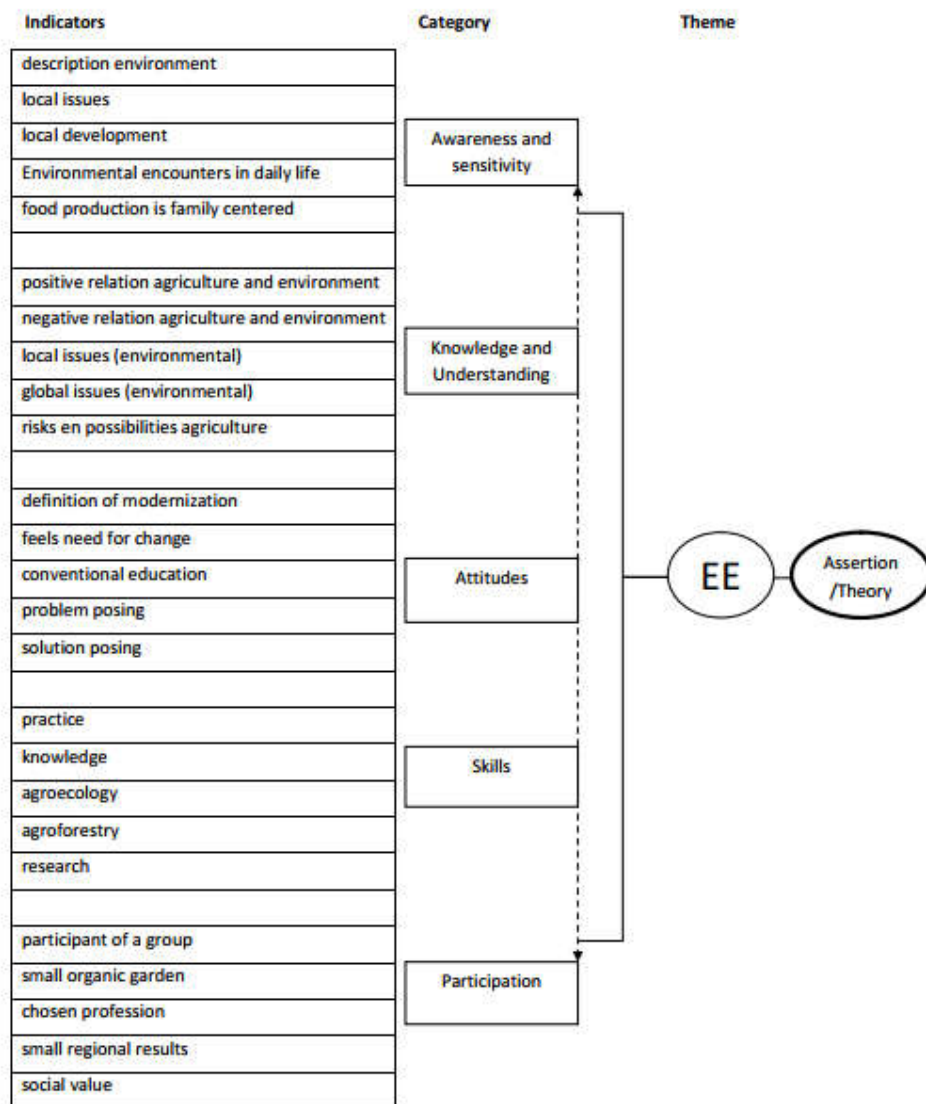


Figure 11. codes to theory model applied to research theme EE, march 2019

This figure displays what indicators are used for what component in relation to theme Environmental Education. For every participant a score per component is established on the basis of these

indicators. These scores are displayed in a table at the end of every platform and the average of these scores are made visible in a diagram.

5.3. Presentation of the Host organization

The host organisation is 'The Universidade Federal do Rio Grande do Sul' also known as the Federal University of Rio Grande do Sul. This university describes itself as *"A century-old educational institution nationally and internationally recognized"*. The university is located in the centre of Porto Alegre which is the capital of the State of Rio Grande do Sul. The university offers academic programs from a wide range of different fields of knowledge. Agricultural fields are no exception and one of their master programs is solely focused on agricultural sciences. (UFRGS, 2017)

The university wants to distinguish itself with the highly qualified training of human resources thanks to the emphasis on research, and the knowledge derived from it. The university states that these research activities give undergraduate and graduate classes the opportunity to consciously educate a citizen about its social, environmental and ethical responsibility. This might be the first possibility to dive deeper in different learning methods and to see how this education of citizens is done. (UFRGS, 2017)

The university has more than 700 registered groups and approximately 14 thousand people are involved in scientific and technologic research activities. The university claims that technological development and innovation are very important aspects in the construction of knowledge. Therefore, the research development is oriented to translating this knowledge into application. This is one of the main reasons that the university has an important interaction with society. (UFRGS, 2017)

According to their website, the university kept the reality of the culture in the work on the rural area. The workers keep linking themselves to the historical experiences of rural education that created in France the Pedagogy of Alternation (Ribeiro, 2008). There are also many EFA's and CFR's and smaller schools for family farms in this state and they played a big role in the research. The base of the research was the Universidade Federal do Rio Grande do Sul. However, travelling towards the more rural areas was found to be of great value to obtain the right data. Especially visiting the EFA's and primary schools was of vital importance.



Figure 12. Major cities Brazil. Retrieved may, 2017, from [http:// www.debconf4.debconf.org](http://www.debconf4.debconf.org)

6. Results

The next chapter will provide an overview of the educational platforms visited during the research. This section is of great value to the research because it will show how social movements led to and formed the current way of education. Therefore, this overview will be very elaborated and detailed.

6.1 Educational Platforms

As explained this research focuses on education from primary school to University. Due to the short time span it was impossible to visit all the schools in Rio Grande do Sul and therefore choices needed to be made. Since this research focuses on education formed because of social movements, private schools were eliminated. The schools reviewed are schools accessible for everybody. The following, logic focus would be a focus towards schools that evolve more around agriculture. Therefore, Rural schools were investigated. These schools are more connected with their surrounded communities. In the rural areas this means they are more focused on the rural challenges these communities encounter. Furthermore, agriculture is interwoven in every rural school. (Harmon & Schafft, 2009). This however is different with secondary education. Like described, after primary education students can choose for vocational education which is stronger focused towards agriculture. This research chose to visit an EFA since these schools evolve around agriculture. For example; they interweave mathematics into their agricultural courses. The platforms will be described in order of age. Therefore, this section will start with the primary schools, followed by the secondary vocational schools and end with the University. After the description of the platform there follows a description in to what extend EE is at play on this platform, and what the challenges are they face. this is operationalized as described at chapter three.

6.2 Presentation Primary Platforms;

The section about the primary schools will be divided in two parts. The first part will describe a school that is still strongly changing towards sustainable education (Rui Barbosa). The second school (Escola do Campo) started this change over ten years ago. This does not mean the school stopped evolving, but in Escola do Campo the result of some changes are already visible as are the difficulties they encountered. Rui Barbosa is still strongly dealing with those difficulties.

6.2.1. Escola Minicipal de Ensino Fundamental

The first school is "Escola Minicipal de Ensino Fundamental Rui Barbosa" in Nova Santa Rita. Even though this school exists for a long time, it was not always functional. The school started in 1949 but had to close during the nineties because there was no sufficient money. During this time there was a

lot of redistributing of land. Families in communities came together and realized that they needed good education for their children. It took 92 days to reopen the school and since two years the school has a stronger focus towards sustainable education. This was when Camilla (38) started working for Rui Barbosa.

Today they have a clear view of what they want to achieve in the following years and what the objectives of the school are. These objectives are listed and further explained below;

- 1) To ensure that the students obtain a basic understanding and possession of reading, writing and mathematics.
- 2) A clear understanding of their natural environment, their social environment, the political system, art and technology and see the value of them in the current society.
- 3) A sufficient base of knowledge to form their attitudes and their values, and to provide them the tools to look critical to this world.
- 4) To strengthen the positive view of the students towards working in agriculture and to add value to their identities.

These objectives are based on the other school, Escola do Campo. Some of the objectives above might seem obvious, especially the first objective is a standard every school needs to live up to. However, a lot of these children have parents who have a very low understanding of the written language. To ensure these children obtain a certain level of knowledge, education in the basic courses is vital. Not only for their further education; without a solid base, forming one's own opinion is not possible (see paragraph 2.5).

Objective 2, 3 and 4 show the direction of the school towards a more sustainable environment in the surrounding communities. These objectives are drawn up to ensure the value of the students for the surrounding communities. Therefore, cooperation with these communities is vital. However, Camilla (38) states that it is difficult to convince the people who live in this area. The value of the basic knowledge is acknowledged, but ecological development and sustainability are undervalued. Critical thinking



Figure 13. Escola Minicipal de Ensino Fundamental Rui Barbosa, May 2017

does not get encouraged if it is not encouraged by the educational system. Therefore, this objective is very important, also to integrate this in the community for further generations.

In this moment the school takes care of 28 children of an age between 4 and 12. This is a big difference compared to urban schools. Simply because the population density is bigger, classes in urban schools are larger. In rural areas there are fewer schools with lesser children. These children do not only have class there, they stay here the whole day. As a result, the school has a tight relationship with those children and their education. Hence, the school has a tight relationship with and a big influence in the community.

The government in Brazil has ongoing projects to encourage schools to become more rural. As a result, there are more schools in Rio Grande do Sul which are perceived as rural schools. However, in most cases this usually means the school has a garden. Tatiana (35) emphasizes that being a rural school includes much more. Tatiana is working as a teacher and supervisor to develop these schools. She states that courses to become a teacher are urban based, handling urban problems. As a result, teachers who are teaching in rural areas encounter different problems they try to solve with urban



Figure 14. Escola Minicipal de Ensino Fundamental Rui Barbosa, May 2017

solutions. This forms a problem. Tatiana tries to counter this. She educates rural teachers, handling rural problems. However; she states that every area, rural or urban, has its specific problems. Therefore, Tatiana educates the teachers to be adaptive, to learn the ability to see the specific needs of the school. It is very visible how motivated Tatiana is, she visits most of the schools her pupils go to and tries to stay involved in the process towards sustainable, rural development. Camilla is one of her pupils and Rui Barbosa one of her projects, as is the school in Ivoti.



Figure 15. Escolas Municipais de Ensino Fundamental do Campo . Retrieved may, 2017, from [http:// http://www.escolasdocampodeivoti.blogspot.com](http://www.escolasdocampodeivoti.blogspot.com)

6.2.2. Escola do Campo Ivoti

As explained is the rural school "Escola do Campo" in Ivoti further in this process, and therefore sees more result. This also means they know which problems these schools encounter and how difficult it is to tackle those. The result is mostly visible in their connection with the community. This school works towards the same goals



Figure 16. Escola do Campo Ivoti, April 2017

as Rui Barbosa but receives more support from the families in this area. However, this is different now compared to when the school started. Furthermore, in this area pesticides and machinery are seen as developments that results in higher production. As explained this is a result of the success of the Green Revolution. Families are stimulated to produce as much as possible on short term while neglecting the consequences for their land in the long term. Producers of pesticides even come to houses to sell their products to these families. And since these products result in a higher production for the first few years, the belief that this is development only becomes stronger. However, as described in paragraph 4.2.1 there are many downsides which later come to the surface. Teaching about these downsides is one of the pillars of this school.

Carine (45) is the coordinator of the "Escolas Municipais de Ensino Fundamental do Campo". These schools share the same vision of becoming rural and sustainable and educate towards agroecology. This is done in many different ways, starting with teaching children at a young age the value of the earth. This belief is

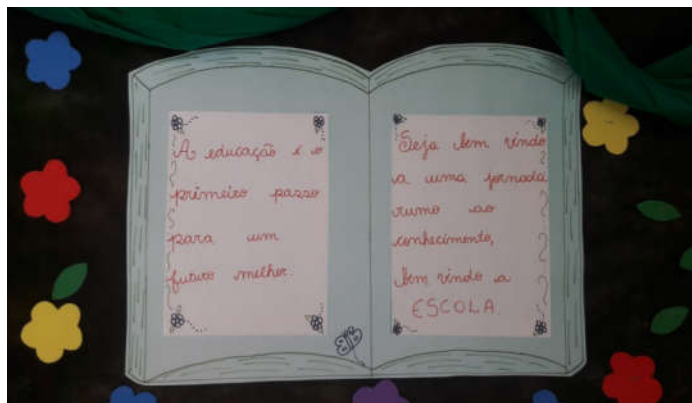


Figure 17. Escola do Campo Ivoti, April 2017

not shared by the families in these communities, a trend that is very visible all around the world. Carine explains that most families, however poor, have television, where they are confronted with a capitalist system on a daily base. Brazilian channels and programs are based on USA standards. The more modern techniques you use, the closer to development you are. This is a shared belief under

small farmers. Naturally, this is the same belief of the children. These schools counter those beliefs, showing the value of the simple things, the natural resources and how these resources are not infinite. Even though this schools still encounters negative responses of some families, Carine sees positive changes. These children are encouraged to bring problems they have on their farms to the school, where the school offers, often agroecological, solutions that are practiced in the school garden, and later in the families. Visiting each other's family farms is therefore one of the important activities. By doing so children experience other ways of producing that shows them that sustainable agriculture does not mean a decrease in production.

Jorge (56) is the director of one of the schools. He shows how the classes are directed and how they intertwine agriculture into their courses. The garden is one of the important elements because it makes their lessons less abstract. The children work with the same crops their parents produce, and even though the production of the school is small scaled, the children see how agroecology increases production and decreases overexploitation of the soil. Making sustainable development visible is important.

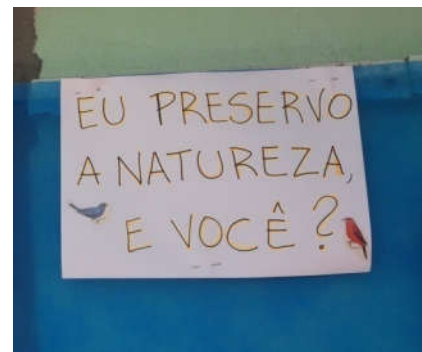


Figure 18. Escola do Campo Ivoti, April 2017

Furthermore, the school invests in small not fully grown 'baby plants' they sell for a small price to the families. By doing so the children watch the plants growing from an early state towards producing crops. These schools are directed towards agriculture, most of the children here are educated to become farmers, just as their families are. This highlights the importance of this change. Today's students become tomorrow's farmers and educating them towards sustainable agriculture is key. That is also the statement where Carine concludes with:

"Yesterday's generation grew up with a system where more is better, and modernization is development. It is only logical that this is visible in the way they use their land. Today's generation is working towards change, and tomorrows generation should not be able to imagine a world where they did not value their natural resources." (Carine, 2017)

While visiting the school surveys were taken and interviews conducted. Since both the teachers as the students' views are valued some of the participants were very young. The results of these interviews are displayed in the following table. Here the degree of EE encountered at primary education is displayed, EE is operationalized as described in chapter three.

Table 3.

Primary Education	Awareness and Sensitivity	Knowledge and Understanding	Attitudes	Skills	Participation
T.Resp. 1	4.5	4	5	3	4
T.Resp. 2	3	2	4	1	2.5
T.Resp. 3	3	3	4.5	2	2.5
Teacher average	3.5	3	4.5	2	3
S.Resp. 4	2	0.5	2	0.5	0.5
S.Resp. 5	2	0.5	4	0.5	2
S.Resp. 6	2	0.5	3	0.5	0.5
Student average	2	0.5	3	0.5	1

The following figure also displays the presence of EE. Here the average scores in the table above are visualized displaying more clearly the stronger and weaker components. The lighter green displays the students, where the darker green displays the teachers.

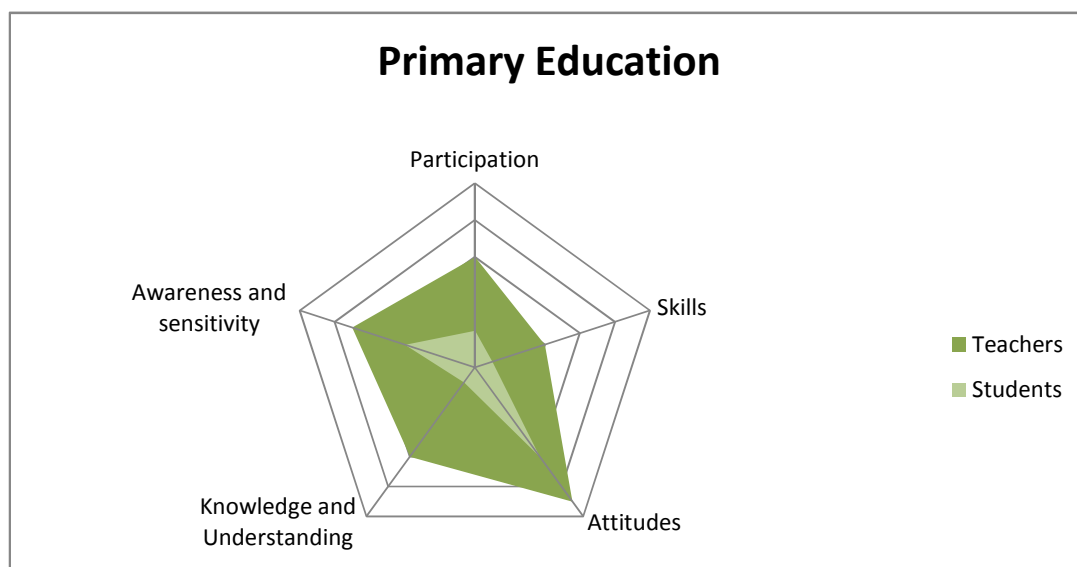


Figure 19. Average scores presence EE, Teachers and Student ,Primary Education, Nov 2017

The figures makes a visible presentation of the scores obtained in this research. As described these scores are based on the indicators as seen in figure 11. For EE to be optimal all scores need to be five. However, some scores are lower than others, these components have room for improvement. On the primary level the component that leaves most room for improvement is skills. There is knowledge and attitudes are high what means that both teachers and students have an global idea of the environmental problems and see these problems as an incentive for change. However they lack the skills to enforce this change. Referring to figure 11. these skills are based on knowledge about different agro ecological techniques and how to put these into practice. Especially for the students this is not surprising. They are of very young age and their families have little knowledge of the relation between agriculture and the environment. This emphasizes the role that schools have within their community. Camilla described that one of the biggest challenges is receiving support of the communities. Their knowledge and understanding of environmental changes is negligible indicating that at the same time this provides a big opportunity. Schools can play a significant role in spreading knowledge through the communities. Camilla confirms this but emphasizes this is a transition and that it takes time. Camilla is very positive about this, she sees results and emphasizes that transitions start with the youth.

Above the primary schools are described, along with their struggles. These schools try to make change by educating the next generation from a young age on. The following paragraphs describe secondary education in agriculture. Here the children are older and their future path is towards agriculture. The secondary school visited in this research is also focused on agricultural education. These kind of schools are located in the rural areas, but not in urban areas.

6.3 Vocational Education; Escola Familia Agricola Santa Cruz do Sul.

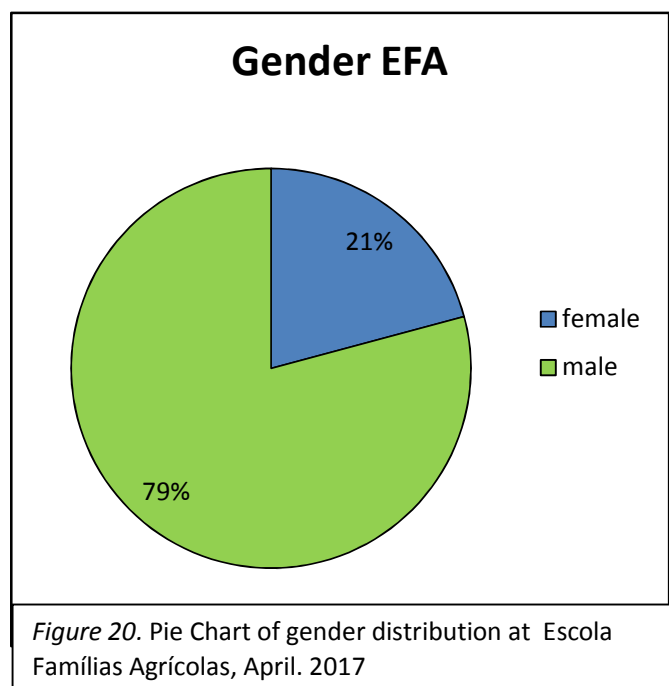
This school is one of the Escola Familia Agricola schools described in chapter 2.8. This school is part of the Associacao Gaucha pro Escolas Familias Agricolas which is an umbrella association. In Rio Grande do Sul there are four EFA's part of this association, the one in Santa Cruz do Sul being the oldest one. Therefore, this school is chosen to evaluate since the process here is most visible. Section (..) reviewed how the EFA's landed in Brazil and what their origin is. However, since EFA's are not established by the government but by the farmers, every EFA has a different story of how it landed in its specific place. Therefore, the first thing handled here is how this EFA landed in Santa Cruz do Sul and, just as important, why.

Antonio Carles Gomez (37) is the coordinator since the beginning. He explains that the origin of this EFA comes from the need to keep the youth in the area. Before the start-up of this EFA there were only primary schools in Santa Cruz do Sul. This meant that after primary school, the possibilities for

youth to develop were very limited. The previous generation started working after primary school, mostly in the tobacco industry, which is the most important industry in this area. However, nowadays working in this industry is only possible for people who are over 18. Due to this fact, and because of the limited possibilities for youth to develop, the urge of young people to move to more urban areas increased. This increase was also fed by a growing negative image of rural work. The current generation does not value, and does not feel valued doing rural work and therefore wants to find, in their opinion, better work in urban areas. This together led to a drainage of young people in this area. This began to influence the area and people realized that change was needed to keep the youth from leaving. This change was led by Sicredi, one of the largest cooperative financial institutions in Brazil (www.sicredi.com.br, 2017). Sicredi started to search for an institution capable of keeping the next generation here, and to motivate them for the rural work.

Antonio was already familiar with the concept of the EFA's because he visited them in Menais Gerais. He was also the one who presented this idea to Sicredi. And so the concept of an EFA in Santa Cruz do Sul was born around October 2008. The start was not an easy one. As described the most important reason for social movements to take over was the lack of a governmental base. And even though education is a right for everyone, there were no governmental funds to support the start of the EFA. Financial support had to come from other sources. This highlights the importance of Sicredi. Sicredi was not only the biggest financial supporter, it was also the institution that brought other stakeholders in contact with the EFA. One of the biggest being Afulra who represents the tobacco industry. Sicredi and Afulra being the two biggest financial supporters of the EFA resulted in keeping the interests of both the farmers (Sicredi) and the companies (Afulra) in mind. But even though financial support was not the key problem anymore, to establish a school, governmental support is necessary. Therefore, the EFA started a partnership with the local university to obtain all the requirements and teachers. This all took place in a time span of 8 months and in February the EFA presented the concept to the government, becoming a real EFA in March of 2009.

Today the school is still growing. The EFA receives children from 14 till 18 and takes



three years. An interesting thing to see is that there is a majority of male students. 79% of the students are males against a female ratio of 21 %. According to Gabriella (16) the main reason for this is that girls feel less attracted towards agricultural labour. Financial support is still the biggest issue making it difficult to keep the EFA alive. Financial support comes from 3 scales; the municipalities, the stakeholders and the government.

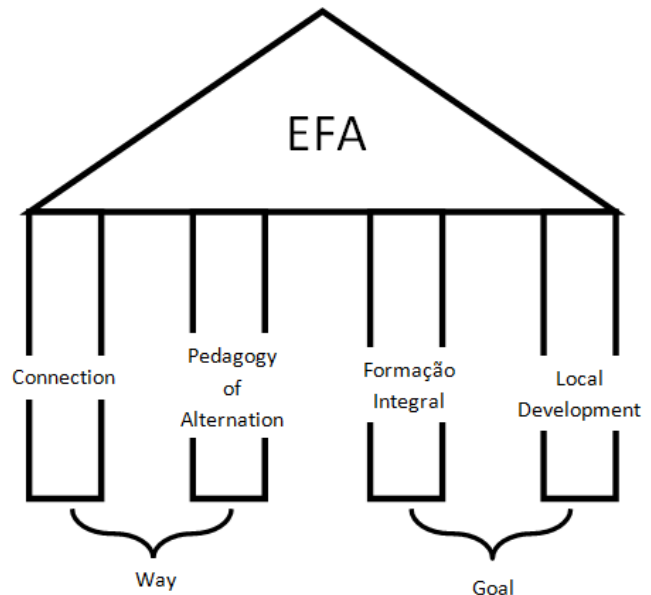
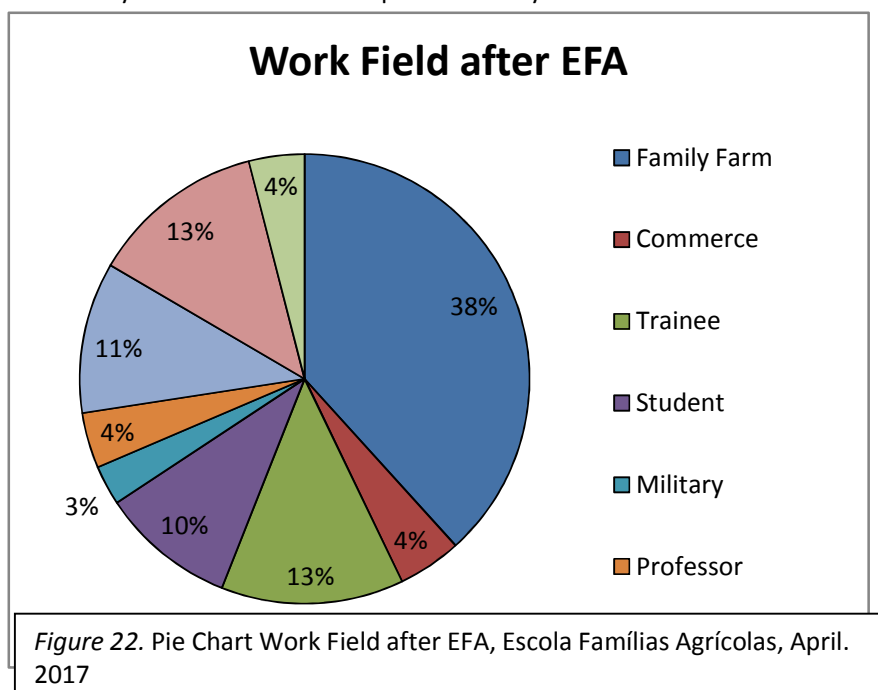


Figure 21. Pillarsystem Escola Famílias Agrícolas, April 2017

The government is now responsible for 60% of the financial support, just enough to maintain the school but it took 8 years to get this amount of financial support. Even though it was difficult, the school survived and teaches by its values. The concept of EFA is different from European schools. Antonio explains that the foundation is based on four pillars. The connection and pedagogy of Alternation forming the way towards Formação Intergral (plenary training) and local development, being the goal.

As explained, the key element of the EFAs is the pedagogy of alternation forming one of the pillars. Therefore, Paulo Freire is an important author for Antonio. He describes that in relation with his theory the students stay a couple weeks at the school, and the other weeks they live with their families and in the communities where they are able to use the practices they learned. In other words, they combine theory with practice. This EFA emphasizes the importance of this. Every week the students research a different topic in their own farms and they share this in the school. Not only does this create broader knowledge about the other farms and practices, this forms also the



base for the right education. Working with this system, the education can be adapted to the existing practices, ensuring that the received education is actually useful. To ensure this the school makes an effort to visit all the families at least twice a year. The school values these visits a lot and sees this as a crucial part of delivering the right education. This education is not solely based on teaching the right techniques. A crucial aspect is to tackle the reason why the EFA started in the first place; for the students to see the value of their histories, their families and the work they do. By visiting the farms and sharing their information the EFA shows how important they are during the history and now. Most families produce a variety of foods, but in this consuming society, the value of this is easily overlooked. This is something the EFA is trying to counter.



Figure 23. Escola Famílias Agrícolas, April 2017

The results are seen not only in the proud voice of Antonio, but in a lot of aspects in the school. Eduardo Gaos (18) explains that although the main production of his family is tobacco, he started his own project growing different crops. This project initially started for his family, but the production now is so high that they are able to sell it to local markets. These markets are another project of the EFA. Every Friday the students get the chance to sell some products of their family farm through the market organized by the EFA. This market is the first thing visible while walking in the school. Even though it is not more than a few stands with products on it that are for sale, the value cannot be underestimated. The variety of products is large, ranging from sweets till grains. Since the EFA is the only school teaching about agriculture without pesticides, there is not really a market for ecological products. As a result, the EFA also needs to provide a market for this type of agriculture. Aside of the

market there is a wide range of projects the EFA works with. Their community garden shows the different techniques they use to find the most sustainable way of agriculture. This also emphasizes the importance of using a small space in a optimum way. The education provided by the EFA is divers since their students are divers. Diego Limberger (24) who works as a teacher at the EFA shows the different techniques used and learned. Most techniques are focused on small areas of land. There are a lot of ecological techniques visible in the garden of the school. Diego explains that local development is strongly linked to ecological development for the EFA. This however is not in line with the current techniques used at most farms. Most family farms are simply not aware of ecological ways of producing. To create awareness of these techniques which are less harmful for the environment the EFA has a wide variety of projects.

One of their biggest project is called '**Diversificação**', **Cultivado a Biodiversidade**. This project uses 8 steps to create a better understanding of the importance of biodiversity under 72 students and their families. One of the pillars of this project is communication. This project emphasizes the importance of discussion and debates. Not only about agricultural practices but also socio-economic subjects. According to this project creating awareness should follow upon critical thinking. This might seem logical but in the current educational system in Brazil, this forms an exception. During this project the students visit not only the farms of each other, they visit institutions that create sustainable methods and markets which evolve around ecological products. During the program the students visit 22 institutions, markets, and properties (this excludes the visits to the farms of the other students). After these visits where they observe, interact with the



Figure 24. Escola Famílias Agrícolas, April 2017

people who work there and use the practices their selves, the discussion starts again. How the students experienced these visits, what they observed and if and how this changed their ideas and objectives about agriculture. After this, the EFA provides pieces of land the students can use to experiment with these practices. Jonas Reis Costa (29) shows this with proud. He shows the different practices they experiment with and the results they obtain. The variety of products produced on this small piece of land is impressive. Their fertilizers are produced solely with ecological practices and the amount of land they use is small compared to the number of products produced. Jonas Reis emphasizes that they obtain these results without any chemical seeds or fertilizers. The results of Diversificacao are not only visible on this property. Jonas Reis states that even though usually the

families hesitate towards agroecological techniques, a significant number of students use a part of these practices at their family farms. There is still a lot to gain, but steps are taken and results become visible. Due to the green revolution and modernization that took place in Brazil as described in paragraph 4.2.1 there is a current belief, especially with the older generation, that pesticides and fertilizers are in line with development. Therefore, Antonio emphasizes the long-term goals of the EFA. He explains that changes, especially changes in techniques and belief take time. The EFA really has its focus on the next generation. This does not mean that they ignore the current techniques used in the agricultural field. But this does mean that they acknowledge that this transition towards different techniques will be a slow transition.

This EFA has a lot of projects available for their students, some towards agricultural practices, but also projects how the students can develop themselves in the professional field. Therefore, the EFA has a lot of cooperation with different organizations, in a lot of different fields. This is both a blessing as a curse. Usually this cooperation brings money and knowledge, and as described, money is very important for the survival of the EFA. However, Antonio describes that it is sometimes difficult to stay objective. With money there follows a certain expectation to follow the practices and objectives of the sponsor. This is something the EFA tries to avoid. The EFA wants to stay close to their beliefs while providing a wide variety of projects for their students. According to Antonio this is still a difficult trade-off.

To summarize, it is clear that there are a lot of difficulties the EFA encounters due to the lack of financial support, governmental support, and due to the strong beliefs that green 'modern' techniques provide development. However, Antonio is optimistic. The amount of work they did, the results they get with students, both knowledge based as mental based, the cooperation together and with stakeholders and other organisations, the more and more support they receive from the



Figure 25. Escola Famílias Agrícolas, April 2017

government. Steps are taken in the right direction. And, as stated above, the EFA has its focus on long term goals and expects a transition to take place with the next generation. The prospects are hopeful, and the EFA is staffed by ambitious people which is also visible in the following table and figure.

Table 4.

EFA	Awareness and Sensitivity	Knowledge and Understanding	Attitudes	Skills	Participation
T.Resp. 7	4.5	4	5	4	5
T.Resp. 8	3	3	5	3	2
T.Resp. 9	3.5	3	5	3	4
T.Resp. 10	5	4	5	5	5
Teacher average	4	3.5	5	4	4
S.Resp. 11	3	3	3.5	3	3.5
S.Resp. 12	2,5	3	2	3	3
S.Resp. 13	3,5	3	3.5	3	4
Student average	3	3	3	3	3.5

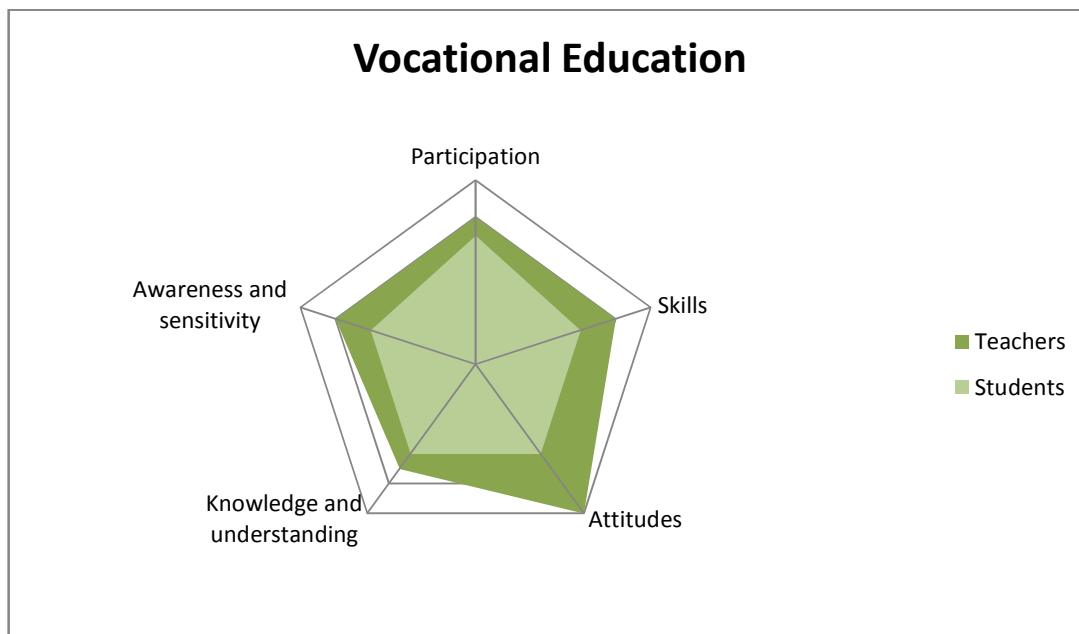


Figure 26. Average scores presence EE, Teachers and Student , Secondary Education, Nov 2017

In the figure above, it is very visible that there is a strong relation between the teachers and students. Antonio emphasized this during the interview and it is also shown in their environmental views. It may be expected that the students have a lower average score in most components since they are still learning, but the gap is small. One of the explanations is that this school teaches in line with Paulo Freires Pedagogy of Alternation. Learning is an interactive process where teachers also learn from their students. Even though there is still room for improvement in every component of EE, this room is relatively small compared to other platforms. Environmental Education is very strong represented in this school. A question that arises in this case, since EE is strongly represented, if this is also visible in the agricultural practices in this region. Students state that their practices are still mostly conventional. This provides a challenge and leaves the question how, if the students learn about agroecology, this can be better implemented in the agricultural practices. This is especially difficult since most agriculture is done for big companies, where monocultures dominate. Antonio describes that another challenge is to motivate the students to stay in the rural areas, and to raise their views on rural labour.

However, the teachers here have a strong attitude towards making change which is in strong contrast with the teachers at UFRGS.

The next and last formal educational platform described in this research is the Federal University of Porto Alegre. As described this is also my host organization. However, there is no expectation with them to stay in line with their objectives, so this research should not be biased. Information about the University is gained by interviews with both students and teachers in the agricultural field. There is also a sufficient amount of literature available about their objectives and the courses they provide. By interviewing the students information about a student organization UVAIA is obtained. This organization revolves around ecological agriculture and practices how to implement those by families. This will be more elaborated later because it provided also significant information about the difficulties families experience in implementing agroecology. More important, UVAIA also functions as an informal educational platform providing information about agricultural practices for farmers who are not in school anymore.

6.4 University Education; UFRGS

First the Federal University of Porto Alegre, Universidad Federal Rio Grande do Sul (UFRGS) will be described. UFRGS Started in 1895 when it was just a school, it became the University of Porto Alegre in 1934, the university of Rio Grande do Sul in 1947 and the Federal University of Rio Grande do Sul in 1950. Today UFRGS has 33.244 students, 94 undergraduate programs, 77 Master programs and 73 doctorate programs. The university has 5 campuses, among which the Agrological campus where most of this research took place. The six academic departments, and respective fields of study are: **Animal Science, Field Crops, Plant Protection, Forage Crops and Agricultural Meteorology, Horticulture and Forestry and Soil Science.** At the undergraduate level, a major in Agricultural and Life Sciences is offered to an average number of 450 students enrolled in over 135 courses in the current curricula. At the graduate level, four programs are currently offered: Business of Agriculture, Soil Science, Animal Science and Crop Science. These programs are home to 28 research groups and are composed of professors, post doctorates, students and research assistants that receive scholarships and fellowships from Brazilian funding agencies. Since 1965, over 1450 M.Sc. and 400 Ph.D. degrees were granted. (UFRGS, 2017) To summarize, UFRGS is not a university to overlook, and they come across as innovative towards agriculture and sustainability. However, while talking to students this picture becomes different.

Even though there are programs for sustainable agriculture, these programs are electives. They are not compulsory and the courses that are, are based on conventional agriculture. Amanda Lovatto (22) is one of the students of the Field Crops program. Her Family owns an ecological farm where Amanda's interest in food and nutrition started. Even though she doesn't want to take over their family farm she has an high interest in organic and sustainable production. She followed another

path compared to the students at the EFA since she had her secondary education at an urban school. She got this chance because her older sister already lived in Porto Alegre and Amanda could move in with her. She explains how the courses at UFRGS teach them about the soil, the crops and the plants but when the lessons become agricultural, they get taught about conventional agriculture. Amanda is one of the few students who realizes this is not the only way of agriculture. Most of her fellow students simply don't know about the small scaled production that can be found all over Rio Grande do Sul. This is one of the key elements why it is so difficult to obtain more sustainable agriculture in Brazil, but this is not the only reason. Amanda and her sister (Amelia, 23) grew up with agroforestry and organic production, but this is only possible because of the small production their family farm has. Organic production is cheaper and healthier but it requires more labour. This makes it more difficult for large producers. An example is pests. It requires less labour to spray pesticides than to take them away with manual labour. However, there are fewer chances to pests when working with different crops, but often this is not recognized or even considered.

Another student is Eduardo Hernandez (30). He is a Master student in Rural Development at UFRGS. Eduardo confirms what is told by Amanda and the other students interviewed for this research. He describes how his courses are about agro-methodology, teaching him about the atmosphere, the soil, air and water and how new techniques can improve crop production. But there is little to none interest in agroecology. Eduardo emphasizes that his interest in agroecology is not something he learned at the University but that this interest was raised outside his education. There has been talked about agroecology in one of his courses, but it was only one class and described as not important and not functional. The reason for this is that agroecology is mostly functional on the small scale, and that is not the area these students get educated for. Students at UFRGS are educated to become researchers or for supervising jobs in big companies, and those big companies invest in monocultures. This is the same as universities in the Netherlands but the difference is that there is a large part of the population in Brazil working on small scaled farms.



Figure 27. University Federale Rio Grande Do Sul, Faculty of Agricultural and Life Sciences, April. 2017

Table 5.

UFRGS	Awareness and Sensitivity	Knowledge and Understanding	Attitudes	Skills	Participation
T.Resp. 14	0.5	3	0.5	5	0.5
T.Resp. 15	0.5	2.5	0.5	5	0.5
T.Resp. 16	3	5	5	5	2
Teacher average	1.3	3.5	2	5	1
S.Resp. 17	0.5	2	0.5	3	0
S.Resp. 18	1	2	0.5	3	0.5
S.Resp. 19	0.5	1.5	0.5	5	0
S.Resp. 20	3	4	1	5	2
S.Resp. 21	4	3.5	3	4	2
S.Resp. 22	3	5	5	4	5
Student average	2	3	1.75	4	1.6

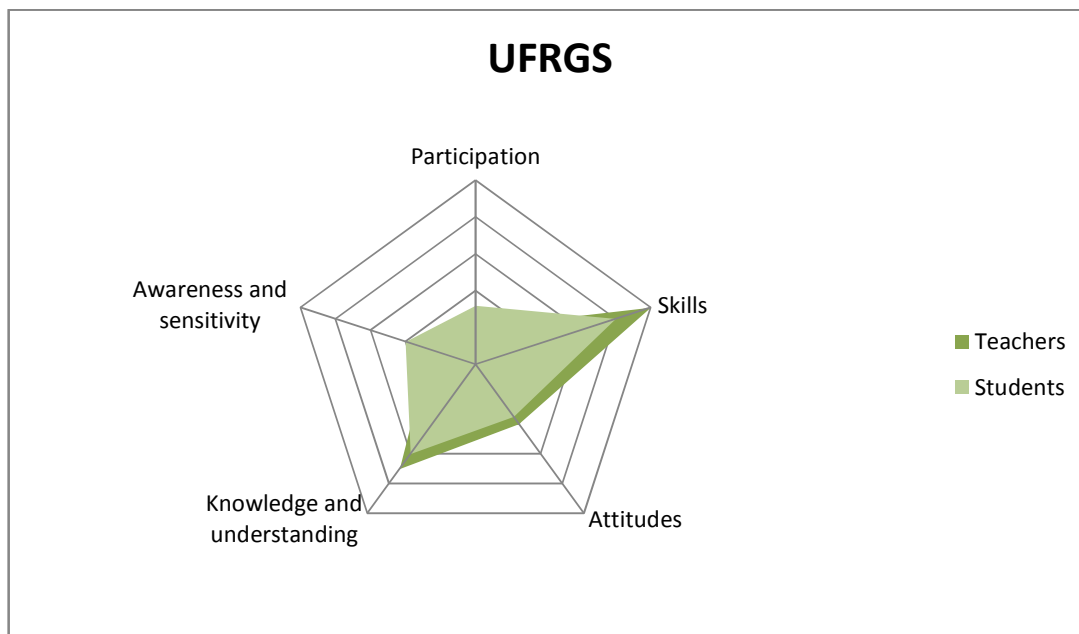


Figure 28. Average scores presence EE, Teachers and Student, University, Nov 2017

The last formal educational platform is the university. The figure makes visible that there is a strong contrast between the EFA and UFRGS. Where the EFA is strong on all the components UFRGS leaves lot of room for improvement on several components. This does not mean that the program and classes of the university are insufficient, it just means that the teaching is not in line with EE. As described, the focus of UFRGS lays on conventional agriculture rather than ecological agriculture and it can be debatable what is more important. While talking to students, most students agree with this direction towards conventional agriculture. According to KaDi (30) modernization is the future The figure shows that there is a significant amount of knowledge and skills. comparing with figure 11, these scores indicate that both students and teachers are aware of environmental issues, solutions, and have the tools to establish change. However since they score low on the other components this indicates that there is no wish for change and as a result of that, only little participation in making change. Figure 28. displays the average score of the participants, therefore the huge differences between participants are not made visible. It is however relevant to mention that the participants of UFRGS have these differences. They either score really low on a component or really high. The participants that score high on the components are in the minority, therefore the average results are still low. This minority of students and teachers who are aware of these challenges and see these challenges as an incentive for change formed the beginning and development of UVAIA

to summarize; even though UFRGS offers a lot of study programs on agriculture and profiles itself as progressive towards sustainable agriculture, this is based on monocultures and conventional

agriculture. However, some students disagree, because they are more focused on the small farms. The students who disagree with this education in conventional agriculture came together and formed a student group named UVAIA. This group has its focus on agroecology, and on the small farmers who all together, play a big role in the agriculture in Brazil.

6.5 Informal Education; UVAIA

The students who disagree with the current study program raised "Uma Visão Agrônômica com Ideal Agroecológico" (An Agronomic View with an Agroecological Ideal). This student group, further referred to as UVAIA, is located at the agronomy faculty and they started out small. They started to discuss topics related to sustainable agriculture, and how to implement this more in the current system. Their mission is to preserve the environment, culture, knowledge and plant material of traditional, rural and original people. Ivan (24) is an old student of UFRGS and really motivated about UVAIA. Passionate he tells how they started out and how they realized that by focusing on monocultures they do not only neglect the environmental aspect, the social aspects also are neglected. There are a lot



Figure 29. UVAIA, May 2017

of people without the opportunities to produce big amounts. As described, the majority consists of families who have to live from their small lands. UVAIA focuses on those people. For UVAIA agroecology is not only a way to make agriculture more sustainable, it is also a way to connect people, and create opportunities for the more vulnerable class. Ivan describes how they try to enrich the rural areas. The first family they connected with, they met at the ecological farmers market. They started their project by applying agroforestry in a small area that was not used at the moment. Even though it is a long-term project, improvements became visible. Mostly in the social aspect, but by including and educating families, they became more known and today they have several settlements with agroecology, and more to come. Ivan acknowledges that it is a lot of work to implement agroecology. He describes how they use their knowledge about plants to make small ecosystems the most profitable. By planting different plants that provide and use different nutrients the soil reaches an optimal quality that will result in a higher production without using agro-toxics.

Even though UVAIA is small, it is an example of a social movement that achieves positive results. Thiago Couto (33) who is another participant of UVAIA gives guest lectures at the Agronomy faculty

and is in conversation with some professors of UFRGS to create a real course around it. This all raises the question that if there is so much knowledge about sustainable agriculture, why is it not implemented in the system. In the following paragraph this question will be examined.

Even though this research is focused on the current education, previous education is still strongly reflected in the current social structures, agriculture and in the beliefs of the communities. Maria Saldanha (43) is one of the small farmers visited during this research. She explains that to take care of her family she needs to get the most out of her land as possible. Pests and weeds make this more difficult and reduce the yield. Pesticides prevent this, increasing her yield and chemical fertilizers helped to keep the land fertile. It was only since someone in her family who owned a farm a couple kilometre away introduced her to UVAIA that Maria started questioning her tactics. She did



Figure 30. Office UVAIA, May 2017

experience a small reduction in the quality of her crops but did not relate this to fertility loss of the soil. Ivan (24) explains that this is the case in many families. Companies approach the families, promoting agro-toxics and chemical fertilizers neglecting to tell the families that this increase in their yield is temporary. After a couple of years the soil will need more fertilizers and crops become more vulnerable towards the toxics. Families start to use more chemicals, increasing these problems and putting risks to their health. The overall problem is that there is a general belief that these agricultural methods are better compared to old methods because they are more modern. Another problem is that there is easy accessibility to obtain these chemicals. With help of UVAIA a couple farms in this area get their soil tested and UVAIA already started with implementing agroforestry. However, Maria explains that with her, a big part of the community was sceptic. Casio (27) is one of

the newer members of UVAIA and explains that this is one of the difficulties they encounter. The methods of UVAIA are perceived outdated and ineffective. According to Casio there is no consideration for the potential Brazil has on a smaller scale. He explains that the government is mostly concentrated on the big monocultures because they increase export products. Since the government is often corrupt, these big producers are given the most attention and opportunities. Farmers that produce on a smaller scale have different needs and need different methods, but these needs are neglected. As a result, these farmers are using the same methods as the big producers, believing this is modernization.

Table 6.

UVAIA	Awareness and Sensitivity	Knowledge and Understanding	Attitudes	Skills	Participation
U.Resp. 23	5	4.5	5	4	5
U.Resp. 24	3	3.5	5	2	5
U.Resp. 25	3.5	4	5	3	5
U.Resp. 26	4.5	4	5	3	5
UVAIA average	4	4	5	3	5
F.Resp. 27	4.5	3	3.5	3.5	5
F.Resp. 28	3.5	0	0.5	0.5	2
Farmer average	4	1.5	2	2	3.5

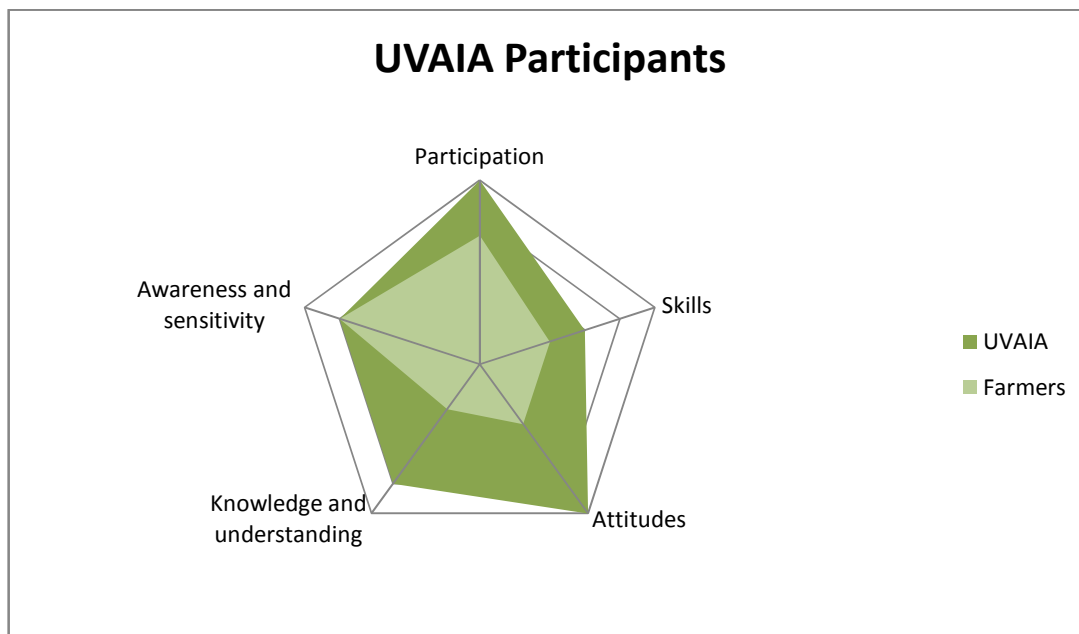


Figure 32. Average scores presence EE, UVAIA and Farmers , Nov 2017

The final platform is the informal educational group UVAIA. This group consist of people who are motivated to change the current agricultural landscape and therefore it is not surprising that UVAIA scores high on almost all components of EE. Even less surprising is that the components that received the highest scores are 'attitudes' and 'participation'. The whole base of UVAIA is establishing change. The previous figures show the scores of the students and teachers, this figure shows the participants of UVAIA and the small farmers. This emphasizes the social relation between education and communities. What stands out in this figure is the differences in components 'knowledge' and 'attitudes' between UVAIA and the farmers. Where UVAIA participants have a lot of knowledge of different agro-ecological practices, the farmers do not. The same can be said for a need for change. There are a lot of farmers who still see agrotoxics and fertilizers as modernization. And even though they see problems occur in the fertility of their land, they do not relate this to these practices. This low attitude is also a reason why they score low on skills. Why learn something you perceive useless?

This is also mentioned by Ivan. Even though there is a transition visible, there is still a lot of room for improvement. Casio adds to this that a major challenge with working towards ecological agriculture is that the farmers do not value their culture. Everything needs to grow faster and bigger, they neglect their own value and therefore the value of their surroundings. This figure also makes visible that being aware of your surroundings and environment is different from knowledge of the environmental challenges. Farmers are aware of their environment since this is their most important life source, however they are unaware of the value of it and the damage they do by using chemicals.

As explained the methods UVAIA suggests are perceived outdated. This however does not demotivate the members of UVAIA. On the contrary, Casio and Ivan are positive. They see results, even though they are small. Ivan is mostly interested in the results on the agricultural processes where Casio is more interested in the social aspects. He explains how UVAIA connects the communities and how they try to help with their self-image. There are a lot of small farmers who just survive and have no valuation for the part they play in the Brazilian culture. Casio is focusing on increasing their self-valuation through education and connecting the communities. Both Ivan and Casio acknowledge that UVAIA is a long-term project. The results will become more visible over the years. However, they emphasize that they have grown a lot the last couple of years. They are small on the huge scale of Brazilian agriculture but they emphasize that small projects do matter. Especially in Brazil where the government neglects the smaller stakeholders. UVAIA is an example of how education does not need to be connected to a school. Schools are important to educate and therefore can work towards more sustainable agriculture. But to change structures informal education is as valuable as formal education. Furthermore, education is still the most important tool to help people to obtain a critical view. And to quote Freire (1968) one more time; *'true reflection' automatically will lead to 'action'*



Figure 31. Focus group discussion at Farm side, UVAIA, May 2017

6.6 Summary

To summarize, every educational platform has to a larger or fewer extend the components necessary for effective EE. However, none of the platforms scores maximum on all the components which is necessary for EE to reach its full potential. The different platforms have different weaknesses. On primary education level knowledge and skills are low. This is not surprising since these students are younger, they require less knowledge and still need to develop on a broad spectrum skills needed in life. The rise in knowledge about the environment is visible during their education. At the EFA their knowledge is already higher in line with the knowledge of their teachers. Both platforms have a strong relation with the communities. The importance of this is reflected in the pedagogy of alternation extending the knowledge of both teachers and students. At the EFA there is still room to improve in attitude. Even though the teachers score high on this aspect, students can grow here. At university level there is a lot of knowledge, only this knowledge is not focused on the environmental challenges. Therefore, this aspect scores low on the EE scale. Both students and teachers have the skills to work towards sustainable agriculture, but there is few to zero motivation. As explained the focus lays on conventional agriculture. Finally, UVAIA is examined. UVAIA scores high on participation and attitudes. They have a lot of knowledge but sometimes lack of skills. This goes hand in hand with their lack of opportunities because farmers are reluctant towards their programmes. However, as mentioned, there is a transition visible.

7. Conclusion

In this chapter The sub questions will be answered and work towards a conclusion answering the research question. These answers are based on the information gained from literature and on the results obtained during the fieldwork. The sub questions are made before and during the fieldwork to obtain valuable knowledge. This is visible in the results. The results are adapted to the first two sub questions of this research.

7.1 Sub Question 1.

The first question; *How is knowledge passed on in the rural areas of Brazil and what are the different educational platforms?* is mostly answered by reviewing literature. Learning theories that played a big role in the learning system of Brazil are described in the theoretical framework. Learning goes beyond schools and social networks play a big role in generating knowledge. The pedagogy of alternation describes that visiting the field combined with theoretical lessons is very important to obtain knowledge. However, for conducting the fieldwork it was important to distinguish the educational platforms. Regarding schools, information was obtained theoretical, and this system is

explained in paragraph 4.3. In the field, it became visible that social structures contributed to sharing knowledge.

7.2 Sub Question 2.

How is knowledge of (sustainable) agriculture generated and what is the role of EE in generating this knowledge. This question consist of two parts. The first part is asking how knowledge of agriculture is generated. This question contributed to making a selection of what educational platforms should be investigated and what platforms could be neglected in this research. Ideally every educational platform is investigated but this is not possible due to the time span. Furthermore, this research evolved around education in agriculture. Therefore, schools that did not provide education in agriculture were not able to help answering the research question. The platforms that are investigated are based on the answer of this sub question, therefore this question is very important. As described this research wants to focus on agricultural education in different life stages and on different levels of education. This means that this research also want to includes informal education next to formal education. Starting at a young age, on the primary level this means that the *rural schools* were visited. These schools differ from other primary schools because they are more connected with their surrounded communities. In the rural areas this means they are more focused on the rural challenges these communities encounter. Furthermore, agriculture is interwoven in every rural school. (Harmon & Schafft, 2009) On secondary level this means that this research puts its focus on vocational education towards agriculture. This resulted in the EFA. As described in the theoretical framework these types of schools focus on agricultural practices. On university level the focus of this research is based on the students of the agronomy faculty. This faculty is located a bit out of Porto Alegre but classes are located both in the centre as at the faculty itself. As explained, education does not end with school. Social structures also form a base for growing knowledge and therefore informal education is also taken into account in this research. The social platforms encountered were family farms around POA, the local ecological farmers market in POA, and UVAIA. In the results these are divided between farmers and UVAIA members.

The second part of the question; *What is the role of EE in generating this knowledge* is one of the most important questions of this research. As described EE consist of five components and every component has a different role. This role is operationalized by indicators. Depending on these indicators the stronger and weaker components of EE become visible. The indicators are displayed in *appendix E*. The following paragraphs explain how the components interact with the people who practice agriculture.

Component; Awareness and sensitivity to the environment and environmental challenges.

Role; To make people understand their surroundings and how they interact with these. This might seem fairly easy, however this is not true. During the interviews some participants were more interconnected with their surrounding than others. Especially those who worked a lot with agriculture were more aware of the role their surroundings played in their lives, and the other way around.

Component; **Knowledge and understanding** of the environment and environmental challenges.

Role; To create knowledge of the relation between agriculture and the environment. This is not only directed to problems but also to the opportunities that lie in this relationship.

Component; **Attitudes** of concern for the environment and motivation to improve or maintain environmental quality.

Role; To create the need for a different relation with agriculture. This role is crucial. The second component should develop an understanding that the environment and agriculture are interdependable. However, during this research it became visible that there are people who believe the environment has an providing function, and a providing function only. They do not feel the responsibility to take care of the environment. This component should develop towards an agricultural field where agriculture and the environment work together towards a sustainable relation. This component influences how agriculture will be practiced. Both in teaching and learning.

Component; **Skills** to identify and help resolve environmental challenges.

Role; To teach and obtain skills in agricultural techniques. This component is flexible and easier to increase. Skills can be obtained. It takes time and effort, but if someone is willing to achieve skills, it is possible. This is visible in the research, the older participants are, the more skills they have. However, skills are not necessary in line with sustainability. Conventional skills are also skills and are also valuable. Nevertheless, for EE, only skills that help the environment are relevant, and therefore agroecological skills are indicators for the score of this component.

Component; **Participation** in activities that lead to the resolution of environmental challenges.

Role; To show if there is action towards a sustainable form of agriculture. This is not necessary agriculture in itself, teaching towards this or other forms are also valuable. However, this component scores optimal when action in different forms are at place.

These components are only able to fulfill these roles if they have a score of five. And is all these components would score five, EE would be able to be as effective as possible. This is not the case. In chapter six the results per component are displayed. The following figure shows how EE scores per platform.

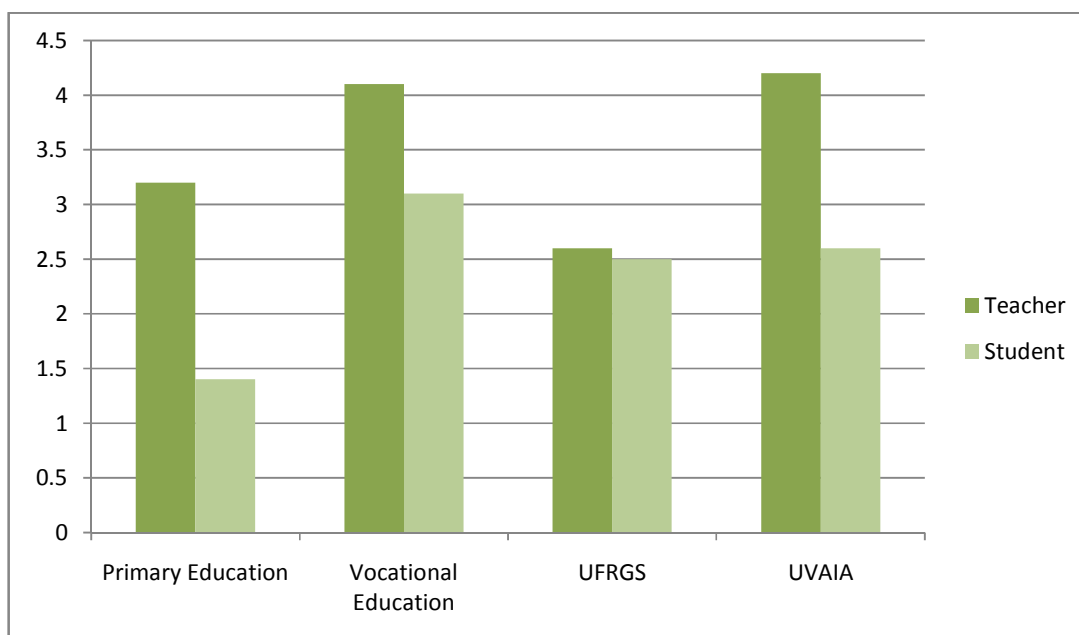


Figure 33. Average scores presence EE, comparison all Educational Platforms, Nov 2017

It is important to know to what extend EE is at place, before this research can make any statements where, and how to improve this. Figure 33. makes visible that no educational platform scores optimal. In other words, every platform needs to improve if it wants to fulfil its role. However, on what component they need improvement differs per platform. KAN BETER

Platform; Primary education

Strongest component; Attitudes of concern for the environment and motivation to improve or maintain environmental quality.

Weakest component; Skills to identify and help resolve environmental challenges.

Conclusion; As described are skills a relatively flexible component. People can obtain skills if they are willing to work for it. Since the strongest component is attitudes there is motivation to work towards these skills. Therefore this combination of strongest and weakest component is relatively positive.

Platform; Vocational education

Strongest component; Attitudes of concern for the environment and motivation to improve or maintain environmental quality.

Weakest component; No component is exceptionally weak, there is little room for improvement on every component.

Conclusion; Vocational education is not scoring extremely low on any component. In other words; EE is very much at place and has the possibility to establish change. There is room for improvement but

this is little. This research states that the main reason for this is that they work with critical pedagogy and the Pedagogy of Alternation. This will be elaborated later in the research.

Platform; UFRGS

Strongest component; Skills to identify and help resolve environmental challenges.

Weakest component; Participation in activities that lead to the resolution of environmental challenges.

Conclusion; Since these participants are university students and teachers it is not that surprising they have strong skills. These participants are smart and have motivation to obtain skills. This however does not continue in their attitude towards environmental issues. This is not their weakest component, but also leaves a lot of room for improvement. This low attitude results in their weakest component; participation, why act on something you do not want to change? Changing attitudes is one of the biggest challenges of this research and at the same time very important for a change towards more sustainable agriculture.

Platform; UVAIA

Strongest component; Participation in activities that lead to the resolution of environmental challenges.

Weakest component; Skills to identify and help resolve environmental challenges.

Conclusion; On this platform it is relevant to state that there is a big difference between the UVAIA members and the farmers. The members score high on all the components where the farmers have a lower average score. This research states that skills is the component that is relatively easy to increase, so this combination of weakest and strongest component is, again, hopeful.

Overall vocational education and UVAIA score highest. The agriculture department of UFRGS scores low compared to the other platforms. One of the main differences of UFRGS and the other platforms is that the others work with the Pedagogy of Alternation. Therefore this research states that this method of education is a key element to implement effective Environmental Education. This will be elaborated in the conclusion.

7.3 Sub Question 3.

The final sub question regards the different social actors that play a role in the agricultural landscape in Brazil. The question; *What are the different types of agricultural actors in the rural areas of Porto Alegre* is very important because it goes beyond educational influences on agricultural practices. This

question is answered by coding the interviews and literature study. A division is made between people who work in agriculture (on different levels) and by who or what these people are influenced. The next table shows the different actors encountered. Some are both working in agriculture and influencing, these actors are listed under both categories.

Table 7.

Actors working in agriculture	Influenced by
Family farmers	Communities Teachers Buyers of agricultural products Company owners Governmental actors
Big company Farmers	Communities Company owners Teachers Sponsors Governmental actors Research
Students	Communities Teachers Students Company owners Governmental actors
Teachers	Communities Company owners Sponsors Students Governmental actors Research
Sellers of agricultural products	Communities Company owners Sponsors Governmental actors

The above shown actors are not divided in age. However, the age of students does influence which actors play a bigger or smaller role in influencing the students. This is explained in the results per educational platform. What stands out is that every agricultural actor is influenced by the community they live in. This emphasizes once again the role communities play in Brazil. Governmental actors are also mentioned as influencers, they influence education programmes and research on university level. The government also influences the companies that produce for export. This because these companies generate profit the government benefits from. On a lower level they also influence the communities. Without subsidies it is difficult for schools to survive and the governments influences the rights of people. However, partly due to the inconsistency of the Brazilian government many other actors play a role here. As described social movements can make changes on a large scale, but social movements do not start out big. A lot of smaller social actors are visible in the agricultural landscape of Brazil and they have proven to contribute to this landscape. Antonio who started the EFA without any governmental support is an example of this.

7.4 Research Question

With the focus on the role of social structures and the role they play in forming the agricultural landscape this research is working towards its main conclusion. In the theoretical framework the theory of critical pedagogy (Freire, 1968) is explained as very important for social movements. In this theory Freire (1968) explains how the right form of education will lead to social movements forming change. The research question of this thesis is

How can Environmental Education contribute to the effectiveness of learning and implementing of sustainable agriculture in the rural areas of Rio Grande do Sul in Brazil?

7.4.1 The role of EE in social movements

This research states that to achieve change in Rio Grande do Sul social influences play a bigger role rather than governmental influences due to the inconsistency of the governmental structures. Hence, for EE to contribute to the effectiveness of learning and implementing sustainable agriculture, EE needs to work together with the theory of critical pedagogy of Freire (1968). In this theory Freire (1968) describes how to establish a social movement. EE can direct this movement by being implemented in the four steps Freire explains that work towards this action. However, this only works when all the components of EE score optimal so these components can fulfil their roles as described in paragraph 7.2. Critical pedagogy describes a form of education that will help improving these components.

As explained in paragraphs 2.5 and 3.4 these four steps are

1. The importance of dialogue
2. Objectify the reality
3. Critical view and problem posing
4. Reflection and action

This research links EE to these steps. Therefore, for EE to contribute to a more sustainable agriculture, EE needs to contribute to the aspects of critical pedagogy in such a way, that sustainable agriculture becomes a desirable movement. This research believes that EE should be involved into these steps as follows;

1. The importance of dialogue

The importance of dialogue as described by Freire (1986) is to direct education away from providing information and instead co-create knowledge through conversations. In relation to EE this dialogue can contribute to the first component; *awareness and sensitivity* of the world we live in. In the results it becomes visible that this is at place at primary school, the EFA and with UVAIA. Raising awareness about the surrounding of the students is already implemented in primary education. However, the EFA and UVAIA stand out in their implementing of dialogue. The EFA and UVAIA see dialogue as the main way to exchange information with each other and other parties. Next to creating awareness, this also contributes to obtaining knowledge. As a result, the first step of critical pedagogy contributes also to the component *knowledge and understanding*.

2. Objectify the reality

The other role of *awareness* is to trigger the second step of critical pedagogy. The students need to learn to separate themselves from their context in objectifying the world. The awareness that they can, and therefore have power to make changes is of big importance. This step is very important and at the same time very difficult to achieve. As described, people struggle with their trust in the government. Especially poor people feel not supported by governmental structures. Even though there are optimistic people, especially farmers feel not empowered. They feel not heard and not in a position to make changes. For a movement towards sustainability, empowerment is crucial. Objectifying the reality should also contribute to *knowledge and understanding*. For a movement towards change, knowledge of the environmental challenges should be in place along with the knowledge they can work towards solutions.

3. Critical view and problem posing

The third step of critical pedagogy should contribute towards a more critical view towards terms of EE this means *knowledge of the current environmental challenges* should be linked to the agricultural practices. The pedagogy of Alternation plays an important role in obtaining this view. As described in paragraph 2.7, with help of the pedagogy of alternation it is possible to notice the problems of the current agricultural system at their own households, and the households of others. In the results it appears that especially primary education and the EFA make good use of the pedagogy of alternation. This helps both the teachers and students to develop a critical view towards these systems.

4. Reflection and action

The final step according to Freire is reflection that automatically will lead to action. With full *knowledge and understanding of the current environmental challenges* both students and farmers can reflect on their agricultural practices. When they link these challenges to their own practices the *attitude* should direct the students towards the importance of these challenges. With the right tools farmers can increase their skills making them **empowered** to work towards change. As described in sub question two, skills is the most flexible component because skills are obtainable if there is motivation. According to Freire (1968), these steps automatically will lead to action. In terms of EE this will lead towards this motivation. Finally, the fifth component, *participation*, will reach its full potential once a movement towards change has started. Also, here the pedagogy of alternation is of importance. It will capture experiences that are generated by rural changes and by seeing these, farmers feel empowered to implement these in their own situations. These changes are visible at some students of the EFA who start their own sustainable projects. UVAIA is an example of a small movement empowering people and making changes in rural practices.

The above chapter shows how EE can direct social movements towards a more sustainable environment. The cooperation between critical pedagogy and Environmental Education will lead to strong components and work towards action. In the results it became clear that platforms that work with the pedagogy of alternation are closer to optimal functioning of EE. Without the pedagogy of alternation, it is harder to follow through the steps and also more difficult to direct these steps to the environmental challenges.

8. Discussion

For EE to be effective all five components of EE need to be fully in place. When awareness, knowledge, attitudes and skills are in place, EE can reach its full potential leading towards participation. This participation of farmers and teachers will help a transition towards more

sustainable agriculture. However, it is already discussed that these components are not fully in place. The educational platforms reviewed in this research have to a fewer and bigger extend these components, and none of the platforms scores maximum. Neither is there one component with an overall lower score. In other words, components that score low differ between platforms. Sub question two discusses what components score low and how this relates with their role. the following chapter will discuss why those components score lower on these platforms, and maybe even more important; how to increase these scores?

8.1. Social influences

The answer of this question lays in the relations between the actors. This aspect cannot be emphasized enough. Table 6 shows which actors influence other actors. This paragraph will connect these relations to the scores of EE, starting with the influence of the government. This research emphasizes the power of social movements; however, this does not mean the government has no power. Governmental structures have the power to direct education. This power is mostly visible through financial support. On the lower education level there is fewer support from governmental actors than there is on the higher education level. UFRGS is a federal university, a state university. In other words, the government has full control over the courses that this university provides. Their course manual shows that the agricultural courses are based on conventional agriculture. This is confirmed by both students and teachers. The research programmes of UFRGS are also based on conventional agriculture supporting monocultures. This research connects the relation between the university and the government to the minimal interest in sustainable agriculture. The economy of Brazil relies on the export of agricultural products, and therefore mass production has high economic value for the government. The government profits of high production, made possible in monocultures. Hence the government invests in techniques and research in the university that contribute to this monoculture production. Even though the major part of the population relies on agricultural production of small family farms, this production does not contribute to the export products, therefore the government adds fewer value to this production. This lower interest of the government in agroecology is reflected in the lower interest of the students. The majority of the university students have a lower attitude towards environmental challenges. This is especially tragic because these students do have the skills and tools to make a transition.

One of the recurring patterns is that the stronger the relation with the surrounding community, the higher the teachers score on attitude and the more passionate they are about more sustainable agriculture. As explained, the relation with the communities is very important for the schools. Education is not only obtained in school, education is an ongoing process and the collaboration

between schools and communities is one of major importance in Brazil. The relation between university and the government is strong, but the relation of lower education and the government is weak. As a result, the communities and schools have a dependency on each other. This dependency is also visible in the adaption of the schools to their own community and the challenges around them. Therefore, the knowledge of the environmental challenges is higher in these areas, they experience the consequences of these challenges, and adapt their education to it. Hence, a strong relation between the community has a positive effect on the knowledge and understanding of the environmental challenges, simply because they experience the consequences. Hence, the attitude towards tackling these challenges and participating in change is also higher.

On a university level this is reflected in both the motivation of the teachers and participants of UVAIA. The students who are aware of the necessity of change struggle with implementing this change at their family farms. One of the challenges is that this knowledge of environmental challenges and attitude is strong in the younger generation, not yet in the generation that is currently doing most of the farming. Eduardo Gaos (14) is one of the few students that increased the production of its family farm with agroecology in a matter that the family acknowledged an increase in their profits. Most students, even though they are motivated, do not get the opportunities at their family to make this transition visible. The same applies to the results obtained by UVAIA. The results are small, and barely visible. And they fade next to the conventional monocultures. Even though the MST led to changes in land distribution, this is still unequal. Even when small farmers work sustainable, big export companies do not, and therefore the results of the small farmers might be neglected.

8.2 Empowerment

However, during the fieldwork it became visible that there is a Western bias towards these results. The results may be small in the increase of production, and in their economic value. However, the results on the social aspects are big, and may be more important. In this research the word **transition** is used many times. It should be emphasized that a transition needs time. What comes forward in almost all interviews is that the participants are positive. They value the small changes they make. Casio (27) emphasizes that UVAIA does not only contribute to more sustainable agriculture, they contribute to the self-worth of the farmers. They encourage the farmers to see the value of their culture and the potential of their practices. Maria (43) explains how her community became closer and how she sees changes at her neighbours. Camilla (35) emphasizes the transition of the attitude of the community towards agroecology and the rural schools. She explains that she teaches a generation that will understand and counter the environmental challenges. Antonio (37) shows the

practices at the EFA and how his students implement this at home. Amanda (22) proudly presents the ecological quality mark while selling the products of her family at the ecological farmers market. Ivan (24) has not enough time to combine the visits to farmers who are interested in their ecological view with their agroecology projects at the faculty. The thing all these examples have in common is that they show a transition is already taking place. A transition moved by people who emphasize the value of social capital. These examples show that social capital gives empowerment to people. This research wants to state that this social capital is of great value. And that the **empowerment** is the keyword for generating change, regardless if this is on a smaller or bigger scale. So my conclusion in the end is that EE, interwoven as it is with social movement empowers people and motivates small farmers to a more sustainable agriculture, this despite all the obstacles EE encounters. And may be still more important, this process of empowerment is likely to grow in the nearby and distant future.

9. Reflection

In the following paragraphs this research reflects on itself. There are weak points and it is important to take this in consideration while reading this research. This indicates that the conclusions displayed are not correct. This chapter is also useful for further research on this topic.

9.1 Bias

The biggest weak point of qualitative research is that there is room for a bias. It is very common that the participants experience a social desirability bias where participants change their answers to some extent. This is explained in paragraph 3.3. Even though this research tries to counter the SDB by interweaving the questions in the in-depth interviews it cannot be assumed that this worked completely. There will always be errors because people tend to change their answers to a more desirable answer. Part of this research is people describing their own opinion about sustainable agriculture and since they knew this was the topic of my research, it is likely they anticipated the answer to my preferences. This is not only the case with participants, the interviewer can also contribute to the bias. It is possible that the interviewer is biased and therefore colors the answers according to what is expected. To minimize these errors multiple ways of research methods were at place. This can confirm or invalidate the answers given by the respondents. However, the results of this research and therefore conclusion should be taken with caution.

9.2 Representation

Another weaker point is the limited amount of cases studied. Five platforms were visited, and 28 respondents interviewed. These respondents were chosen through snowball sampling but they are not necessarily a good representation of the population. Neither are these platforms. They were

chosen on their relevance for this research but not necessary a good representation either. During reading and discussing other researchers in this area it became clear that other researchers encountered other types of farmers and participants. Where I mostly encountered poor farmers and schools that were struggling with money, the other researcher encountered mostly rich farmers. This confirms that this error has a high probability of occurring. For following research on this topic more participants should be interviewed and more cases should be evaluated.

9.3 Ethics

The ethical situation should always be taken in consideration. Ethics are the moral principles that govern a person's behavior or the conducting of an activity, and that differ between cultures (Maril, 2000). The Netherlands and Brazil have very different cultures and very different moral principals. This mostly turned out to work positive. In general the people in Porto Alegre have been very friendly. Where there is in the Netherlands a certain hierarchy between teacher and student, this is smaller in Brazil. In Brazil the relation is more informal. This is not only the case between teachers and students but with people in general. This also manifests itself in the willingness of people. People are all very eager to help, to meet with me and to show me around. The same counts for translators. Not many people in POA speak English, however, anybody who does, offered to help me with translating. As described most people are very friendly what made it easy for me to connect with them, but this resulted also in a more friendly relation instead of a researcher-respondent relation. This made that the researcher-respondent bridge was easier to "gap" and the answers are more honest, however, for research the researcher-respondent relation is one to preserve.

Another ethical aspect is due to the inequality in Brazil. This inequality is visible in living in POA but emphasized by visiting the schools in the more rural areas. Even though a lot of people try to accomplish change, this is made difficult due to financial situations. For me this placed me in an ethical situation that made me uncomfortable. I am not sure if the respondents felt the same way, but this might have changed the way how I approached the respondents. I did not experience any gender discrimination during my fieldwork, but one interview with an UVAIA member learned me that gender discrimination is still a problem. Even though I did not feel discriminated, I cannot rule out that some answers are biased because I am a women.

Finally, I encountered my "western" undervaluation for social capital. Going to visit the farm sides with UVAIA and taking research samples could have gone way faster. But we spent a lot of time chatting with the families, having lunch and chatting some more. In my opinion, this was unnecessary and time-consuming. However, Ivan explained that this was very important. These families often don't feel valued, and they feel not heard. When spending time with them, and actually listening

UVAIA is working towards a changing mindset of these families, and this change is of major importance.

10. References

- Altieri, M. A. (2018). *Agroecology: the science of sustainable agriculture*. CRC Press.
- Altieri, M. A., & Nicholls, C. I. (2017). Agroecology: a brief account of its origins and currents of thought in Latin America. *Agroecology and Sustainable Food Systems*, 41(3-4), 231-237.
- Barbosa, L. P. (2017). Educação do Campo [Education for and by the countryside] as a political project in the context of the struggle for land in Brazil. *The Journal of Peasant Studies*, 44(1), 118-143.
- Beddington, J. R., Asaduzzaman, M., Fernandez, A., Clark, M., Guillou, M., Jahn, M., ... & Scholes, R. (2011). Achieving food security in the face of climate change: Summary for policy makers from the Commission on Sustainable Agriculture and Climate Change.
- Boserup, E. (2017). *The conditions of agricultural growth: The economics of agrarian change under population pressure*. Routledge.
- Brace, I. (2018). *Questionnaire design: How to plan, structure and write survey material for effective market research*. Kogan Page Publishers.
- Brundtland, G., Khalid, M., Agnelli, S., Al-Athel, S., Chidzero, B., Fadika, L., ... & Singh, M. (1987). Our common future ('brundtland report').
- Bruneau, T. C. (2018). Democratic politics in Brazil advances in accountability mechanisms and regression in civil–military relations.
- Carleton-Hug, A., & Hug, J. W. (2010). Challenges and opportunities for evaluating environmental education programs. *Evaluation and program planning*, 33(2), 159-164.
- Coleman, J. S. (1958). Relational analysis: the study of social organizations with survey methods. *Human organization*, 17(4), 28.
- COOPER, G. (1992) The role of the outdoor and field studies centre in educating for education for the environment, *Environmental Education*, 39, pp. 5-7.
- Crusciol, C. A., Nascente, A. S., Borghi, E., Soratto, R. P., & Martins, P. O. (2015). Improving soil fertility and crop yield in a tropical region with palisadegrass cover crops. *Agronomy Journal*, 107(6)
- Damasceno, L. M., Pla, I., Chang, H. J., Cohen, L., Ritter, G., Old, L. J., & Batt, C. A. (2004). An optimized fermentation process for high-level production of a single-chain Fv antibody fragment in *Pichia pastoris*. *Protein expression and purification*, 37(1), 18-26.
- De Almeida, L. F., Sánchez, F. R., & Hallewell, L. (2000). The landless workers' movement and social struggles against neoliberalism. *Latin American Perspectives*, 27(5), 11-32.

- Diniz-Pereira, J. E. (2005). Teacher education for social transformation and its links to progressive social movements: The case of the Landless Workers Movement in Brazil. *Journal for Critical Education Policy Studies*, 3(2), 91-123.
- Evans, J. (1992). *Plantation forestry in the tropics: tree planting for industrial, social, environmental, and agroforestry purposes*. Oxford University Press.
- Flexor, G., & Grisa, C. (2016). Contention, ideas, and rules: the institutionalization of family farm policy in Brazil. *Canadian Journal of Latin American and Caribbean Studies/Revue canadienne des études latino-américaines et caraïbes*, 41(1), 23-37.
- Freire, P. (1968). *Pedagogy of the oppressed*. (M. Bergman Ramos, Trans.) New York: Herder & Herder. *Original work published*.
- Ghisleni, A. C., & Luce, M. B. (2016). Large-scale effects of national policy assessment on the political and pedagogical management of schools of Porto Alegre: Exploring relationships and uses. *education policy analysis archives*, 24, 71.
- Gruhn, P., Goletti, F., & Yudelman, M. (2000). *Integrated nutrient management, soil fertility, and sustainable agriculture: current issues and future challenges*. Intl Food Policy Res Inst.
- Hassanein, N. (1999). *Changing the way America farms: Knowledge and community in the sustainable agriculture movement* (Vol. 12). U of Nebraska Press.
- Hennink, M., Hutter, I., & Bailey, A. (2011). Participant recruitment. *Qualitative Research Methods*. London: Sage Publications Ltd, 81-107.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The journal of environmental education*, 21(3), 8-21.
- Kloppenborg, J. (1991). Social theory and the de/reconstruction of agricultural science: local knowledge for an alternative agriculture. *Rural sociology*, 56(4), 519-548.
- Kopnina, H. (2014). Revisiting education for sustainable development (ESD): Examining anthropocentric bias through the transition of environmental education to ESD. *Sustainable development*, 22(2), 73-83.
- Kopnina, H., & Meijers, F. (2014). Education for sustainable development (ESD) Exploring theoretical and practical challenges. *International Journal of Sustainability in Higher Education*, 15(2), 188-207.
- Leher, R., & Vittoria, P. (2015). Social movements and critical pedagogy in Brazil: From the origins of popular education to the proposal of a Permanent Forum. *Journal for Critical Education Policy Studies—JCEPS*, 13(3), 145-162.
- Lockie, S. (2006). Networks of Agri-Environmental Action: Temporality, Spatiality and Identity in Agricultural Environments. *Sociologia ruralis*, 46(1), 22-39.

- Maril, S. (2000). *Audit cultures: Anthropological studies in accountability, ethics, and the academy*. Psychology Press.
- Meek, D., Bradley, K., Ferguson, B., Hoey, L., Morales, H., Rosset, P., & Tarlau, R. (2017). Food sovereignty education across the Americas: multiple origins, converging movements. *Agriculture and Human Values*, 1-16.
- Moraes Sá, J. C., Lal, R., Cerri, C. C., Lorenz, K., Hungria, M., & de Faccio Carvalho, P. C. (2017). Low-carbon agriculture in South America to mitigate global climate change and advance food security. *Environment International*, 98, 102-112.
- Nehring, R., & McKay, B. (2013). *Scaling up local development initiatives: Brazil's food acquisition programme* (No. 106). Working Paper, International Policy Centre for Inclusive Growth.
- NUFFIC. (2012) Country Module: Brazil. Retrieved from: <http://www.nuffic.nl/en/diplomarecognition/country-modules/country-modules>
- Pires, G. F., Abrahão, G. M., Brumatti, L. M., Oliveira, L. J., Costa, M. H., Liddicoat, S., ... & Ladle, R. J. (2016). Increased climate risk in Brazilian double cropping agriculture systems: Implications for land use in Northern Brazil. *Agricultural and Forest Meteorology*, 228, 286-298.
- Ribeiro, Marlene. (2008). Pedagogia da alternância na educação rural/do campo: projetos em disputa. *Educação e Pesquisa*, 34(1), 27-45.
- Saldaña, J. (2015). *The coding manual for qualitative researchers*. Sage.
- Schneider, S., Shiki, S., & Belik, W. (2010). Rural development in Brazil: overcoming inequalities and building new markets. *Rivista di economia agraria*, 65(2), 225-259.
- Silva, F., Fulginiti, L., & Perrin, R. (2016, May). Trade-off between amazon forest and agriculture in Brazil—shadow price and their substitution estimative for 2006. In *2016 Annual Meeting, July 31-August 2, 2016, Boston, Massachusetts* (No. 235800). Agricultural and Economics Association.
- Snapp, S., & Pound, B. (Eds.). (2017). *Agricultural systems: agroecology and rural innovation for development: agroecology and rural innovation for development*. Academic Press.
- Suweis, S., Carr, J. A., Maritan, A., Rinaldo, A., & D'Odorico, P. (2015). Resilience and reactivity of global food security. *Proceedings of the National Academy of Sciences*, 201507366.
- Teixeira, E. S., de Lourdes Bernartt, M., & Trindade, G. A. (2008). Estudos sobre Pedagogia da Alternância no Brasil: revisão de literatura e perspectivas para a pesquisa. *Educação e Pesquisa*, 34(2), 227-242.
- Thrupp, L. A. (2000). Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture. *International affairs*, 76(2), 283-297.
- Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental education research*, 1(2), 195-212.

Van den Berg, H., & Jiggins, J. (2007). Investing in farmers—the impacts of farmer field schools in relation to integrated pest management. *World Development*, 35(4), 663-686.

Vilhena, P. (2018). Corruption: Brazil's Everlasting Parasite.

Appendix

Appendix A; In-depth interview Guide

Introduction and Consent:

The research that is being conducted aims to understand the current practices in the agricultural landscape and education in Rio Grande do Sul. My main interest is finding out the differences between communities and educational platforms. Therefore the same questions are asked to people of other communities, age, schools and professions related to agriculture. I am currently a student at Utrecht University in the Netherlands. This research will be used to develop my master thesis, in the field of International Development. Everything you tell me will be only used for writing this thesis. The questions I would like to ask you are related to agriculture, education, social structures and environmental questions. If you prefer to stay anonymous I can change your name. This protection can increase your comfort to answer the questions truthfully, as no repercussions should occur. The more truthful the answers, the more everyone involved will benefit. If you feel not comfortable with a certain question you have the option to abstain from answering, furthermore you can stop the interview anytime you want. If you are okay with everything that I have said, will you sign this consent form? In addition, would it be okay if I record this interview for the sake of being able to review your answers later?

Background Information;

Name

Age

Profession

Education

Opening questions

Can you tell me how you became this profession?

What motivated you?

Besides your profession, what is your role in relation to others?

What do you see as current important issues in Brazil?

Can you tell me the history of this school?

What is the education program in this school/ what are the courses you follow?

Key questions

Education

What do you see as the main goal of education?

Follow up; How is that related to you?

How is that related at the current educational platform?

What are short term goals and what are long term goals?

Follow up; How do you work towards those goals?

What are the local goals and broader goals?

Follow up; How do you work towards those goals?

Do you feel that the education is working towards its goals?

Follow up; can you explain why it does or does not?

What do you see as the main challenges, and opportunities of this educational platform?

Social relation questions

What are the partners you work with?

Follow up; Can you explain those relations?

Follow up; What are the challenges and opportunities in these relations?

What is the relationship with the communities?

Follow up; How is this displayed in the education?

Agricultural questions

What are the main agricultural practices in this area?

Follow up; Can you explain why?

What do you see as the role of agriculture in relation to Brazil?

What do you see as the role of agriculture in relation to education?

What is according to you the future of agriculture?

What do you see as challenges and opportunities?

Follow up; Can you explain these challenges and opportunities?

Environmental questions

Can you describe in your own words what environment means to you?

Do you feel aware of the environment around you?

Follow up; Can you describe how?

Follow up; If you would rate this awareness, 5 being the maximum zero being the minimum,
how would you rate yourself?

What is according to you the relation between agriculture and environment?

What do you see as the challenges and opportunities in this relation?

Follow up; Can you explain these challenges and opportunities?

Are there ways to optimize this relation?

Follow up; If so, can you explain these ways?

What is your view on environmental issues, local and global?

Do you know any environmental issues?

Follow up; If so, what issues ?

Follow up; Do you know how to counter these?

Follow up; Can you explain the possibilities?

How do you see your role in the environment, can you explain?

Follow up; If you see your role as important, explain how, and how you can involve this in your life?

Closing questions

What are your ambitions ?

Where do you see yourself in five years, and where in ten?

Where do you see Brazil in five years, and where in ten?

Is there anything you like to add?

Do you have any questions for me?

Appendix B; Focus group discussion Guide

Introduction and Consent:

The research that is being conducted aims to understand the current practices in the agricultural landscape and education in Rio Grande do Sul. My main interest is finding out the differences between communities and educational platforms. Therefore the same questions are asked to people of other communities, age, schools and professions related to agriculture. I am currently a student at Utrecht University in the Netherlands. This research will be used to develop my master thesis, in the field of International Development. Everything you tell me will be only used for writing this thesis. The questions I would like to ask you are related to agriculture, education, social structures and environmental questions. If you prefer to stay anonymous I can change your name. This protection can increase your comfort to answer the questions truthfully, as no repercussions should occur.

The more truthful the answers, the more everyone involved will benefit. I also encourage you to get involved in the discussion. Strong opinions are very welcome, as are out of the box ideas. Preferably they are supported with good arguments. If you feel not comfortable with a certain question you have the option to abstain from answering, and you can stop anytime you want. If you are okay with everything that I have said, will you sign this consent form? In addition, would it be okay if I record this interview for the sake of being able to review your answers later?

Can you explain who you are, and why you agreed to join this focus group discussion?

How are you related to each other?

Follow up; What interests do you share? What profession? Do you work together, and if so how? What do you expect from each other? What motivated you?

What do you see as the main goal of education?

Follow up; Do you feel like the current education is working towards this goal? How is this goal related to you?

What are according to you the main challenges, and opportunities for education in this area?

Follow up; Can you explain why and how to tackle the challenges and how to use the opportunities?

Do you feel education is influenced by non-educational actors?

Follow up; If so, what actors and how? Is this good thing? Maybe even good preparation for the work field? (This is biased to provoke the participant and counter SDB)

What is your role in the community you live in?

Follow up; What is the role of agriculture? and what of education?

What is according to you the relation between education and agriculture?

Follow up; What is the future of agriculture in Brazil? How is this on a bigger scale and how on a smaller scale?

What is according to you the relation between the environment and Brazil?

Follow up; What role does agriculture play here, and what role education?

What are according to you the main challenges, and opportunities for the environment?

Follow up; Can you explain why and how to tackle the challenges and how to use the opportunities? What is your role in these challenges and opportunities?

Is there something you want to add to this discussion, or something you feel strongly about?

Appendix C; List of in-depth interview participants

Name	Position	Education type	Profession	Age	Date of Interview
Carine	Resp. 1	Primary	Principal / Teacher	45	19-04-2017
Jorge	Resp. 2	Primary	Teacher	56	19-04-2017
Camilla	Resp. 3	Primary	Teacher	38	11-05-2017
Lucas	Resp. 4	Primary	Student	9	19-04-2017
Maria	Resp. 5	Primary	Student	9	11-05-2017
Otavio	Resp. 6	Primary	Student	6	11-05-2017
Antonio	Resp. 7	Vocational	Principal / Teacher	37	25-04-2017
Diego	Resp. 8	Vocational	Teacher	24	25-04-2017
Jonas	Resp. 9	Vocational	Teacher	29	25-04-2017
Adiar	Resp. 10	Vocational	Teacher	27	25-04-2017
Eduardo	Resp. 11	Vocational	Student	18	25-04-2017
Gabriella	Resp. 12	Vocational	Student	16	25-04-2017
Gomez	Resp. 13	Vocational	Student	18	25-04-2017
Fiona*	Resp. 14	UFRGS	Professor	38	23-03-2017
Carlos	Resp. 15	UFRGS	Professor	49	25-03-2017
Tatiana	Resp. 16	UFRGS	Professor	35	19-04-2017
Kadi	Resp. 17	UFRGS	Student	30	22-03-2017
Eduardo	Resp. 18	UFRGS	Student	29	05-04-2017
Casio	Resp. 19	UFRGS	Student	24	08-05-2017
Amelia	Resp. 20	UFRGS	Student	23	07-05-2017
Amanda	Resp. 21	UFRGS	Student	22	07-05-2017
Karlla*	Resp. 22	UFRGS	Student	27	10-05-2017
Casio	Resp. 23	UVAIA	Student	27	21-03-2017
Ivan	Resp. 24	UVAIA	Researcher	24	21-03-2017
Adriana*	Resp. 25	UVAIA	Student	28	11-05-2017
Thiago	Resp. 26	UVAIA	Post Graduate	33	11-05-2017
Maria	Resp. 27	UVAIA	Farmer	43	21-03-2017
Carlos	Resp. 28	UVAIA	Farmer	48	11-05-2017

(*name is changed for research)

Appendix D; List of focus group discussion participants

Name	Profession	Date of Focus group discussion
Pablo*	Teacher	25-04-2017
Lucas*	Teacher	25-04-2017
Filipe*	Teacher	25-05-2017
Nadia*	Student	25-04-2017
Elisa*	Student	25-04-2017
Marcus*	Student	25-04-2017

Name	Profession	Date of Focus group discussion
Chris*	UVAIA participant	03-04-2017
Elina*	UVAIA participant	03-04-2017
Nadia*	UVAIA participant	03-04-2017
Maria*	Farmer	03-04-2017
Clara*	Farmer	03-04-2017
Davi*	Farmer	03-04-2017
Carlos*	Farmer	03-04-2017
Raoul*	Farmer	03-04-2017

(*name is changed for research)

Appendix E. Codebook, from codes to category

Code	Category	Themes/Concepts
description environment	Awareness and sensitivity	Environmental Education
local issues		
local development		
Environmental encounters in daily life		
food production is family cantered		
Positive relation agriculture and environment	Knowledge & Understanding	
negative relation agriculture and environment		
local issues (environmental)		
global issues (environmental		
risks en possibilities agriculture		
definition of modernization	Attitudes	
feels need for change		
conventional education		
problem posing		
solution posing		
practice	Skills	
knowledge		
agroecology		
agroforestry		
research		
participant of a group	Participation	
small organic garden		
chosen profession		
small regional results		
social value		

Code	Category	Themes/Concepts
biggest economic value	Role	Agriculture
food production		
income small family		
social value		
historic value		
agroforestry	Agroecology	
different crops		
soil diversity		
small production		
labour intensive		

monocultures	Conventional Agriculture	
big economic value / export		
focus in higher education		
easier		
green revolution	Modernization	
agrotoxics		
modernization is the future		

Code	Category	Themes/Concepts
rural primary schools	Education Platforms	Rural Education
EFA's		
University		
UVAIA		
preparing for farm life	Goal	
personal development		
stay of youth in area		
increase personal value		
intellectual development		
differs per platform		
research		
preparing for urban life		

Code	Category	Themes/Concepts
local issues	Community	Social Influences
food production is family cantered		
quality of life		
connection community & schools		
(difficulty with) autonomy		
federal university	Governmental Actors	
financial input		
research		
economic value		
USA input		

political influence in agribusiness		
food production is family cantered	Family	
pedagogy of alternation		
financial input	Sponsors	
sponsors		
Research		
monocultures		

Code	Category	Themes/Concepts
rural vs. urban value	Social Value	Empowerment
value youth		
value rural work		
room for discussion		
grow of network		
connection		
connection community	Challenges & Opportunities	
maintaining autonomy		
governmental neglect		
commitment		
pedagogy of alternation	Freire	
theory of the oppressed		
MST/land distribution		
focus on development person		
long term goals	Transition	
afraid for change		
next generation		
focus on youth		