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Abstract

Title: Mathematics in kindergartens: learning or playing?
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This thesis contains a cross-cultural study in which early childhood education in Flanders (Belgium) and Norway was compared. The main aim of the thesis was to reveal the differences in focus for an activity on numeracy between kindergarten teachers in a social-oriented approach (Norway) versus a preschool-oriented approach (Flanders). Two kindergarten teachers in each country were observed during an activity with focus on numeracy and interviewed. In the interview, their own activity was discussed. Furthermore, the videotaped activity of the other country was viewed and discussed. The activities were compared and the reactions of the kindergarten teachers on the other country's way to offer activities on numeracy were analyzed. The results show that Flemish kindergarten teachers see mathematics mainly in *adult-initiated activities* and they describe mathematics as '*learning'*. The Norwegian kindergarten teachers see mathematics in everyday situations, where both *child-initiated* and *adult-initiated activities* take place, and they consider mathematics as '*playing'*. There is also a difference in the instructional styles. The Flemish kindergarten teachers show signs of both a *content-focused style with an emphasis on performance* and of a *classroom-focused style.* Their focus is mainly on the performance of the children. The Norwegian kindergarten teachers mainly display a *learner-focused style*, where the focus lies on the motivation of the children.

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Karen Leclercq

Stavanger, May 2010

Contents

1. Introduction

In the first chapter of this thesis, I will explain the background and reasons for this study. I will also show the relevance and I will present the research questions.

1.1 Background

Every year, the European Commission of Education and Training gives more than 180,000 students the chance to experience a student exchange program called ‘Erasmus’ (European Commission of Education and Training, 2009). Also companies frequently offer their staff a study trip to or even staff exchanges with other countries. All these people go abroad and participate in a culture, more or less different from their own. How do these people experience the culture in their host country? Does it change their views? How do they look back onto their own educational work compared to this other way of doing the same job?

In 2007, I was an exchange student from Belgium and came to Norway to study comparative educational studies. We were about 30 teacher students from 10 countries. It seemed that most of us took our own educational work for granted and were surprised by the different ways of education. Most of us were very unfamiliar with the Norwegian culture and I decided to stay and discover the culture a little bit more. After living in Norway for three years now and having worked in two Norwegian kindergartens, I am beginning to understand and appreciate the policy of Norwegian kindergartens. The confrontation with this other culture also gave me a different look, both positive and negative, on the Belgian and more specifically on the Flemish tradition.

This experience inspired me for the choice of the topic of this master thesis: a comparative study between Norwegian and Flemish kindergarten teachers with regard to mathematics. I look into the views on learning of number concepts and how it differs in a social-oriented versus a preschool-oriented approach. Furthermore I focus on the differences between the activities in the two approaches. This is off course a small sample, two observed kindergarten teachers in each country, but it can show some specific characteristics for these two countries related to number concepts. In this way, I looked into how different cultures facilitate in different ways for the same intention.

I also observed how kindergarten teachers from Flanders and Norway conceive activities from the other country. Although it can not be compared with an exchange program, even looking at a short activity and reflecting about it can open a person's mind for another culture.

1.2 Relevance of the thesis

There is a lot of research on mathematical beliefs (see Philipp, 2007, for an overview). There have been studies on mathematical beliefs of both students and teachers, but Philipp's focus on research concerns teachers' beliefs only. The research presented by Philipp dealt with teachers' mathematical beliefs, mostly with primary and secondary teachers, but in the latest years also with preschool teachers. I will discuss a selected number of research programs on this topic in the 'Theory and research' chapter of this thesis (chapter 3). Regarding cross-cultural studies with focus on mathematics, also a lot of research has been performed. But here as well, there is a stronger focus on primary and secondary teachers rather than on kindergarten teachers (Bryan, Wang, Perry, Wong & Cai, 2007; Jacobs & Morita, 2002).

Saracho and Spodek (2008) are the editors of '*Contemporary perspectives on mathematics in early childhood education'*. They argue that mathematics education can develop children's mathematical knowledge if it is initiated in the early years. Since the number of children enrolled in early childhood education is increasing, these children can profit from a pedagogical environment that can provide other stimuli than they would get at home. A high-quality mathematics education for young children begins with a set of standards for early childhood. These are based on the knowledge of young children's mathematical understanding, which includes acting, thinking, and learning. These guidelines need to be flexible to consider the children's individual needs. But how do different kindergarten teachers interpret a high-quality mathematics education? All kindergarten teachers aim to provide high-quality but this view of high-quality can differ from adult to adult, kindergarten to kindergarten and, obviously, from country to country. Saracho and Spodek (2008) describe this as follows: the youngest children can develop their mathematical knowledge in an environment that is rich in quantitative experiences. Thus, when their thinking is stimulated, uniqueness is valued, and exploration is encouraged. They also state that the young children's mathematics experiences need to be related to their everyday life, because their daily experiences, interests, and questions strengthen their learning process. As I will show later in this thesis, this can be understood in different ways. Both kindergarten teachers in Norway

and Flanders say that they teach the children mathematics through play, but compared to each other, their understanding of 'through play' is remarkably different.

In both Norway and Flanders, the focus on mathematics in kindergartens is increasing. In Norway, the national curriculum framework (Ministry of Education and Research, 2006) has 'antall, rom og form' (number, space and shape) as a focus area. In 2008, the Norwegian Ministry of Education and Research published a 'temahefte om antall, rom og form' for kindergartens (Reikerås, 2008). Furthermore, there are journals for mathematic teachers, for example '*Tangenten'*. In Flanders, there is a specific framework for mathematics (*Wiskunde: leerplan*, 2002) for both kindergartens and primary schools. This publication is an elaboration of the focus area on mathematics, as described in the Framework for the Catholic kindergarten (Vlaams Verbond van het Katholiek Basisonderwijs, 2002).

My study offers a description of the similarities and differences between two different countries. It is a cross-cultural study and it can start a discussion on how we can learn from one another. Sheridan & Schuster (2001) argue that we have to make various pedagogical processes visible in early childhood education in order to reflect, critically analyze and improve. Bø (2002) argues that an international perspective should be included in the education for kindergarten teachers. She says that knowledge on similarities and differences of cultures can give teachers in early childhood education a better understanding of both their own and other countries' situations. She also mentions that this will become increasingly important because the kindergartens are getting more and more multicultural. Understanding and interest in other cultures can help them when they meet people, both adults and children, from other countries.

1.3 Research questions

For this thesis, I have performed a cross-cultural study between Flanders and Norway. I asked kindergarten teachers in both countries to show an activity with focus on the development of number concepts. These activities were videotaped and used afterwards in the interviews. The main research question is:

- What are the differences in focus for an activity on numeracy between kindergartens in a social-oriented versus a preschool-oriented approach?

Sub-questions are:

- How do the activities on numeracy differ in these different approaches?
- How do the kindergarten teachers react when confronted with another way to offer activities on numeracy?

1.4 Overview of the thesis

In chapter 2, a description of the observed kindergartens in Flanders and Norway is presented and different approaches to early childcare are explained. In chapter 3, theory on the teaching of mathematics and on conceptions is presented. Also cross-cultural studies are dealt with. Chapter 4 is a methodology chapter, where I explain the choices made in the presented study. The observed activities and the interviews are presented, analyzed and discussed in chapter 5. This is followed by the discussion in chapter 6. The last chapter is the summary and conclusion.

2. Approaches to early childcare

I will first describe some of the differences in early childcare education between Flanders and Norway. I start with a look at some descriptions of the Organisation for Economic Co-operation and Development (OECD), and afterwards I describe the policy of the kindergartens and the framework of both countries.

2.1 Different traditions in early childcare

The OECD describes two traditions in the report '*Starting Strong II, early childhood education and care*' (OECD, 2006). The OECD describes these approaches as a social pedagogy tradition and as a 'readiness for school' or pre-primary tradition.

- The social pedagogy tradition sees a kindergarten as a specific institution aimed to support the broad developmental needs of young children. This tradition uses a broad concept of pedagogy, combining care, upbringing and learning. This approach is common in Nordic and central European countries.
- The pre-primary tradition to early education sees a kindergarten as an institution providing children with 'readiness for school' skills. This approach can be found in many countries, including Australia, Belgium, Canada, France, Ireland, the Netherlands, the United Kingdom and the United States. Here, we can often find program standards which indicate what children should know and should be able to do after participating in preschool programs.

The OECD does not want to make a too sharp contrast between these two traditions, but describes them as different curricular emphases, one merging into the other as part of the same continuum. This means that there are a lot of different traditions in early childcare education, not just the two extreme traditions, but also many different intermediate ways to combine these traditions (Figure 1).

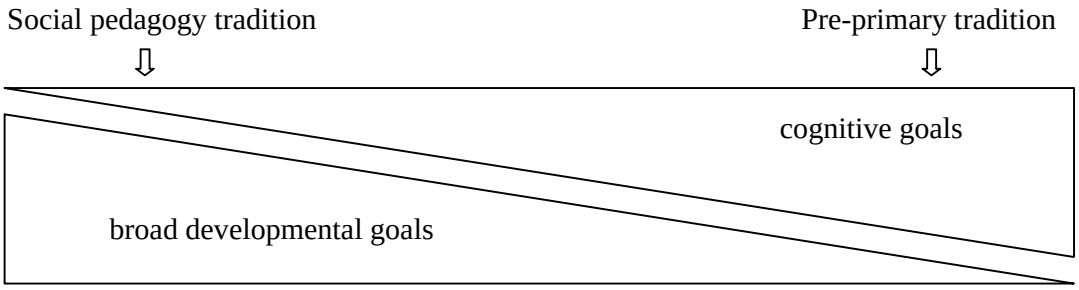

Figure 1. Balance between the social pedagogy tradition and the pre-primary tradition, based on the OECD, 2006, p. 63.

This figure explains how the social pedagogy and pre-primary tradition are the two extremes where all kinds of intermediate combinations are possible.

Norway can be found in the social pedagogy tradition with the focus on broad developmental goals, while Flanders can be found in the pre-primary tradition with focus on cognitive goals. As they are situated in different traditions, the outcomes of the observations and interviews of this thesis can be expected to be diverse.

2.2 Early childhood education in Belgium

In Belgium, supervision and responsibilities for education, welfare and culture have been given to the Flemish and Wallonian communities. The Program for International Student Assessment (PISA) shows significant differences between the 2 communities. The PISA study of 2003 compared the results of the Flemish and Wallonian communities with 40 countries from 5 continents (De Meyer, I., Pauly, J. & Van de Poele, L., 2005). More than 250.000 fifteen-year old students participated in this study. For mathematical literacy, Flanders had the best score of all participating countries and communities. Wallonia only made a 24th place. This can also be observed in the other areas, as indicated in table 1. The scores are always better for Flanders, which might indicate a better learning environment. Therefore, Flanders will show more interesting results when compared to Norway.

Table 1. The ranking of the level of education in Flanders and Wallonia based on PISA, 2003
The results of the two Belgian communities in several areas are compared with 40 countries and ranked.

	Flanders	Wallonia
Mathematical literacy	1	24
Scientific literacy	5	32
Problem solving	4	24
Reading literacy	3	31

Belgium has a long history of a split system between education and care. From the very origins of day care, in the second half of the 19th century, the care sector for infants and toddlers evolved quite separately from the education in kindergartens. Nowadays, childcare for children below 3 years of age is under the competence of the Flemish Ministry of Welfare, while children from 3 years on are enrolled in a kindergarten (kleuterschool) as part of the educational system controlled by the Flemish Ministry of Education (Karlson Lohmander, Vandenbroeck, Pirard, Peeters & Alvestad, 2009).

In a Flemish kindergarten, the mean child/staff ratio is 18:1 in theory. However, in practice, most kindergarten classes have a 25:1 child/staff ratio (OECD, 2006). By working with larger groups, the schools have the possibility to hire extra staff, often used for language-support. The classes often work with projects or themes that last for 1 or 2 weeks. In these projects, all the areas of the national curriculum framework are involved. These areas are further explained in 'The Flemish framework' (chapter 2.3). This means that each area often has a predetermined hour in the week schedule; there is a time for language, for mathematics, for arts and crafts, and so on.

All this is also reflected in the '*Framework plan for the Catholic kindergarten'* (Vlaams Verbond van het Katholiek Basisonderwijs, 2002). The development of children is described as a development on eleven different areas as described in chapter 2.3. The framework is very clear on this theoretical separation and recommends the use of the different areas combined in activities. Each of the 11 areas of development has its own curriculum, where goals and areas of development are described in detail.

2.3 The Flemish framework

As explained in the introduction, the different communities in Belgium have their own Ministry for Education. But furthermore, there is also a separation between privately owned and public kindergartens. The majority of the kindergartens are privately owned and most of them are Catholic kindergartens (64% of the kindergartens according to OECD, 2006). They have their own framework called '*Framework for the Catholic kindergarten'* (Vlaams Verbond van het Katholiek Basisonderwijs, 2002). The two Flemish kindergarten teachers who I observed and interviewed, follow this framework.

The main task for kindergarten teachers in a Catholic kindergarten is to offer children chances for development as a holistic person. By dividing this holistic person in 11 areas of development, the framework aims to get a better view on all these areas. This also helps them to survey if all the areas of development are equally represented in the daily life in a kindergarten.

The main area is positive attitude, which is indicated in the middle of the circle of figure 2. Ten areas surround the positive attitude: emotional, social, moral, religious and expressive development, and development of motor skills, senses, logic thinking, language and independency.

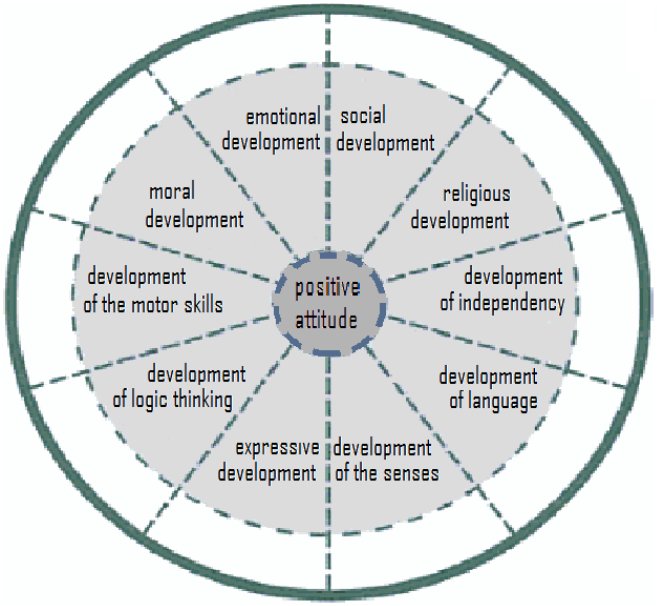

Figure 2. The 11 areas of development in the Framework for the Catholic kindergarten (Vlaams Verbond van het Katholiek Basisonderwijs, 2002, p.21), translated by the author.
This figure shows the main value 'positive attitude' and the ten additional areas of the framework.

Although the framework divides development in 11 areas, it also stresses that this is a theoretical separation and that these different areas are interwoven in educational work.

Figure 3 builds upon figure 2 and takes it to a higher level. It indicates the three layers of the child. The core of the scheme is the main value: positive attitude. This is the first layer and a prerequisite for the children to have motivation, curiosity and energy to learn. With this attitude, children can achieve basic qualities: basic insight, skills and attitudes. This is the second layer. In the third layer, we find specific knowledge and skills that the children have obtained.

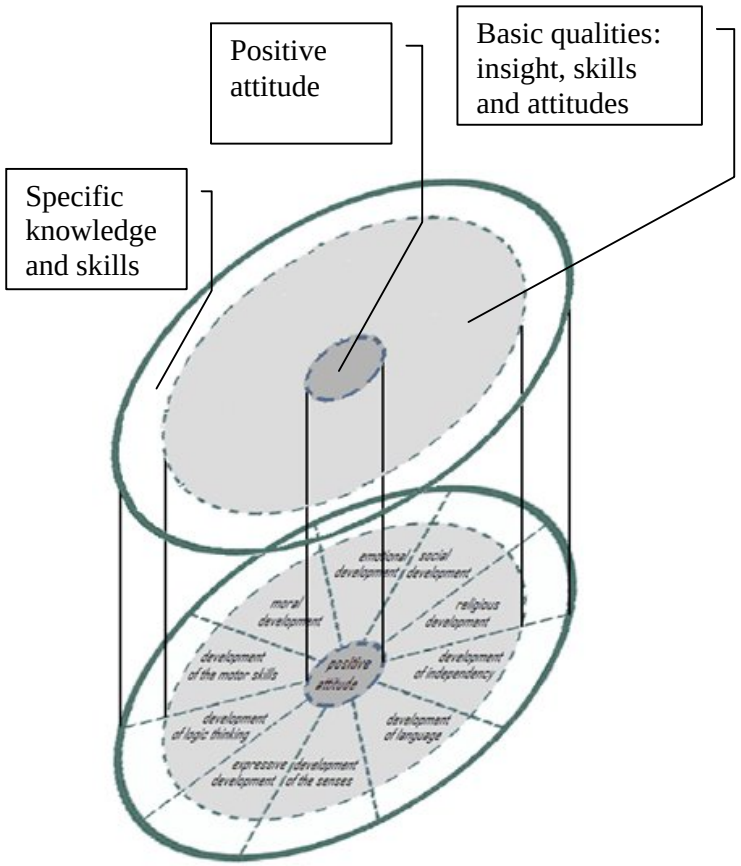

Figure 3. The three layers of the child (Vlaams Verbond van het Katholiek Basisonderwijs, 2002, p.23), translated by the author.

T*his figure builds further on figure 2 and shows the three layers of the child, with different aspects of development.*

If the kindergarten teachers can support the children in all these 3 layers, and on all 11 areas of development, a comprehensive and broad development is offered. To help kindergarten teachers, the eleven areas of development are even more detailed in 85 different aspects of development. Although mathematics is present in several aspects, the 4 specific aspects are situated in the area of logical thinking: acquisition of knowledge on area, time, numbers and measurement.

2.4 Early childhood education in Norway

The OECD describes the early childhood education system as an integrated system of services for all children between the ages of 0 and 5 years, with a well established and extensive system of publicly funded kindergartens and having high quality standards (OECD, 2006). Since 2005, the Ministry of Education and Research has responsibility for kindergartens in

Norway. In 2006, the Ministry published the '*Framework Plan for the Content and Tasks of Kindergartens'* (Ministry of Education and Research, 2006). According to this framework, the social mandate of kindergartens is to provide children with good opportunities for development and activity in close understanding and collaboration with the parents. This means that they take care of the children's needs for care, play, learning and development. Furthermore, democracy and equality are stressed as core values (Karlson Lohmander et al., 2009).

In Norwegian kindergartens, the mean child/staff ratio is 3:1 for children between the ages of 0 and 3 years, and 6:1 for children between the ages of 3 and 5 years. There has to be 1 qualified preschool teacher per 9 children under the age of 3 and per 18 children over the age of 3. The other staff members are assistants, who have no requirement for formal qualification (OECD, 2006, p. 397).

2.5 The Norwegian framework

The Norwegian framework gives the kindergartens a social mandate, where kindergartens shall provide preschool children with an environment that offers challenges appropriate to the age and functional level of the children, as well as protection from physical and psychological harm. Kindergartens also have to give children the opportunities to participate actively in a peer group. The framework gives the kindergarten a responsibility towards the health and social equality of all children. Kindergartens have a responsibility in the society for early prevention of discrimination and bullying. Kindergartens shall take a holistic view of care, upbringing, play, learning, and social and linguistic skills. The framework specifies several learning areas, as indicated in table 2. Goals are put forward for the children, as well as guidelines for the staff, to ensure that the kindergarten works towards these goals.

Table 2: The learning areas of the Norwegian framework

- communication, language and text
- body, movement and health
- art, culture and creativity
- nature, environment and technology
- ethics, religion and philosophy
- local community and society
- numbers, spaces and shapes

2.6 Mathematics in the Flemish and Norwegian frameworks

Both the Ministry in Flanders and in Norway have published a detailed description of how to work with mathematics in kindergartens. In Flanders this is called '*Wiskunde: leerplan*' (Vlaams Verbond van het Katholiek Basisonderwijs, 2002) and in Norway '*Temahefte om antall, rom og form'* (Reikerås, 2008). Both publications address several aspects of mathematics in a kindergarten, but I will only discuss their chapters on numeracy.

- In the Flemish publication, this chapter contains 5 pages with goals, also indicating at what age children should master each goal. For example, the use of the words 'little/many, too little/too many, more/less' should start at the age of 3. The use of 'is more than, is less than, is equal, is not equal' should start at the age of 4. 3-year old children should be able to count till 5, while 4-year old children should count till 10. 5-year old children have to be able to recognize a quantity of 5 objects without counting. This confirms that Flemish kindergartens belong to the preschool tradition, based on the goal-oriented framework.
- The Norwegian publication has 4 pages related to numeracy. With the use of examples, it describes how children use numbers and counting in their everyday life. The chapter concludes with some questions and assignments for the staff of the kindergarten. For example, choose one child and find out how he or she uses numeracy in a day in the kindergarten. Discuss this child and his skills in numeracy. Which challenges do you have to become even better and aware of stimulating children's development in numeracy? This Norwegian publication confirms the social-pedagogic tradition in which I categorized the Norwegian kindergartens.

2.7 Summary

The OECD (2006) describes the social pedagogy tradition as an institution with focus on the broad developmental needs of young children, whereas the pre-primary tradition aims for 'readiness for school' skills.

It is clear that the Flemish kindergartens are part of the pre-primary tradition. They are skill-orientated and work with a programme with fixed developmental goals. Although children do not have to reach all developmental goals to go to the next grade, kindergarten teachers have to prove that they have supported all children on their way to achieve all goals. This might be why the Flemish framework is so detailed, with descriptions of 11 areas of development,

subdivided in 85 different aspects. Kindergarten teachers use these descriptions in the preparation of activities.

In contrast, the Norwegian kindergartens focus on the social pedagogy tradition. This is also reflected in the Norwegian framework. It shows a holistic view of care, upbringing, play, learning, and social and linguistic skills. It also has learning areas, but the descriptions are not as specific and goal-orientated as in Flanders. The Norwegian version gives room for interpretation. The staff of Norwegian kindergartens is expected to discuss the framework and to question how they will translate these descriptions into practice.

When we look at the publications concerning mathematics, the differences are clear. The Flemish publication is result-orientated with goals for each aspect of mathematics and an indication of the correct age to master these goals. The Norwegian publication uses examples to demonstrate how children use mathematics and challenges the staff to reflect on how they can improve their educational work.

3. Theory and research

In this chapter, I present several parts of theory and research. First of all, the focus of the observed activities in this thesis is on numeracy. Therefore, the first part of this chapter focuses on mathematics and on what is needed for mathematics according to researchers. The second part deals with conceptions and instructional styles, since this is an important aspect of the analysis of my results. Comparative studies are presented in the last part.

3.1 Learning of mathematics

There is no final answer as to how kindergarten teachers should support children in the development of mathematical skills, but research can give us recommendations to a better practice. Baroody, Lai and Mix (2006) identified several approaches to teaching. They categorized them into direct instruction, guided discovery learning, flexible guided discovery learning, and unguided discovery learning. The direct instruction approach has been used most often in schools. However, it does not engage the children and it is not the most effective approach. In contrast, an unguided discovery learning approach will engage learning. In many ways it reflects a child-centered education, but it is a hit-or-miss approach and it is uncertain that children will achieve all that they can. What seems to be most effective and most engaging are the guided and flexible guided discovery approaches. Here, careful observation of the children by their teachers can lead to a developmentally appropriate and interesting educational game.

Ginsburg and Ertle (2008) have stated this in another way: mathematics education at this age (3- to 6-year old children) should be used in at least two forms. The first form is familiar to and comfortable for many early childhood educators: teachers should use teachable moments arising in children's everyday play (like building towers of different heights) and in other activities (like lining up or distributing snacks) to introduce or expand upon mathematical ideas. The second form is controversial: early childhood educators should employ an intentional curriculum that deliberately sequences the teaching of mathematical ideas in what is thought to be a coherent and developmentally appropriate manner. Furthermore, Ginsburg and Ertle stress the importance of knowledge and understanding of the basic ideas before being able to explain and teach them to the children. The first form is something we can relate to the guided discovery approaches of Baroody, Lai and Mix (2006). By observation of the

children's games, conversations and actions, the kindergarten teachers can see those teachable moments that Ginsburg and Ertle speak of.

Anderson, Anderson and Thauberger (2008) stress the same concept as Ginsburg and Ertle (2008), which is using teachable moments arising in children's everyday play. During observation of preschoolers engaged in free play, they found that 44% of the free play involves mathematical activity. They support the idea of Clements, Sarama and DiBiase (2004) to create learning conditions that begin with children's experiences and then support the use of their reasoning capacities to build conceptual knowledge. Engaging children in play provides informal experiences from which mathematics learning can emerge. Certain games can encourage the development of flexible thinking about mathematics. During play, children learn comparison, estimation, patterns, symmetry and spatial relations. Another idea is to pose problems and then assist children in discovering strategies to solve them.

Tudge, Li and Stanley (2008) stress the importance of adults. They studied children during story time, adult-led activity, free play and at mealtime and looked for literacy and numeracy events. They found that such events are far more likely to occur when the children are in the company of an adult than with peers, and occur more frequently during story time and adult-led activities than during free play or mealtime. An interesting finding is that numeracy is more likely to occur during the course of literacy than alone. They conclude that although there is a large amount of materials relevant to numeracy, the relatively low proportion of numeracy events without any adult interaction demonstrates the dependence on adults of such young children for literacy and numeracy experience. First of all, this stresses again the importance of the adult who observes the children and helps them to discover the world. In addition, the paper of Tudge and colleagues points out the connections between several areas of development and indicates that these areas can not be considered as separate areas but as an interwoven mosaic.

Seo and Ginsburg (2004) obtained additional results while studying how often children engage in a mathematical activity during free play. Young children use a significant amount of various types of mathematical activity, such as patterns, shapes, comparison of magnitudes and enumeration. Less frequently, they explore dynamic changes, and classify and examine spatial relations. Seo and Ginsburg conclude that the mathematics of children under the age of 6 is more advanced and powerful than is often realized. They argue that we should revise

views about what is developmentally appropriate. Kindergarten teachers can use children's spontaneous interest as a starting point to engage in diverse and challenging mathematical activities.

Clements (2004) also points out the importance of treating mathematics as connected to other areas of development. 'Connections – between topics, between mathematics and other subjects, and between mathematics and everyday life – should permeate children's mathematical experiences' (p. 57). He also argues that general mathematical processes, such as problem solving, reasoning, connections and representation, and specific mathematical processes, such as patterning and composing, should be involved in a high-quality early childhood education. Kindergarten teachers help children to develop knowledge throughout the day, building upon their play and the natural relationship between learning and life in their daily activities, interests and questions. Clements recommends teachers to find frequent opportunities to help children reflect on and extend the mathematics that arises in their everyday activities, conversations and play, as well as structuring environments that support such activities. Teachers should be proactive as well in introducing mathematical concepts, methods and vocabulary.

Bredekamp (2004) shows us the possible advantages and disadvantages of having goals or standards for young children. This is something we can find in Belgium, where each area of development has its own set of standards. However, because of the fact that children develop at individually different rates, a major concern is that a particular set of age-related goals can never be applied to all children. A second concern is that specifying learning outcomes might limit the curriculum to those outcomes and would also lead to inappropriate teaching of narrowly defined skills. Both of these concerns are based on the same assumption: that the standards will be the wrong goals. But if this could be confronted and changed, this could be turned into an advantage. Teachers need guidance about what are appropriate expectations for children's learning. If these goals are achievable, challenging and developmentally appropriate, it could be a valuable and useful framework to plan and to individualize teaching. A disadvantage that Bredekamp does not mention, is the possibility that these goals are used as a check list for the development of children, where only their academic skills are taken into consideration, and not their social and creative skills, imagination, sense for exploration and investigation, and so on.

3.2 Conceptions of learning

What are conceptions and is it possible to change someone's conceptions? Philipp (2007, p. 259) gives the following description: "A conception is a general notion or mental structure encompassing beliefs, meanings, concepts, propositions, rules, mental images and preferences". Beliefs are described by Philipp as "psychologically held understandings, premises or propositions about the world that are thought to be true. Beliefs might be thought of as lenses that affect one's view of some aspects of the world".

Philipp (2007) makes a distinction between beliefs and knowledge, the former being a conviction and the latter being consensual. Within these conceptions, he highlights 4 views or instructional styles:

- learner-focused
- content-focused with an emphasis on conceptual understanding
- content-focused with an emphasis on performance
- classroom-focused

References to the two outer limits are traced back to 1895, and ultimately to Rousseau. Grove (2006) uses classroom observations to reveal patterns of collective behavior of the group in a classroom and, in turn, to provide advice to teachers from other cultures. In the classroom-focused style, the teacher delivers challenging learning content. In a learner-focused style, the teacher facilitates a motivating learning process. A central preoccupation of the learner-focused style is the motivation of the learner or student to learn; this concern is absent from the classroom-focused style. Another indicator of the learner-focused style is when the learners are asked to evaluate the teacher's performance; this is almost unknown in the classroom-focused style. Important aspects of the classroom-focused style are that a learner's academic success is thought to depend on his effort, that learners are 'receptive' to the learning content, and that they attempt to master all the content. Aspects of the learner-focused style are that the learner's success is thought to depend on his aptitude or natural ability, that learners are 'reluctant' towards the learning content, and that they are motivated to acquire as much content as possible. The terms 'receptive' and 'reluctant' refer to the presence or absence in each style of the preoccupation with the learners' motivation to learn. But what happens when a student fails to learn? In a learner-focused style, the methods of the teachers are revised, leading to interminable efforts to devise ways and means of making it

more likely that learners will be effortlessly able and be positively motivated to acquire the learning content. In a classroom-focused style, this does not happen and the failure is ascribed to the student himself.

Grove (2006) reveals another important difference between the two styles, i.e. in their typical sequence of learning activities. In the classroom-focused style, a lengthy private opportunity to attain content mastery precedes public demonstration. In the learner-focused style, public trial-and-error demonstration often precedes any private opportunity for content acquisition.

According to van der Sandt (2007), a content-focused style with an emphasis on conceptual understanding is driven by the content itself. Content is the focus in the activity and the students' understanding of ideas and processes is stressed. A content-focused style with an emphasis on performance has a focus on the use of an exact mathematical language. Here, the rules are basic building blocks. Correct answers and solved problems show knowledge of mathematics. Furthermore, it is not necessary to understand the source or reason for student errors as further instruction will result in appropriate learning.

But is it possible to change conceptions? Pajares (1992) states that to change behavior, one must first change one's beliefs, because beliefs act as filters that affect what one sees. Both Guskey and von Glasersfeld (as cited in Philipp, 2007) say that 'significant change in teachers' belief and attitudes is likely to take place only after changes in student learning outcomes are evidenced'. von Glasersfeld states that teachers who make a serious effort to apply some of a constructivist methodology, become interested after five or six weeks. This makes it possible to change conception, but how do you start? Studies were performed where teachers were shown new and different models of teaching, but this did not seem to be effective (Grant, Hiebert & Wearne, 1998). It was concluded that observations combined with other activities designed to support their reflecting upon the experience are more likely to lead to a change. This was a confirmation of previous research where teachers either ignored the new ideas or inappropriately fit the ideas into their existing practices (Borko, Mayfield, Marion, Flexer & Cumbo, as cited in Philipp, 2007). Cooney, Shealy and Arvold (1998) have pointed out another important aspect. In their studies, they present 2 teacher students who hold the same beliefs at the start of the study. During the study, the students are in similar environments but only one of them changes beliefs. Cooney and colleagues concluded that this student was open to the other's perspectives and enjoyed the exchange of diverse

opinions, whereas the other student held on to his own opinions and felt frustrated when these were challenged. The former had a reflective attitude, which gave him the possibility to reformulate his beliefs when confronting small differences.

3.3 Cross-cultural studies

An example of cross-cultural studies is PISA, where countries assess their students' skills in reading, mathematics and science literacy. The first PISA study was performed in 2000 with 43 countries participating, the second in 2003 with 41 countries, which became 57 participating countries in 2006. The fourth study was performed in 2009 in 67 countries. This shows the growing interest in cross-cultural studies and in a form of globalization with transnational circulation of ideas and studies. The OECD stresses the importance of these kinds of exchanges, both in *Starting Strong* (2001) and *Starting Strong II* (2006). The OECD asks for systematical attention to monitoring and data collection. There is a need for information on early childhood education within a given country, as well as across countries (OECD, 2001).

Cross-cultural studies can be done in several ways, for example by using questionnaires, interviews, videotaped observations or a standardized scheme. The latter was used by Sheridan (2001) and Sheridan and Schuster (2001). They used the Early Childhood Environment Rating Scale (ECERS) in studies performed in Sweden and Germany. The ECERS has 37 items and each has a seven-point scale. This is used during one full day observation. One team of three researchers from Sweden and one team of three researchers from Germany visited 10 kindergartens in both Sweden and Germany. All the researchers used the ECERS and, in addition, they wrote down the rationales for their scoring. In this way, they scored kindergartens in their own country as well as in the other country.
This is off course a much more extensive study than I performed for this master thesis. The use of such a test and scoring might give a more objective image compared to only using descriptions. However, Sheridan and Schuster also say that it is not always obvious how to interpret a score: how does a score of 4,5 out of 7 differ from a score of 4,7 out of 7? This is why writing down the rationales for giving a particular score is very important. With the help of the explanations for the scoring, one can analyze and learn from the differences.

Another possibility is the use of videotaped observations, like for example performed by Jacobs and Morita (2002). They have based their study on the premise that teachers' opinions can be activated through the process of criticizing an actual classroom lesson captured on videotape. By comparing their own criteria for good instruction to what they see in the videotaped lesson, teachers should be able to produce judgments about the lesson that reflect the topics of the interview.

Cross-cultural studies can also be based on interviews. Bryan and colleagues (2007) have performed research on the teachers' views on effective mathematics teaching and learning in Australia, mainland China, Hong Kong and the United States. In the analysis of the interviews, their study is presented in three categories, with topics as how to learn mathematics, how to teach mathematics. Each category shows some of the answers of the teachers in each country. They show examples from their interviews to illustrate different opinions and the answers can be compared.

3.4 Summary

Researchers seem to agree that children are capable of age-appropriate mathematics. The question is: what is high-quality mathematic education? Ginsburg and Ertle (2008) argue for the use of mathematics in teachable moments arising in children's everyday play and for an intentional curriculum that deliberately sequences the teaching of mathematical ideas in what is thought to be a coherent and developmentally appropriate manner. The idea of using children's play is supported by Anderson, Anderson and Thauberger (2008). Tudge and colleagues (2008) argue that these teachable moments do not happen if the adult does not join the play, since mathematics does not happen that often when the adult is not a part of the game. Clements (2004) recommends teachers to find frequent opportunities to help children to reflect on and to extend the mathematics that arises in their everyday activities, conversations and play, as well as structuring environments that support such activities. Teachers should be proactive as well in introducing mathematical concepts, methods and vocabulary. It is therefore still a matter of debate if these teachable moments can arise from the children's play or if this is created by the kindergarten teachers.

In the second part of this chapter, I explained the instructional styles used by Grove (2006). These will be used during the analysis of the results of this thesis. I also discussed the process

of changing conceptions. As presented by researchers, this will only happen after seeing the changes in student learning outcomes and it might take up to five or six weeks before the teachers are interested in these new conceptions. This also depends on how this new conception is presented, first of all by observations of this new conception combined with other activities designed to support reflection upon the experience. The last aspect that I discussed was the importance of the attitude of the teachers, where a reflective attitude gives the possibility to reformulate his/her beliefs when confronting small differences.

There are several research methods that can be used for cross-cultural studies, including questionnaires, interviews, videotaped observations or a standardized scheme. Each of these different methods has specific advantages and disadvantages.

4. Methodology

The main aim of this project was to find out if kindergarten teachers in Flanders and Norway have a different focus during an activity with numeracy. This research question led to a comparative study in which I used a combination of videotaped observations and interviews.

4.1 Social constructivism

In social constructivism, each person is viewed as a unique individual, with unique needs and background. Social constructivism encourages the person to arrive at his version of the truth, influenced by his background and cultural worldview. The child is a member of a particular culture and social constructivism stresses the importance of the social interaction with other people. Young children develop their thinking abilities by interacting with other children, adults and the physical world. From the social constructivist's viewpoint, it is important to take into account the background and culture of the learner throughout the learning process, as this background also helps to shape the knowledge and the truth that the learner creates and discovers (Wertsch, 1985). For me, this means that a person is influenced by his background. This is also the case for kindergarten teachers. A person who has grown up in a particular culture is affected by that culture and is, in a way, a result of that culture. This background shapes the customs that are taken for granted, in this case on early childhood education. For a Flemish kindergarten teacher it is normal to have a group of 25 children, being a part of the school system and working towards the goals put forward by their framework. A Norwegian kindergarten teacher takes it for granted that there are assistants and that they use the time in kindergarten in a different way than the Flemish kindergartens teachers, for example spending more time outdoors.

Social constructivism stresses the importance of the learner being actively involved in the learning process, unlike former educational viewpoints where the responsibility rested with the instructor and where the child played a passive, receptive role. Learners search for meaning and will try to find regularity and order in the events of the world, even in the absence of full or complete information. According to the social constructivist's approach, instructors have to adapt to the role of facilitators and not teachers. A facilitator helps the child to get to his/her own understanding of the content. A further characteristic of the role of the facilitator in the social constructivist's viewpoint is that the instructor and the learners are equally involved in learning from one another (Holt & Willard-Holt, 2000).

4.2 Research methods

Because of the limited amount of time, I chose to work with two kindergarten teachers in Flanders and two in Norway. In Flanders, I worked with kindergarten teachers in a Catholic kindergarten, since these are the most common (64% of the kindergartens according to OECD, 2006). In Norway, the first kindergarten teacher works in a public kindergarten and the second kindergarten teacher works in a private-owned kindergarten.

I wanted to find kindergarten teachers with a special interest in mathematics and who were willing to share their work with me. To find participants for this study, I sent out information to four kindergartens in the city centre of Ghent, Belgium, and to four kindergartens in the city centre of Sandnes, Norway. All four Flemish kindergartens replied the day after I contacted them. One of them could not join because of festivities at the time that I wanted to observe them. The other three kindergartens were enthusiast to join. One of these kindergartens had two kindergarten teachers who were interested, one of them worked with 3-year old children and the other with 5-year old children. Because of these two ages and the possibility to observe them both in one kindergarten, I decided to work with these kindergarten teachers.

In Norway, none of the kindergartens answered and I had to take contact with them again. However, none of them were interested and said that participating would take too much time. Therefore, I started to contact several other kindergartens in Sandnes as well as in Stavanger. 15 kindergartens replied negative. Even kindergartens with focus on mathematics were not enthusiast. In the end, I got in touch with a kindergarten teacher who liked the idea. She worked with children from the age of 0- to 3-years and wanted to join the project. Afterwards, I met a kindergarten teacher of a group of 3- to 5-year old children and she too found the project interesting. I asked the kindergarten teachers to show an activity with the oldest children (3-year old and 5-year old children) since similar age groups as in Flanders might make it easier to compare them.

In each country, I made video observations of a freely chosen activity with focus on mathematics. During the video observation, the kindergarten teacher is in focus. The observed groups are called:

- F3: Flemish group with 3-year old children
- F5: Flemish group with 5-year old children
- N3: Norwegian group with 3-year old children
- N5: Norwegian group with 5-year old children

Details on the children and the kindergarten teachers are summarized in table 3. In the observed Norwegian group of 3-years old children (N3), the kindergarten teacher was 26 years old, and graduated four years ago. In Flanders, the kindergarten teacher of F3 was 24 years old, and graduated two years ago. Both kindergarten teachers had been working in kindergartens for two years. Their work experience is therefore comparable. The average age of the children was 2 years and 10 months in Norway and 2 years and six months in Flanders. The Norwegian group had 10 children, but the 6 youngest children (between 0 and 2 years old) were not present during the activity, they were in adjoining rooms with the assistants. The Flemish group had 7 children; this is a so-called starter's class with children who just started in a kindergarten. Children start going to a kindergarten in Flanders when they are 2 years and six months old.

Table 3: Information on the children and kindergarten teachers of the 3-year old groups.

Group	Country	Average age of the children	Number of children during the activity	Kindergarten teacher	
				Age	Experience
N3	Norway	2 y, 10 m	4	26 y	2 y
F3	Flanders	2 y, 6 m	7	24 y	2 y

In Norway, I also observed an activity with a group of 5-years old children (N5). This kindergarten teacher was 45 years old and graduated seven years ago. She worked for 15 years as an assistant in a kindergarten before taking a bachelor as kindergarten teacher. In Flanders, the kindergarten teacher of F5 was 47 years old and graduated twenty-five years ago. The kindergarten teachers were almost the same age but the Flemish kindergarten teacher had worked longer as an educated staff member. The average age of both groups was about the same, but here, as with the 3-year old children, the Norwegian group had fewer children. There were 8 more children in the Norwegian group, but they were with the assistants in other areas of the kindergarten. This information is summarized in table 4.

Table 4: Information on the children and kindergarten teachers of the 5-year old groups.

Group	Country	Average age of the children	Number of children during the activity	Kindergarten Teacher	
				Age	Experience
N5	Norway	5 y, 8 m	10	45 y	7 y
F5	Flanders	5 y, 5 m	24	47 y	25 y

During the video observations, the kindergarten teachers were in focus. With group N3, all four children were also visible because of how they were seated around the table. In all the other observations, the children and their expressions were not always clear, neither speech nor body language. This was the result of the difficult settings to film other persons in addition to the kindergarten teacher, but also because of the sound level made by a lot of children in a small area.

Afterwards, the kindergarten teachers were interviewed. In the first part of the interview, I asked them questions regarding their own work (see appendix A) and I used their own video observation to demonstrate some choices they made. In the second part, I showed the video made in the kindergarten group of the same age in the other country. Here, I asked questions about how they experienced this and what this could mean for their own way of working (see Appendix A). To make sure that the information given by the kindergarten teachers was valid, several questions refer to the same topic (Flick, Kardorff & Steinke, 2004). When analyzed, these answers confirmed previous statements.

For the interviews, I used my interview guide as a start and the kindergarten teachers talked about their way of working. By looking at the other country's way of working, the kindergarten teachers might discover new methods to work with, because they got interested in this way of working and liked to discover more about it. I like to compare this with the 'duck-rabbit' (Figure 4), made famous by Wittgenstein (as cited in Monk, 1990).

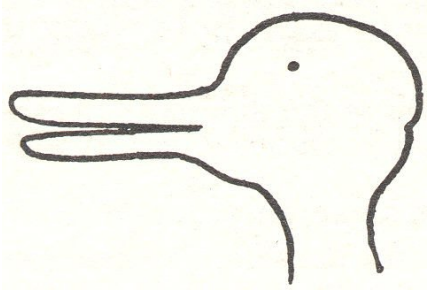

Figure 4. The 'duckrabbit'
This picture can represent both a duck or a rabbit, dependent on what focus you have.

When the kindergarten teachers look at a method, they might just see one side. But when they look more closely into this method, they might discover something that they were 'blind' to before, and see a different picture. The original picture did not change, but the person who is looking discovers a new perspective. When this happens, the kindergarten teacher might see positive sides of a previous unknown method. As described in chapter 3, Pajares (1992) states that to change behavior, one must first change one's beliefs, because beliefs act as filters that affect what one sees. So when the 'duck-rabbit' represents possible ways of offering early childhood education, the kindergarten teachers mainly see their own way, the duck, because their belief affects what they see. Kindergarten teachers in another country might have the another way of offering early childhood education, represented by the rabbit. But what is needed for the first kindergarten teachers to see the rabbit instead of the duck?

4.3 Analysis

The observed activities are presented in this thesis (chapter 5.1) with a description of the group setting and a description of the activity itself. These activities were analyzed to reveal some key-aspects that differ between the two countries. The interviews were transcribed, the Flemish interviews in Dutch and the Norwegian interviews in Norwegian. These were translated to English afterwards and corrected by native speakers (one native Dutch speaker and one native Norwegian speaker) with experience in translating and writing in English. The interviews lasted between 45 and 60 minutes and all of the transcribed interviews together are 18 pages long. I selected the data based on which extra questions and topics the kindergarten teachers talked about. Some parts of the interviews could not help me to answer the research question; these parts were left out during the analysis. For example a kindergarten teacher wanted to show some board games focused on mathematics. I used the 'constant comparison' method (Tesch, as cited in Alvestad & Duncan, 2006) which is often used in qualitative studies. It involves reading through the interviews and then comparing them with each other. Afterwards the interviews are read again, separately. The presentation of the interviews (chapter 5.2) is based on the interview guide (see appendix A). Question by question, I first present the answers of the kindergarten teachers, which are then summarized and discussed with the research questions as a guide.

4.4 Ethical matters and possible risks during the study

The project was approved by the Norwegian Social Science Data Services (NSD) as the requirements of the law of personal data were fulfilled: criteria like confidentiality, anonymity, right to withdraw and right to be fully informed were complied with. If wanted, the kindergarten teacher could also bring a colleague (another assistant or kindergarten teacher) to the interview. All kindergarten teachers were given a new name. No information of the children, except how many children and their average age, were recorded.

During the video observation, there was a risk that the kindergarten teacher would feel uncomfortable. I tried to prevent this by talking to the kindergarten teachers in advance to inform them and answer all their questions. However, one of the Flemish kindergarten teachers expressed the wish to stop filming when the children chose which game they would play (the children had to take their name tag and placed it with the symbol of the game they wanted to play). She told me this before I started to videotape, because she felt that the children were not used to this system yet. I stopped when this moment began and started videotaping again when the children were all playing.

By working with kindergarten teachers who are interested in mathematics, I hoped that they were feeling secure in showing a math activity and were proud about their work and achievements. I will sketch an image of the view on learning and compare these four examples, based on the interviews and the activities.

The research results obtained for this master thesis are based on data from a relatively small sample. In particular, the number of kindergarten teachers is small. As there are probably differences between the kindergartens of a particular country, generalization of the findings needs to be considered with caution. Further research is required to investigate whether similar findings can be obtained from a larger study based on more samples.

Being raised in a Flemish kindergarten and school system, and still discovering the policy of Norwegian kindergartens, I need to be aware of my feelings about these two cultures. It is probably impossible to be completely objective, but I need to show respect for values and attitudes of the kindergarten teachers (Den nasjonale Forskningsetiske komité for samfunnsvitenskap og humaniora, 2006). Since I moved to Norway three years ago, I am

trying to find a professional balance between the Flemish and the Norwegian educational system. Because of this, the validity of my study could be compromised. During the observations in Flemish kindergartens, I found it sometimes hard to stay focused on the research because my expectations were high and these were not always fulfilled. Onwuegbuzie and Leech (2007) call this researcher bias.

> Researcher bias occurs when the researcher has personal biases or *a priori* assumptions that he is unable to bracket. This bias may be subconsciously transferred to the participants in such a way that their behaviors, attitudes or experiences are affected. In addition to influencing participants unduly, the researcher could affect study procedures or even contaminate data collection techniques. Researcher bias does not occur only at the data collection stage, it can also prevail at the data analysis and data interpretation phases (Onwuegbuzie & Leech, 2007, p. 4).

Bryman (2001) states that there is another risk with cross-cultural studies. When data like the interviews are being translated, the researcher has to make sure as to not undermine genuine comparability. He also points out that insensitivity to specific national and cultural contexts is a possible risk. To ensure validity in the study, I spoke to other researchers about these feelings and reflected with them about the possible consequences. The interviews and my analysis were also read by two other researchers to see if my analysis was valid, which is called face validity by Bryman.

4.5 Summary

With a social constructivist's view, I have chosen to combine observed activities and interviews as data for this qualitative study. These were analyzed with the 'constant comparison' method. During the collection of data and the analyzing process, ethical questions were asked and reflected upon. To ensure validity, other opinions were asked to confirm my interpretations and conclusions.

5. Results

Before I present the analysis of my results, I describe the observed activities in the 4 different groups. Each activity was videotaped and the video was shown afterwards to the kindergarten teacher of the other country with the same age group of children, to ask for her comments on this other approach. The comments of the 4 kindergarten teachers are then compared.

5.1 Description of the activities

Flemish 3-year old group (F3)

The kindergarten teacher was Julie, 24 years old. She graduated 2 years ago and had 2 years experience as a kindergarten teacher. The children in her group were all born in 2007. During the activity there were 7 children with an average age of 2 years and 6 months. These 7 children were the whole group for this kindergarten teacher. All of these children had been going to the kindergarten for a month or less and were still getting used to daily life in the kindergarten.

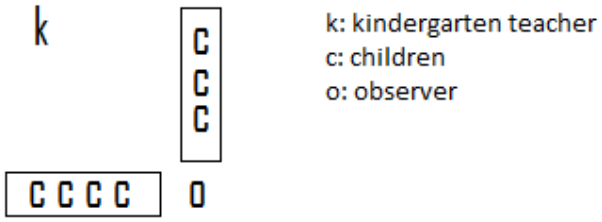

Figure 5. Seating situation of the kindergarten teacher, children and observer during the video observation.

Time: 9.30-9.50

The children just returned from their gym class. When they entered the room, they each found a place to sit on the bench (Figure 5). They greeted their class doll. The kindergarten teacher told them that Jules (the class doll) brought a box with him today. She shook the box and we heard a loud noise. She sang a song in which she wondered what could be in the box and invited the children to come and take a peek. In the box were 9 Duplo blocks: 3 of each color (red, yellow and blue) and 3 of each size (small, medium and large). The class doll emptied the box on the floor and one of the children was invited to sort the blocks by color. After that, the children sorted them by size. Some of the children were also asked to count how many blocks there were. The kindergarten teacher asked the children to find the biggest block, the

smallest, the ones with the same color,… In the end, the children carried the blocks to the Duplo boxes and started to play with them, together with the kindergarten teacher.

Flemish 5-year old group (F5)

The kindergarten teacher was Abby, 47 years old. She graduated 25 years ago and had 25 years experience as a kindergarten teacher. The children in her group were all born in 2004. During the activity there were 24 children with an average age of 5 years and 5 months. These 24 children were the whole group for this kindergarten teacher. The group had focused on one number each Tuesday since January.

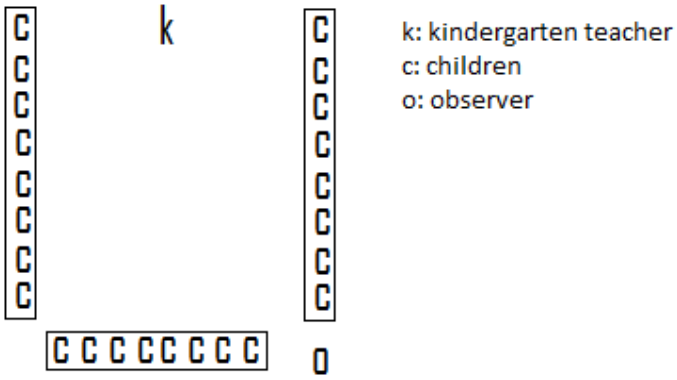

Figure 6. Seating situation of the kindergarten teacher, children and observer during the video observation.

Time: 9.00 – 9.45

The class and the kindergarten teacher started the activity with a dance called ‘zevensprong’ or the sevenjump in the gymnastic room. Afterwards, the children came inside their classroom and sat down (Figure 6). The kindergarten teacher and the children counted up to 7 on their fingers and placed both a dot symbol and a finger symbol for 7 on the wall, next to the symbols for the other numbers. After this, the kindergarten teacher explained the possible choices for activities and the children chose an activity:

- 3 groups of 4 children each played a board game with numbers
- 6 children played with puzzles with numbers
- 3 children played with puzzles with geometric shapes, and different colors and numbers
- 3 children played with puzzles with pieces with a chronological order

Abby went from table to table to talk to the children and to check if they understood the rules and were getting along. The children played for about half an hour before going outside for the morning break.

Norwegian 3-year old group (N3)

The kindergarten teacher was Charlotte, 26 years old. She graduated 2 years ago and had 2 years experience as a kindergarten teacher. She had also worked as a kindergarten assistant for 1 year. The children in her group were all born between 2007 and 2009. During the activity, there were 4 children with an average age of 2 years and 10 months. These children were the oldest children of the group. All of these 4 children had been going to this kindergarten for about 1 year and 5 months. There were 6 more children present that day, but they were joining the 2 assistants in an adjoining room.

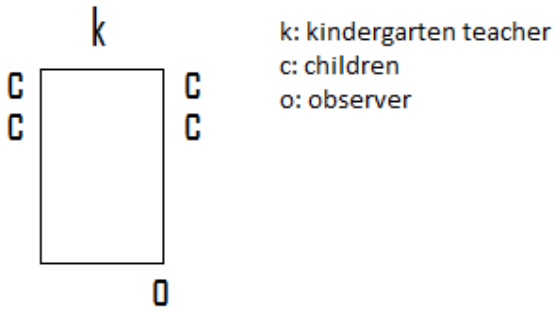

Figure 7. Seating situation of the kindergarten teacher, children and observer during the video observation.

Time: 13.45 – 13.55

The children were invited to sit at the table; the kindergarten teacher pointed where each child could sit down (Figure 7). The kindergarten teacher placed a bowl with several kinds of fruit on the table and told the children that they were going to count. She placed several kinds of fruit on the table (5 pieces) and asked all of the children to count them. She started with the apple, cut it in half and asked the children how many pieces of fruit there were then; she repeated this until she got 4 pieces. She asked how many children were present and counted them; they each got a piece of apple. This was repeated with the orange. Then she cut the banana while counting. When there were 7 pieces, a child counted the pieces and ate one afterwards. The kindergarten teacher followed up on this action and made this into the activity. All of them got a turn to count the banana pieces and could eat one afterwards until

there were no more pieces left. The kindergarten teacher asked how many banana pieces there were left and a child replied that they had eaten all of them. The other children in the group came to join them to eat their afternoon snack.

Norwegian 5-year old group (N5)

Hannah was the kindergarten teacher in focus, but she was joined by Sophie, a kindergarten teacher of another group in the same kindergarten. Their groups were going to play a football game against one another. Hannah graduated 7 years ago and had 7 years experience as a kindergarten teacher. Before taking a bachelor degree, she worked as an assistant in a kindergarten for 15 years. The children in both groups were born between 2004 and 2006. During this activity there were 5 children of each group, 10 in total (the average age was 5 years and 8 months). These children were the oldest children in both groups. The other children were in other areas of the kindergarten, with the assistants.

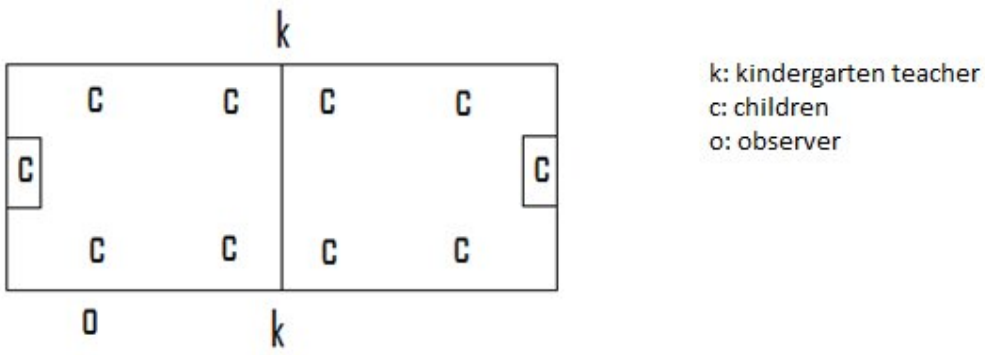

Figure 8. Location of the kindergarten teacher, children and observer during the video observation.

Time: 10.00 – 10.15

The groups had focused on different countries; one of these countries was Italy during which the children started talking about soccer. When they chose to work on the theme of Brazil, the kindergarten teachers decided to work towards a soccer game between Italy and Brazil. Before I came to observe, both groups talked about the rules of soccer, the different expectations of the defense and offense, the lay-out of the game (entering, presentation of each player, different sets, break,…). They also had made shirts, and they had painted a little shield in the colors of the country, their game number and their name on the back of the shirt. On the floor, the lines of the soccer field were marked with tape and there were also numbers on the floor to show the children the start position. This preparation had all been done the

days before I came. The following description is the observed activity. When they entered the room, the children were introduced to the crowd (children from other groups who came to cheer) indicating their number, name and position. After the introduction, they stood on the number on the floor corresponding to their own number on their shirt (Figure 8). The game started and both adults talked about time, sets and game-score. During the break, the children drank from a cup, also with their number on. When the game was over, all the children received a medal, gold for the first place and silver for the second place.

Comparison of the observed activities in Flanders versus Norway

One of the research questions of this thesis is how the activities on numeracy differ between the social pedagogy tradition and the pre-primary approach. These approaches are only represented here by the observed activities in 2 kindergartens of each country but they might give a representative view of the kindergarten teachers' interpretations of their tradition. To address this research question, I selected the following categories: *staff size, organization, content, focus of the children, communication, relations and flexibility.* These categories were chosen because of the expected differences that they represent between the Flanders and the Norwegian observations.

When comparing the Norwegian and Flemish kindergartens that participated in the study, the *staff size* is an obvious and important difference. While the mean child-staff ratio is 18:1 for Flemish kindergartens, the mean child-staff ratio in Norwegian kindergartens is 3:1 for children between the ages of 0 and 3 years, and 6:1 for children between the ages of 3 and 5 years (OECD, 2006). In the observed groups in Flanders there was 1 adult, who was an educated kindergarten teacher. In contrast, the Norwegian groups had 3 adults: 1 educated kindergarten teacher and 2 assistants. The Norwegian groups also used the staff in a different way than the Flemish groups. With the help of the assistants, there were only a third of the children present during the observed activity. The other children were in different areas of the kindergarten. The Flemish groups did not have this advantage and all the children were present during the observation. This gave the Norwegian groups more opportunity for activities suited for children and more one-to-one contact with each child.

As I will describe later, the kindergarten teachers in Flanders reacted differently on the use of the assistants. The positive and negative sides of both situations can be discussed. By using a larger staff, there can be more ideas, enthusiasm and support to create a good environment for

the children. A staff with both kindergarten teachers and assistants can also work in smaller groups with the children. This can give the kindergarten teacher the possibility to help children in a one-to-one situation when the other children are with the assistants. For trips outside the kindergarten, no extra adults are needed since the staff size is large enough to guide the children. The most important aspect might be that if a child does not have a good relation with one of the staff members, he/she might have a splendid relation with one of the other adults. This gives the children a better chance to have good contact with the adults throughout the day. The different characters of the adults can be an enrichment for the kindergarten and can potentially give different stimuli to the children. The use of assistants does require guidance by the kindergarten teacher, to support the assistants in their work with children.

On the other hand, a kindergarten teacher who works on her own, without assistants, can decide everything herself. There is no risk that information is not passed on, which might be the case if one of the adults talks to a parent and does not write down or tells the others about what is decided during that conversation. When there is only one staff member, she/he has to keep track of her involvement with each child. In this way, she/he is responsible that each child is seen and observed.

Another aspect is the ***organization***. When we compare how these kindergarten teachers used the available area, it becomes clear that the Norwegian groups had fewer children on more area. This was especially the case for group N5. When seated, the Norwegian children of N3 each had their own chair. The Flemish children were seated on benches. The children of F3 had more than enough space, but it looked to me that they found it harder to stay seated, especially when compared to the children of N3. The children of F5 were also seated on benches but they did not have enough space. These children were sitting shoulder to shoulder with their neighbors and this led to confrontations which affected the mood. These confrontations between the children of F5 also affected to noise level. As a result of this, the video observation was hard to interpret. This did not happen in the other video observations.

The activities in the Norwegian groups were scheduled to be repeated with the children who were with the assistants. All children get the chance to join all activities since they are repeated several times. In N5, the children also got the choice if they wanted to join the

activity or not. The Flemish children did not have this choice as all children joined the activity at the same time, so it was a group activity.

The available area and sound level influenced the atmosphere of the group. I am convinced that all kindergarten teachers want enough space for their children, but this is something directed by money and politics. Here, it is important to remember that only two kindergarten teachers of each country were visited for this thesis. Other kindergartens might have more or less space, often linked with the age of the building and so on. The age of the children is also important, as younger children might experience large spaces as scary, whereas older children can use such an area for role-play. An important aspect, however, is the seating arrangement for group moments, for example during story time. Each child should have enough space when seated, to avoid confrontations or disturbance. The sound level should also be taken into consideration. By the use of sound-muffling material on the walls, the sound level of playing children can be significantly reduced. This creates a better atmosphere and results into a calmer environment for both children and staff.

The *content of the activities* was chosen by the kindergarten teachers. The kindergarten teacher in N3 mainly focused on counting. The activity of F3 had more elements, such as counting, and distinguishing colors and sizes. The Flemish group thus used more aspects of mathematics and the content was more varied. But when we look at the groups of the older children, the opposite was true. The kindergarten teacher of F5 spent much time on counting, symbols and representation of numbers. Group N5 had a more varied content in the activity, including elements like counting, symbols and representation of numbers, one-to-one relations, shapes, directions, space, and so on.
There is no clear answer of how activities are supposed to be like. This is dependent on what the children are interested in, what time of the day the activity happens, how many children there are, and so on. The kindergarten teacher has to know the children to decide what she can offer. But it is also important to read the signals of the children which indicate if the level of the activity is good, too low or too high. By interpreting these signals correctly, the kindergarten teacher can adjust the activity to the needs of the children. Some children might need an activity that is repeated during several days with small adjustments of the content and difficulty, while other children are challenged by a varied content.

When we explore the *focus of the children*, the 2 Flemish groups as well as N3 were mainly looking at the kindergarten teacher. The kindergarten teacher looked at the children, but also at the objects, to help the children focus on the same object of interest. In contrast, the children of group N5 were focused on each other and on the football game. This had also an effect on the visible *relations and communication*. N5 was the only group where communication between the children was equally or more common than communication between the children and the kindergarten teachers. In N3, there was some communication between the children, but the kindergarten teacher had one-to-one contact with each child. She addressed both the individual children as well as the group of children. In both Flemish groups, the kindergarten teachers addressed the whole group at once and had little communication with individual children, unless when they had to correct them. Here, communication between children was discouraged and the children were expected to listen to and respond to the kindergarten teacher.
The focus of the children is of course also dependent on what kind of activity they are participating in. A football game asks for more attention of the players, compared to the other groups where the children were seated and where the kindergarten teacher had a larger role in the activity. How can a balance between focus on the other children and on the kindergarten teacher be achieved? When children get the chance to contribute to the activity, they can share the responsibility to control the activity and become more motivated to join.

How much of the activity was planned and was there a chance for the children to influence the activity? In other words, were the staff members flexible? In both Flemish groups, the course of the activity was decided by the kindergarten teacher. This was also the case for group N5. The kindergarten teacher in group N3 had also planned her activity, but changed this to follow up on an action of a child and made this into the main activity. This can be related to child-initiated and adult-initiated activities or actions. Although I believe in the value of adult-initiated activities, child-initiated activities are not always equally valued. As in the previous part on relations and communications, the children need to feel that they can contribute throughout the day in the kindergarten. This might also contribute to a feeling of being able to influence decisions, actions and activities.

5.2 The interviews of the kindergarten teachers

I will present parts of the interviews and use the interview guide (see appendix A) as a start. The questions asked were related to the research questions of this thesis. The main research question deals with the focus differences of the kindergarten teachers in an activity on numeracy. The sub-questions focus on the differences in the activities and in the reactions of the kindergarten teachers when they observe another way to offer activities.

The structure of this part of the chapter is as follows: after each question, the answer of each kindergarten teacher is presented, followed each time by my personal interpretation of her answer. Thereafter, I summarize my interpretations of all answers, followed by a discussion.

Activities with focus on mathematics

The first question to the kindergarten teachers dealt with their own work in the kindergarten with focus on numeracy. I asked how often they had activities with focus on mathematics or numeracy. The kindergarten teachers were also asked to give examples. This question is both related to the main research question and the sub-question on how activities differ.

> F3
>
> Not very often as it is a group with toddlers. This was actually the first time, but I think that I will try to do this at least once a week. The problem is that new children join the group in January, February, April and June, which each time lowers the level of the group. The children use lots of mathematics throughout the day. For example while they are playing in the kitchen, they say: I got two spoons.

When the kindergarten teacher says ‘at least once a week’, she refers to the mathematics hour, with activities aimed for training of skills such as counting, colors and size. She also mentions the use of mathematics during everyday activities. She spoke a lot about the level of the children, and mentioned several times how hard it was when new children joined the group. Each time she had to help them to achieve the same level as the other children so that she could reach the goals of the framework.

F5

About once a week, for one hour. It also comes along during other activities; this happens a lot. For example: when they make an animal with four legs during arts and crafts, I ask them how many legs they already have and how many they still need to add. But that is just something that happens now and then. They also use it on the computer where they play small games that use numbers and shapes.

This kindergarten teacher mentions the mathematics hour as the main working form. This hour builds further on the hour of the previous week, with more difficult activities than last time. She also mentions the use of mathematics during everyday activities, like arts and crafts or computer games. She stresses, however, that these are occasional and I thus interpret this as being less important to her than her planned mathematics hour.

N3

Not often, but for example on Fridays, when we have arts and crafts, we try to focus on mathematics at the same time. Other examples are when we change diapers, or when we count how many children are ready to go outside.

The Norwegian kindergarten teacher does not mention the concept of a mathematics hour during the interview. She stresses the importance of using it during everyday activities, often combined with other learning areas such as arts and crafts.

N5

Actually we use a lot more mathematics than we realize. When we set the table, the children use the logical-mathematical intelligence. We can count how many plates, glasses and knives we need. Also how we set it on the table, the knife goes on the right side and the fork on the left side of the plate. But we also use it when we are tidying up after playing; we have boxes with symbols on it. The children use it often when they are playing, with pearls or Lego. Some children sort the toys on color and size, while others do not need to organize the pieces and just start creating.

This Norwegian kindergarten teacher seems to be very aware of the different aspects of mathematics that are regularly dealt with. She seems to detect mathematics in the majority of events in the kindergarten and states that we use mathematics more than we realize. In her

opinion, mathematics becomes a vital aspect of life, a way to organize ideas for play, a way to organize actions like setting the table.

Summary

The most obvious here is that both Flemish kindergarten teachers plan their mathematics activities, while the Norwegian kindergarten teachers use mathematics more in combination with other activities or events. The focus on how to teach mathematics therefore differs between planned activities and moments that arise during the day. There is also a difference in isolating mathematics versus combining mathematics with other learning areas, thus working interdisciplinary.

Discussion

Which focus do kindergarten teachers in a Flemish kindergarten versus a Norwegian kindergarten have for an activity on numeracy? Their focus differs first of all regarding where they see the possibilities for mathematics. Although they both see mathematics in everyday situations, only the Norwegian kindergarten teachers call this their main focus. In chapter 3, I referred to Anderson, Anderson and Thauberger (2008) who showed that during free play, children are involved in mathematical activities 44% of the time. This gives us a good starting point for working with mathematics in everyday situations, but this also requires something from the kindergarten teacher. Tudge, Li and Stanley (2008) argue that events with numeracy are far more likely to occur when children are in the company of an adult than with peers. But the presence of an adult is not enough. First of all, the kindergarten teacher needs awareness and, in addition, also knowledge of mathematics and specifically of age-appropriate mathematics.

Supporting the children in the development of numeracy

The second question was how the kindergarten teachers learn children how to count and to use mathematics. The answers show what is important to these kindergarten teachers and what their focus is aimed at.

> F3
>
> I use elements that come from their own world of experience, like those Duplo blocks. They like to play with Duplo blocks and that makes it easy to motivate them. I use

mathematics all the time, like in games, without them noticing that they are using mathematics.

The kindergarten teacher mentions the use of objects that motivate the children, for example toys that the children enjoy playing with. She does, however, not mention actions of the children as a method of learning. She says that mathematics is a part of many games and something that is used often, but she also states that the children do not notice her using mathematics.

F5

I often use words like ‘the first’, ‘the last’. For example, I tell them that the last person who comes in has to close the door. And we count a lot. We use our fingers to symbolize the numbers. With the oldest children, I also count backwards. And we take number by number: in the beginning of the year, I worked with number 5, and each week thereafter we took one more. All children have to do some work on paper every week, which we use for evaluations. Some of the children get assignments that go up to number 10, while other children only work up to number 5.

This kindergarten stresses the importance of using numbers in different ways, although these situations seem to be all adult-initiated. She also follows a plan to achieve the goals of the framework. She is interested in a schedule with an increasing level of difficulty, probably because of a need to see outcomes of the learning of the children. The children also get assignments, for example work sheets, which is comparable to teaching in primary schools.

N3

We, adults, count a lot, and that is something they notice. I also give the oldest children small assignments, like get 3 spoons, find 2 blue blocks. The oldest children use it in their play, even when we are absent. But when we sit down, join them and play with them, we can bring the games to a higher level, and use both words and numbers that they would not have used otherwise.

The kindergarten teacher mentions both adult-initiated and child-initiated actions. She says that she sits down and joins them, which gives a chance to develop interaction with the

children. She mentions that children engage in mathematics even without adult guidance, but that the quality of this mathematics improves with the help and support of an adult.

> N5
>
> I believe that it is important that we join the children in what they are doing and talk with them, while being aware of our role. We have to join them in their games and be curious about what they see and hear, so that we know what is important for the children. That way we can help them where they need us.

This kindergarten teacher mentions joining children in their activities, in other words child-initiated actions. This might be interpreted as following: by observing the child when joining them, she can detect what the child is capable of and where she can support the child. She can also find the interests of the child and use this in further actions and activities.

Summary

All kindergarten teachers mention the importance of the children hearing the adults count, except the kindergarten teacher of F5. While three of them say that this is something that happens while playing, the kindergarten teacher of F5 also mentions assignments like worksheets. Overall, the kindergarten teachers of F3 and F5 use mainly adult-initiated activities, whereas the kindergarten teachers of N3 and N5 also use child-initiated activities.

Discussion

As indicated in the previous discussion, knowledge of mathematics, and especially age-appropriate mathematics, is important. For adult-initiated mathematics, the activities need to be challenging for the children, but it also needs to be possible for them to achieve a sense of accomplishment. It is a challenge for the kindergarten teacher to get each child involved during an adult-initiated activity. On the other hand, there is also a potential drawback in the child-initiated activities. Here, the children start, which often means that the children are more motivated. But are all children engaging in such activities? When the activity is the responsibility of the children, some children might try to avoid certain activities or engage in activities below their level. These children might need adult-initiated activities to make sure that they as well get enough stimuli in different areas of development. The Norwegian kindergarten teachers both mention everyday activities as a possibility to use mathematics.

For a good kindergarten teacher, this might give possibilities for adult-initiated activities, as well as giving the children the chance to start a child-initiated activity.

In chapter 3, I referred to Grove (2006) who distinguishes following styles:

- learner-focused
- content-focused with an emphasis on conceptual understanding
- content-focused with an emphasis on performance
- classroom-focused

It is not possible to categorize the 4 observed kindergarten teachers in a particular style based on the interviews, but it can give us a hint of direction. Based on the extract of her interview, the kindergarten teacher of F5 can be placed either in a content-focused style with an emphasis on performance or in a classroom-focused style, because of the focus on worksheets and expecting the children to accomplish the goal level of the Flemish framework. The extract of the interview of the kindergarten teacher of N5 might point to a learner-focused style, since she focuses on being curious together with the children and hearing what is of importance to them.

Supporting the children who have problems in the development of numeracy

The next question asked during the interviews was about children who have problems with numeracy: how does the kindergarten teacher help a child that does not count as well as the others? Once again, this might help us to answer the main research question regarding what the differences in focus are for an activity on numeracy between kindergartens in a social-oriented versus a preschool-oriented approach. This interview question was not asked to the kindergarten teachers of F3 and N3, and the results here are thus based on the kindergarten teachers working with the 5-year old children.

> F5
>
> I have a boy like that right now: in his assignments he only works up to number 4. We have started to test him to find out why he can not count, because it is not normal that a Flemish child can not count to higher numbers at the age of 5.

The kindergarten teacher states that the child lacks age-appropriate skills. She compares the skills of the boy with the skills of the other children. Furthermore, she seems to think that the child himself is the source of the problem, therefore she is testing him.

N5

It is important that we count a lot, so that this child hears this in every kind of situation. For example, during meals, or while we are getting dressed to go outside, we count our fingers and toes so that it becomes natural to count in everyday life.

The kindergarten teacher focuses on the adults and the awareness of counting, she does not focus on the skills of the child but rather gives extra stimuli to both this child and the other children. The goal here is to make counting a natural action. When the adults do this frequently, the children might also adapt counting themselves.

Summary

When confronted with a child that does not have the same skills as the other children with regard to numeracy, we see a difference in the focus of the kindergarten teachers. The focus of the kindergarten teacher of F5 is on the lack of skills of the boy, while the kindergarten teacher of N5 focuses on the adults and how they behave in the presence of children. Whereas the Flemish kindergarten teacher wants to change the boy, the Norwegian kindergarten teacher changes her own behavior.

Discussion

These reactions confirm the styles dealt with in the previous discussions: the kindergarten teacher of F5 can either be placed in a content-focused style with an emphasis on performance or in a classroom-focused style, whereas the kindergarten teacher of N5 might be placed in a learner-focused style. I refer to Grove (2006) who explains the different reactions when a student fails. In a learner-focused culture, the methods of the teachers are revised, leading to interminable efforts to devise ways and means of making it more likely that learners will be effortlessly able and positively motivated to acquire the learning content. In a classroom-focused culture, this does not happen and the failure is ascribed to the student himself.

I would also like to connect this with the staff size. As described before, the Norwegian kindergartens have more staff, which might give them the possibility for more support when needed. In Flemish kindergartens, staff size is more limited, which might be a possible explanation for the observed reaction of the kindergarten teacher. But this does not change the fact that her reaction does not comply with the framework, where kindergarten teachers are advised to revise their methods to see if this leads to considerable changes for the children.

Progression in activities

To find out how the kindergarten teachers would offer progression in activities, I asked them what they would do if they wanted to continue working with the same mathematical content. This deals with the main research question and the question on differences between activities. Unfortunately, this interview question was not asked during the interview with the kindergarten teacher of N5.

> F3
>
> I think that I would just repeat it. I would also focus more on the children with a different mother tongue, so that they understand the activity as well. I could also start counting on my fingers; maybe they (children with a different mother tongue) could do that. And the children could also sort the blocks from small to big.
> Mostly repeat it, because if there are children who do not understand it, I need to make sure that they have the same basis as the other children. Afterwards, I could also introduce symbols. And we could, for example, each build a tower and see who has the biggest. Or use other materials but with the same concepts: then it becomes a new activity and they are unaware that they are learning these numbers. That is my goal, to let the children use and learn these concepts without them being aware of it.

It is of importance to this kindergarten teacher that all the children master the content in the activity before she makes the activity more difficult. The children need to reach the same goals and skills to join the kindergarten teacher in her activity. Her group probably consists of children with different skill levels. By repeating the same content, she tries to give each child the same skills so that they have a better chance to succeed when they start in the first grade of primary school.

> F5
>
> Count backwards from seven to zero. Also e.g. teach them which number comes before and after number 7. And then I do a game in which each child gets a card with a quantity of objects on it, and they have to put their card with the right number on the blackboard. Or I give each of them a card and they have to line up from least to most objects on their card. Or I put the cards on the table, swap them and the children have to correct the situation.

The kindergarten teacher offers the same content in more difficult activities, but in different settings and with other aspects of the same content. This is part of her schedule that has an increasing level of difficulty. Many of the activities ask for correct answers of the children and are thus also a test of their skills. In this way, the kindergarten teacher controls if the children understand the content or need more practice.

> N3
> I would do the same (counting) in different situations, but it is not just me who does this: also the assistants, the parents and the other children learn them as well.

This kindergarten teacher stresses the importance of repetition. By repeating the same content, the children will start to use it themselves. She also shares the responsibility with the environment of the children as all persons in the children's world contribute to the development of the children.

Summary

Repeating seems to be the keyword here. The kindergarten teacher in N3 also focuses on the importance of other adults in the children's world, which indicates that the kindergarten is just one aspect of the world for the children. The Flemish kindergarten teachers themselves use the same concepts in other situations or in similar situations at a higher level. For them it is important that all children master the content before they move on to a higher level.

Discussion

First of all, it is clear from the interviews that the framework is very important for the Flemish kindergarten teachers. They need to get the children ready for the first grade and the children have to meet the required goals. This means that activities are repeated sufficiently, so that all children can attain the same skills. This is typical for a content-focused style with an emphasis on performance: correct answers and solved problems show knowledge of mathematics. Furthermore, it is not necessary to understand the source or reason for student errors as further instruction will result in appropriate learning (van der Sandt, 2007).

We can also see that correct answers and results are important, e.g. the worksheets and children who are given tasks to execute in front of the other children. This is an important difference between the classroom-focused and learner-focused cultures in their particular sequence of learning activities. In the classroom-focused culture, a lengthy private

opportunity to attain content mastery precedes public demonstration. In the learner-focused culture, public trial-and-error demonstration often precedes any private opportunity for content acquisition (Grove, 2006).

Reactions on the staff size while looking at the activity of the other country

The kindergarten teachers were shown the videotaped activities of the same age group of the other country. I told them the context of the activity, for example which persons were in the activity, what the activity looked like, where this happened, and so on. The kindergarten teachers were asked to stop the video when they wanted to make comments or ask for more information. I collected the reactions from the kindergarten teachers on the video and more specifically on the staff size. The kindergarten teacher of group N3 had no specific comments that belonged to this category.

> F3
>
> That is interesting, in that way they can work with smaller groups (reaction when hearing that the kindergarten teacher is helped by two assistants).

This kindergarten teacher sees the advantages of working with assistants. She immediately outs the possibility of working in smaller groups, which might indicate that she could imagine working like this.

> F5
>
> But these assistants, do they have any kind of education? What is their role in the kindergarten then? They can off course help the children with puzzles, but you need an education to help the children to develop (reaction when hearing that the kindergarten teacher is helped by two assistants).

This kindergarten teacher might see how the assistants can help the children with practical matters, but she questions whether they can play a role in the education of the children. She states that an education as kindergarten teacher is necessary for a more elaborate role in the kindergarten.

N5

That kindergarten teacher is all alone, with so many children? (reaction when hearing that the kindergarten teacher is the only staff member for a group of 24 children).

This kindergarten teacher is not positive towards this way of working but was amazed that the Flemish kindergarten teacher could organize such a group. She even repeated this after the interview.

Summary

Only the kindergarten teacher of F3 is positive towards the structure of the kindergarten in the other country. Her colleague of F5 does not have the same attitude and expresses the belief that pedagogical education is required for working with children, even though the Flemish institutions for children under the age of 2 years and 6 months do not have kindergarten teachers but child carers as staff. Child carers have a 1 year post-secondary professional diploma which can be compared to the Norwegian assistants with a 2-year apprenticeship. This apprenticeship is not compulsory, so not all assistants have such a diploma (OECD, 2006, p. 291 & 397). None of the assistants in group N3 had such a diploma, while both of the assistants in group N5 had the diploma.

Discussion

The reactions of the kindergarten teachers towards the methods of the other country can not be generalized, since these individual reactions might not be representative for the opinions of the kindergarten teachers of that country. Only one kindergarten teacher reacts positive. This might be explained by a different attitude than the other kindergarten teachers. I refer to a study by Cooney and colleagues (1998). They show the importance of such a reflective attitude, which gives the possibility to reformulate beliefs when coming over small differences. The kindergarten teacher of F3 seems to be open to other perspectives, which might be an indication that she has a reflective attitude.

Comments on the observed activities of the other country

When asked about reactions on the observed activity in the other country, the kindergarten teachers talked about what they liked about the activity and the goals set up by the observed kindergarten teacher. This question shows us again what is important for the kindergarten

teachers and gives us therefore their focus of interest. It also shows us how the kindergarten teachers react when confronted with another way to offer activities on numeracy.

> F3
>
> That looks like fun, since the children are following the teacher's activity. They probably like fruit, which is a part of their world. But I think that they might just want her to cut the fruit so that they can eat it, since not the entire group is following: only the older children are working along. The two youngest children are not interested in the kindergarten teacher, they are already eating. But they (the two youngest children) are seated farthest away from the adult; I would seat them closer to me and those older boys further away since they already seem to be involved in the activity.
> I find it a fun way to start the activity: the children are working with mathematics without knowing it. But I think the fruit distracts them too much. I do not think that I could keep their full attention if I did this during snack time, but it is a great activity if you can do this with just a couple of children. Fun and playful!

The kindergarten teacher is interested in the methods of the Norwegian kindergarten teacher. She is clearly positive about some ideas, but she also notices aspects of the organization that she does not like: she expresses doubts about the seating of the children and about the use of materials. For example, she would place the youngest children, who were not as involved in the activity, closest to her and the oldest further away. Her comments were often practical and showed a habit of working with many children.

> F5
>
> Well, the goal is to learn how to count. They use it on the floor and on their T-shirts and so on, but it is really playful. I think that they could do more if they were sitting down, because now, the children are more focused on playing football.

This kindergarten teacher was not so interested while watching the video. When she said that this activity was playful, I did not interpret this as a positive statement but more as a critique on the activity. The focus of this kindergarten teacher was aimed at numeracy and she did not see the possibilities with a football game. She mentioned football later on as something the boys in her group play during recess. Her own activities are a preparation for the first grade of primary school and free play is often only allowed in the afternoon.

N3

Maybe some children could follow, but maybe they were not all ready for this. That is what is so great about working in small groups: then you can adjust to what the children need. But she has a goal for a whole group.

This kindergarten teacher was intrigued by the methods, but did not consider them relevant for her own work. Her biggest concern was the goal for the whole group; she focused on the children who were not involved in the activity, who did not understand what the kindergarten teacher said. I felt that she meant that these children should have another activity instead of joining the rest of the group during this activity.

N5

But what they are having is an hour where everything is about mathematics, a mathematics hour. Since they can choose themselves, they can choose an activity that they know and are good at. I am thinking about how to organize an activity for so many children together. What about the children that can not succeed in this activity when there is only one adult? I am not sure that this is a good experience for that child.

The kindergarten teacher had her focus on the children who might fail during the activity. Because of the limited staff size, not all children are followed up on their progress during the activity. The kindergarten teacher was concerned that some children might not experience a feeling of accomplishment, which she valued high because this creates motivation to continue with similar or more difficult activities.

Summary

The focus of the Flemish kindergarten teachers during observation of the activities in Norway seems to be on the organization: they mainly comment the settings and the use of materials. To me, they look at how this activity can be done with their group, which is much larger than the Norwegian group. This might explain why the kindergarten teacher of F5 seems to be negative about football and the kindergarten teacher of F3 against working with fruit. Their activities have to be possible to perform with more children without losing control over the situation.

The Norwegian kindergarten teachers have the opposite view. They are used to working with assistants and therefore can work in smaller groups with fewer children. This might make it easier to have individual goals and adjusting the activity to the level of each individual child. As this is not always possible for the Flemish kindergarten teachers, this is something that the Norwegian kindergarten teachers comment on.

Discussion

When describing their own activity, the Flemish kindergarten teachers used the word 'learning'. When observing the Norwegian activities, they use the work 'playing' instead of 'learning'. The Norwegian kindergarten teachers mainly use 'playing' when they describe their own activity, while they describe the Flemish activity as 'a mathematics hour' which might refer to lessons like they have in school.

I interpret the Flemish answers as being indicative for a classroom-focused style, where learning and progress is valued. The Norwegian answers might be understood as a sign of a learner-focused style. A typical characteristic of a learner-focused style according to Grove (2006) is that the teacher facilitates a motivating learning process. A central preoccupation of the learner-focused culture is to motivate the learner or student to be willing to learn. I interpret the answers of the Norwegian kindergarten teachers as them using the play of the children as a starting point for developing knowledge (see Ginsburg & Ertle, 2008; Anderson, Anderson, & Thauberger, 2008; Seo & Ginsburg, 2004).

The kindergarten teachers adjust the observed activity to their own wishes

The last question was how they would use the activity from the other country as a starting point and would offer progression in activity, while working with the same mathematical content. The answers to this question can address the differences between the activities in the different traditions and between the focus of the kindergarten teachers.

> F3
>
> I would not use fruit but rather some material, like toys, maybe Duplo blocks. Then I would build a tower and break it into smaller pieces. Or let them build towers in only blue blocks. Let them break the tower in two; ask whether they can make it even smaller.

Here again, this kindergarten teacher shows the same focus of interest as in previous answers: she is occupied with the use of materials and chooses adult-initiated activities. She is familiar with activities for larger groups. As a result, she needs to make some decisions that make it easier to support more children. For example, working with fruit is replaced by toys. This might be because of hygiene, but more likely because snack time is done rather short since all children need to be helped as fast as possible.

> F5
> If I was to use football, I would definitely have a scoreboard and maybe a timer as well. I would also let the children write down the numbers of the score.

The kindergarten teacher formulated comments on playing a football game before, maybe because of the thought that football is something that children only do when they have recess. But here she shows how she would make small changes and adjustments to fit her idea of an activity. She uses elements that are used in real-life football, like a scoreboard and a timer. These are also great sources for numeracy and she uses this as a possibility to let the children write numbers as well.

> N3
> I would like to ask questions like that, but rather while we are playing. Like when we are playing with blocks: “I need a smaller brick, who can find it?” Or “I need a small blue one.” I would rather do this because she takes the blocks out of the context when using them for an assessment.

This kindergarten teacher chooses to take the same concept as the Flemish kindergarten teacher but uses it in a situation where the children and the kindergarten teacher are playing. This gives the children a possibility to make child-initiated moments, whereas, in addition, the kindergarten teacher can take the children’s numeracy skills to a higher level.

> N5
> I would have used smaller groups, to be sure that I am able to observe each child, what they need and what they are capable of. Maybe more playful, because I see that we use much more mathematics than we are aware of, even pouring a glass of milk is

> mathematics. But it is more playful than sitting down and say: now we are going to do mathematics.

This kindergarten teacher chooses to change the organization into several smaller groups, probably each with an adult. She shows the same focus of interest as before: that she aims to have contact with all children and to make sure that the activity is adjusted to each child. She also makes a comment on the mathematics hour which, according to her, seems to belong in school. Play is a keyword here.

Summary

In these answers we can find the same comments as on the previous question. The Flemish kindergarten teachers have to be able to do the activity with more children than the Norwegian kindergarten teachers and their adjustments are practical, for example the use of an easier to handle material. The Norwegian kindergarten teachers divide the large group into smaller subgroups and stress the play and the possibility for child-initiated actions. This confirms my assumptions on the importance of the staff size and, as a consequence, of the number of children involved in the activity.

Discussion

The kindergarten teachers all confirm what they said earlier in the interviews: by adjusting the activity, they would make their own focus of interest become more visible in the activity. The Flemish kindergarten teachers suggested to adjust the activities into learning situations with more adult-initiated actions. The Norwegian kindergarten teachers would focus more on play and the possibility for child-initiated actions.

The instructional styles (Grove 2006) discussed earlier are confirmed by these suggested changes. This is a good sign for the validity of the interviews (Flick et al. 2004). For example, the smaller groups suggested by the kindergarten teacher of N5 would give the children the possibility to practice and experiment in a private setting. This is an element of the learner-focused instructional style. In contrast, the kindergarten teacher of F5 would bring in more elements where correct written answers are valued, which is a sign of a classroom-focused style.

The motivation of the children is also briefly addressed. This is especially important to the Norwegian kindergarten teachers who mentioned several times that the Flemish activities looked like a mathematic hour. This kind of activity might have reminded them off a class like they have in primary school. When they suggested adaptations to the Flemish activities, they changed the situation so that the children would be able to initiate actions themselves and would have the possibility to express their own interest. This is supported by the research presented in chapter 3 of this thesis (Baroody et al., 2006; Ginsburg & Ertle, 2008; Anderson et al., 2008). This is again a sign of a learner-focused instructional style. The corresponding sign of a classroom-focused style is offering the children a challenging learning content. The changes suggested by the Flemish kindergarten teachers can be interpreted in this way.

Another element is the performance of the children in the suggested changes of the Flemish kindergarten teachers: tasks and assignments would be given to evaluate if the children understand the content. This can be related to the content-focused style with an emphasis on performance. The focus here lies on the use of an exact mathematical language. Correct answers and solved problems show knowledge of mathematics (van der Sandt, 2007). These suggested changes could also be understood as an impact of the Flemish framework. Bredekamp (2004) argues for age-appropriate goals in frameworks. Further research could take a closer look at the Flemish framework to investigate if this does not lead to inappropriate teaching of narrowly defined skills.

5.3 Summary

For the activities, I asked the kindergarten teachers to focus on numeracy. Each kindergarten teacher showed us her own interpretation in this regard. Differences between these activities were analyzed and discussed in this chapter, based on aspects that differ: staff size, organization, content, focus of the children, communication, relations and flexibility. One aspect that has an important impact is the difference in staff size. By determining how many adults are available for a group of children, it is unavoidable that other aspects, like organization, are influenced.

During the analysis of the interviews, the statements of the kindergarten teachers were compared to elements of different instructional styles. The Flemish kindergarten teachers show signs of both a *content-focused style with an emphasis on performance* and of a

classroom-focused style. The Norwegian kindergarten teachers mainly show characteristics of a *learner-focused style*. This can also be found in their focus during the activities. Whereas the Flemish kindergarten teachers use the term '*learning'*, the Norwegian kindergarten teachers prefer the term '*playing'*. Furthermore, *adult-initiated activities* are more valuable to the Flemish kindergarten teachers, whereas the Norwegian kindergarten teachers combine *child-initiated* and *adult-initiated activities* in everyday situations. The Norwegian kindergarten teachers also preferred an interdisciplinary approach.

The reactions during the observation of the videotaped activities of the other country differ, but only one reaction can be called positive. The kindergarten teacher of group F3 was interested and open to other possibilities. She showed a reflective attitude towards other cultures.

6. Discussion

The topic of this study was chosen based on my own experiences when discovering a culture different from my own. This made me to investigate the differences in early childhood education in different cultures and led to the main research question of this thesis: what are the differences in focus for an activity on numeracy between kindergartens in a social-oriented versus a preschool-oriented approach? Although there are variations between the different kindergartens of a particular country, based on OECD (2006) the Norwegian kindergartens can be categorized in the social-oriented approach, while the Flemish kindergartens mainly use a preschool-oriented approach. Therefore I compared the activities of 2 Norwegian kindergarten teachers to the activities of 2 Flemish kindergarten teachers. The data exist of 4 observed activities and 4 interviews. The observed and videotaped activities were used during the interviews, similar to the research of Jacobs and Morita (2002).

Even though the study performed in this master thesis can be considered as a small project, some conclusions can be drawn. The focus of the Flemish and the Norwegian kindergarten teachers participating in this study was remarkably different. The Flemish kindergarten teachers used mathematics mainly in *adult-initiated activities* and they described mathematics as '*learning'*. The Norwegian kindergarten teachers used mathematics in *everyday situations*, where both *child-initiated and adult-initiated activities* can happen, and they described mathematics as '*playing'*. Is the choice of the word 'learning' connected with adult-initiated activities? Does this mean that adult-initiated activities are not conceived as 'play' by the Flemish kindergarten teachers? And is it possible for them to conceive child-initiated activities as 'learning'? Answers can be found in the interviews (chapter 5.2). For example, the kindergarten teacher of F5 mentioned, when she discussed the activity of N5: "I think that they could do more if they were sitting down, because now, the children are more focused on playing football". She expressed that the football game was 'playing' and thus did not fit into her view of learning. On the other hand, are Norwegian kindergarten teachers comfortable with 'learning' in either child- or adult-initiated activities? My interpretation of the results from the interviews is that both observed Norwegian kindergarten teachers felt that learning and playing is an alliance in kindergarten, although they mainly chose the word 'playing' during the interviews. The kindergarten teacher of N3 said: "But when we sit down, join them and play with them, we can bring the games to a higher level, and use both words and

numbers that they would not have used otherwise." Although she uses the word 'playing', I interpret this as a situation where 'learning' is clearly involved.

There was also a difference in the instructional styles. Based on the work of Grove (2006) and van der Sandt (2007), we can characterize the style of the Norwegian kindergarten teachers observed in the study of this thesis as most closely related to a *learner-focused style*, where the focus mainly was on motivating the children. The educational method of the observed Flemish kindergarten teachers showed characteristics of both a *content-focused style with an emphasis on performance* and as a *classroom-focused style*. Their focus was mainly on the performance of the children. This can be related to the content of the Flemish framework (Vlaams Verbond van het Katholiek Basisonderwijs, 2002). Bredekamp (2004) discussed the advantages and disadvantages of the fact that kindergarten teachers have to follow a particular framework. She expressed the concern that specifying learning outcomes might limit the curriculum to those outcomes and would also lead to inappropriate teaching of narrowly defined skills. A positive side is that it could be a valuable and useful framework to plan and to individualize teaching. Further research is required to discover how the framework for both Flanders and Norway affects the kindergarten's educational work.

These conclusions can first of all help to raise awareness amongst kindergarten teachers in Flanders and Norway. When being aware of your actions and your role model, it is for example possible to strengthen elements like child-initiated actions, which are highly valued in the Norwegian framework (Ministry of Education and Research, 2006). This approach should be used more in a Flemish kindergarten to achieve more active participation of the children. This, in turn, can probably strengthen the child in his/her positive attitude, which is the core value of the Flemish framework. Study of young children and their use of mathematics also shows that child-initiated actions are valuable teachable moments if the kindergarten teacher is capable of seeing these actions and supports the children to develop their skills (Ginsburg & Ertle, 2008; Anderson et al., 2008; Clements et al., 2004). This can also be related to the flexible guided discovery approach of Baroody and colleagues (2006). I do not suggest that adult-initiated actions should not happen, but a balance should be attained. Adult-initiated actions are encouraged by Tudge and colleagues (2008). Their study shows that young children are dependent on adults to gain certain skills. This might indicate that kindergarten teachers have to offer some contents. Seo and Ginsburg (2004) showed what kind of mathematics young children use during free play. Young children use a significant

amount of various types of mathematical activity, such as patterns, shapes, comparison of magnitudes and enumeration. Less frequently, they explore dynamic changes, and classify and examine spatial relations. Here, the support of the kindergarten teachers is essential. This does, however, not mean that all children involve patterns and shapes in their play and that no adult-initiated actions should be undertaken. A delicate balance between child-initiated and adult-initiated actions should be the aim for kindergarten teachers.

The acquisition of a conscious attitude can also help to increase the use of mathematics in everyday situations. Since Anderson and colleagues (2008) have shown that children already use a lot of mathematics throughout the day, a kindergarten teacher can provide a stimulating environment if she is attentive to the mathematics that the children already use. By using mathematics throughout the day, this will become a natural way of thinking for both children and staff members. When this happens, it might become something more than goals that need to be fulfilled. Mathematics in everyday situations can stimulate problem solving in a creative way.

It was very important as well as challenging to describe the differences between the observed activities. Since I have worked in kindergartens of both countries, I know how different they are. However, I found it hard to describe the actual differences of kindergartens in Flanders versus Norway. This helped me to choose the first sub-question: how do the activities on numeracy differ in these different approaches? To accurately analyze the results, I focused on the following aspects: staff size, organization, content, focus of the children, communications, relations and flexibility. The Norwegian kindergarten teachers were supported by 2 assistants, whereas the Flemish kindergarten teachers worked by themselves. This affected the organization. When I observed the Norwegian kindergarten teachers, only a third of the group of children was present, the other children were in other rooms with the assistants. The Flemish kindergarten teachers worked with the whole group at once. Only the children of N5 did not have focus on the kindergarten teacher all the time, whereas all the other groups did. Each kindergarten teacher had prepared an activity and seemed to follow this structure when I observed them. Only the kindergarten teacher of N3 followed up on an input of one child and changed her planned activity to allow the children to actively participate. The differences in these aspects not only affect the possibilities of activities in a kindergarten, but also affect the view of adults on children. For example, children learn how to communicate with both children and adults, and this is affected by the specific culture in a kindergarten. Are children

allowed to say their opinion in kindergarten and can they influence activities and their daily life?

The second and last sub-question was: how do kindergarten teachers react when confronted with the other country's way to offer activities on numeracy? In a world where we are confronted with different cultures and opinions on a daily basis, it was interesting to observe the kindergarten teachers' reactions when watching a videotaped activity from a kindergarten in the other country. Surprisingly, only one kindergarten teacher was very interested in this alternative educational method from the other country. Therefore, she probably has a reflective attitude (Cooney et al.1998). The other 3 kindergarten teachers expressed that they did not feel that this was something that they would be comfortable to use in their own work, which could be expected since research has shown that longer confrontations are necessary to achieve a change of conception (Grant et al., 1998; Guskey, as cited in Philipp, 2007; von Glasersfeld, as cited in Philipp, 2007).

For future research, it is advisable to investigate and to compare the context of several early childhood education cultures. In this thesis, I compared two rather opposite educational styles. I would recommend to study and compare activities in the early education system of several different countries. The results might induce more interest of the kindergarten teachers in alternative approaches. In addition, also more extensive confrontations with their own activities should be considered. These will probably raise awareness and will reveal both positive and negative sides of their own way of working. This can be compared to the study of Sheridan and Schuster (2001).

To colleges and universities that offer programmes for kindergarten teachers institutions are responsible to educate these young kindergarten teachers and to form their attitudes. I would advise that they add comparative education into the curriculum. This would increase the awareness of the students for their own choices and it would possibly urge them to consider alternative methods of early childhood education. There is already interest and cooperation between the bachelor institutions in early childhood education, more specifically between the Artevelde College in Ghent, Belgium, and the University of Stavanger, Norway. Study trips and even collaboration in research have started. From my recent visits to the Artevelde College in Ghent, it became obvious that the teachers of the bachelor in early childhood education are already aware of and interested in the Norwegian kindergarten culture.

Especially the skills of the Norwegian kindergarten teachers in supporting child-initiated actions are highly appreciated. However, the teachers of the Artevelde College did not agree to what extent they have managed to teach these alternative educational methods to their students. What is needed to create a change in traditions? When teachers at a college change their view of education, newly educated kindergarten teachers might take this with them to the kindergarten, but this is not a guarantee for change. Several partners need to collaborate: not only the previously formed as well as the newly educated kindergarten teachers, but also, and maybe most important, the board of direction of the kindergarten. Furthermore, also support from colleges and universities as well as support from ministries and other involved agencies is essential.

One of the last conclusions of the present study is that kindergarten teachers need to work age-appropriated and, in addition, individually with the children. As discussed previously in chapter 5, a shared goal for up to 25 children is very difficult to achieve. Therefore, there is an urgent need to differentiate, both more difficult and easier, in order to support all children.

In conclusion, this comparative study of early childhood education in Flanders versus Norway showed that the educational methods, including instructional styles and the organization of the activities, were significantly different. This thesis also demonstrated that the majority of the observed kindergarten teachers did not show an open mind towards alternative approaches. A comparative project like this can contribute to a better knowledge on similarities and differences of education, and it can result in the implementation of positive aspects of alternative methods in the own educational work.

7. Summary and conclusion

The main aim of this cross-cultural study is the comparison between the Flemish and the Norwegian kindergartens. The Flemish kindergarten was categorized as part of the pre-primary tradition (OECD, 2006) because of the focus on skills required to start school. The Flemish kindergartens have separate frameworks for private catholic, other private and public kindergartens. The majority of the Flemish kindergartens is catholic (64% of the kindergartens according to OECD, 2006). Both participating kindergarten teachers work in a private catholic kindergarten. The '*Framework plan for the Catholic kindergarten'* (Vlaams Verbond van het Katholiek Basisonderwijs, 2002) is discussed, wherein the development of children is described as a development on eleven different areas.

The Norwegian kindergarten have characteristics most closely related to the social pedagogy tradition (OECD, 2006). The broad concept of their pedagogy is combined care, upbringing and learning. The goal of the Norwegian '*Framework Plan for the Content and Tasks of Kindergartens'* is to provide children with good opportunities for development and activity in close understanding and collaboration with the parents. This means that they take care of the children's needs for care, play, learning and development. The Norwegian framework describes 7 learning areas (Ministry of Education and Research 2006).

Both the Ministries in Flanders and Norway have published detailed descriptions of how to work with mathematics in a kindergarten. The Flemish version is a set of goals that should be worked towards, whereas the Norwegian version is meant as an inspiration for the staff members.

Three kinds of research have been presented: on mathematics, on conceptions and on cross-cultural studies. The use of children's own play as a starting point for teachable moments (Ginsburg & Ertle, 2008; Baroody et al., 2006; Anderson et al., 2008; Clement et al., 2004), was discussed as well as the involvement of staff members with regard to the quality of the mathematics used during the activities (Tudge et al, 2008; Seo & Ginsburg, 2004). The goals put forward by the national frameworks (Bredekamp, 2004) were compared.
Four instructional styles (Grove, 2006; van der Sandt, 2007) were presented, and these were often used during the analysis of the interviews. The possibility of changing conceptions and the description of related research (Grant et al., 1998; Cooney et al, 1998) became an aspect

of the analysis of the second sub-question. Furthermore several research methods for cross-cultural studies were presented, for example questionnaires, interviews, videotaped observations or a standardized scheme (Sheridan & Schuster, 2001; Sheridan, 2001; Jacobs & Morita, 2002).

For the project of this thesis, I chose a comparative study with 4 participating kindergarten teachers: 2 in Flanders and 2 in Norway. In each country, one of the kindergarten teachers worked with children at the age of 3-years old, while the other worked with 5-year old children. All 4 kindergarten teachers showed me an activity with focus on numeracy. Afterwards, they were interviewed. Questions were asked about their own work and they also commented the videotaped activity of the corresponding kindergarten teacher in the other country.

The main research question of this study is the following:

> *What are the differences in focus for an activity on numeracy between kindergartens in a social-oriented versus a preschool-oriented approach?*

It became clear from the interviews that the Flemish and Norwegian kindergarten teachers working with these 2 different educational traditions had a different focus of interest. For the Flemish kindergarten teachers, mathematics starts mainly from *adult-initiated activities* and they also describe mathematics as '*learning'*. The Norwegian kindergarten teachers use mathematics in *everyday situations*, where both *child-initiated and adult-initiated activities* can occur, and they approach mathematics as *'playing'*. The Norwegian kindergarten teachers also stressed the interdisciplinary view on the activities.

The results also show a difference in instructional styles. The instructional method used by the observed Flemish kindergarten teachers showed characteristics of both a *content-focused style with an emphasis on performance* (van der Sandt, 2007) as well as a *classroom-focused style* (Grove, 2006). The Flemish kindergarten teachers are required to follow the Flemish framework and have to support the children in achieving the goals put forward herein. Therefore, their work is based on the *performance* of the children. This also implicates that activities have to be repeated sufficiently so that all children can attain the same skills. When the children have problems with achieving the knowledge, the failure is ascribed to the child. Repeating the same content will result into appropriate learning when children have problems

in a classroom-focused style. Another sign of this is the children's demonstration of knowledge in front of the group, both for practicing and assessments. Sometimes this is done to practice difficult matters with the help of the kindergarten teachers, while other times all children have to do an assignment to evaluate if the children have achieved the aimed goals.

The observed Norwegian kindergarten teachers mainly show characteristics of a *learner-focused style* (Grove, 2006). The kindergarten teachers focus on being curious together with the children and listening to what is of importance to them. They also revise their methods when children show problems of development and put effort in finding good ways to make the children able to learn the same content as compared to the other children. Children also get the chance to practice and to experiment a new content in small groups, in a private atmosphere. They can choose themselves if they want to demonstrate their knowledge in front of the whole group. Finally, motivation of the children is a very important goal of the Norwegian kindergarten teachers. By starting with the play of the children, they use the children's interest as a starting point for further development of knowledge and skills. This is also an aspect mentioned in the Norwegian Kindergarten Act and the Norwegian framework:

> "Children in kindergartens shall have the right to express their views on the day-to-day activities of the kindergarten. Children shall regularly be given the opportunity to take active part in planning and assessing the activities of the kindergarten" (Ministry of Education and Research, 2006, p. 8).

Children are seen as active participants in the kindergarten and this is clearly reflected in the interviews with the Norwegian kindergarten teachers.

The first sub-question is the following:

How do the activities on numeracy differ in these different approaches?

As explained above, the kindergarten teachers described their mathematic activities in different settings. Where the Flemish kindergarten teachers focused on adult-initiated activities, the Norwegian kindergarten teachers used a combination of both adult-initiated and child-initiated activities.

The importance of the differences in ***staff size*** between a Flemish and a Norwegian kindergarten was obvious, which, among others, affected the ***organization***. The Flemish kindergarten teachers often divide the group in small groups but have to split his or her time

between the groups. In contrast, the Norwegian kindergarten teachers can divide the group in small groups with each group having an adult present to support the play and to help each child to succeed. This also has a major impact on the ability to help children with difficulties: with more staff, this becomes easier and possible. Another aspect of the organization is the available area. The Norwegian children had more space for their activities as compared to the Flemish children. This can affect the *content* of the activities. There was a difference in the variety, but this difference was not consistent. For the youngest children, the content was more varied in Flanders while this was the case in Norway for the oldest children.
The *focus of the children* was mostly aimed on the kindergarten teacher, except for N5 where the children were mostly focused on each other and on the game. The *communication* was mostly from the kindergarten teacher to the children in Flanders and the whole group was addressed at once. In Norway, the kindergarten teacher addressed most frequently individuals instead of the group and communication between the children was more common. This aspect had also an effect on the *relations* that were visible during the observation. In Flanders, the children were discouraged to speak or touch each other, to protect the concentration of many children on limited space. The Norwegian children often had eye-contact, spoke to each other and had physical contact. The last discussed aspect is the *flexibility* of the activity. The children did apparently not influence the course of the activity, except for N3 where an action of one boy initiated the largest part of the activity.

The second sub-question is the following:

> *How do the kindergarten teachers react when confronted with another way to offer activities on numeracy?*

As said before, the results can not be generalized due to the fact that only 4 kindergarten teachers were observed, and in addition, because of the differences between the 4 kindergarten teachers. Of all the kindergarten teachers, only the kindergarten teacher of F3 seems to be open to other perspectives and enjoyed the exchange of diverse opinions. This might indicate that she has a reflective attitude. From the theory presented and discussed in chapter 3, this result could be expected. Pajares (1992) says that to change behavior, one must first change one's beliefs, because beliefs act as filters that affect what one sees. von Glasersfeld (in Philipp, 2007) states that teachers who make a serious effort to apply some of a constructivist methodology, only become interested after 5 or 6 weeks. This makes it hard to

change anything by looking at a video of 15 minutes, as has been done for this thesis. Therefore, a more elaborated study is necessary.

A possible risk during this study was my own involvement in the two countries, called researcher bias (Onwuegbuzie & Leech, 2007). To protect the validity of my study, other researchers read my analysis to check my interpretations. But at that time, the data were already collected and there could thus be a risk of unintentional influence. However, during the observations and interviews, I carefully reflected on my own feelings towards the study and on the possible implications. Because of this, I am quite confident that the obtained data are reliable.

Because of limited time, only 2 kindergarten teachers in each country were observed and interviewed. It also became obvious that is was harder to find participants in Norway than in Flanders. But because all kindergarten teachers were interested in mathematics and willing to show their work, this might be a good representation of the styles used in early childhood education in each country.

For future research, I would recommend to include a higher number of participants, also representing different kinds of kindergartens from both countries. Other countries could also be included. In addition, a questionnaire might help to achieve better data material. A standardized test, similar to ECERS as used by Sheridan and Schuster (2001) and Sheridan (2001), could also be used for the observations in the kindergartens. Longer and more observations provide a more accurate and reliable analysis of the diversity and complexity of the cultures. I would also recommend a collaboration between researchers from both countries, as their specific knowledge might help to get a better understanding of nuances of statements in the interviews and of the culture itself. I would also suggest to study the staff of younger children. In Flanders, this is a different institution than the kindergartens, i.e. day-care centers (OECD, 2006). Different views between the staff of day-care centers and kindergarten could be found as well.

Differences in focus will not only be found in mathematics but also in other areas of development. Furthermore, differences can be found in the view on children. Future research can continue with mathematics but can also explore broader aspects of the different cultures.

To get a better view on the evaluation by kindergarten teachers of the activities in a kindergarten in another country, a better and longer confrontation than a video observation might be needed (von Glasersfeld, in Philipp, 2007). I think about study trips for staffs or even trainee programs for students of early childhood education training. More and more colleges and universities offer comparative education courses, where exploration of other cultures is the goal. The experiences of these students during these courses could be a better confrontation, where effects could be more easily achieved. A more detailed comparison of the frameworks will also help to understand the different cultures. In addition, studying how kindergarten teachers understand and implement the framework could be interesting. Further research could also be done on the differences between the political cultures of the countries that influence the kindergartens, for example state funding, support from their ministry, and so on.

Finally, before changes are made, awareness is of utmost importance to realize what is already done and to evaluate if the proposed actions will be positive or negative for the children. Positive actions can improve even more when awareness is present, while negative actions can be discussed and reflected on. Cross-cultural studies, like in this thesis, can reveal positive aspects of educational methods of another country. These positive elements can be adjusted to the needs of a particular kindergarten teacher and, most important, to the needs of the children.

References

Alvestad, M., & Duncan, J. (2006). 'The value is enormous – It's priceless I think!' New Zealand preschool teachers' understandings of the early childhood curriculum in New Zealand – a comparative perspective. *International journal of early childhood*, *38*(1) 31-45

Anderson, A., Anderson, J., & Thauberger, C. (2008). Mathematics learning and teaching in the early years. In O. N. Saracho, & B. Spodek (Eds.), *Contemporary perspectives on mathematics in early childhood education* (pp. 95-133). Charlotte, NC: Information Age Publishing Inc.

Baroody, A. J., Lai, M., & Mix, K. S. (2006). The development of young children's early number and operation sense and its implications of early childhood education. In O. N. Saracho, & B. Spodek (Eds.), *Handbook of research on the education of young children* (pp. 187-221). Mahwah, NJ: Erlbaum.

Bredekamp, S. (2004). Standards for preschool and kindergarten mathematics education. In D. H. Clements, J. A. Sarama, & A. DiBiase (Eds.), *Engaging young children in mathematics: standards for early childhood mathematics education* (pp. 77-83). London: Erlbaum.

Bryan, C. A., Wang, T., Perry B., Wong, N., & Cai, J. (2007). Comparison and contrast: similarities and differences of teachers' views of effective mathematics teaching and learning from four regions. *ZDM, 39*(4), 329-340

Bryman, A. (2001). *Social research methods.* NY: Oxford University

Bø, I. (2002). Barnehagen i et internasjonalt perspektiv. In M. Lea (Eds.), *På vei videre… Jubileamsskrift for førskolelærerutdanningen i Stavanger* (pp. 113-121). Høgskolen i Stavanger.

Clements, D. H. (2004). Major themes and recommendations. In D. H. Clements, J. A. Sarama, & A. DiBiase (Eds.), *Engaging young children in mathematics: standards for early childhood mathematics education.* (pp. 7-76) London: Erlbaum

Clements, D. H., Sarama, J. A., & DiBiase, A. *Engaging young children in mathematics: standards for early childhood mathematics education.* London: Erlbaum

Cooney, T. J., Shealey, B. E., & Arvold, B. (1998) Conceptualizing belief structures of preservice secondary mathematics teachers. *Journal for research in mathematics education, 29*(3), 306-333

De Meyer, I., Pauly, J., & Van de Poele, L. (2005). *Learning for tomorrow's problem. First results from PISA 2003.* Ministry of the Flemish Community, Education department. Ghent: University of Ghent.

Den nasjonale Forskningsetiske komité for samfunnsvitenskap og humaniora (2006). *Forskningsetiske retningslinjer for samfunnsvitenskap, humaniora, juss og teologi*. Oslo.

European Commission for Education and Training (2009). *The Erasmus program.* Retrieved from http://ec.europa.eu/education/lifelong-learning-programme/doc80_en.htm on 19.01.2010

Flick, U., Kardorff, E. V., & Steinke, I. (2004). *A companion to qualitative research.* London: Sage.

Ginsburg, H. P., & Erlte, B. (2008). Knowing the mathematics in early childhood mathematics. In O. N. Saracho, & B. Spodek (Eds.), *Contemporary perspectives on mathematics in early childhood education* (pp. 45-66). Charlotte, NC: Information Age Publishing Inc.

Grant, T. J., Hiebert, J., & Wearne, D. (1998). Observing and teaching reform-minded lessons: what do teachers see? *Journal of mathematics teacher education, 1*(2), 217-236

Grove, C. N. (2006). Understanding the two instructional style prototypes: pathways to success in internationally diverse classrooms. Retrieved from http://www.grovewell.com/pub-classtype-abstract.html on 18.04.2010

Holt, D. G., & Willard-Holt, C. (2000). Let's get real: students solving authentic corporate problems. *Phi Delta Kappan, 83*(3), 243–246

Jacobs, J., & Morita, E. (2002). Japanese and American teachers' evaluations of videotaped mathematics lessons. *Journal for Research in Mathematics Education, 33*(3), 154–175

Karlson Lohmander, M., Vandenbroeck, M., Pirard, F., Peeters, J., & Alvestad M. (2009). New developments. *European Early Childhood Education Research Journal, 17*(3), 407–424

Ministry of Education and Research (2006). *The framework plan for the content and tasks of kindergartens*. Oslo: Ministry of Education and Research.

Monk, R. (1990) *Ludwig Wittgenstein : the duty of genius.* London: Jonathan Cape.

OECD (2001). *Starting Strong, early childhood education and care.* OECD publishing, Paris.

OECD (2006). *Starting Strong II, early childhood education and care.* OECD publishing, Paris.

Onwuegbuzie, A. J., and Leech, N. L. (2007). Validity and qualitative research: an oxymoron*? Quality & Quantity, 41*(2), 233–249

Pajares, M. F. (1992) Teachers' beliefs and educational research: cleaning up a messy construct. *Review of educational research, 62*(3), 307-332

Philipp, R. A. (2007). Mathematics teachers' beliefs and affect. In F. K. Lester, Jr. (Ed.), S*econd handbook of research on mathematics teaching and learning* (pp. 257-315). National Council of Teachers of Mathematics.

Reikerås, E. (2008). *Temahefte om antall, rom og form*. Oslo: Kunnskapsdepartementet.

Saracho, O. N., & Spodek, B. (2008). *Contemporary perspectives on mathematics in early childhood education*. Charlotte, NC: Information Age Publishing Inc.

Seo, K., & Ginsburg, H. P. (2004). What is developmentally appropriate in early childhood mathematics education? Lessons from new research. In D. H. Clements, J. A. Sarama, & A. DiBiase (Eds.), *Engaging young children in mathematics: standards for early childhood mathematics education* (pp. 91-104). London: Erlbaum.

Sheridan, S. (2001). *Pedagogical quality in preschool. An issue of perspectives*. Göteborg: actua universitatis Gothoburgensis. 48-61

Sheridan, S., & Schuster, K-M. (2001). Evaluation of pedagogical quality in early childhood education: a cross-national perspective. *Journal of Research in Childhood Education, 16*(1), 109-124

Tudge, J., Li, L., & Stanley, T. K. (2008). The impact of method on assessing young children's everyday mathematical experiences. In O. N. Saracho, & B. Spodek (Eds.), *Contemporary perspectives on mathematics in early childhood education* (pp. 187-215). Charlotte, NC: Information Age Publishing Inc.

van der Sandt, S. (2007). Research framework on mathematics teacher behaviour: Koehler and Grouws' framework revisited. *Eurasia Journal of Mathematics, Science & Technology Education, 3*(4). 343-350

Vlaams Verbond van het Katholiek Basisonderwijs (2002). *Ontwikkelingsplan voor de katholieke kleuterschool.*

(Flemish association for catholic education: Framework for the catholic kindergarten)

Vlaams Verbond van het Katholiek Basisonderwijs (2002). *Wiskunde: leerplan.* (Flemish association for catholic education: curriculum for mathematics)

Wertsch, J. V. (1985). *Vygotsky and the social formation of the mind.* Cambridge: Harvard University Press.

Appendix A: Interview guide

The interview has two parts. In the first part, questions are asked on the kindergarten teacher's own work and on the observed activity. The second part deals with the reactions of the kindergarten teacher when observing an activity in the kindergarten of the other country.

The questions listed below were used in the first part of the interview. More follow-up questions were used depending on the answers given by the kindergarten teachers.

- How often do you have activities with focus on mathematics or numeracy?
- Can you give an example of a child that used numeracy? How did you react on this?
- Do you often see the children using mathematics without your intervention?
- How often do you start an activity on numeracy? Can you give an example?
- How do you choose the theme of that activity? Is this teacher- or child-initiated?
- What are important aspects of an activity with mathematics?
- What goals do you have with such an activity?
- How do you help children to learn how to count?
- How do you help a child that does not count as well as the others?
- How would you describe your own activity?
- What do you think the children have learned from this activity?
- How would you take your own activity to the next level?

During and after observing the videotaped activity of the other country, the kindergarten teachers were asked to give reactions on the following questions:

- How would you describe this activity?
- What goals did the kindergarten teacher have?
- How did you experience this activity?
- How do you think the children experienced this activity?
- What parts would you like to use in your own work?
- How would you take this activity to the next level?

Appendix B: Letter with information to the kindergarten teachers, Dutch version

Oproep aan kleuterleidsters om deel te nemen aan een observatie en een interview in verband met een thesis

Ik ben een masterstudent aan de Universiteit van Stavanger, Noorwegen, en ik ben nu bezig met mijn eindwerk. Het onderwerp van mijn eindwerk is wiskunde in de kleuterklas, en ik onderzoek hoe kleuterjuffen wiskunde geven in de kleuterklas. Ik ben geïnteresseerd in de verschillen en overeenkomsten tussen kleuterklassen in België en Noorwegen.

Om dit te onderzoeken, wil ik een kleuterjuf observeren en interviewen. Ik wil een activiteit observeren met als thema wiskunde in de kleuterklas. De activiteit kan u natuurlijk zelf kiezen en zal worden gefilmd. De video van deze activiteit zal later worden gebruikt in het interview, en wordt ook getoond in een interview met een Noorse kleuterjuf.
In het interview stel ik vragen over de verschillende soorten van activiteiten, het gebruik van wiskunde. Tijdens het interview kijken we ook naar een wiskunde activiteit van een Noorse kleuterschool. Het gesprek wordt opgenomen met een tape-recorder en ik maak aantekeningen terwijl we praten. Het interview duurt ongeveer één uur, en de tijd en plaats spreken we samen af.

Het is vrijblijvend om mee te werken en u kan altijd de samenwerking verbreken, zonder dat nader toe te lichten. Alle gegevens die verzameld worden, worden geanoniemiseerd. De informatie zal vertrouwelijk worden behandeld. De interviews en de opnamen worden vernietigd wanneer mijn eindwerk af is of ten laatste in december 2010.

Als u wilt deelnemen aan het interview, kan u de bijgevoegde toelating teruggeven aan mij.

Als u vragen heeft, kan u me bellen op 004748355993 of stuurt u mij een email (karenleclercq@hotmail.com). U kunt ook contact opnemen met mijn begeleider Reidar Mosvold op het telefoonnummer 004751832342.
Het onderzoek werd gerapporteerd aan het Noors Instituut ter Bescherming van de Privacy.

Groeten
Karen Leclercq

Knip hier_____

Toelating:

Ik heb informatie gekregen over de studie met als thema wiskunde in de kleuterklas en wil graag meewerken.

Handtekening..... Telefoonnummer.....

Appendix C: Letter with information to the kindergarten teachers, Norwegian version

Forespørsel til pedagogisk leder om å delta i observasjon og intervju i forbindelse med en masteroppgave

Jeg er masterstudent i barnehagevitenskap ved Universitetet i Stavanger og holder nå på med den avsluttende masteroppgaven. Temaet for oppgaven er matematikk i barnehage, og jeg skal undersøke hvordan førskolelæreren legger til rette for matematikk i barnehagen. Jeg er interessert i å finne ut om det er forskjeller og likheter mellom førskolelærere i Belgia og Norge.

For å finne ut av dette, ønsker jeg å observere og intervjue en førskolelærer. Jeg ønsker å observere en aktivitet med fokus på matematikk i deres barnehage. Aktiviteten er selvfølgelig fritt valgt og skal bli filmet. Videoen av denne aktiviteten blir vist i en intervju med en Belgiske førskolelærer.
I intervjuet skal spørsmålene dreie seg om forskjellige slags aktiviteter, nytte av matemattik og diskusjon om hvordan Belgiske førskolelærere tilrettelegger for matematikk. I intervjuet ser vi også på en matematikkaktivitet fra en Belgiske barnehage. Jeg vil bruke båndopptaker og ta notater mens vi snakker sammen. Intervjuet vil ta omtrent en time, og vi blir sammen enige om tid og sted.

Det er frivillig å være med og deltageren har mulighet til å trekke seg når som helst underveis, uten å måtte begrunne dette nærmere. Dersom deltageren trekker seg vil alle innsamlede data om deg bli anonymisert. Opplysningene vil bli behandlet konfidensielt, og ingen enkeltpersoner vil kunne kjenne seg igjen i den ferdige oppgaven. Opplysningene anonymiseres og opptakene slettes når oppgaven er ferdig, innen utgangen av 2010.

Dersom dere har lyst å være med på intervjuet, er det fint om dere skriver under på den vedlagte samtykkeerklæringen og sender den til meg.

Hvis det er noe dere lurer på kan dere ringe meg på 48355993, eller sende en e-post til karenleclercq@hotmail.com. Dere kan også kontakte min veileder Reidar Mosvold ved institutt for førskoleutdanning på telefonnummer 5183 2342.
Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S.

Med vennlig hilsen
Karen Leclercq

Klipp her_____

Samtykkeerklæring:
Jeg har mottatt informasjon om studien av matematikk i barnehage og ønsker å være med på intervju.
Signatur ……. Telefonnummer ……..

Appendix D: Letter with information to the parents, Dutch version

Oproep aan de ouders van de kleuterklas om uw kind te laten deel nemen aan een observatie in verband met een thesis

Ik ben een masterstudent aan de Universiteit van Stavanger, Noorwegen, en ik ben nu bezig met mijn eindwerk. Het onderwerp van mijn eindwerk is wiskunde in de kleuterklas, en ik onderzoek hoe kleuterjuffen wiskunde geven in de kleuterklas. Ik ben geïnteresseerd in de verschillen en overeenkomsten tussen kleuterklassen in België en Noorwegen.

Om dit te onderzoeken, wil ik een kleuterjuf observeren en interviewen. Ik wil een activiteit observeren met als thema wiskunde in de kleuterklas. De activiteit wordt gekozen door hun eigen kleuterjuf en de kleuterjuf wordt gefilmd tijdens de activiteit. De video van deze activiteit zal gebruikt worden in een interview met een Noorse kleuterjuf.

Het is vrijblijvend om mee te werken en u kan altijd de samenwerking verbreken, zonder dat nader toe te lichten. Geen informatie over de kinderen wordt bewaard. De interviews en de opnamen worden verwijderd wanneer mijn eindwerk af is of ten laatste in december 2010.

Als uw kind mag gefilmd worden tijdens de observatie, kan u de bijgevoegde toelating teruggeven aan de kleuterjuf.

Als u vragen heeft, kan u me bellen op 004748355993 of stuurt u mij een email (karenleclercq@hotmail.com). U kunt ook contact opnemen met mijn begeleider Reidar Mosvold op het telefoonnummer 004751832342.
Het onderzoek werd gerapporteerd aan het Noors Instituut ter Bescherming van de Privacy.

Groeten
Karen Leclercq

Knip hier_____

Toelating:

Ik heb informatie gekregen over de studie met als thema wiskunde in de kleuterklas en laat toe dat mijn kind gefilmd wordt tijdens de observatie in de kleuterklas

Naam van mijn kind.....
Handtekening..... Telefoonnummer.....

Appendix E: Letter with information to the parents, Norwegian version

Forespørsel til foreldre om å la barnet delta i observasjon i forbindelse med en masteroppgave

Jeg er masterstudent i barnehagevitenskap ved Universitetet i Stavanger og holder nå på med den avsluttende masteroppgaven. Temaet for oppgaven er matematikk i barnehage, og jeg skal undersøke hvordan førskolelæreren legger til rette for matematikk i barnehagen. Jeg er interessert i å finne ut om det er forskjeller og likheter mellom førskolelærere i Belgia og Norge.

For å finne ut av dette, skal jeg observere og intervjue en førskolelærer i deres barnehage. Jeg ønsker å observere en aktivitet med fokus på matematikk i deres barnehage. Aktiviteten er valgt av deres egen førskolelæreren og skal bli filmet. Videoen blir senere brukt i intervju med deres egen førskolelærer og en førskolelærer i Belgia. Barna blir aldri navngitt.

Det er frivillig å være med og dere har mulighet til å trekke deres barn når som helst underveis, uten å måtte begrunne dette nærmere. Dersom dere trekker deres barn vil alle innsamlede data om deres barn bli anonymisert. Opplysningene vil bli behandlet konfidensielt, og ingen enkeltpersoner vil kunne kjenne seg igjen i den ferdige oppgaven. Opplysningene anonymiseres og opptakene slettes når oppgaven er ferdig, innen utgangen av 2010.

Dersom dere samtykker at deres barn kan bli filmet, er det fint om dere skriver under på den vedlagte samtykkeerklæringen og sender den til meg.
Hvis dere ikke samtykker at deres barn kan bli filmet, får barnet mulighet til å være med på en annen aktivitet.

Hvis det er noe dere lurer på kan jeg nåes på 48355993, eller på e-post til karenleclercq@hotmail.com. Dere kan også kontakte min veileder Reidar Mosvold ved institutt for førskoleutdanning på telefonnummer 5183 2342 .

Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S.

Med vennlig hilsen
Karen Leclercq

Klipp her_____

Samtykkeerklæring:
Jeg har mottatt informasjon om studien av matematikk i barnehage og samtykker at mitt barn blir filmet i observasjon i barnehagen.
Navn til mitt barn: .....

Signatur ……. Telefonnummer ……..