Working methods and different ways to teach
- a study made on a school in Barbados.
Abstrakt

Syftet med denna rapport är att redogöra för de olika arbetssätt och arbetsformer som används under matematikundervisningen på en grundskola i Barbados. Vi har undersökt om det fokuseras på abstrakt eller konkret matematik samt hur de använder sig av det matematiska språket i sin matematikundervisning, då vi anser att språket har en stor roll i inlärningen. Vi har observerat matematiklektionerna samt intervjuat utvalda pedagoger på skolan, utifrån dessa undersökningsscheman har vi fått fram ett resultat som analyseras och diskuteras i slutet av rapporten. Resultatet av undersökning visar att den abstrakta matematiken, individuellt arbete med matematikboken, är den undervisningsmetod som används mest på skolan.

Nyckelord

Matematik, Barbados, arbetsmetoder, arbetssätt, undervisning

Abstract

The purpose of this report is to explain the different ways to teach mathematics and working forms used in mathematics education at a primary school in Barbados. We have investigated whether it is focused on abstract or concrete mathematics and how they make use of the mathematical language in their mathematics teaching, as we believe that language has an important role in learning. We have observed mathematics lessons and interviewed selected teachers at the school. Based on these research methods, we have produced a result that is analyzed and discussed at the end of the report. The results of the survey show that the abstract mathematics, individual work with mathematics book, is the teaching method used most at school.

Keywords

Mathematics, Barbados, working methods, different ways to teach, teaching
# Table of Contents

1. Introduction .................................................................................................................. 3  
   1.1 Information about Barbados ................................................................................... 3  
      1.2.1 The school system in Barbados ...................................................................... 4  
2. Purpose of this research ............................................................................................. 5  
   2.1 Purpose and issue's of the study ............................................................................. 5  
3. Theoretical Background .............................................................................................. 6  
   3.1 Working forms and methods .................................................................................. 6  
      3.1.1 Group work ..................................................................................................... 6  
      3.1.2 Individual work ............................................................................................... 7  
      3.1.3 Problem solving .............................................................................................. 8  
   3.2 From abstract to concrete through representation forms ...................................... 8  
      3.2.1 Mathematics and conversations .................................................................... 9  
4. Method .......................................................................................................................... 11  
   4.1 Qualitative Study .................................................................................................... 11  
      4.2 Selection ............................................................................................................... 11  
      4.3 Choice of methods .............................................................................................. 11  
      4.3.1 Observations .................................................................................................. 12  
      4.3.2 Interviews ...................................................................................................... 13  
   4.4 Ethical Considerations ............................................................................................ 14  
5. Results .......................................................................................................................... 15  
   5.1 Abstract or concrete mathematics, and why is one preferable over the other? ...... 16  
   5.2 What ways of working are preferred, and why? .................................................... 17  
      5.2.1 Group assignment ........................................................................................... 17  
      5.2.2 Individual assignment ................................................................................... 17  
      5.2.3 Problem solving ............................................................................................. 18  
      5.2.4 Materials ......................................................................................................... 18  
      5.2.5 Mathematic conversations .............................................................................. 19  
6. Analysis ........................................................................................................................ 21  
   6.1 Abstract or concrete mathematics, and why is one preferable? ............................ 21  
   6.2 Group work ............................................................................................................ 21  
   6.3 Individual work ....................................................................................................... 22  
   6.4 Problem solving ...................................................................................................... 22  
   6.5 Materials ................................................................................................................ 23
1. Introduction
The teaching profession is something that we have always been interested in, and we consider it to be one of the most important professions in the world. Teachers have an important role from many points of views, both socially and knowledge-wise. Even if all of the subjects in school are extremely important, we believe that mathematics is one of those subjects that will always be useful. You can find mathematics everywhere, from counting how many people there are in a room - to know how much it will cost to pay your bills.

In 2012 we received a scholarship from the organization Sida of 25,000 Swedish kronor. With this economical precondition we went to Barbados to observe the mathematics education. We thought this would be incredibly interesting project to be able to take part of their education and see how they run their operations. We planned to spend nine weeks on Barbados where we through observations and interviews on a school would study our research questions. That we will be presented further on in this essay. We were to make these observations in both higher and lower years, ages five-eleven. We planned to interview the teachers from the different years about how they teach mathematics. This would be an educational moment to be able to take part of mathematics and its educational preferences in a different country.

Both of us have gone to Swedish schools, and we have studied the Swedish school during our teacher educations but we believe that we can learn much more about the way children think and learn, if we look beyond the borders of Sweden. To investigate other countries ways of teaching and view children from other cultures - we believe that we can help not only ourselves, but everyone who reads this essay, to understand the learning process better.

The background to why we chose to study mathematics is that we have noticed, during earlier internships and in different school situations, that most educators we have met today often use abstract mathematics when teaching. Math books have pretty much always been in the center for educator’s way of teaching, and they have relied on them to meet the requirements needed for mathematical skills. In the classroom there should be various ways of working and different forms of working to capture student’s possibilities to engage mathematics in different ways and methods. Students have different needs in the classroom that must be met and be taken seriously (Ahlström, 1996). We believe that conversations about mathematics content should permeate the lectures, to talk and discuss different mathematical problems, so that the students get an understanding of the basics of maths.

1.1 Information about Barbados
Barbados is an island in the Caribbean that is located in the east and the official language is English. The island itself is not more than 430,00km2 and is rated to have the highest GDP (Gross domestic product) in all of Caribbean. The sugar industry has previously been the country’s main income, but lately tourism has taken over more and more. Barbados has a tropical climate with a rain period that reaches from July to November. In the end of summer there is a risk for hurricanes (http://www.landguiden.se/).

Almost all of the population has roots in Africa. Barbados is rated as one of the most populated countries in the world and is under constant development. Today, Barbados is on 38th place of the UNDP’s (United Nations development programme) human development index. This is a scale where they measure the human development in a country by combine the expected welfare, educational level and income (http://hdrstats.undp.org/).
The island have many influences from Great Britain, and is sometimes called "Little England", even the schools have similarities with England. Principals have a high status and education is internationally considered to be very good (http://www.landguiden.se/). Barbados became an independent country at 1966 and until then the island was ruled by the British, although is the British monarch still the island’s domination. The English heritage can also be seen everywhere, which describes the nickname. Some examples of the British influences on the island are that they drive on the left side of the road and the biggest sport is cricket as well as horse racing and polo which also are popular (Ver Berkmoes 2008). The culture on Barbados can be described as a mixture of influences from both USA and England and is called “bajan”. Bajan is also a designation to their language which is English but with clear influences of the African. The recording artist Rihanna is from Barbados and is therefore a connection to the American culture as well as the American hip hop and NBA that is also popular on the island (Ver Berkmoes 2008).

1.2.1 The school system in Barbados
There are several reasons to why we chose Barbados for our empirical investigation. It would be interesting to see how their educational system looks like. We knew since before that the country is an old English colony and has a strict form of schooling. School uniforms are used, so that every individual becomes a part of a community. The teachers have authority, a clear leading position that the student respect and considers a good role model. Barbados is a country far away from Sweden and Europe, and therefore we thought it would be interesting to take part of their educational system and see how it works in the Caribbean. The schools consist of British standards and elementary school is free and mandatory, 95% of the children go to school (2008). 99% of the population has reading and writing skills. The schools on Barbados are considered to have a high standard (http://www.landguiden.se/).

According to observations and discussions with the staff we have come up with the following: The teachers and the principal had a lot of authority, and every time a teacher or the principal entered the classroom, the student stood up and sang a welcoming song. All the children had identical school uniforms except Thursdays and special occasions, where the students had their scout uniforms or specially chosen school uniforms. Despite all these rules, which felt strict from our point of view, the school itself seemed to be relaxed and a fun place for the students. Also the teachers liked their work place. They had no particular dress code, except that the clothes they wore should cover their body. They were in no means strict or harsh against the students. The principal claimed that these rules are the same on every school in Barbados, but others are stricter, where teachers are obligated to wear suits and the expectations on students are much higher.

It was a small school, which was built out of barracks. There are no closed doors, and every classroom has two big open doors, even if other classes were on a break and were playing outside. During one of the observations in a special class for juniors, a rooster walked into the classroom, and none of the students reacted on it. Their concentration was high even though you could hear the sound of playing children and animals walking around in the classroom. Except the significant differences in appearance of the school, there was a difference in ages. The children start going to school at the age of 3, where they go to a grade that was called ‘infants’. They went there until the age of 6, and then they went on to the next grade which was called ‘juniors’, where they went until the age of 11.
2. **Purpose of this research**

Our essay focused on the mathematics teaching in a school in Barbados. We wanted to get personal experience that we could use in our future profession. We focused on working methods and ways of working and how the educators teach mathematics to their students. We wanted to study the use of abstract and concrete mathematics, to see whether there was only one way being used, or one being used more than the other. Another important part we studied were the use of different tools and materials that were available, to see if they were used, and in that case how they were used. We also investigated the importance of language use when it comes to mathematics.

2.1 **Purpose and issue’s of the study**

The purpose of the study was to investigate which forms and methods there is to teach mathematics on a school in Barbados. In simpler words this work was about teaching methods, working ways and working methods.

The purpose is divided into the following issues;

- What does the mathematics education look like? Is it focused on abstract or concrete mathematics, and in that case, why is one preferable to the other?

- What ways of working are preferred, and why?
3. Theoretical Background

This section is going to address the previous research of the issues we have stated above. The theories will be helpful to understand our issues and their background. We will bring up working forms and methods, group work, individual work, problem solving, from abstract to concrete through representation forms and mathematical conversations.

3.1 Working forms and methods

Students future knowledge is in the hands of the pedagogue. Choosing approach and a form of work that suits the individual person is a choice that can provide long-term consequences, both negative and positive. Earlier, the type of teaching that has been going on in schools, has not been effective and fully working for all the students and because of that, the schools has to vary their teaching to get a result that is as pleasing as possible (Löwing & Kilborn, 2009). Teachers today must base their education on an individual classroom work and encourage conversations, discussion and reflection. The traditional teaching must become more modern and contribute to more various working strategies (Unenge, Sandahl & Wyndhamn, 1994).

Amongst students in the middle classes, it is obvious that the interest of mathematics is low. There could be two reasons for this decreasing interest. To weaker students, it could be about not understanding and thereby losing interest. To the stronger students, the reason could be that it is not challenging enough, and they on the other hand lose their interest as well. Berggren and Lindroth (2011) writes that “In the schools where students do not lose interest, there was a clear common denominator. In these places, the students take part in a varied teaching, a teaching beyond mathematics book also made use of investigative and laboratory activities where problem solving and communication were important elements” (Berggren & Lindroth, 2011: 11, our own translation).

When you, as an educator are supposed to choose an appropriate way of working, it is of great importance that you choose from the purpose of the task in mind. And you must not forget that, as a teacher, you must increase student’s interest and confidence before mathematics (Ahlström, 1996).

A student may come with weak prior knowledge to a new class. Interest is low and confidence tarnished. The student are increasingly uninterested, self-confidence declines further and knowledge absent. It is this negative spiral that must be broken (Björklund & Grevholm, 2012:43, our own translation).

If this evil circle is broken, student’s interests in mathematics will increase and thereby the motivation will increase, which will lead to improved knowledge for the students. With interest, motivation and knowledge in mathematics – confidence come by itself. An evil circle will then develop to a positive development amongst the students (Björklund & Grevholm, 2012).

3.1.1 Group work

Group work is a way of working where students get to compare, discuss and put together their different knowledge, skill and interpretation. Students get to practice cooperation in organized forms, listen to each other and cooperate in a group. Sitting in groups with many students, or by forming groups of two is also a part of group work (Arfwedson, 1972). Group work can also be theme work, couple training or a common task. The biggest method of group work is that the group gets an assignment that they are going to solve together. All parts of the group help each other with the solution of the task, and the teacher is supposed to make sure everyone participates. The group is not ready until everyone has solved the task and has come
to a conclusion. The teacher’s job is to make sure every student gets to speak and account for their conclusions (Hensvold, 2006).

Hensvold (2006) claims that the teacher must capture all students with group works. To do that, strict instructions from the teacher are needed, what is going to be done, how is it supposed to be done and why is it supposed to be done. The students need to get an understanding about how, what and why they are going to do assignments in groups. The tasks must be adequate and all students must participate. Prepare students for the group work, with easy assignments to get them started, and the harder tasks in the end. The teacher must contribute with good group connection and help students to get started with discussions and work. The school must aim for student space (2006).

The student must be able to discuss, argue and work their mathematical reasoning with each other. They must help each other and share knowledge amongst them. By doing a task alone, it does not benefit analysis or argumentation for a solution (Ahlström, 1996).

Individual silent counting and joint reviews of the tasks dominates the lessons. Students receive good training to count, but not the opportunity to analyze and solve problems, argue for their solutions or consolidate concepts. [...] The difficulty to individualize teaching disadvantage not only students who are unable to solve problems on their own, but also students who are able and willing to solve more complex problems (Ahlström, 1996:11, our own translation).

By not giving the students time to reflect and converse with each other, does not only effect the weak students, but also those who are willing to work with harder tasks, since they are not given the chance to develop their way of thinking (Ahlström, 1996).

3.1.2 Individual work
Individual work is most commonly performed by teaching an entire class first. The teacher by the board, and shows, or explains a problem or a math problem. After that, the students get individual assignments to work with. Most commonly the students work alone with their math books. The teacher then walks around and helps the students. Working by the board and then handing out individual work to the students, is the dominating work way in Swedish schools, according to Hensvold (2006).

Hensvold (2006) argues that the most important part of individual work is that students are able to take responsibility for their own teaching. Students get an opportunity to develop in their own pace and get to work based on their own conditions. Students use a planning book, where they themselves, get to plan how they are going to work and how much work that should be done. Student does not help each other, but develop themselves after their abilities. They sit by their desks and work from their books. The teacher often has briefings in the board, but after that it is up to every single student to complete the tasks themself. Mostly, they get help from the teacher and not from each other, which could have been a good aid in the development (Hensvold, 2006). Hensvold (2006) also argues that the weaker students have hard time learning from individual work, and the stronger students are learning more. The individual work often highlights the social indifferences between students (2006).
3.1.3 Problem solving

The definition of what problem solving is differs from person to person. Some claims it is a task that contains a problem in a text, while others mean that all assignments are problems. It does not matter if the assignment has a text or not, it can still be a problem (Löwing & Kilborn, 2009). One problem is more accurately a task that is not a routine task or standard task, it is a task that requires students want or need to solve the task, and that there is no given suggestions. Many also believe that it requires some effort from the students to solve the task (Björklund & Grevholm, 2012). One example of a problem in text is “Amanda and Timo are making the tables for the class party. Six children are able to sit at one table. How many children can be seated at four tables if they are lined up next to each other?” (2012:209, our own translation).

Every day we encounter different problems that must be solved by using mathematics. The aim for problem solving in our education is that everybody gets to develop their ability to solve these problems. The students must learn to use all their previous skills to solve a problem. They must think, reflect and solve the problem with their mathematical skills (Ahlström & Wallby, 2000).

Instead of the term problem solving, there is another term – problem management. This term can be described as a way to problem solving. Students must learn to handle the problem before they actually solve it. They must reflect and gather their knowledge to solve the problem. To handle a problem each student must ask questions and discuss amongst themselves; What happens if I do this? What method should I use? How do I use the chosen method (Unenge, Sandahl & Wyndhamn, 1994)? Björklund and Grevholm (2012) writes that “through problem solving, they may develop a way of thinking that can be used in other situations” (2012:216, our own translation).

3.2 From abstract to concrete through representation forms

The definition of mathematics say it is an abstract topic, this does not Löwing and Kilborn (2009) agree with. The teacher’s role of mathematics in primary school is to concretize it so that all children can find connections between mathematics and their everyday lives. In higher grades where mathematics become even more abstract, it is not about students going from the concrete, but to be able to understand the abstract by always being able to think back to the concrete (2009).

In Matematik – ett kommunikationsämne Ahlström (1996) writes about a way of working that means that you should involve five parts in your education: Laborative models, written symbols, around-the-world-situations, speaking symbols and pictures. By using a way of working that includes all these parts in the education, the students do not only get to write and read in their math books (1996).

Learning mathematics is a process where the goal is insight into abstract structures and relations. But to get there, we know as a teacher can not just work and train with symbols. You have to "talk math", "link to reality", "work laboratory", "start with the concrete", "learn to think" (Ahlström, 1996:15, our own translation).

The quote describes the importance of having the five parts listed above, and why it is important to children that teachers have various ways and forms of working and teaching.
Research has been done on children’s understanding in mathematics. Children build up an understanding when they can connect and find connections between different mathematical figures or calculations. Unfortunately, teachers often put too much weight that students should repeat the numbers and problems daily. One example of this could be when students, daily, gets to talk and go through the calendar in the hope that they will learn the order on the numbers. Although it is a common practice to teach students, it has ”found that although the children repeat what date it is every day, they still doesn't learn the arrangements of numbers” (Ahlberg & Wallby, 2000:61, our own translation). In order to build and understanding of mathematics in children, the teacher must give them a connection between mathematics and their everyday lives. It is through the experience of their own daily lives as students can learn mathematics, these experiences can be found in all sorts of routines in the children’s life during the day, such as in games or in baking. The key is to take the abstract mathematics and make it real for kids (2000). One way to do this is to work with materials during math lessons.

The school provides many opportunities for the use of laboratory materials, especially in the lower grades. By allowing students to explore numbers and connect abstract symbols to concrete materials, they create and understanding of the abstract. If students are free to create or collect their laboratory materials, it becomes automatically to reflect and to question what they are investigating. To work with materials elaborative furthers the students’ ways to view and understand the numbers they are working with. They should be able to break the numbers down, and then rebuild it. ”The intention is to concretise numbers and also give children stimulation and variety” (Ahlberg & Wallby, 2000:52, our own translation).

To a teacher, it is very important today that they base their education on the students’ everyday lives, and the experience that they already have. Instructions will address both theoretical mathematics and practical mathematics by the students to explore and get to try different kinds of materials (Ahlberg & Wallby, 2000). Laboratory materials will not come totally without problems, if you do not vary your material there is a big risk that many students does not want or are able to make it without the material he or she have been introduced to. The fear that can be built up can also affect it the other way. Some students might not want to use elaborative material because the fear of what others in class will think about him or her (2000).

3.2.1 Mathematics and conversations
Mathematics is all around us, we are surrounded by mathematical words and concepts such as patterns and symbols. Children often have difficulty expressing themselves with words when it comes to mathematics, and therefor it is important for the educator to introduce it early. Being able to express what you have done as a student and how you completed it is an important learning process. Children are treating their own language best, it is a tool that every educator should use in learning processes (Ahlström, 1996).

Sterner (Ahlberg & Wallby, 2000) argues that language play an important role in the learning process of students. Language lead individuals forward in their way of thinking and they develop an understanding of the task. The ability to create new ways of thinking means that you can socially reason with other people. Bringing students together in groups where they are supposed to solve the same task, draw pictures and converse about the problem. It opens up for the individuals’ understanding that the educator is trying to reach. When students understand mathematics, it becomes more fun and they understand why they are learning. It is important that the educator let students develop in their own pace, since motivation is lowered if you try to stress it or show symbols that the student can not understand too early.
Wistedt (in Ahlström, 1996) suggests that through conversations, the children get an opportunity to express themselves with other individuals. It is extremely important what way the teacher looks upon conversations with students, as well as conversations between students, since it affects the students learning. It is important that the students understand each other and the teacher to influence the conversations in a positive way. That way it will be a good learning opportunity when the students are sitting in groups (1996).

It is not enough to hand out a task and let the students solve, argue and listen to other students. Some students need help with this communication. The educator needs to realize that it is not enough to just hand out a task and let the students discuss it freely. Wistedt (in Ahlström, 1996) claims that the educator needs to help the communication. Students need help from an educator with they understand and how they express themselves. The teacher needs to show the students the right way to a good and working communication that benefits the solution of the problem. There must be an interaction between students and the teacher, so that the conversations can contribute to a good way of teaching, according to Wistedt (in Ahlström, 1996).
4. Method
In this chapter we will bring up our chosen methods to complete our investigation. Why these methods are good to our investigation, will be explained later on in the text. We will describe our chosen methods thoroughly. The methods are observations and interviews. The chapter will also contain the ethical dilemmas we put ourselves up to, considering we come from another country and meet their culture.

4.1 Qualitative Study
Dalen (2007) argues that the qualitative method means to obtain a deeper understanding of how people perceive their environment and how humans adapt to this reality. The qualitative method should try to take the respondent's perspective and take part of his person's perception of the driving operations (Dalen, 2007). In order to provide relevant input to our work, our data was collected through interviews and observations.

4.2 Selection
During our collection of empiricism we were, as mentioned earlier, in Barbados and collected our information through interviewing the staff at the school and observing the mathematical classes. In total we observed four classes on different occasions, the ages in the different classes were from four years old and up to ten years old. All together, we interviewed three teachers from the staff, the rest of our empiricism come from discussions with teachers and the principal as well as from observations. We chose who to interview based on their work assignments at the school. We wanted to get as big of a picture as we could get, and therefore chose people from all parts of the school. Since we considered it to be a lot of difficulties in doing qualitative interviews with children, we chose to interview teachers and special education teachers. We did not contact the school ourselves, we did not have a choice in which school to investigate.

To make sure the staff is completely anonymous, we constructed new names that are in no way linked to the school where we did our research.

Principal: Maria
Teacher for junior class three: Rut
Teacher for infants class two: Siv
Special education teacher for juniors: Sofia

4.3 Choice of methods
We chose to use observations and interviews to complete our investigation. We considered observations as a good method to investigate, since we knew what to observe. We also thought that we got a freedom to design our observations the way we wanted. Through only observations we would not be able to see everything we wanted to see, since we had a short time doing it. Therefore, we had to use interviews as a supplement to get the information we needed to complete our work. We recorded all interviews so we later on could go back and listen to our interviews if we needed. By using these methods we hoped to get a base to stand on that was as wide as could get to complete our work.

The advantages of the observational method is that it is simple to use and it is a rewarding method when it comes to collecting data of behavior in educational contexts. The Interview method advantages is that it provides the knowledge about individuals’ values and their own thoughts as opposed to the observational method. Disadvantages of this method is that it is difficult to handle, one must have an understanding of how the interviews is supposed to go in order to get a successful results (Johansson & Svedner, 2010). Below we have described the
different methods further and also written more about the pros and cons with the chosen methods.

4.3.1 Observations
Through observations, we observed and analyzed our issues. We observed as much as possible. We had nine weeks in Barbados to observe the smaller children in the school, in ages five to seven, as well as the children in the ages eight to eleven, and we also observed the special education. All observations was made when the students had mathematic classes. We observed and analyzed the working ways and forms of education, and the questions described above. Johansson and Svedner (2010) argues that observations are being used more and more often in graduation essays. It has become a good way to get the information you need to your work. Through observations and complementing with interviews and surveys, you are able to collect information in a good way. When it comes to education processes, observation is probably the most important and most giving method to collect information. Our work was about teaching methods, working ways and working methods. And in this case, observation was the most giving method according to us, as well as according to Johansson and Svedner (2010). There are a lot of different observation methods to choose from, tallying, critical incidents, journals, sociograms and running observations. It is important that you start by creating an observation manual before you start to observe (Johansson & Svedner, 2010). Below follows some observation advices and the observation methods we used during our work. According to Johansson and Svedner (2010) the most important thing to start with is an observation manual that you will carry with you through your observations. You start by introducing yourself to the students and the teachers, before you start to observe. Here follows some advices we had in mind when we observed:

- Note the observers name, time, place etc. Does the observer work alone or in pair? Is the observer mobile or is he/she sitting still: Placement in the classroom.

- What is going to be observed? Who is going to be observed? Is the observer one person, or a whole class?

- Time position

- What aids will the observer have? Paper and pen, or taping equipment?

It is good to carry an observation form with you, for example an A4-page. That, since it becomes easier to structure your observation. It also becomes easier for the observer to take notes of the same things every lecture (Johansson & Svedner, 2010). This manual was an instrument that was used when we conducted our observations. We used running observations in the classroom, where we observed all of the mathematic education. Our observations was supposed to observe all of the class, and the class as a whole. Johansson and Svedner (2010) states that running observations is a good and appropriate method when you are going to observe education that goes on for a longer period of time. There will be a good pre-work that comes out in the questions that are going to be registered through the observations. They shall be free from our own opinions and values. We took notes on what was happening and did not write our own thoughts about the situation. Johansson and Svedner (2010) argues that this type of study, observation, gives a good picture of how the lessons are implemented and how their classroom culture looks like.
4.3.2 Interviews

There are two different types of interviews, the structured interview form and the qualitative interview form. The latter form is the most commonly used when working with the thesis within teacher education (Johansson & Svedner, 2010), it is also the form that we have chosen to work with. The structured interview has predetermined topics for discussion and questions and documenting the responses via writing. The qualitative interview gives more freedom for both the interviewee and the interviewer, only four points are predetermined and the issues may be different from one interview to another, depending on how the questions are answered. Because this form can take up much more than the former, it may be too much to document, therefore mostly used a voice recorder, tape recorder or other recordable technology to document what has been said (2010).

When we conducted our interviews there were things we needed to think about ahead of time, there was a risk that the qualitative interview did go over to a structured interview if we had not prepared for it. The interviewee might feel that he or she must only answer the questions we have, without considering his or her own thoughts, therefore we must make it clear to the interviewee that he or she should speak freely and be honest. We must listen well to what the interviewee is saying, so that we can adjust our questions in a way that will get the most from the interview (Johansson & Svedner, 2010). In addition to listening and adapting our questions, we must also be prepared to ask the right follow-up questions, we must always try to get the interviewee to expand their answers while he or she does not slip off the subject too much. For us to get as much information as possible from the interviewee, we must ask questions like "can you give us an example?", "How did that happen?" And "why is it so?" (2010). However, we believe that it is important not to exaggerate with supplementary questions, the respondent must be given a chance to breathe, and instead make it a hearing, so we think it will be more like an easy conversation. We believe this makes the interviewee more relaxed and not have to worry about a nervous conversation.

Before we began with an interview, we kept in mind that we had to act right, not only ask the right questions, but also think about the culture that exists in Barbados. We where no longer in Sweden where we know what kind of rules and regulations there are in the school, now we have to adapt to their rules and culture in order to be able to build a relationship with the respondent and thus get truthful and good response thereto. More about its ethical and cultural rules is written about later in this chapter. Work, in form of helping students with tasks or other things, was made during the observations. We chose to interview these people because we wanted to have as broad of a view as possible on the subject of mathematics in Barbados, by only interviewing classroom teachers, we believed that we would have a very narrow results with answers that was almost identical. Since we decided to interview many different people with different jobs, we would get a wide result which also would facilitate our future work for this thesis. "When selecting interviewees, it is appropriate to include people with different experience and backgrounds, because it increases the chance of finding the key notions and variants of them" (Johansson & Svedner, 2010:39, our own translation).
4.4 Ethical Considerations

When we reflected on this, we started from the principles of research ethics published by Vetenskapsrådet (2002). They write about four different standards that we have related to. The requirements are information requirements, the consent requirement, confidentiality obligations and utilization requirement. The first requirement is to us as investigators to inform all those involved about what we do and its purpose. The second requirement is to those who are participating in our survey are free to choose how much or if they want to participate in the survey. The third requirement deals with the participants’ data, all personal information will be confidential and no outside investigation should be able to find them. The last requirement is based on the information we collect about individuals surveyed may only be used in our research, the information may not be distributed or used in any other way (Vetenskapsrådet, 2002). We lived up to these demands by informing the principal and the staff in advance before we arrived in Barbados and at the school. We told the people we interviewed and observed that if they did not want to be a part of our survey they did not have to, and that all the information, in form of recordings and notes, we gathered would only be used in our thesis and would be destroyed after the thesis was done.

4.5 Procedur

Besides the use of the four demands from Vetenskapsrådet we contacted the school that we did our empirical investigation at. We had early contact with the headmaster at the school and asked if there were any specific rules on how a teacher in the country is supposed to act and dress. We knew from before that Barbados is an old English colony, and we all had our suspicions that schools in the country were very strict with school uniforms and a special dress code for teachers. These suspicions was confirmed by the headmaster we had contact with, all pupils had a school uniform and teachers had a high status in the country. How a teacher dress and behave in the classroom was important, we was all told to have wide clothing which means long trousers and a shirt anywhere. These was rules we believe that we all had to follow to build a good relations hip with teachers, students and parents. Without a good relationship with them, we believed it could be difficult to get good interviews or rewarding observations. We had not managed to find any syllabus from the past and we also had to ask principals and teachers for help to get them, though it did require a good relationship with the staff.

All teachers welcomed us with open arms. We walked around with the headmaster, who showed us the school. After that, we presented ourselves to the teachers as well as the students. Instantly, we noticed that the respect for teachers were much bigger than it is in Sweden. Every student and teacher stood up and welcomed the headmaster to their classroom, which was an incredible sight. After we were presented we could start observing. We split up and observed different classes. Simon observed the junior class three and infants class two and Alexander observed the special education class and junior class two. We walked around in the classrooms and observed their ways of working. We also conversed with the students about how and what they thought of the class. We felt it was good to talk with the students instead of interviewing them. The conversations become more relaxed and we are able to get more from the students, than we would by interviewing them. The headmaster at the school also told us that if we were to interview the children, the headmaster had to contact the parents and get their approval. There was no sitting down, since we felt it would be better to participate in the observation. We also helped the students with several mathematical tasks. We chose to do our observations first, and our interviews afterwards. The reason for that was to collect knowledge and different questions, which we later on could as the teachers about.
We interviewed (Addition 1) the teachers whose classrooms we had observed. We got to observe the teachers during the lessons, as well as discussing through interviews why they were teaching mathematics the way they did. During our observations, we asked if we could interview the teachers that we had observed. All the teachers were very helpful and really wanted to tell us about their ways of working when it came to mathematics. The only problem was that it was the end of the semester, and the students therefor were preparing for a christmas play that was going to end the semester. Big preparations were made for the christmas play, which caused troubles when it came to finding time for interviews. It did not become a problem to us, since we did not have any other appointments to attend, and we made sure there would be time to interview them. During the observations we had pen and paper. We noted everything that went on during the classes. We did not apply anything personal in our notes, but focused solely on the ways of working that were in progress. After each observation, we gathered the data at home and went through what we had observed. We exchanged thoughts about the already made observations.

We interviewed three of the teachers we had observed in the classrooms. We completed the interviews together, since we considered both parts should have a chance to ask questions and talk to the interviewee. The interviews took place in their own classrooms, which felt good for both us as well as the interviewee. They knew the environment and felt secure in their own classrooms. We started by asking if it would be all right for us to record the interview. All teachers approved of the recording and did not consider it to be a problem, but we still explained that all the recordings were to be destroyed after we had finished our work. It was important to notify them that the material were to be destroyed after it was all done, since we think it was important to help the interviewee to calm down. At the beginning of the interview we described what our work was about and started to make small talk about what we thought about their school etc. Since we started that way, the conversation had a constant flow and the interview become more of a conversation, rather than an interview. We sought a conversation where we could ask questions in relation to the ongoing conversation, where the interviewee did not feel pressured to answer, and instead the conversation had a constant good flow.

4.6 Processing of the data

As described above, we collected our data through observations and interviews. We conducted our observations before our interviews to obtain more detailed questions to the prospective interviewees. We brought protocols on what we observed, we collected the data we saw and recorded it. When we got back to our apartment we discussed how the observations went, what we liked and what we needed to observe the next day. It was good that we had to sit and go through what we had recorded and what we had observed. If what we observed was relevant to our future work or not. We split up when we carried out the observations, we felt that we covered more ground that way. It is always better to have too much data than too little data.

We conducted the interviews after we felt that we were done with our observations. The interviewees were teachers that we observed. We thought it gave the most data considering what we wanted to get out from our work. Once we had completed the interviews, we wrote them down in detail when we got home, that way we had the data collected in recent memory. Although we had the information recorded, we felt it was important to write the information instantly while everything was fresh. After each interview we discussed what could have been better, whether we should change our interview questions or not in order to get the information needed for our work. We did not change anything in our questions, since we felt we already got the relevant information needed for our work. We then sorted the observations and interviews based on the study questions so that it was clear what information we had been given.
5. Results 
In this section, we present our results from our survey in Barbados. We will present what we have observed and the information we received from interviews with staff at the school.

5.1 Abstract or concrete mathematics, and why is one preferable over the other? 
Through our observations we noticed quickly that most focus was on the abstract mathematics but what we later found out was that this was because all students would soon make a big test, a test that was especially important for the older children. There was a lot of repetition of what has been taught previously and this was mostly done by the teacher, who stood by the blackboard giving information to the student, which was later on illustrated on the blackboard. After the briefing, the students in the class got stencils to work with to repeat even more. This was a working way that was used by all the teachers in the higher classes. Amongst the younger children, there was more focus on concrete mathematics with games and other materials, but it was still something that there was a lack off according to the teachers.

“We try to do as much practical as possible but the math syllabus is so heavily abstract and it's so much to cover so you do end up doing more abstract then you like” (Sofia). This was a common response we got when we talked to the teachers at the school. However, there was a teacher who completely focused on abstract mathematics. Instead of that she would work on practical mathematics, another teacher came once a week and had a lesson where the students got to work with more practical material. During an observation of this Junior three-class, the teachers worked with coins, although they never did it alone. The teacher always gave directives about what to do with the coins. During an observation in Junior class two, same method was used, but in this case the students worked with the clock, where everybody had their own analog wooden clock. The teacher wrote a digital time on the blackboard, and the students were to show on their own watches what time it was, on their analog clocks. Again, the students got to work with stencils after a briefing in the whole class, that concerned the previous briefing.

The special education teacher for the juniors had at several times tried to get the students to do practical work where they are free to choose the materials they want to work with. Although, it was not appreciated by the students, who preferred working with abstract mathematics in their math books. The teacher was convinced that this was because the students were so used to working abstractly, that they did not want to change their approach.

What im trying to do is to put togheter a activitytable where the kids can choose what they want to work with when they are done with all the other things. They havnt acctually responded to that. I would have thought that some of them would have liked to try different things and experiment and i think its because we focus so much on the abstract. Some of them are happier to sit down and do exercise three and go on with it. If they have that freedom to go and choose they dont quite know what to do with themselves (Sofia).

After studying the classes in the younger ages, we found they were using more concrete mathematics. Despite this, the teachers in infant stage, which was doubtful about how much practical work that could be done, says: "Everything is so much bookwork now so you dont really get to use the materials like before” (Siv). The main reason for the abstract work on the whole school was that it was less time consuming then practical work and the majority of teachers thought that rehearsal was the best way to prepare the older students for the final test.
5.2 What ways of working are preferred, and why?
The educators at the school were all aware of the different ways of working, but the individual work was still the work that was focused on and used the most. They all considered the individual work not to be the best, but since most parts of the education was rehearsal for a big test, they were convinced it was the best working strategy.

5.2.1 Group assignment
Group assignments were something that we, unfortunately, did not get to see much of during our stay at the school. Most of the teaching was individualized and tailored to the books that existed. Group assignments did, however, exist in the form of discussion with the whole class during the briefing before the lesson. During briefings, there was no requirement that students would be quiet, but they could talk freely with each other and interrupt the teacher if necessary. Based on observations, it appeared that it was not in this way in all classes, but this type of observation was primarily in the special education class. In most other classes, it would be quiet and no one was interfering with the teacher when speaking. In infant classes, there was a certain freedom to debate and to help others, much more than in the junior classes.

The special education class had, except while briefings, group works in the form where students at some occasions got to choose working materials themselves, "what im trying to do is to put togheter a activitytable where the kids can choose what they want to work with when they are done with all the other things" (Sofia). Amongst the material available, there were different games and learning materials that were to be worked with in groups of two or more. By working with those materials, the students had an opportunity to discuss and solve tasks with workings ways they find suiting. Students often helped each other, even though they were playing games against each other, which was appreciated both among the students working with it, as well as the teacher.

5.2.2 Individual assignment
Juniors worked mostly with individual work. They sat alone and solved various tasks. The assignments mostly came from the math book, or sheets with different tasks to solve. Since the students had a final test, the teacher realized that it was important to study for this test in their own pace and try to solve and learn the different ways on their own. According to Rut the teachers felt that the students were able to do more of the work faster, if they did it alone (Rut). Time was a big issue when it came to learning. There was no time to try to work in any other way. All focus was on completing the final test, which would determine their future, positively or negatively. The approach of the working way, was that the teacher stood by the blackboard and described math issues, and the students got to sit alone at their desks and work. In the lessons, it was silence and the focus was to work on the assignments you had been given.

Also in the lower ages, individual work existed. In the class we observed, a rewarding system occurred. The students got to sit quiet by themselves and work with abstract mathematical tasks, and when they were done with their task they got to work with something "fun", which at the time was painting balloons. The ones who finished fast got to work with the balloons, while the slower ones got to work with their mathematical tasks all of the lesson. The students watched each other work with both fun and dull tasks. In the lower ages, they tried to implement practical mathematics and group works, but seen from our observations most of the work was done solely in their workbooks. Most of the time it was single work, where you were not allowed to discuss with each other. The teacher sat by the desk and if the students needed help, they had to join a line and come up to the teacher.
5.2.3 Problem solving

Problem solving was not a working method that was being used much by the teachers. Although, the junior three’s got some problem based assignments during their extra lessons with learning material where they got to work with coins. There was no text-based tasks but they were free to solve this problem by using previously learned skills. To some of the students, this was not considered a problem, since it was an easy task for them to exchange coins and similar tasks.

As described earlier, the juniors’ special education teacher tried to make the students pick their own working materials. Among these different working materials, there were some kinds of materials that dealt with problem solving. Examples of this were games that processed every day mathematical situations as well as other mathematical question games that were being work on in teams, where the students paired up and answered mathematical questions. If they solved a task, their team received a point.

One specific problem solving task we observed during our time at the school was a mathematical puzzle that had more than one solution. The pieces had different colors on the ends and the students had to match the colors to form different forms and shapes. When we observed students working with this kind of puzzle they worked in pairs, they discussed and came up with different solutions together. Below shows a simple example of the puzzle pieces for the mathematical problem solving puzzle.

![Picture 1: by Alexander Johansson Lorentsson and Simon Lindroth]

5.2.4 Materials

Usage of materials in the mathematical education varied among age groups. In the earlier ages it was something that was used in as many cases as possible while there was a clear lack of use of the material in the higher age groups. All the teachers were convinced that mathematical materials was a good tool, but most thought that while it was difficult to integrate learning materials in teaching and therefore avoided this. In the junior stage, the focus was on the rehearsal to prepare students for the final exam which all students take when they're eleven years old, the teachers considered that it was better to work abstract because it is faster and you have time then cover more of the subject. The special education teacher, however, had a different view on laboratory material, which she tried to integrate as much as possible. Students in special education classes had the same requirements as all other students, but they were working in a more relaxed pace and then got more time to experiment with materials and playing different math games. Besides self-made and purchased games, there were coins, clocks in wood, puzzles (see picture: 1) and Unifix blocks as tools.

In infants class two, the teacher encouraged the children all the time to use the materials, even when they did not work with educational material, they got to use everything that was close to hand. A material that she considered to be very good was the ruler, if a student had difficulty with a particular number, they could always use it to add or subtract. She was very open to the use of all materials that were around her but the unfix blocks was a favorite because it was easy to show the construction of a number with them.
The teacher in the junior class three worked nothing with learning materials, she focused solely on abstract mathematics because she thought it was too difficult to integrate materials when there was so much that had to be rehearsed. Instead of her working with learning materials, the school hired an extra teacher who came and worked with learning materials in the class, as well as another time in the week. During these sessions, they had a working method, as mentioned earlier, which was that the teacher stood at the front of the classroom and told the students what they would do and then asked for an answer to what they had just done. After working in full class, they got to work with their sheets or in their math books.

The special education teacher had a positive view of materials and laboratory work. Since all students worked in a more relaxed pace than all the other classes, they had more time to practice with materials and games. Her favorite materials were games, both purchased games and the games made by students during mathematics lessons, “they learn better, they are playing, they are having fun and they are learning at the same time” (Sofia). She also made use of what she called the activity table where she has accumulated learning materials and games, the idea was that the students themselves would choose what they wanted to work with when it was time to do so. She did not, however, get any good response from the student while working with this method. They preferred working in their math books or with sheets.

It looked the same in almost all the rest of the classes, with an exception of junior class two, where the teacher had a positive attitude towards learning material, even though the biggest part of the math education was rehearsal. Instead of focusing on the abstract rehearsal, they got to work concretely with what was to be rehearsed. Sofia felt that students were more likely to remember what they have learned, if they are able to connect their knowledge to something real.

5.2.5 Mathematic conversations
The mathematic conversations played a major role throughout the individual's mathematical knowledge development. It would permeate the entire education, the individual were to describe their own mathematical skills. Maria said that mathematics was the life, constantly surrounding us, it was being used to a lot in our society, everything from baking to getting to a place in time. The students needed to be able to understand the language, but also to express themselves in mathematical terms in order to describe what they mean to other individuals (Maria). In the early ages, they worked a lot with mathematical conversations, in form of tasks that demanded conversations, and it would also be ensured throughout their schooling here at the school said Maria. She also claimed that the conversations about mathematics with students became less important when the students became juniors. The mathematics became more abstract than concrete as it was in infant classes. The school tried to exert concrete mathematics with many conversations and understanding but it became difficult when students reach a higher age since it then played an important role in the tests and the students had to practice for these exams.

Rut said that the students developed an understanding of mathematics when they got to express themselves, discuss with the teacher or other students. The conversations have to be from two different directions, both from the teacher's direction in which the teacher will describe a task that the students will understand. The students were to understand what and how to perform the indicated task. The students were able to ask questions and discuss the task or discuss a solution to the stated problem (Rut). Rut also said that it was difficult to bring the mathematical conversations individually to each student. There was no time when there was a lot of pressure on the students, when it came to completing the upcoming tests. The abstract part took the upper hand when it is so much to be learned, when they get to sit individually and work on different tasks, the teacher has more time to teach more than just
concrete mathematics. The language disappears with the abstract execution. Rut said that she
tried to work with mathematical conversations, but the time was not enough.

In Ruts classroom we observed that the lessons consisted of varying individual work. Students
would sit quietly at their desks and work hard to keep up with the tasks. Every individual that
was complete was allowed to exercise another task that was not about mathematics, a clear
solution with a reward system. Each student received a reward when they were done with the
given task, then the reward consisted mostly of picture or an optional topic. The mathematical
conversations consisted mostly of teachers who described a mathematical number or task that
students would perform. Students were asking questions but then it was individual work that
practiced in the classroom. The teacher walked around and discussed with the students about
the mathematical problems that usually came from the math book or sheets. Here, those
mathematic conversations came up, and through observations made by us, we noticed that the
teacher discussed and tried to make the students come up with their own solutions, by
conversing with the teacher. The individual work permeated the entire teaching. We did not
observe discussions between students. Rut says that she tries but as described above, there is
not enough time. It is important to understand the students and their interests, to exercise this
in mathematics. Talk about other things so that the interest is awakened and students
understand and get to see an overall picture of what they will learn.

Sofia said that the mathematical discussions were important. If students received a task on a
piece of paper, not everyone understands what to do or how to do. But if you discussed with
each student and came up with a joint solution, it helps a lot. Discussing with the students was
important because many needed to talk to understand the given task. Sofia told us that she has
a small special education class, where she is able to exercise the mathematical conversations
with each individual. It is harder when you have a large class. Each student was responsible
for his work but also the work of others as they helped each other. Sofia said that students
should help each other with what they understand and what they do not understand. Students
learned more while describing and getting the task or problem described for themselves than
if the teacher was standing at the blackboard and described. Obviously, the teacher must
describe the task at first but then it is up to the students to help each other and come up with
solutions through mathematical discussions (Sofia).

Through observations of Sofias class, we discovered that the teacher described a task, and
then it was up to the students to tell each other about the task, explain and help each other. A
student who understood the task sometimes had to go to the board and explain the rest of the
class. The conversations worked very well between the students and the teacher. The class
had good teamwork since they constantly communicated amongst each other. They worked
individually, but helped each other through discussions and conversations.

Siv meant, just like the other teachers, that conversations are important for the individual
development, but that there was not enough time to exercise those mathematical discussions.
But she claimed that, in the lower ages, there was a lot of concrete mathematics - and with
concrete mathematics, the mathematical discussions came along. They worked close to the
students, explaining and giving the students a chance to discuss the task, wether they
understood it or not. In the classroom, every student exercised their individual work and
worked alone. The conversations mostly consisted of the teacher describing the task, and the
students then performed the task (Siv). We noticed that the conversations did not have that
much impact, but the completion of tasks were the most important part.
6. Analysis
In this part, we will once again present our results, but from the theory we previously described. We will go deeper and analyze the result we have gotten from our time at the school in Barbados.

6.1 Abstract or concrete mathematics, and why is one preferable?
Among the older students, the focus was on the abstract mathematics and there were not many signs of a diverse teaching. The greatest weight was pointed at rehearsal and a classic teaching where the teacher stood by the blackboard and explained to the students what to do and how it should be done. Research has shown that students learn better if they get something concrete, such as figures or the like to connect to. Although, the focus is on repetition of numbers and mathematical formulas (Ahlberg & Wallby, 2000). In the younger ages, there were signs of a more substantial and varied teaching with blocks and more concrete work, but even here, there was a lack of concrete mathematics. This is consistent with what Löwing and Kilborn (2009) writes about in their book, *Baskunskaper i matematik*. They argue that, at younger ages there are more concrete mathematics while mathematics in higher age groups tend to be more abstract.

The special education teacher tried to work more concretely to include all students, she gave the students an opportunity to choose for themselves what to work with. An attempt, that to some extent failed, since a majority of the class chose to work in silence with their workbooks. It is important for an educator to involve several different forms of learning for the students to gain the insight of the subject needed to understand the abstract. Despite an attempt by the special education teacher to provide the students with this understanding, it did not succeed, which means, according to Ahlström (1996), that the students miss out on the variety needed to fully understand the abstract structures and relations that exist in the subject (1996).

6.2 Group work
Arfwedson (1972) argues that as soon as you sit in a group with more than one student to discuss, compare and listen, it is a form of group work. However, this was a way of working that rarely occurred in the school. Discussions sometimes occurred with the entire class, which also is a form of group work, according to Arwedson (1972), but that rarely happened. Hensvold (2006) writes that the teacher must give strict instructions on what to do, how it should be done and why it should be done. The special educator at the school used group work but chose not to give any instructions to include problem solving to the assignments. She allowed students to discuss and solve the problems by themselves with good results of the few students who chose to work this way.

In infant classes, the teachers sometimes encouraged the students to discuss freely in the class. During the few occasions where students were encouraged to discuss, the teacher was constantly attentive and made sure everybody got the chance to speak. Hensvold (2006) writes that this is a must for a successful group work, the teacher must ensure that the group has a good dynamic, all get to speak, and everyone should listen to the speaker (2006). The teachers at the school were convinced that discussing problems and solutions not only helped the weak students, but also those who were further ahead in their development. Not only educators are convinced of this, in *Matematik – ett kommunikationsämne* (Ahlström, 1996) it is written that ”The difficulties to individualize teaching disadvantage not only students who have difficulty solving problems on their own, but also students who can and want to solve more complex problems” (1996:11, our own translation).
6.3 Individual work
In the classes we observed they used a lot of individual work. Those who worked mostly with this approach were the older students, those who went in Junior Classes. Students prepared for the big final test that will determine their future. Because of this test, the teachers tried to keep up with everything the students needed to know in order to complete the test, thereby there were a lot of individual work because of the shortage of time. Teachers also believed that it is a good way to learn the given subject. Students sat quietly and worked in their math books and tried to get to the various chapters with an understanding of the mathematical problems. The teacher began the class teaching by standing at the blackboard and showing problems and solutions, and then the students get to work in their mathematics books.

According to Hensvold (2006), this class teaching is the most common implementation in Sweden. The teacher goes through the subject on the blackboard, and then the students are to work with their math books or sheets individually. The teacher walks around the classroom and try to help the best they can (2006). In the observed classes the teachers mostly sat at their desks, and the students were to approach them if they needed help. This caused long lines in order to get help, but mostly the system worked well. The students were patient and let their class mates get the help they needed.

The teachers we interviewed felt that the students will learn personal responsibility for their studies as well for the upcoming final exam. In the lower ages, they tried to work together with group tasks, but even here it was mostly individual work. In the lower ages we mean primary school classes. Hensvold (2006) argues that the reason for individual work is to enable children to take responsibility for their studies and develop individuality at their own pace. It is up to the student to complete given tasks. There is a problem with the individual work, which is that every individual is different from the other and they develop at their own pace. Students who are struggling may not complete it easier by working individually and there will be huge gaps in class between the weak and the stronger (2006). The teachers in Barbados considered every student to be unique, and needed to develop in their own pace, and thereby individual working were good, since every individual get to work the way they seemed best, and thereby are more likely to complete the final test.

6.4 Problem solving
Ahlberg and Wallby (2000) writes that every day we encounter problems in our daily lives and mathematics will help us solve these problems (2000). Since the students at the school were able to examine and exchange coins in different ways, they got to work with everyday problems which requires mathematical skills to solve. Although, Björklund and Grevholm (2012), writes that there are many who claims that it takes a certain effort towards the task, in order for it to be classified as a problem. Many in the class did not consider this as a problem when they thought the task was relatively simple while some others in the class had big problems with the task.

The special education class for juniors had different games which handled every day mathematical problems. According to Unegne, Sandahl and Wyndhamn (1994) games can be considered problem solving, since the students got to think about how to do, which method to use, and how to use the selected method (1994). Since it was no routine tasks, the students were forced to analyze, reflect upon, and then solve the task, which is the reason it becomes a problem according to Ahlberg and Wallby (2000).
6.5 Materials
The usage of material at the school varied considerably, both among educators and ages. In the earlier ages, it was considered a great asset, which opened up for new possibilities to concretization, while in the higher ages, it was considered to be something that took away valuable time for the educators. It was, among all teachers, considered to be a good aid to develop the children in mathematics, but was considered to be too hard or too time consuming for some to use. The few teachers at the school who used much of the material saw it as a great medium to work with and felt that it was the best way to develop a students’ mathematical knowledge. Ahlberg and Wallby (2000) states that in order for a student to be able to create an understanding of the abstract, she must be given an opportunity to connect the abstract to something concrete. Working with materials contribute to this possibility (2000)

The students who attended the special education class had the same requirements as all other students, but they were working in a more relaxed pace and the teacher then had no problem with that material would be somewhat time consuming. They often made their own games in class and besides that, there were coins, watches and unifix blocks they could work with. The teacher was in favor of working with learning materials and saw unifix blocks as one of her favorite materials. Unifix blocks were one of her favorite materials to work with, since it was easy to show the structure of problems with them. Ahlberg and Wallby (2000) writes that tearing down the numbers and being able to build them up again, increases the understanding of the problems. The problems concretize and the students get a chance to see the problems in another way than just an abstract number on a paper (2000).

Besides the special education teachers worked with learning materials, the teacher in junior grade two had a positive attitude to material and its possibilities. Despite all of the rehearsal that took place in the higher age groups, she considered the material to be an important part of teaching. She argued that working with learning materials helped the students remembering earlier knowledge and getting further understanding of what they already know. Which is an opinion shared with Ahlberg and Wallby (2000) that believes that “to work with materials elaborative furthers the students ways to view and understand the numbers they are working with” (Pp. 9).

6.6 Mathematical Conversations
According to Maria the mathematical language would permeate the individual's education. Being able to communicate mathematics through language and expression is a great advantage later when entering the working life. And trying to practice it throughout their schooling is an important educational. Being able to understand what other people think and say, being able to engage in dialogue with other people is an important part of learning the language of mathematics. Maria claimed that students must be able to understand the mathematical language in order to, for example, know what time it is or how to bake. The mathematical language circles around us all the time. Ahlström (1996) states that throughout our life time we are surrounded by mathematical signs, words and symbols, and that it is important to learn to communicate with other people through mathematical words, understanding and engaging in communication. At an early age, students had difficulty with the mathematical language, they had difficulty expressing themselves, and thereby it was important to start with the mathematical language at an early age. Students will then have time to develop a mathematical language that they could use throughout their lives (1996).
According to Maria, it was easier to educate the younger children in the mathematical language, since they had the time and the student of those ages was more interested in learning. In the lower ages, mathematics was more concrete than it was in the higher age courses. Since it was more concrete, the students could discuss with each other and the language came naturally. While going up the classes, the mathematics become more abstract, and the language was limited. It was an environment where you were to work alone with your mathematical problems. Ahlström (1996) claims that the language is an important part of the individuals development. The students must be able to take care of their own problems in life, and thereby the language is a great tool. The students understand each other better and are able to solve problems together if they understand each other. There is a great responsibility for the educator to let the students develop their own mathematical language in their own pace. All students must take responsibility for their learning processes, and try to develop their mathematical language and expression in order to pass on their knowledge to others (Ahlström, 1996). Maria argued that it was terrible that the students stopped using their mathematical language in the higher ages. They tried keeping it up, but the given language disappeared since there was such a lack of time, and the very individual working way that would be done before the final test.

In the higher ages, there was a lot of individual work, as previously described. The teacher stood by the blackboard and explained, while the students sat alone and worked in their math books. Not much time was given for discussions or mathematical conversations. Rut claimed that it was because of the lack of time, that the students had to sit by themselves and work in order to try to do as much as possible before the final test. Yet, Rut tried to encourage the students to discussion and to help each other. She claimed that it is important to try to keep the language up amongst students and the teacher, in order for them to be able to express themselves when they get to the working life. Wistedt argues, in *Matematik – ett kommunikationsämne* (Ahlström, 1996), that it is important to constantly using the language for everybody in the class. If every individual are to understand each other, it is important to keep up the language in order to create understanding among people.
7. Discussion
In this section we will discuss and reflect over our results based on our background, purpose and issues. We will present our own thoughts and opinions on the results and reflect on why it the result is the way it is.

7.1 Method discussion

7.1.1 Purpose and Issues
Our first aim of the study was to compare the education system in Barbados with the Swedish school system, but we discovered early on that it was a very big topic to cover. We decided to limit ourselves to the purpose we have now, that is, to examine working methods and work in mathematics at a school in Barbados. We investigated what teaching methods were preferred and why they were preferred. We were forced to change, delete and redo the questions several times as well. At the start we had six questions that ranged from abstract and concrete math to assess students and syllabuses content. After discussion with the supervisor, we realized that this was too large to investigate. The restriction finally allow us to summarize all our investigation in this essay.

Before we went to Barbados to investigate, we were to sit down and reflect upon whether our purpose and issues were actually possible to investigate during such a short period. It had not only simplified our investigation on the spot, but also made it possible for us to start writing our essay as soon as possible. An advantage of our first broad topic was that we got a lot of information and support for our report even though all the parts could not be included in it. We personally received a broader view of what the math-education looked like in Barbados, and without a bigger purpose we had missed many parts.

7.1.2 Investigation methods
We observed students and teachers in the mathematical learning. We participated in lessons and observed while we were wandering around in the classroom or on the playground. We went around in class and talked to the students about how and what they thought of the lesson. We felt it was good to talk with the students instead of interviewing them. We walked around the classroom and observed their work, there was no sitting out, we felt it was better to do a participant observation. We even walked around and helped with various mathematical tasks. We chose to implement our observations first and then performing our interviews. We felt that we wanted to acquire more data before we started with the interviews. The teachers we observed felt that it was fun to be able to share their knowledge with us who came from another country.

The teachers we had interviewed was the teachers we observed. We recorded the interviews on the phone and deleted them as soon as we had written them down. Since we had promised the interviewees full confidentiality, it was important that we kept our promise. Since we did what we promised, we got very much out of our interviews, because the teachers felt safe sharing what they considered to be relevant. All teachers felt that it was nice to be interviewed and we got useful data that we then could use in our work. We had read about how the interviews should be done and used the given framework. We managed well with both observations and interviews. We felt it was important that all teachers felt secure and that they could share their information without the feeling that their privacy had been violated. As we got to know the teachers the interviews became more than just interviews, it was a relaxed conversation. Unfortunately we both felt that we did too few interviews. We interviewed three people and we got useful data, but in hindsight it would have been better with more data.
7.2 Results discussion

7.2.1 Is the mathematics education focused on abstract or concrete mathematics?
As mentioned earlier, the teachers focused mostly on abstract mathematics and we also found a reason for this, through our observations we noticed quickly that most focus was on the abstract mathematics but what we later found out was that this was because all students would soon make a big test, a test that was especially important for the older children. All teachers at the school felt that an approach than education by book was too time consuming. It was obvious to the staff at the school, but a big question mark for us. We consider that big amount of training is good for repetition, but we observed that many students did not have understanding needed to cope with certain tasks. By continuing to work concretely, we believed that students build further understanding of speech and were able to handle mathematics better.

There were a few teachers at the school who considered concrete mathematics as an opportunity for further development of the students and they even tried to make use of concrete materials in their teaching. We saw examples of this in our observations, but despite efforts to use practical mathematics as it was seen primarily among the younger students, which we consider to be normal. This was also an assertion we noted in Löwing and Kilborns book, *Baskunksaker i matematik* (2009). A teacher in the Junior class three, however, had as part of their teaching to invite an extra teacher once a week had what they called for concrete mathematics where students got to work with coins the occasions we had the chance to observe this lesson. We got to watch as the students worked with the coins from the extra-educator’s directive which we felt was not any practical work in a good way. They had some kind of link to the abstract, but they did not work examining the coins, which meant that they only repeated what the teacher did and then got no chance to reflect on what they had done.

They had to work together in pairs of two or more and they were free to choose whether they wanted help from the teacher or not. If they choose to work without any help they got to discuss and come up with solutions and together reflect of the answer, which created positive team work. In order for the task to be a problem solving task it has to be a task that is not a routine task or standard task, it is a task that requires students want or need to solve the task, and that there is no given suggestions. Many also believed that it requires some effort from the student to solve the task (Björklund & Grevholm, 2012). The educator’s choice of work contributed not only to a positive concrete work for the students but they also got a chance to develop their mathematical language through group work and its reflectivity through problem solving.

7.2.2 What ways of working are preferred, and why?
We realized that the working ways the teachers in Barbados preferred were individual work. The abstract mathematics was used a lot with the students. They mainly worked individually in their math books or on a sheet. This system was used both by infants (age five to seven) and Juniors (age eight to eleven).

In the younger ages (infants five-seven years old) the teachers used a reward system. The students who finished first got to work with something else, they were rewarded when they were done with their practical work in the math books. The reward was mainly letting the children work with aesthetic work, where they could paint or work practical in other ways.
We consider the system could have been done in another way, since the students were stressed by the reward system. When some students finished before others, stress and jealousy was formed. Students watched other children working with "funnier" tasks than just working in their math books. The students stopped caring about the given task or they became stressed and had no real chance of learning. A ranking was established amongst the students, where it was clear who finished first and who took the longest in finishing their tasks. We worried that this system could contribute to bullying - where people who were slower or not as far ahead in the math book got bullied. It became clear who was skilled and who was not. The discipline of the students was very strong, where every single student had great respect for their teachers and thereby there were no tendencies of bullying or anything similar. We do not consider this to be system which would have worked in Sweden.

The older juniors (aged eight to eleven), mostly worked with individual work in the math books or on sheets. The teachers felt that the lack of time hindered the students to perform practical mathematics. They tried to get it once a week, but almost always it was first teaching/briefing on the board then individual work in mathematics book. Students would get to a certain page every day. All students prepared for the test and then came the final test, a sample that shows the individual's future. To encourage the students to pass the test, the teachers though abstract mathematics was a good solution and they had a lot of time for mathematics because of the abstract teaching in math books or a sheet.

We think the students need more varied lectures, and not just sit and count in math books. All students are different and need different learning processes. If the teacher varies their education they will be able to intercept more students and encourage them to learning maths. In Ahlström's (1996) book called Matematik – ett kommunikationsämne she describes the importance of varied teaching so that each student get their own needs stimulated. If educators use varied teaching they captures more children's interests who understand the task. Every individual is different and learns different, therefore it is good with varied teaching according to Ahlström (1996). The teachers often blamed the final test and they thereby were forced to work with abstract mathematics in order to have the time for as much as possible. In the younger ages, there was more focus on practical work than for the older students. We realized that there is more need for practical mathematics even in the older age groups, since it’s more fun and the students get to see what math can be used for, not just in black and white. The teachers were convinced that this working way was best adopted for the students in order to pass the final exam. “Repeat numbers allows students to remember how to cope with the given numbers” (Siv). She meant that repetition of numbers was the best way to prepare for the final test, since the students schooling was always just a preparation before this test. During the students schooling, numbers and problems practical before the final test. In our theoretical background part however we wrote that repetition not always is the best way to teach, Ahlberg and Wallby (2000) writes that "although the children repeat what date it is every day, they still doesn't learn the arrangements of numbers" (2000:61, our own translation).
8. Further research
As revealed by our study rarely aesthetic and practical subjects is integrated in subjects such as mathematics. This despite the fact that teachers in many cases, unaware of the educational benefits that such teaching can contribute to. The main reason for this was said by the teachers to be the time: there was no temporal space to use the aesthetic subjects to promote the practical. It was also revealed that was students so accustomed to the prevailing teaching model that they felt most comfortable with working in this way. These are obstacles that can be said to be part of the actual structure of the school system, why do we assume that there exists at more schools than the one in which we have conducted our observations. Proposals for future research would be to focus on how to integrate the arts into the practical, both with respect to timing and according to the "old" teaching method, both among students but also among teachers.
List of References

Printed Sources


Johansson, Bo & Svedner, Per Olov (2010). Examensarbetet i lärarutbildningen. 5. uppl. Uppsala: Kunskapsföretaget


Internet sources
http://www.landguiden.se/Lander/Nordamerika/Barbados?p=1
Downloaded: 2012-11-05

Downloaded 2012-11-05
Addition 1

Interview Guide

Possible general questions
- What is your position/work at the school?
- How long have you been working at the school?
- Which kind of training have you received?
- In what ages are the children you work with?

Possible questions for the mathematical topic
- Do you focus on abstract or concrete mathematics when you teach? Why do you use one before the other?
- Is there any helpful materials you can use when you teach? Any favorite material you prefer?
- Do you see the mathematical language as an important tool in your class/classes?