

# Place value



In this essay I will be looking at the definition of place value and what does it mean, I will then explore the importance of the base-ten system in relation to place value and why knowing the base-ten system is important for understanding place value. I will then discuss the reason for why learners struggle with understanding the concept of place value, also I will discuss the importance of using concrete material. Finally I will look at the progression of levels from grade 2 into grade 3 learners according to the CAPS document.

### Definition

Price (2001), state that place value refers to our base-ten system, where each digit in a number represents a partial amount, this amount is determined by the structure of the number and the position of the digit in the number. In the base-ten system the position of a digit represents its value, therefore each digit has its own value in relation to another written symbol. This concept can be very easy to understand or it can be very complex, it can also be extended to many extends such as moving to the left to or to the right where numbers become decimals or fraction. The importance of the base ten system.

According to Klimam (2000), in order for a learner to understand place value, they need to understand the structure and sequence of the base ten number system. As learners count, they interpret the values of written and spoken numbers, they are able to distinguish which number is larger or smaller, and explore relationships among numbers, through doing this they are developing a picture of our denary number system. The importance of understanding place value is that the learners are able to use the base-ten

system to form accurate, flexible, conceptual structures for quantities represented by written symbols.

The learners need to be able to manipulate numerical values in a meaningful manner to solve mathematical problems(Price, 2001). Through teaching the learners the base-ten system they develop schemes in their head, when the learners understand the base-ten system it is easy for them to apply it, to the new knowledge, in this case place value. This concept of place value becomes the new knowledge and can be link to prior knowledge. This process is known as assimilation.

The understand of the new knowledge can happen through using a variety of different materials either concrete or these materials can be the thoughts of the learners and their ideas( Lombard, 2013: 2) Why do learners struggle with the place value concept Learners tend to struggle with the concept of place value, as there is a lack of fundamental understanding and experience with positional systems. Therefore, learners tend to struggle with trading groups for collections of groups, such as regrouping 10 tens for 1 hundred.

As there is a lack of understanding of the place value structure, that is, multiplying each place value position to the left of a number by the base 10 and dividing each place to the right of the decimal point by the base. If the learners mistakes are conceptual, the teacher will intervenes and she will begin to use manipulative materials to help develop an understanding of the concept. These materials used could be place value blocks, counters of any type, and place value charts. If the learners mistakes are more procedural, then the learner has forgotten the rules and algorithmic steps but they understand how the system works.

Interventions do not necessarily have to involve manipulative materials in those cases. Lessons are focused on drawing and representing objects and then connecting numerals to those figures or making notations as reminders. For example, when subtracting, students can draw an arrow over the “ 2” if that helps them remember where to start. Or, pupils could circle the ones column in each example, prior to computing, in order to remember to regroup that place and not the tens place (Sherman, Richardson and Yard, 2009).

When a learner does not understand a concept, they are having difficulty linking the new knowledge to the prior knowledge, this is what is known as disequilibrium. When this occurs the teacher intervenes and builds up on the existing knowledge or on the new knowledge. Once the learners understand the existing knowledge, they will try to make meaning of the new knowledge. Through moving forward and backwards more effective schemes are formed( Dr Moodley, 2011: 3). Using concrete material to understand place value.

Price(2001) states that for a learner to understand a mathematics concept they need to understand the relationship between the numbers and the written system. In order for a learner to understand place value according to Prince the learner needs to for an understand with the following three links: the relation amongst numbers, written symbols and concrete materials. Learners need to formulate that written numbers are presented in a abstract and social manner, whereas concrete materials are more closely linked to the learner's experience therefore understanding the concept will be more meaningful.

When using concrete material there is a direct link between the magnitude of a number and the size of the numerosity of its physical representation. However, written symbols are "culture tools" the learners need only to understand the conversation of the symbols. According to Thompson(1994) it is often thought, that using the actual wooden base-ten cube is more concrete to a learner than is a picture of a wooden base-ten cube. To understand the cube using pictures or the actual materials as representing a numerical value of one a digit, the learner needs to create an image of a cube that shows its relations to its potential parts.

For example the learner will give each block a value that it can be made of: 10 blocks each having a value of one, 100 blocks each having a value of ten, or 100 blocks each having a value of one. If their image of a cube is simply as a big block named "ten," then there is no difference between the learners using a picture of a cube or an actual cube, the problem of this matter would be immaterial to their understanding of base-ten numeration. Using concrete materials have two values.

First, one being, they are used to enable you and the learners to have grounded conversations. therefore, it is necessary to provide something concrete about which can lead your class into speaking about the concept. The crux of the discussion should lead to how to think about the materials and the meanings of various actions with them. The second purpose for using concrete materials, provide something on which students can act. The goal for using the concrete material in this case is for the learners to reflect on their actions in relation to the ideas that were taught, to establish and in relation to the constraints of the task as they have conceived it.

Learners between the ages of 7 to 11 learn better if they using concrete materials. The learners are depend on the concrete material to form a more logical understanding of the concept been taught, they are however not able to formulate an understanding of the concept if only abstract ideas are used. Using concrete material allows for reflective thought to take place, this is important as, the learners are able to make sense of the maths by connecting prior knowledge to new knowledge.

For the learners to link the prior knowledge to the new knowledge they need to reflect on what they already know, and link this new knowledge to some thought which has they have processed (Lombard, 2013: 3). Vygotsky's theory states that when learners work together or with the teacher, the experience is more enriched as different views are shared and transmitted to the next person. Culture plays an important part in the learners thoughts as this teachers the learner about both what to think and how to think, through doing this the learners are able to form their own opinion and learn to problem solve.

Using material and psychological tools are useful for effective learning to take place. Material help learners accomplish task and make them more meaning, whereas psychological tools assist with interact with one another. (Dr Kwenda, 2011: 1) The level of understanding needed in Grade 2 and 3 According to CAP document(2011) in grade 2 place value can be introduced at the beginning of the year already, it can be used to show how numbers are put together. Here they are introduce to the word digit and they need to understand and be able to identify the value of a digit in a number.

Using the appropriate mathematical language is important for the learners understanding. The teacher will build on the learners knowledge and extending the number range throughout the year. At the end of the year the learners should be able to decompose numbers up to 99, also they need to be able to identify and state the value of the number. In Grade 3 the learners are required to estimate objects and count objects up till 100, they use the apparatus such as dienes blocks and sticks to do these estimation.

Through doing this the learners are encouraged to count in groups, by counting in groups it will help learners with calculations as numbers can be broken up. For example:  $362 + 527 = (300+60+2) + (500 + 20 + 7)$ . The focus of this not only solving the equation but also being able to recognise number symbols, decompose a larger number and also understanding the value of each digit in the number. Language plays an important part for the development of a concept as it helps link ideas to words, also learners learn from others and they receive new knowledge from others. Language is provides learners with the cognitive tool to solve problems and to think. Through language learners are able to reflect on their thoughts (Dr Kwenda, 2011: 2).

## Conclusion

In conclusion for a learner to achieve a certain measure of success they need to understand the base-ten number system. Using concrete materials, assists them to develop a better understanding of the place value system. Concrete material as read about is also a good form of scaffolding, bring the learner from the unknown into the known. (Thomas, 1994).