

Numbers Count

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Why is good numeracy important?

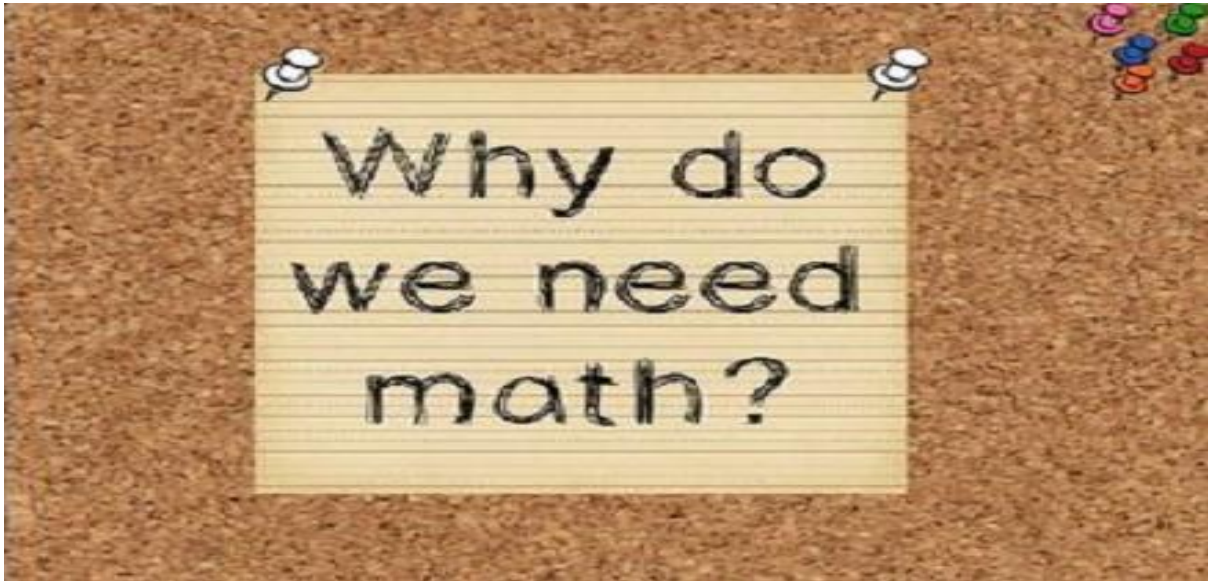


Figure 1- Mathnasium (2017)

‘What’s the point in learning maths when we have calculators?’. This is a question that I get asked a lot in the classroom, and if I am honest it’s probably something that I have said myself in the past, but good numeracy skills are not just about the maths that you learn in the classroom and think that you will never use again but are as much a part of everyday life as reading and writing.

When thinking about the world today it is easy to assume that numeracy skills are no longer important when, thanks to technology, we now always have access to calculators on our phones, smart watches, or the ability to ask the internet for the answer to any given question. But without the skills that you learn in school, the value of number is meaningless and the ability to complete simple mathematical tasks is impossible. Without numeracy skills how would you be able to work out how long it is until your bus is due or work out if you have been given the correct change in the shop. “Numeracy is not simply the ability to do calculations. It is the interpretation of those calculations”. (Kus, 2018)

Numeracy is so intrinsically a part of our everyday life that as adults we often don’t even notice that we are using the skills that we complained about learning in school. Schleicher (2018) believes “good numeracy is the best protection against unemployment, low wages and poor health”. I would have to agree with his ideas. Most jobs that are advertised today are

“Numeracy is important to living in modern times.” (Craig, 2018)

looking for at least basic numeracy skills for employment, with many asking for formal qualifications in mathematics, such as GCSE, to prove their skills. Schleicher also states that poor numeracy is linked to poor health, I would have to agree that a person’s mental health as an adult could be affected by having poor numeracy skills. As an adult running a

household, the day to day running of the home relies on numeracy for paying bills, buying food, managing finances and for working out your own income. Without at least basic numeracy skills it would be easy to fall into debt as proven by a study from the Royal College of Psychiatrists which showed that half of all adults with a debt problem are also living with mental ill-health.

So that shows how good numeracy effects adults, but what about for the children learning these skills, is it just something that they will use in later life? No not at all, numeracy is as much a part of their world as it is for an adult, from learning to tell the time to knowing the value of money, maths skills are a part of their life even if they don’t recognise it. Children use numbers and numeracy skills without even realising that they are doing it, when playing ‘What’s the time Mr Wolf?’ in the playground or shops in the home corner, they are developing their maths skills every day.

STEM subjects in school have been pushed into the limelight in recent years. It is obvious where numeracy skills would fit into these subjects, but it is often not made clear to children why these subjects are important. Bell-Young (2020) suggests that “without knowledge and skills in various industries, civilisation as we know it wouldn’t be able to function properly”. This may seem to be an exaggeration, especially to children, but without engineers, scientists and programme developers using their numeracy skills to do their job the world would be a very different place.

The role of schools in developing numeracy skills

It has been shown that Mathematic skills are an important part of everyday life, but who's responsibility is it to teach these skills? The obvious answer would be that the responsibility lays with the school to ensure that the children learn the skills that they will need later in life. But does the responsibility also lay on the children's family to support and encourage their numeracy?

When children enter a day nursery or a pre-school, they are already learning basic numeracy skills without knowing it through activities that are planned around the seven areas of development. "During the Foundation Phase, children develop their skills, knowledge and understanding of



mathematics through oral, practical and play activities". (Welsh Government, 2015). When a child enter school, at three years old, the start of formal maths education will begin. This is where children start to learn the basics in addition and subtraction, patterns, and other simple skills. At this age children still do not know they are learning; they are learning through play. It is not until children reach the later years of primary school that they start to have more formal maths and numeracy lessons where they are learning in a more traditional way, not through play and activities. This is where the education of maths changes for children and could also be where they could lose their love of numeracy in the classroom.

When children reach comprehensive school level their education becomes a lot more formal and structured, so this is where a lot of children struggle to adapt. For many it will be the first time that they have different teachers and have separate lessons for every subject... or do they? In recent years numeracy has become a skill that is now showing up in all areas of the curriculum. Cross curricular education of maths is now very common meaning that in all subject teachers need to show that there are incorporating numeracy skills into their subjects. Clearly in some subject this is going to be more natural than in others, for example in science, technologies, and art. But in subjects such as performing arts or religious studies it is harder

to fit numeracy into the day-to-day studies of these lessons and so often a teacher will put a “numeracy lesson” into their planning to say that they have covered it in their subject.

The school’s goal is always to help the children to reach their full potential and to leave school with the qualifications and skills that they will need for the future. The numeracy skills that they need to gain their qualifications are learnt in the classrooms but are the children learning the skills that they will need for the future. “All children across the UK should be taught basic money skills in primary school by 2030”. (Lekarski, 2021). By teaching children about money at a young age you are giving them a strong foundation and understanding of financial skills that they will need. I believe that the schools have a much bigger role in numeracy education than just teaching children the maths that they need to sit their exams, they have a role in teaching children life skills, like how to calculate interest or run a bank account for example, that they will need in their future lives to thrive.

Factsheet

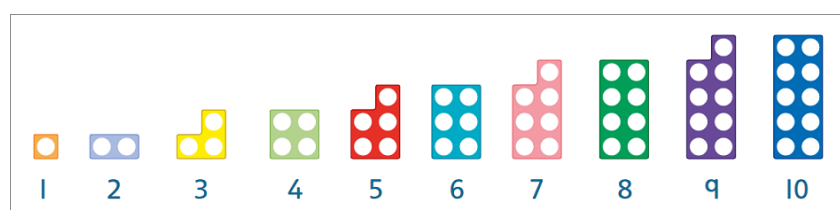
Numicon

Numicon is a multisensory mathematics resource that is produced in the UK by Oxford Owl. Numicon “supports your child as they learn early maths skills in nursery and primary school”. (Oxford University Press, 2021) but it is not limited to use in primary schools and used in all educational settings. It is often used with children with Additional learning needs (ALN) as it is a useful tool to explain mathematical concepts using physical examples and multisensory prompts. Main (2017) believes that “Being able to hold a physical representation of something helps children to understand an abstract concept.” Being able to see the connections between numbers and the coloured shapes can help children to make the connection between the written word, the verbal number, and the concept of the number.

Numicon is made up of brightly coloured plastic shapes with holes cut out, each hole represents one. The shapes fit together to make up larger numbers and can be stacked on top of each other to represent the concept of multiplication or division. Numicon can be used to display number lines for children and once the Numicon resource is familiar to the children it can be used in a variety of different ways to promote numeracy in the classroom.

The resource can be used with children of all ages and abilities as the programme can grow and develop with the children with the addition of extras for example. the pen balances. The Numicon programme can be used as an individual activity or incorporated into group work activities for versatility. Once the child is familiar with using Numicon then it can be used to promote independent study and exploration.

The use of Numicon makes the recording of a child’s progress in numeracy skills easier for school staff to track and record.



(Oxford University Press, 2021)

Evaluation of Numicon

When looking at Numicon there are some very clear advantages of using the resource in schools, especially when working with younger children or pupils with an additional learning need. The nature of the resource means that it is flexible to change with the need of the pupil and the lesson. "Children would benefit from an almost individual programme". (Compton. A, 2007). Campton et al believes that when you are working with children, especially those with additional learning needs then it is important to understand that what works for one may not work for another. The Numicon programme, because of the style and versatility of the resource, is easy to adapt the usage to fit the pupil and their individual needs. "The pairing of number with colour and shape is assumed to promote mental imagery and this visualization of numbers is seen as key to the learning approach". (Rinaldi, 2020). If this is correct, then the use of Numicon in education settings should have a positive effect on children's learning and understanding of numeracy.

The resource is made to be sturdy and large enough that it is easy for the children to manipulate into place themselves with very little support from others. This could be a positive in helping to promote independence for the children in their learning, but also for the development of fine motor skills for younger children and children with additional learning needs. The manipulation of the resource promotes good pincer grip and hand shape formation for the children which will help them in other areas of development. The larger foam set that can be used alongside the regular resource could also be used to promote gross motor skills as well as other areas of development, like communication. This indicates that the Numicon resource does not just support numeracy skills but also other areas of the children's development.

Numicon can be used for a variety of different topics within the brackets of numeracy. The expansion of the Numicon set to include items such as a pen balance to demonstrate weight and addition could be used to illustrate the concepts to the pupils before giving them the opportunity to experiment for themselves. These concepts can be introduced at a younger age but by progressing in the Numicon programme the resource can grow with the children to help support their learning with physical representations of concepts and through experimentation. As the set can be easily adapted and extended to support all children at

their learning level then it is a resource that could be used with all children regardless of ability.

Children of all ages benefit from learning in a multisensory way for all subjects. “Multisensory processes may therefore scaffold healthy cognitive development” (Denervaud. S., 2020) when learning numeracy skills, the concept of number can be a difficult one for children to grasp, especially the idea that a number on paper is the equivalent of an amount in front of you and this is where the use of Numicon can bridge the gap between understanding the spoken number, the written number, and the number concept. Horner (2002) described Numicon as “visual, tactile and multisensory” By making the Numicon resource more than just a counting tool and incorporating it into multisensory experiences and games then it will support the children’s learning in a fun and engaging way. As Numicon is made of plastic it is an ideal tool to be used for multisensory experiences such as using the Numicon blocks in different textures or hiding the blocks and having children identify the numbers using only their sense of touch. As the Numicon programme is so easy to adapt into various activities then it is something that could be used across the ages without the pupils getting bored.

The use of baseboards alongside the Numicon resource can be useful when working with children to represent ideas or patterns, however, one of the disadvantages on using Numicon in the classroom is that it can be difficult to evidence the children’s work. When using the resource with young children or with children with an ALN then the work may be done wholly through multisensory work and not through written work, meaning that the children progress is harder to evidence and track. Once the work is completed then the activity is cleared away, so the children’s multisensory work is lost. This could mean that for an educational provider having the evidence to support the child’s progress file can be difficult. It can also be challenging as in order to monitor a child’s progress accurately using the Numicon programme then a teacher or teaching assistant will need to be closely monitoring the activity to document the progress by either note taking or photographs. The drawback to this would be that the observer could be stifling the child’s exploration by being so present. Observing so closely could also lead to questioning of the children by the practitioner to try to lead the child’s enquiry, or to encourage the child to complete an activity in a ‘tick box’ exercise. A more natural exploration, encouraging independent learning and interest would be favourable.

When using Numicon for addition then the resource can be very useful in understanding how the number join to make a new number, whereas for subtraction then other resources used for numeracy, such as link blocks or similar, may be a more effective way of teaching the concept of subtraction. For multiplication and division, the Numicon structure works well to indicate how numbers fit into other numbers and the style of the Numicon makes putting the pieces together very simple and easy to do. Numicon can also be used for more complicated concepts such as rotation, scale, and pattern. Each Numicon set however only comes with only a small number of each number shape so if more of these are needed than you have you have the need for additional sets, also if multiple children are using them at one time, they are going to be very limited on number shapes. This could lead to expensive outgoings for the school in the first instance to ensure that they have enough sets for the children to use them freely. Each classroom using the programme would need multiple sets for the children to use. An alternative for this is printed copies of the programme which are available online to print yourself, this disadvantage of this though would be that the children are not getting the same experience as when they are using the Numicon set. As the paper is flat and do not fit on baseboards etc then it is limited to what activities it could be used for. The paper resource could be used for maths skills for older children, possibly, but it does not give the children the same experience or the same explorative possibilities.

As a conclusion from looking at the resource theory and that in use in the classroom, it is clear to see that the Numicon system is a valued part of many classrooms. The versatility of the programme means that it can be adapted for all children from the youngest learners to the older learners as the programme can grow and adapt to the needs of the user. When working with children with additional needs Numicon's versatility and durability means that it can be differentiated to suit the needs of every child. The skills that Numicon can help develop other than numeracy shows means that it is one of the most useful resources in classrooms from nursery to comprehensive exploration.

Reflection

As the topics of the modules were listed upon my computer screen the feeling of dread overtook my body. When I was in school myself mathematics and numeracy skills were not my strong point, I was much more of a creative thinker and thrived when learning through experiences and practical activities, what is sometimes describes as a kinesthetic learner. Bay Atlantic University (2022) describes this style of learning as the “use body movement and interact with their environments when learning. To better understand something, they need to touch or feel it; hence practical information is usually preferred over theoretical concepts”. Looking back at my maths lessons in school I can see where the negativity towards maths took over and I decided that it was ‘not my subject’ and that was when I moved from primary to secondary school where all my numeracy lessons were taught in a stuffy classroom, desks facing forward and through learning by copying off the whiteboard and answering endless questions out of a textbook. There was very little interaction with the class teacher and there was defiantly no interaction with my peers in the class. By learning like this I was able to complete the questions I needed to gain a good grade in my GCSE examinations, but I had very little understanding of how and why it worked like that. My education was very much based on the thought that you learnt it because it was in the exam and it didn’t matter if you understood it so long as you got the correct answer in the test, “good exam results do not always mean children have received the subject knowledge they need” (Sellgren, 2017). As a result of this way of learning I would say that I did not have good maths skills and although I could recite information there was no understanding of the processes involved. Looking back, I do not think I had bad numeracy skills, I have always been very quick when working with number and have been able to complete mental arithmetic in my head, but it was the dislike and lack of understanding that brought me to the conclusion that I was no good at the subject.

Reflecting on my own education I can see where it is that education has changed in the last 20 years. I am now attending these lessons again and learning the skills, not as a student but as a member of staff and can see where there were shortfalls in my own numeracy education. It is only by attending these lessons as a member of support staff that I can understand the processes and concepts and improve my own skills while supporting others. I am learning alongside the pupils and then using my own understanding to support them. This has made

me want to make all lessons with my pupils more engaging and I am keen to explore with them where they will use the skills that they are learning in the future.

As I worked my way through the tasks of this assignment there have been challenges that I have come across as a student that I was not expecting. The task of finding a numeracy resource that is used in the classroom is not something that I can relate to due to the nature of my job, I work with one pupil supporting him through British Sign Language in his lessons, he is a more able and talented pupil and so I do not provide academic support but purely work as a communicator of information. The classes that I work in do not use resources as aids in learning which made talking about resources difficult as they are not something that I come across on a regular basis. In order to complete the task, I must rely on the knowledge of others and my past experiences to complete the review. This was more challenging than I was expecting as I did not have a lot of first-hand experience of planning with or using the Numicon programme myself.

As the resource is not familiar to me, it has meant that a lot more research has had to go into the work to make up for my own shortfall. This has been very time consuming, trying to find non-bias information on the resource but it was necessary to learn as much as I could to give a fair evaluation. I have also had to speak to teachers who use the resource on a regular basis, and this has pushed me out of my comfort zone of having to ask for help, which is something that I am not very good at doing. I have also had to seek guidance off my university lecturer which again I find very difficult and uncomfortable. I feel that if I am struggling or finding something difficult, that it feels like a failing on my behalf and therefor something I should rectify myself, "Asking for help is not an admission of failure - it's a statement of courage, integrity, willingness to change, willingness to learn and move on". (Mosley, 2018). From doing this assignment and having to ask for help I have realised that people are willing to support me in my learning and that I only must put myself out there and ask. Although at the time it is not comfortable it was necessary and now, I have realised that asking for help is not a failure, but it will help me in my academic studies moving forward.

Lastly when reflecting on this assignment I can see that I am much more comfortable in writing academic essays but find writing blogs and factsheets difficult to do. In this instance I have found that having to do both formal and informal writing very difficult and having to move between them both has been quite a challenge. This is something that I have had to

work hard on this module to make sure that I am using the correct style of writing in the correct portion of the portfolio. In order to do this, I have had to focus on only one aspect of the assignment at a time and complete that task before moving onto the next task. I have had to learn a new way of working where I use notes to write down ideas or references that I have found that will be useful for other sections of the assignment as I have been unable to jump between the sections. This new way of working and organising my assignments may come into use in the future with other modules and I feel that it is something that I will adapt to be able to use in my work in school as well as in my studies.

The overall reflection of this module is that I have enjoyed looking into numeracy and the impact that it has on our lives more than I expected but I have found the work and the reflection on myself quite challenging. I have found ways to overcome my challenges and in doing so have learnt new skills that I will be able to take with me onto future studies. My problem-solving skills have been put to the test this module showing that numeracy skills really do impact all areas of life, even when you do not expect it.

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