

Numbers Count

ECIE5002

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Element 1

The Importance of Numeracy

This essay will discuss the importance of Numeracy along with the political and social development. Numeracy first began in the 1950's and was known as the ability and knowledge of working with numbers (Kus, 2018), it has since developed into not just a stand-alone subject but an area in which can be used in everyday life and taught throughout the Welsh Governments Numeracy Framework (2020) now in the 21st century using the right pedagogical teaching.

The importance of numeracy into adulthood is immensely important especially when it comes to financial literacy, financial literacy is how personal finances are controlled with the ability to manage, save and risk take with personal finances (CEPF®, n.d.). Abrdn's (2024) article The first on-going barometer of the UK's financial literacy states that in the United Kingdom 23.3 million adults have poor financial literacy leaving them to have little pension, minimal if and savings and struggles of investing in homes as opposed to those with a high understanding of financial literacy who are able to manage debt, save and invest with a good understanding of credit ratings, interest rates along with pension planning (Tamplin, 2023). Financial literacy comes from the theory of social numeracy a theory that is based on the way history, politics and relationships influence the presentation of numeracy (Ackland, 2014). Craig and Guzmán (2018) express it is a complexed concept, explain diversity of how the social aspect of a person's life can have a profound effect on their understanding, and can be affected by who is in their environment and where they are, personal circumstances also play a part such as past history, race, religion, social status and even gender can effect understanding Nollenberger, Rodríguez-Planas and Sevilla (2016) note how women are less likely to have as much financial numeracy skills due to lesser earnings and breaks in work due to child-rearing.

Alongside social numeracy is critical numeracy which extends the skills of using numeracy in real-world situations but to then to take them further by breaking them down, questioning, analysing and evaluating. O'Keefe & Paige (2019) declare to be able to think competently in critical numeracy will allow for contributions to real world problems such as poverty and climate change. Governments are now assessing the importance of critical numeracy by taking part the Program for International Student Assessment (PISA), PISA is a competitive three yearly test 15-year-olds from 80 countries including Wales and England, with the use of the same questions on critical numeracy (National Center for Education Statistics, 2015), encouraging the critical thinking prosses needed in everyday life. The PISA study compares each countries result ranking them in order, this has a detrimental effect on the way countries evaluate and develop their numeracy pedagogy leaving some schools now teaching to prepare for PISA (Vaughan, R. 2015). It is in question whether the PISA tests influence is positive as it leaves a trial of negative publicity for those countries who are ranked lowest adding pressure to student effecting self-confidence and self-belief (Dweck,2009). Arguably the aspect of PISA being a fair test is contentious taking into consideration of cognitive development theory of Piaget, (Wadsworth, B.J. 1989) shares that Piaget believed cognitive

development differs from person to person by to difference in experience such as social and education leading them to think differently to each other.

Furthermore, the addition of technology to the 21st century has also had an outstanding effect on the importance of numeracy skills and the way it is being perceived today. Numeracy is not just used for real life problems but for digital understanding such as programming, algorithms and data. Tout (2022) shares that a considerable number of workplaces now expect worker that are confident in science, technology engineering and mathematics (STEM) skills and able to incorporate them with problem solving poor numeracy skills can be a barrier to succeed in careers. With the new abundance of technology came a new theory of Connectivism coined by George Siemens and Stephen Downes in 2005 (Pappas, 2023) consisting of the understanding that the introduction of online presence has influences learning from other people, ideas and resources, often not always reliable, the need for critical thinking is again crucial (Adedeji, 2022) .

In consideration of the development of social and political factors that affect numeracy it is apparent that the importance of good numeracy is key to understanding the effect of personal financial literacy into adult hood and how it can determine the life of an individual. Along with the attributes of being able to be a social and critical citizen using numeracy to develop and support real-life problems along with the ever-growing development of technology and connectivism manifests the importance of numeracy is always going to be essential.

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Element 2

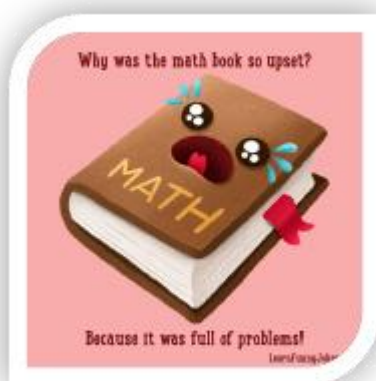
Numeracy is for life



(Freepik,2018)

When we think of numeracy some of us even as adults instantly feel the gut wrenching feeling of no not for me or I just cannot do numbers. But do we want our children and future generations to have the same daunting feeling? I certainly do not. Schleicher (2014) demonstrates that numeracy is all around us whether it be when we are measuring ingredients too cook or whether it may be working out how much we are spending in the shop, it is an essential life skill. So, what can schools do to encourage numeracy?

But I cannot do it



Just like this incredibly sad maths book to the left from (Bing,2025) many children also feel that math is a problem (excuse the pun), and this can be down to self-belief. According to the Cockcroft report (1982) working in specific ability sets allows learners to work at both the speed and level they need allowing them to reach achievable goals, but a study by University College London (2020) show that there is a vast gap in self confidence in children in the lower sets. This can be avoided by using Vygotsky's theory of Social Constructivism, Hughes (2009) explains that though excellent quality conversation and sharing of

information numeracy skills such as problem solving and reasoning are developed. Allowing children to work together in mixed ability groups would indeed allow them to reach even further goals. The high ability learners can lock in and reevaluate their prior knowledge, children of the lower ability are more likely to understand from another child's point of view believing they can achieve as well as their peers. Schools that allow room for both types of teaching are sure to have the best outcome.

I just want to play

(The Cosy Blog, 2022)

Concurring the bad reputation numeracy carries with it is no easy task for schools but by offering a more fun, free approach can make children more engaged, Rousseau believed that children learn best when they are free, following curiosity and learning from their own experiences (Pedagogy4Change, 2019). This can be achieved in schools by allowing learners to learn outside with natural recourses for example counting concurs, measuring sticks, counting scavenger hunts the list is truly endless.



Teachers can also use the pedagogy of liberationism to encourage numeracy by allowing the children to take control of their own learning. Choosing what they want to learn and how they want to learn it. For example, in School A junior students are set tasks to do in different areas such as fractions, multiplications and long division. They are then allowed to choose which order they want to do them throughout the week and can choose what level they would like to push themselves to do, bronze silver or gold, each level getting more difficult. Yes, I know what you are thinking, 'Well does this does not eliminate the teacher,' according to Freire when teachers and students work together both with an open mind using a problem-posing approach allows learners a true understanding of the world (University of Bedfordshire, 2012.). Despite this way of learning being liberating we will not be banishing teachers to the back of beyond just yet because let's face it we all know not every student will push themselves but take the easy road never reaching their full potential. Skinner believed that children learn best from not having the freedom but by being conditioned to learn via rewards and punishments. His research shows that rewarded behaviours are much more likely to be repeated (Grace, 2020). Quite frankly little Jimmy throwing paper aeroplanes at the back may benefit more from a sticker chart than the freedom to choice.

What that was numeracy?

Numeracy can take form in many ways schools should be developing numeracy throughout different subjects, as stated by Welsh Government (2023) the inclusion of cross-curricular skills is essential and will allow learners to develop lifelong skills. For example, let us take science and an experiment as simple as 'Does it float.' By applying the 4 strands to numeracy framework set by Welsh Government (2013) in this experiments learner will cover lots of numeracy skills. Such as:

1. Measuring skills – How much liquid do they need to fill the tank. Is it long enough and wide enough to fit all the objects?

2. Numerical reasoning – Estimate weight, order weight, weigh accurately, how long did it take to sink?
3. Number Skills – What happens if they add, subtract, multiply and divide the weight?
4. Data Skills- Use graphs and charts to record their findings

Other ways numeracy can be used throughout are;

Art- Perspective, dimensions, patterns

Music- Beat, Reading notes, Timing

History- Dates, Timelines,

Geography- Dats, Climate, Distance

Physical education – Seed, Distance, Scores



(PrintableMaterials,2024)

So, whether it be keeping track of how many wives Henry the 8th had or counting beats to the new viral dance, our learners are already using numeracy vastly, so with continued support and planning from schools the future of numeracy will be bright.

Teach me, Teach them

As explained numeracy is an everyday all about life skill and not just for school, but many parents still struggle with basic numeracy (Business-school.open.ac.uk, n.d.) so how are they supposed to help their children succussed in developing these essential numeracy skills if they are unable themselves. School can help encourage good numeracy by supporting parents and care givers by providing training courses. A fine example of this is in School A Springboard a learning project run by the council run free courses to develop maths and numeracy skills at the school each term (Pembrokeshire County Council, 2017). Not only are these courses fun for the children and families to get involved with but they support healthy relationships between families and schools. According to the research of Bronfenbrenner's ecological systems theory it is crucial microsystems are all on the same page and working together. Guy-Evans (2024) notes how parents who share in educational activities with their children can positively influence learning.

Let us face it the future of numeracy is right in the hands of our teachers (no pressure) and by adding a little bit of all the techniques covered in this blog numeracy is looking a little less gut wrenching and a little more 'I have got this.'

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Element 3



What is Lego?

Lego is plastic building blocks that click together, a resource known worldwide for its bright colour and ability to allow children to express themselves through creativity (Daniel, 2023) but it is much more than that. Lego is an exceptional tool to use throughout the development of numeracy, it can be used to support numeracy skills and follow the Welsh Governments Numeracy Framework (2020) in many ways. Here are a few examples;

- Conceptual understanding –  visually seeing how adding and subtracting is done by moving blocks
- Logical reasoning -  Problem solving when building
- Strategic competence –  planning how big structures need to be, design and problems
- Calculation –  separating individual blocks for multiplications
- Measurement –  building structures and measuring them to see which are tallest.



(Millington, 2019)

Who is it for?

The great thing about Lego is that it is inclusive for all ages (Matthew, 2023) beginning with the bigger locks Duplo at just 1.5 years moving on to the classic blocks as development progresses.



(Buildingblockstoy.com, 2025)

As well as being age inclusive Lego is also inclusive to the majority of children with additional Learning needs.

Many children with additional learning needs prefer to use equipment that is familiar to them and with Lego being a popular household toy it enhances the mood of the learner, Weiner (1972) demonstrates how the importance of emotions can affect the learning outcome. Informed by Main (2022) Lego theory captivates students with ASD and is proven an effective method to assist in development of social and symbolic thinking skills.

"LEGO has become a significant player in the realm of inclusive play, making it possible for children of all abilities to connect, learn, and thrive." (HodgePodasDays, 2024)



Examples

There are a vast amount of ways Lego can be adapted for the purpose of numeracy throughout all school ages and can be presented in many ways. The use of tuff trays will make it social and allow students to learn from each other (James,2023). Children can choose Lego characters to make their work personal to them which encourages ownership and responsibility (Kumon UK, n.d.) . Characters can also be used to retell stories and create personal versions of the story Ralli et al (2021) explains this will develop skills such as language, creativity, vocabulary and critical thinking.



(Mavink.com, 2024)

Linking activities to topics and literature that are being taught will keep learners engaged. This can also be done by asking questions such as:

- What can you build to keep the pigs safe from the wolf?
- How big is the structure you have made; can you measure it?
- What can you change to make it stronger?
- How many blocks have you used?
- Are they all the same size?

By asking questions rather than instructing learners will develop critical thinking skills as they go (Lydian-admin, 2025).



(Pineck, 2014)

Keeping track

Numeracy Lego activities can be assessed by following Teacher's guide to numeracy assessment instruments by the Department of International Development (2004) this can be achieved by :

- Asking students to point or use flash cards to demonstrate their answer.
- Asking students questions and writing down their answers whether they be correct or incorrect.
- Asking students to demonstrate their working out.

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Element 4

Lego Numeracy in Action

Please see attached a link to my video containing both an example of a key stage 1 Duplo building activity and a key stage 2 Classic Brick Multiplication activity.

https://www.canva.com/design/DAGgmmecjC4/z9K7q9bb8jPd-zyOP2vGCw/edit?utm_content=DAGgmmecjC4&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

Element 5

Is Lego really the Infinite Numeracy Resource

Is it just play?

The name Lego comes from the Danish phrase ' Play well' which is exactly what it does. It encourages children to learn through play even sometimes whilst not even realising they are indeed learning (Augustyn,2023). In Frobel's theory of learning through play it is noted that children need to go at their pace exploring as they go (Bruce,2012). When learning through play students will retain what they have learned more effectively opposed to learning facts Hoskins, K. and Smedley, S. (2015) note that Frobel explained play as 'The highest expression of human development in childhood, for it alone is the free expression of what is in a child's soul'. Playing with Lego can be a fantastic support to neurodivergent students as it is a familiar resource that is predictable (Autismeye.com, 2023). Muzikar (2014) also informs that children who are neurodivergent see things from a different perspective, through shapes and patterns. With the nature of the Lego blocks being a solid shape that can be constructed into any shape or pattern it is inevitably going to be a successful learning tool to encourage neurodivergent children to engage in numeracy activities. Alongside Frobel's theory Parker, Thomsen and Berry (2022) demonstrate that there is now clinically proven in neuroscience that play has a detrimental effect on the development of the Prefrontal cortex prompting new neurons to develop also noting that not enough play can negatively affect the way the brain problem solves.

Adding numeracy to the play

When using Lego Duplo to complete a numeracy activity of building a structure for characters from a story, allowed the learner freedom to build and evaluate how tall and wide it needed to be. This proved an effective method, allowing the learner to connect with the story and develop skills in measuring, counting, spatial awareness and problem solving. This activity demonstrated Discovery learning a concept by Bruner who believed children are active learners and by doing so begin to think critically and build a stronger foundation of knowledge (Currell, (2022). This student also used critical thinking skills to self asses the development of the structure to see how they can improve, a skill that allows the learner to take responsibility for their own learning and supports future development. (Mccrea, 2017) said to be able to self-assess aids learners to “grow to appreciate why they are doing what they are doing.”

Alongside this using Lego for a more structured task of multiplication for junior student proved to be a trickier concept, due to the fact Lego blocks are mainly made up of even numbers. When adding the extra single block for the odd numbers it became awkward to handle due to the small-scale nature of the block. Overall, this did not deflect the learner from the learning outcome, enjoying the use of a concrete resource to physically handling and see how multiplication works through grouping and counting. Johnson, (2023) reveals the

importance of concrete representation is the very first step in developing numeracy skills through The Concrete Pictorial Abstract (CPA) approach and without it the understanding of pictorial and abstract cannot be developed.

Is it for me?

Recently when Using Duplo Lego for an activity of recent with a group of nursery students in School A it was apparent that the numeracy activity needed to be adapted to suit a learner with Symbrachydactyly, this is a medical condition that effects the development of hands from birth (Cleveland Clinic, N.d.). I adapted the activity by using larger outdoor blocks that were easier for the student to handle. On another occasion working with Year 3 students in School A to complete a 3D model activity using Lego Classic bricks. I found the majority of learners found the activity exciting and effective, but one learner had great difficulty finding the bricks too fiddley to work with, again by offering a large block (Duplo) this problem was eliminated but then sparked the child to feel embarrassed about the need for extra help, Jacobson (2023) explains that children who need support often have a low self-esteem.

Let's get that goal

The use of Lego blocks for numeracy throughout primary school can be assed to keeping track of learner's abilities. As the Welsh government explain in the Assessment for Learning and the National; Literacy and Numeracy guideline (2013) carrying out assessment for learning allows both the learner and the teacher to keep track of development. The guidelines not that assessments should be a positive experience that help empower learners, it is principle that students take part in setting and assessing personal targets to defer the feeling of worry due to expectations and feeling less valued (Thomas Fordham Institute, 2021). Conn, C. and Hutt, M. (2020) clarify that for leaners with ALN this will be in the form of independent development plans supporting them to reach the goals they have chosen for themselves opposed to the statements of special educational needs once used.

Conclusion

As expressed, I do believe Lego has an outstanding amount of potential to be an effective numeracy resource for all learners with only a minority who find it difficult to operate. Lego allows learners to learn numeracy through play a crucial part of development supported by Frobel's theory of Learning through play (Teaching, 2024), Lego also supports practitioners to follow the Welsh Governments Numeracy Framework (2020) offering a flexible resource that can be incorporated cross-circular. Also offering opportunities for learners to progress through social constructivism with the aid of tuff trays (James,2023) and mixed ability grouping which in turn develops problem solving and reasoning skills needed later in life in the form of social and critical numeracy.

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