



LEARNING CORNER

Tessellations: the art and science of tiling

Eliza Cherian

Have you ever wondered about the shapes of your tiles or how shapes fit together to form a pattern? Well! You may be surprised to learn (I know, I was) that there is both an art and a science behind the pretty floor patterns in old homes.

Welcome to the world of tessellations!

Simply put, a tessellation is a pattern made of one or more repeating shapes that completely covers a surface without any gaps or overlaps. Different kinds of shapes can make up a tessellation. However, tessellations are different from patterns. Patterns may repeat but they do not have clearly defined closed shapes as tessellations do.

The art of creating tessellations has been known since early days. The word tessellation is derived from the Latin word tessera, which means 'cube' or 'die'. When people began to build their houses and fortifications, they tried to fill spaces. Broken stones, making random tessellations, probably built the first homes and castles. Later, the arrangements of these stones would have possessed a somewhat regularity. The earliest tesserae were cut from marble and limestone. The different sorts and ways of parqueting, complicated covering of ceilings, mosaic tiling of floors are some examples of tessellations that reveal human creativity over the years.

The first insightful mathematical study of tessellations was written by Johannes Kepler in 1619- 'Harmonics Mundi'. He described geometric properties of planar tessellations by regular polygons. Later, Dutch artist M.C. Escher (1898-1972)), fascinated by the mosaic tiles in the Alhambra in Granada, popularised tessellations. He designed hundreds of tessellated patterns in his lifetime that have been used for educative purposes too, besides visual enjoyment, because of their close affinity to mathematics. His patterns changed from simple polygons to forms of fish, birds, dogs, crabs, horses and even humans.

The link between tessellations and education was further forged by Dale Seymour. He has written many books which use this art form in education, and promote its usefulness in the child's understanding of geometry.

RELATED RESOURCE FOR CHILDREN

Sutradhar has a 'Rangometry kit' with tiles in different shapes and colours for early learners.
For children from 3-8 years

WEB RESOURCES

www.tessellations.org



Playful art with tessellating shapes and colours!

- A regular tessellation is a pattern made with only one type of polygon
- No regular polygon with more than six sides can be used in a regular tessellation
- Only regular polygons (where sides and angles are of equal measure) that have interior angles that are factors of 360 will tessellate

Thus only equilateral triangles, squares and regular hexagons can make regular tessellations. And this is just the beginning! There are semi-regular tessellations with two different kinds of polygons (say, a square and a hexagon) and irregular tessellations which are much more complicated with irregular polygons and shapes. There are also 3-D tessellations where cubes, cuboids and tetrahedra (and other solid shapes) tessellate!

WHAT'S NEW

First Steps: A Creche kit



Children develop maximally in the first three years!

Brain Science tells us that a young child's brain is neuroplastic, forging millions of synapses in the first three years. Providing appropriate stimulation in these years can make all the difference. This is particularly true for children with mild developmental delays, or children in institutional settings such as creches and orphanages. First Steps, the **Creche Kit** that Sutradhar is putting together, has a selection of developmentally appropriate resources. There are suggestions on how to use the material too. Please write in to sutra@vsnl.com for more details!

TEACHER TALK

Nature and the Child – a Montessori perspective

Shaila Mallik

In the early years of Maria Montessori's work on child development, she was greatly influenced by the work of the French researcher Itard. The work that interested and fascinated Montessori above all was his work with the "savage boy of Aveyron". Through this work Itard himself and Montessori to follow, recognised the relationship that man's inner self has with nature, and established the importance of nurturing and building on that relationship.

Itard had 'adopted' a savage boy who wandered into his French town in the 1800s, and conducted extensive research on his development. The boy was believed to have been abandoned in the forest as a baby and grew up feral until the age of about 12. The 'savage boy' was truly a child of nature. He was at home in the outdoors, took pleasure in the natural elements, played in the rain and snow, and adapted to the weather within his surroundings. He seemed to feel at one with nature in a unique and special manner, choosing often to go out and enjoy the outdoors in what others would consider 'inclement weather'. His behaviour gave to Itard the insight that so-called human 'development' results in the renunciation of our natural instincts and urges. Reading his work brought home to Montessori the realisation that humans are intrinsically part of the natural world and their basic instinct is to commune with nature.

According to Montessori, as the world gets increasingly urbanised, it is important to free the child from the confines of a restrictive and contrived life. Most often we restrict our children to the indoors, protecting them from the elements that they should learn to weather instead. Our concession to this is to sometimes let children walk barefoot in the grass, or to wear light outdoor clothing on a sunny day. We restrict our interaction to the plant world with a few house plants and window boxes, and to animals by having small house pets or domesticating animals that provide us with a food or a service. We have begun to believe that we show our love for an animal by caging or imprisoning it and then feeding it at our will.

When adults fear nature and try to protect themselves from it, in the process they instil the same fears in their children. They restrain children from running outdoors or getting wet in the rain. A child so restricted may inflict pain to plants and animals, destroying plants, or teasing small creatures, and we accept it as part of his natural activities as a child, not noticing that "his soul has already become estranged from nature." - **Montessori in "The Discovery of the Child" (Clio Press 1997).**

Nature makes children strong; and it is our role to help this develop. Even a two year old child left free to walk in natural surroundings will walk for miles without tiring, so long as we adults accompanying her remember that her limbs are still short and it is we who must keep pace with the child, allowing her the rests and pauses she needs, enjoying a pause to

admire a view, smell a flower or find shapes in a cloud.

It is vital that we keep alive this natural affinity that children have for nature rather than subdue it. A small child has a natural concern for other living things be they small or large, plant or animal. A child loves the feeling of knowing she can care for something that will respond, so will take great joy in knowing she must water plants for them to grow and flower, or feed pet animals in order for them to live. These tasks fill children with enthusiasm and a nurturing spirit. A child given the life cycle of a bug or butterfly to observe will be deeply interested in watching the care a mother gives to her young, or express wonder and joy at seeing young ones being born or hatched. Montessori recalls entering her Children's House one morning to find the children all seated in a circle on the floor in silence, staring at a rose that had bloomed the night before, awed into silence and contemplation, almost meditative.

Recognizing how important it is to let nature be an integral part of a child's growing years, every Montessori Children's House that is ideally planned ensures that there is the provision for a garden and an opportunity to commune with nature. At home and at school, it is vital that we as adults provide an opportunity to nurture and strengthen this bond that is integral to living.

SPOT LIGHT

Track the status of anganwadis in your state



A Supreme Court judgement of Dec 2006 has implications for thousands of young, underprivileged children to be served by anganwadis (AWCs) under the **Integrated Child Development Scheme (ICDS)** of the government of India. The highlights:

1) Government of India shall sanction and operationalise a minimum of 14 lakh AWCs in a phased and even manner starting forthwith and ending December 2008. In doing so, the Central Government shall identify SC and ST hamlets/habitations for AWCs on a priority basis.

2) Government of India shall ensure that population norms for opening of AWCs must not be revised upward under any circumstances. While maintaining the upper limit of one AWC per 1000 population, the minimum limit for opening of a new AWC is a population of 300 may be kept in view. Further, rural communities and slum dwellers should be entitled to an "Anganwadi on demand" (not later than three months) from the date of demand in cases where a settlement has at least 40 children under six but no Anganwadi.



3) The universalisation of the ICDS involves extending ICDS services (Supplementary nutrition, growth monitoring, nutrition and health education, immunization, referral and pre-school education) to every child under the age of 6, all pregnant women and lactating mothers and all adolescent girls.

4) All the State Governments and Union Territories shall fully implement the ICDS scheme.

5) The Chief Secretaries of the State of Bihar, Jharkhand, Madhya Pradesh, Manipur, Punjab, West Bengal, Assam, Haryana and Uttar Pradesh shall appear personally to explain why the orders of this Court requiring the full implementation of the ICDS scheme were not obeyed.

6) Chief Secretaries of all State Governments/UTs are directed to submit affidavits with details of all habitations with a majority of SC/ST households, the availability of AWCs in these habitations, and the plan of action for ensuring that all these habitations have functioning AWCs within two years.

IMPORTANT WEBSITES

What is the situation of anganwadis in your state? If you are interested in being part of the nationwide campaign monitoring anganwadi expansion and efficacy; join The Right To Food Campaign.

VISIT

www.righttofoodindia.org

IMPORTANT PUBLICATIONS

The FOCUS Report brought out by the right to food group highlights issues related to the under 6 years child, the most vulnerable segment of our population. (Rs 150)

Its Hindi translation "Che Varsh se Kam ke Bachchon par Focus" is also available with them. (Rs100). Order from righttofood@gmail.com

Sutradhar, 59/1, 3 Cross, 10 A Main, Indiranagar Stg 2, Bangalore 560 038.

Phone: (080) 25215191, 25288545 Email: sutra@vsnl.com www.sutradhar.com

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