

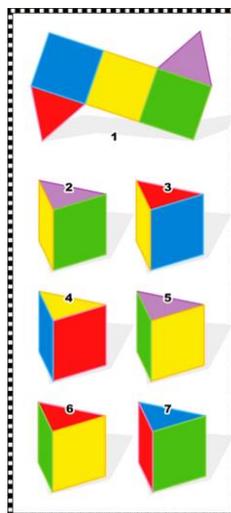
'Picture Smarts' – How to Identify and Foster Visual-Spatial Intelligence in Children

The artist sees what others only catch a glimpse of.

Leonardo Da Vinci

You may have never heard of visual-spatial intelligence, but you have definitely used it. We use spatial intelligence every day. When a child imagines where a toy is in his room before he goes to get it, when we endeavour to find our way home from a new neighbourhood, when we merge in traffic, cross the road, or attempt to negotiate two metres social distance while walking on a narrow footpath, we use the brain's ability to perceive, process and imagine information about the physical universe. Some of us may have even found our visual-spatial skills challenged when we have attempted to follow 2D diagrammatic instructions to construct a 3D finished product while assembling flat-pack furniture!

Howard Gardner, American developmental psychologist and Harvard University education professor, first posited the theory of multiple intelligences in the 1980s. Gardner proposed that intelligence was not made up of one factor, but nine. (See previous *How Smart Are You? How Are You Smart?*) Spatial intelligence is one of the nine intelligences that he identified. He considered spatial intelligence a foundation intelligence upon which many of the other eight intelligences rely and interact, hence we can identify bodily-kinaesthetic *and* spatial intelligence in many famous artists and sculptors. The word *spatial* means relating to space, or the perception of objects in space. It comes from the Latin *spatium*, for 'occupying space'. Gardner defined spatial intelligence as the intelligence of visual thinking. People with this form of intelligence can visualise and manipulate three dimensional shapes in their 'mind's eye'. We refer to people with high visual-spatial intelligence (or visuo-spatial intelligence, as it is also called) as being 'Picture Smart', but this intelligence is not confined to a talent for drawing and painting. It includes the ability to imagine or visualise in one's mind the position of objects, their shapes, their spatial relations to one another, and then manipulate them through mental movement, rotation, or transformation. In the example below, which 3D triangular prism is made from the 2D net in number 1?



To come up with the answer to you need to mentally form a picture of the prism being folded. While doing that, you need to keep track of the relative positions of the different coloured sides. (See answer at end of article *)

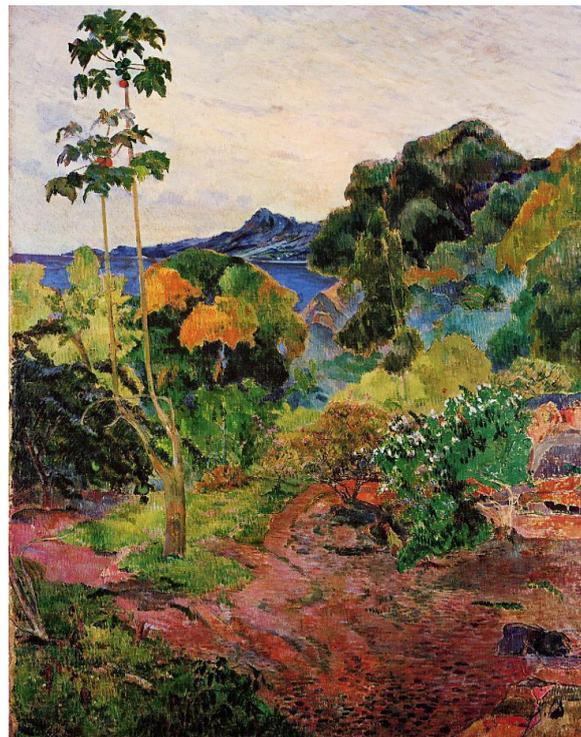
Most tasks that involve visual-spatial intelligence also require additional visual-processing skills. However, while Gardner readily admits there is often a visual component to spatial intelligence, he is careful to distinguish between spatial intelligence and visual-spatial intelligence. He claims that individuals who are blind or visually impaired may also demonstrate high spatial intelligence. For instance, a blind person, who has no access to the visual world can develop spatial intelligence by utilising the tactile modality of their perceptual system. Using touch and spatial reasoning to calculate the size, shape, width, and length of an object can result in an accurate visual picture of the object. Louis Braille is an example of such an individual. Many renowned artists would seem to agree with Gardner's theory:

If I close my eyes, I see things better than with my eyes open. Henri Matisse

I paint objects as I think them not as I see them Pablo Picasso

Art is not what you see, but what you make others see. Edgar Degas

I shut my eyes in order to see Paul Gauguin



Martinique Landscape by Paul Gauguin

This ability to imagine or see 'what could be' in the mind's eye arises from spatial intelligence. It's what Michelangelo used when he visualised a potential sculpture inside a crude lump of stone. It's what led Picasso to assert *Everything you can imagine is real*. It's what television architect Dermot Bannon employs when he visualises and then designs a potential

structure to occupy a green-field site, or a dramatic rebuild on the footprint of a run-down cottage in his *Room to Improve* series. During the process, the architect creates a 3D representation so accurate and detailed that his designs literally become a reality. It is the mode of thought we use to imagine different visual perspectives and the intelligence we employ when we attempt to answer the question: are these shapes different – or are they identical, and merely oriented differently?

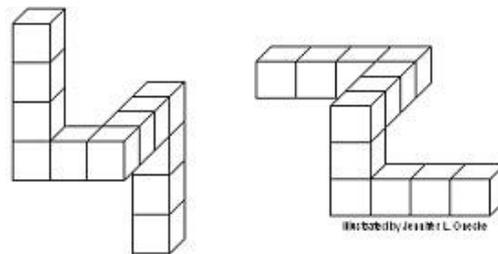


Figure 1: Based on Shepard & Metzler's 'Mental Rotation Task'

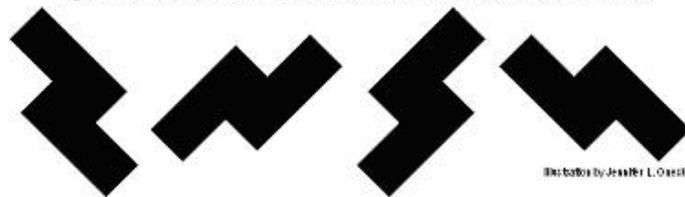


Figure 2: Mental Rotation Task Based on Canonical Orientations

People with this intelligence tend to think visually and often prefer learning the same way. They are good at seeing the big picture but they sometimes overlook the details! Traditionally, boys were thought to perform better than girls on visual-spatial tasks, but many studies have debunked this gender-biased assumption. It has been found that when boys and girls were exposed to the same level of 'spatial talk', when girls were given the self-belief that they could perform as well as boys on these tasks, and when girls and boys were given equal time and opportunity to practice the skills, there was no difference in their achievements.



Characteristics of 'Picture Smart' Learners

The term 'visual-spatial learner' was first coined by psychologist Linda Kreger Silverman Ph.D., an expert on giftedness and the author of several books on visual-spatial learning. She suggests that approximately 30% of students can be considered strong visually-spatially, with another significant percentage leaning towards this 'learning style'. The visual-spatial learner is a student who learns holistically rather than in a step-by-step fashion. It could be said that they have an all-or-nothing learning style (sometimes referred to as the 'aha' phenomenon). They need to see the whole picture before they can understand the parts. Because the learner is processing primarily in pictures rather than words, ideas are interconnected. Linear sequential thinking, which is the norm in many classrooms, is particularly difficult for these learners, requiring a translation of his or her usual thought processes, which often takes more time. Some visual-spatial learners are excellent at auditory sequential processing as well, but the majority of them are deficient in these skills.

This leads to a complex set of problems for the student. A definite mismatch exists between this learning style and traditional teaching methods. So, how can we identify children who exhibit this form of intelligence in order to validate this vital kind of intelligence and to differentiate instruction methods for such learners?

'Picture Smart' learners:

- ✚ Think in pictures rather than in words, and can visualise anything in their 'mind's eye', without actually having to see it.
- ✚ Learn more easily when presented with visual rather than auditory information, and remember information by creating visual pictures.
- ✚ Love to draw, paint and work with clay.
- ✚ Are good at artistic composition e.g. creating perspective. They may be able to draw in 3D from a young age.
- ✚ Enjoy building construction toys, e.g. Lego, K-nex, Mobilo, etc.
- ✚ Are skilled at visual problem-solving, visual puzzles and visual estimation.
- ✚ May struggle with phonics and learn words more quickly using 'whole word approaches' to teaching reading such as flashcards.
- ✚ Demonstrate better reading comprehension than reading accuracy.
- ✚ Grasp mathematical concepts as a whole due to a sharp sense of space, distance and measurement, but may make needless computational errors because of their inability to attend to details.
- ✚ Struggle with showing the sequence of a process, e.g. when the teacher asks them to show their work, since they see the task as a whole rather than a product of several steps. Because of this, they may seem disorganised.
- ✚ Have excellent observational skills – they notice colours, shapes and fine details, and easily recognise patterns.
- ✚ Appreciate books with pictures, even as they grow older.
- ✚ Enjoy playing computer games.

- ✚ Are expert navigators, have an excellent sense of direction and can read maps and charts easily.
- ✚ Can easily translate first-person spatial knowledge into a bird's eye view.
- ✚ Notice and read body language and facial expressions well.
- ✚ Are very aware of their environment, remember places vividly, and are skilled at manipulating their physical surroundings.
- ✚ Can easily remember and interpret visual information, including print – they may seem to possess a photographic memory!
- ✚ Enjoy geometry, computer graphics and computer-assisted design.
- ✚ Have vivid imaginations, and are often good at coming up with unusual or unexpected ways to solve problems.



I was never capable of being an average pupil. I would either seem refractory to any teaching and give the impression of being completely dumb or I would fling myself on my work with a frenzy, an impatience, and a willingness to learn that astonished everybody. But to awaken my zeal, it was necessary to offer me something I liked. Once my appetite had been whetted, I became ravenously hungry. Salvador Dalí

As we can see, these learners neither learn in the step-by-step fashion common in the classroom nor from drills and repetition. They are whole-picture thinkers who grasp a concept all at once and see the whole before acknowledging the details. Despite this, they are able to work on complex tasks and may be classified as system thinkers.

Famous People with High Visual - Spatial Intelligence



The only thing I know is that I paint because I need to. Frida Kahlo

People with high visual-spatial intelligence possess the ability to visualise the world accurately, modify their surroundings based upon their perceptions, and recreate the aspects of their visual experiences. They are able to visualise objects from different angles. 'Picture Smart' people have excellent spatial judgement and reasoning. They are able to accurately judge the distance between themselves and an object, and are skilled at using their visual ability to complete tasks and projects that include design, judgment, and creativity. For this reason, they make good painters, artists, architects, engineers, and designers.

Here are some examples of famous people who have demonstrated exceptional visual-spatial intelligence:



Leonardo da Vinci (1452 – 1519) was a painter, sculptor, architect, inventor, military engineer and draughtsman. The young Leonardo received little formal education beyond basic reading, writing and mathematics instruction, but his artistic talents were evident from an early age. At

around age 14, da Vinci began a lengthy apprenticeship with a noted Florentine artist, where he learned a wide range of technical skills including metalworking, leather arts, carpentry and drawing. In 1503, da Vinci started working on what would become his most well-known painting, and arguably the most famous painting in the world, *The Mona Lisa*. He also painted *The Last Supper*. Although da Vinci is best known for his artistic abilities, he only ever completed 15 works. One reason is that his interests were so varied that he wasn't a prolific painter. Always a man ahead of his time, da Vinci appeared to prophesy the future, conceptually inventing the modern day bicycle, the parachute, the helicopter, an armoured fighting vehicle, a self-propelled cart (car), the use of concentrated solar power, diving equipment, a calculator, a rudimentary theory of plate tectonics and the double hull. Perhaps his most well-known invention is a flying machine, which is based on the physiology of a bat. Da Vinci did not see a divide between science and art. He viewed the two as intertwined disciplines rather than separate ones. He believed studying science made him a better artist. In 1502 and 1503, da Vinci also briefly worked as a military engineer, travelling outside of Florence to survey military construction projects and sketch city plans and topographical maps. For centuries after his death, thousands of pages from his private journals with notes, drawings, observations and scientific theories have surfaced and provided a fuller measure of the true 'Renaissance man'.



I.M. Pei (1917 – 2019) Chinese American architect, well known in his field for using large, abstract forms and sharp geometric design. His glass-clad structures seem to spring from the high-tech modernist movement. When he was a child, he learned basic knowledge about architecture from his father. He is popularly known for designing the Rock and Roll Hall of Fame in Ohio, (above) and he also built the Louvre Pyramid, which is the main entrance to the Louvre Museum in Paris.



Amelia Earhart (1897 – 1937) set a number of aviation records in her short career. When she was just twenty-three, Amelia Earhart took her first airplane ride. It was just a few hundred feet, but from then on she was determined to learn to fly. When she earned her pilot's license in 1923, she became the sixteenth woman in the United States to do so. In 1928, she became the first woman to fly across the Atlantic. In 1932, Earhart became the first woman (and second person after Charles Lindbergh) to fly solo non-stop across the Atlantic Ocean. She was the first person to fly alone from Hawaii to California. Near the end of the uneventful flight, she listened to the radio broadcast of the Metropolitan Opera! In 1937, Amelia attempted to fly around the globe with one crew member, Fred Noonan. She completed most of the global journey, a distance of twenty-two thousand miles, and had just seven thousand to go. When they reached the Pacific, they had radio trouble and were low on fuel. The plane disappeared on July 2, 1937. They were never found.



Racing Driver **Charles Leclerc** was born in Monaco in 1997. During his childhood, Charles Leclerc was a friend of the late Jules Bianchi, who had won his first racing championship when Leclerc was only 10 years old. At the age of eight, Leclerc began karting at the track managed by Bianchi's father. He made his Formula One debut in 2018 for Sauber, a team affiliated with Ferrari. He became the second-youngest driver to qualify on pole position in Formula One at the 2019 Bahrain Grand Prix. The 2019 season also saw Leclerc take his first career win in Belgium, followed by winning his first Italian Grand Prix as a Ferrari driver the week after. He

won the Pole Trophy in the 2019 season becoming the youngest driver ever and the first non-Mercedes driver to win it since the trophy's inception in 2014.



My imagination creates my reality – Walt Disney

Walt Disney (1901 – 1966) is probably the world's most famous animator. He was also an American business magnate, producer, cartoonist, producer, screenwriter, entrepreneur, and voice actor. He remains an important person in the American animation industry and throughout the world. He is well known for his influence and contributions to the field of entertainment during the 20th century. His best-known creation is the character Mickey Mouse, and he even provided the voice for this character for many years. Donald Duck, Minnie Mouse and Pluto are also his creations. Walt struggled in school and is now thought to have had dyslexia. He was also once sacked from a Kansas City newspaper company because of his lack of creativity! Walt Disney started the Walt Disney Studios and produced the first full length animated movie when he created *Snow White and the Seven Dwarves*. The movie was a huge critical and financial success, and gave him the means to create many more cartoons and movies. He won 32 Academy Awards. In the 1950s Disney opened Disneyland, the first modern theme park in California. He also bought the land for Walt Disney World in Florida, but unfortunately did not live to see it finished, as he died before it opened.

language. Louis was the youngest of four children. He became blind at the age of three, due to an accident at his father's workshop. Louis went to the Royal Institute of Blind Youth at the age of ten, where he would later become a teacher. Braille was a good student, especially in science and music, and also went on to become a church organist.



I think in pictures. Words are like a second language to me. I translate both spoken and written words into full-colour movies, complete with sound, which run like a VCR tape in my head. When somebody speaks to me, his words are instantly translated into pictures. Language-based thinkers often find this phenomenon difficult to understand, but in my job as an equipment designer for the livestock industry, visual thinking is a tremendous advantage. Visual thinking has enabled me to build entire systems in my imagination. Temple Grandin

Temple Grandin was born in 1947, in Boston, Massachusetts, and was diagnosed with autism at the age of three. She didn't speak until she was almost 4 years old. Temple's mother sought out schools and learning opportunities for her daughter that would help young Temple focus on her abilities. From an early age, Temple was aware that she thought in pictures. Of course, thinking in pictures rather than words made Grandin's childhood a struggle, particularly in school, and she was subjected to cruelty and ridicule during many of her school years, and even well into her adult professional life. However, her unique ability to think in pictures afforded her remarkable insight into why animals react the way they do, and what comforts them. By seeing things as an animal can see them, she conceptualized down to minute details her design for a humane livestock restraint system, which is now used on a huge scale in the United States and throughout the world. She has also become a leading advocate for autistic communities and has also written books on her experience of the world. In 2010, HBO released a film entitled *Temple Grandin*, starring actress Claire Danes. The movie received 15 Emmy Award nominations and won five.

How to Foster 'Picture Smarts' in Children

Neuroscientists have found that the specific regions in the brain that are responsible for thinking about location and spatial relationships develop in very early childhood. In fact, pre-schoolers' spatial abilities can predict their future performance in mathematics learning in primary and secondary school. Spatial ability is cumulative and durable. Those who master the skills in early childhood will have more opportunities to use it to acquire and organise additional information throughout their lives.

Spatial skills are only one aspect of a person's overall intelligence but research suggests that spatial thinking predicts a young person's achievement in science, technology, engineering, and mathematics. (STEM) College students who score high on spatial tests tend to major in STEM disciplines and go into STEM careers. But visual-spatial skills are also crucial for everyday activities such as tying one's shoelaces, reading, and playing sports. A child perceives how numbers and symbols are placed in relation to one another when solving equations like $7-2+5$ has a different answer to $2-5+7$. He also needs to be able to align numbers vertically to add and subtract multi-digit numbers. For reading, a child needs to know that certain shapes; u and n, w and m, b and p, 6 and 9, can have different meanings, depending on how they're rotated on the page, and that the arrangement of the same letters on the page can form different words, e.g. step, pets. In order to catch a ball, a child must gauge the speed and distance of the ball in flight and coordinate their movements accordingly. It is essential, therefore, that we, as teachers and parents, help the children in our care to cultivate 'picture smarts'. So, how do we help children to develop visual-spatial intelligence?

- Encourage active, physical exploration of the real world from an early age. Avoid 'Look, but don't touch' approach to learning.
- Seize everyday opportunities for spatial thinking and spatial talk. Use spatial vocabulary and spatial terms with both boys and girls and encourage the children to use those terms too, e.g. draw what this would look like if I turned it upside down.
- Introduce structured construction games: challenge kids to *match the design*. (Lego, Mega bloks, etc.) A typical spatial intelligence test presents a figure made of blocks, and asks the test taker to create an exact copy.
- Build in a storytelling context to block building: ask the children to build structures to solve a problem.
- Play games that allow you to exercise the ability to manipulate 3D objects, e.g. chess, Jenga, Lego.
- Solve 3D puzzles – the Rubik's cube is hands down one of the best ways to build spatial reasoning. It requires you to not only move the cube but to think ahead to successfully solve the puzzle.



- If toys are scarce, use empty cereal boxes, Toblerone boxes, kitchen roll holders, etc. to stack and build interesting structures.
- Provide frequent opportunities to draw, paint, model with clay, and to make pottery and 3D crafts. As Salvador Dali instructs 'Painter, paint!'
- Introduce children to Tangram, (ancient Chinese puzzle consisting of 7 shapes) non-jigsaw and other open-ended spatial puzzles. In studies, children who played multiple-solution spatial puzzles were found to be more innovative and flexible in subsequent problem solving.



Tangram

- Provide children with plenty of opportunities to read use and create maps, charts and plans – create treasure trails around the school and local area.
- Encourage children to study the globe. (See Map Challenge attached)
- Try origami - the Japanese art of paper folding.



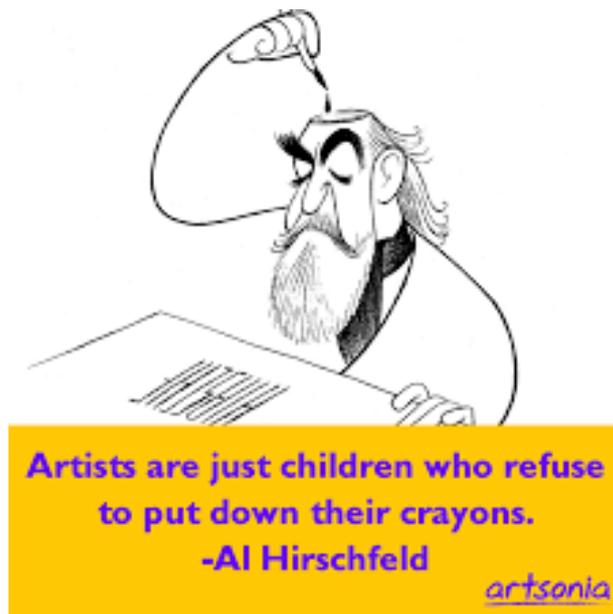
shutterstock.com • 736975540

- Practise 'mental folding': the ability to fold in 'the mind's eye' is a predictor of a student's performance in STEM fields.
- Challenge them with mental rotation puzzles and assign puzzles for homework.
- Use visual aids, colourful displays, pictures, graphics, videos, diagrams and tablet games to teach or explain a topic or concept.
- Let children experiment with photography: taking photos of objects at different angles can enhance children's ability to take on different visual perspectives and recognise changes in scale.
- Navigate without a map (or GPS!) using landmarks.
- Play age-appropriate, non-violent action video games (See *Common Sense Media* website for reviews)
- Play spatial video games such as Tetris and Marble Madness.

- Encourage children to use mime and hand gestures when solving spatial problems.
- Allow them to doodle and highlight notes in colour.
- Integrate art with other subjects, including pottery and 3D crafts.
- Practice visualisation techniques and activities – encourage them to use their mind's eye.
- Change places frequently in the classroom to gain different perspectives.
- Use whole word recognition strategies, such as Look and Say/flashcards, as well as phonics, in the teaching of reading.
- Use manipulatives, concrete material and story problems instead of equations in the teaching of Maths.
- Encourage them to read books with pictures, regardless of age.
- Use advance organisers and goal setting charts so they can see the 'whole picture'.
- Learn to play music! More than 550 studies have found that learning to make music, rather than just listen to it, can raise spatial-temporal ability and is associated with better spatial intelligence.
- Introduce them to famous 'picture smart' individuals throughout history and their successes.
- As teachers and parents, model appreciation and enthusiasm for art, sculpture, architecture and design.
- Be prepared for gradual progress!

Studies show that students with poor spatial skills are often slow to improve – in the beginning. So, if you start a program of spatial skills training, don't be discouraged if the children don't show improvements right away. It may take 6 sessions or more before you notice a difference. Once spatial learners create a mental picture of a concept and see how the information fits with what they already know, their learning is permanent. Children with high visual spatial intelligence may begin to perform better in higher years in secondary school and college where their gifts of grasping whole concepts and the big picture become more important. These individuals are often thought to be 'late bloomers' because of this.

Career choices for people with high visual-spatial intelligence



Spatial skills are crucial in many academic and professional fields, such as STEM. 'Picture smart' people can visualise anything related to art, fashion, decoration, and culinary design before creating it. They have an 'eye for detail'. All of us have some visual-spatial intelligence – we need it to negotiate space in a busy playground, pack a suitcase or put up a tent. Some people, however, have high spatial intelligence and are drawn to careers that allow them to exercise their abilities, such as those in the Visual Arts, STEM, architecture and design. Here are some examples:

- ✚ Artist, sculptor, potter, craftsperson, computer animator, graphic designer.
- ✚ Photographer
- ✚ Fashion designer, tailor, fashion merchandising.
- ✚ Interior designer, decorator, set designer.
- ✚ Working in film and television: director, costume designer, video-editor, and make-up artist.
- ✚ Architect, draughtsperson, town planner.
- ✚ Visual advertising, art director.
- ✚ Construction worker, carpenter, industrial designer.
- ✚ STEM careers: surgeon, engineer, physicist, mechanical engineer
- ✚ Mechanic, mechanical operator, computer technician.
- ✚ Chef, culinary design.
- ✚ Business leaders – 'big picture' thinkers.
- ✚ Airline pilot, air traffic controller, taxi driver.
- ✚ Map-related careers: cartographer, photogrammetrist (translates aerial photos to drawings.)
- ✚ Surveyor, navigator, tour guide.



You don't take a photograph, you make it. Ansel Adams

People with visual-spatial intelligence learn best when taught using written, modelled or diagrammed instruction, and visual media, as they have a good memory for visual details. They do less well with auditory-sequential teaching methods such as lecture, recitation, drill, and repetition. In the past, traditional teaching methods may not have served visual-spatial learners well. The good news is that spatial intelligence is not a fixed ability. It is malleable and can be strengthened with practice. Through training and practice, spatial ability and in turn Mathematics and STEM skills can be boosted. Although some people are better at spatial processing than others, everyone can improve. Picture Smart individuals frequently develop their own businesses or become CEOs in major corporations because of their inventiveness and ability to see the relationships of large numbers of variables. We need these individuals for advancement in the arts, technology and business. These are often the creative leaders of society. We need to protect their differences in childhood and enable them to develop their unique talents in supportive environments at home and schools.



Girl with Balloon by Banksy Photograph by Dominic Robinson (Flickr)

People say graffiti is ugly, irresponsible and childish...but that's only if it's done properly Banksy

RESOURCES TO HELP DEVELOP VISUAL-SPATIAL INTELLIGENCE OR 'PICTURE SMARTS'

www.ark.ie

Online art classes are available to spark creativity in kids of all ages. As part of The Ark@home, artist Duffy Mooney-Sheppard will guide children aged 5-12 through visual art workshops via Zoom, introducing them to some curious beasts and inspiring them to create their own artwork.

www.chesterbeatty.ie

Online art classes from the Chester Beatty Library for older children.

www.museum.ie

Learn how to animate: The Museum of Ireland has some great online tutorials. Animation studio Paper Panther on how to create an optical animation toy, a thaumatrope, or a cut-out animation character.

<https://www.youtube.com/user/ArtforKidsHub>

www.cinemagic.ie



Become a film-maker: Cinemagic Film Festival Dublin will be running online workshops for 7-12 year olds in SFX make-up, Lego animation and stop motion in July, in partnership with Can-Do Academy. Cost €5 per tutorial, €20 for five.

www.nationalgallery.ie

Virtual tours, videos, podcasts, activities for children, blogposts and more, downloadable resources on the children and schools section, creative activities for families. Zurich Young Portrait Prize 2020 (Inclusive art competition for children and young people) The National Gallery, Merrion Square West, Dublin 2 (General Collection is Free)

See other recommended sites for teenagers in:

[s://www.irishtimes.com/life-and-style/health-family/parenting/the-ultimate-parents-survival-guide-to-summer-2020-1.4270997](https://www.irishtimes.com/life-and-style/health-family/parenting/the-ultimate-parents-survival-guide-to-summer-2020-1.4270997)

www.louvre.fr

My First Louvre Fun for all the Family, 75 videos, several virtual tours, The Louvre 360 experience, Through Children's Eyes Section, From Hercules to Darth Vader (Petite Gallery - artworks which have drawn inspiration from myths). Egyptian Antiquities comes highly recommended.

<https://www.purewow.com/family/virtual-museum-tours-for-kids>

12 Virtual Museum Tours for Kids (including The Louvre, the Van Gogh Museum, Metropolitan Museum of Art, the Uffizi, the National Gallery of Art, Boston Children's Museum, NASA Glenn Research Centre, the Roald Dahl Museum

<https://mymodernmet.com/what-is-great-art/>

Looking at the work of 12 Contemporary Artists by Jessica Stewart.

<https://mymodernmet.com/best-sculpture-parks/>

Top 10 Sculpture Parks Around the World

<https://www.parents.com/fun/entertainment/gadgets/apps-to-inspire-creativity-in-kids/>

<https://www.commonsemmedia.org/game-reviews>

To find age-appropriate, non-violent video games.

<https://www.yourtherapysource.com/blog1/2020/02/06/visual-spatial-intelligence-in-children/>

<https://www.scholastic.com/parents/school-success/learning-toolkit-blog/4-websites-where-kids-can-create-digital-art.html>

<https://brainly.com/question/11474173> (on origami)

Resources about Temple Grandin:

www.grandin.com

Thinking in Pictures by Temple Grandin (2006) Vintage Press

The Girl who Thought in Pictures; The Story of Temple Grandin (Amazing Scientists Series) by Julia Finley Mosca.

How to Build a Hug: Temple Grandin and her Amazing Squeeze Machine by Amy Guglielmo

Articles on Visual-Spatial Intelligence

<https://www.understood.org/en/learning-thinking-differences/child-learning-disabilities/visual-processing-issues/visual-spatial-processing-what-you-need-to-know>

<https://www.parentingforbrain.com/visual-spatial-reasoning-skills-stem/>

<https://blog.mindvalley.com/spatial-intelligence/>

<https://www.dyslexia.com/about-dyslexia/dyslexic-talents/the-visual-spatial-learner/>

<https://www.parentingscience.com/spatial-intelligence.html>

<https://study.com/academy/lesson/visual-intelligence-definition-lesson-quiz.html>

<https://personalitymax.com/multiple-intelligences/visual-spatial/>

<https://www.verywellfamily.com/understanding-visual-spatial-learning-styles-2162778>

<https://www.psychologytoday.com/ie/tests/iq/visual-spatial-intelligence-test>

Nora S. Newcombe, a professor of cognitive development and expert in the development of spatial cognition:

Newcombe NS 2010. *Picture This: Increasing Math and Science learning by improving spatial thinking*. American Educator: Summer 2010, 29-43

Zimmerman AE, Dean RS (2011) *Visual-Spatial Intelligence*. In Goldstein S., Naglieri JA (eds) *Encyclopaedia of Child Behaviour and Development*. Springer, Boston, MA

Books on Multiple Intelligences (General)

Gardner H. *A Multiplicity of Intelligences* Published 2004

Gardner H. *Frames of Mind: The Theory of Multiple Intelligences* (Third Edition) New York: Basic Books; 2011

Gardner H. *Intelligence Reframed: Multiple Intelligences for the 21st Century*. New York: Basic Books; 1999

<s://www.irishtimes.com/life-and-style/health-family/parenting/the-ultimate-parents-survival-guide-to-summer-2020-1.4270997>

TWINKL RESOURCES FREE TO PARENTS, TEACHERS AND PUPILS DURING COVID 19 SCHOOL CLOSURE

<https://www.twinkl.ie/search?term=art>

Explore more than 2163 Art resources for teachers, parents and pupils, as well as related resources on Art Display.

Resources available on Twinkl on:

- ✚ Michelangelo (Information PowerPoint)
- ✚ Famous people: Leonardo da Vinci
- ✚ Paul Cezanne (Information PowerPoint)
- ✚ Pablo Picasso
- ✚ All About Picasso (Information PowerPoint)
- ✚ Picasso and Cubism Lesson Pack
- ✚ Claude Monet
- ✚ Vincent Van Gogh (Information PowerPoint)
- ✚ Vincent Van Gogh (Information PowerPoint – Art for Children)
- ✚ Sunflowers by Van Gogh Worksheet
- ✚ Mona Lisa by Leonardo da Vinci (Information PowerPoint)
- ✚ Henri Matisse
- ✚ Edgar Degas Artist Fact Sheet
- ✚ Frida Kahlo (Artist photo pack and prompt questions, PowerPoint, factfile, fact cards and poster, Blue House fact file)
- ✚ Salvador Dali (Information PowerPoint and activity)
- ✚ All about Wassily Kandinsky (Information PowerPoint)
- ✚ Andy Warhol (pop art PowerPoint)
- ✚ Roy Lichtenstein (Information PowerPoint)
- ✚ Georgia O'Keefe (Information PowerPoint)
- ✚ Ansel Adams Photo Pack (x2) and prompt questions, reading comprehension activity, photography activity.
- ✚ Banksy (Second Level Art Resource Pack)
- ✚ Graffiti Artist: All About Keith Haring (PowerPoint/graffiti themed display pack)
- ✚ All About Walt Disney (Information PowerPoint)
- ✚ All About Walt Disney differentiated worksheets.
- ✚ Steven Spielberg Dyslexia A4 Display Poster
- ✚ Louis Braille Significant Individual Fact Sheet & Writing Frame
- ✚ All About Louis Braille (Information PowerPoint)
- ✚ World Braille Day Differentiated Reading Comprehension Activity
- ✚ Louis Braille Learning Resource Pack
- ✚ Braille Secret Code Challenge Cards
- ✚ Roman pottery (Information PowerPoint)
- ✚ Design: Clarice Cliff (pottery worksheet)
- ✚ Andy Goldsworthy (Information PowerPoint)
- ✚ All About Clarice Cliff (Information PowerPoint)
- ✚ Books inspired by art and artists booklist.
- ✚ Artists Fact Sheet Resource Pack
- ✚ Famous Paintings Display Posters
- ✚ Art Vocabulary Display Poster
- ✚ Famous Artists Through Time Photo PowerPoint
- ✚ Japanese Art Activity

-  Visual Art Construction Method Display Poster
-  Great Architects Through Time Lesson Teaching pack
-  Scottish Architects: James Stirling Photo Pack
-  Scottish Architects: William Henry Playfair Photo Pack
-  Scottish Architect: Robert Lorimer Photo Pack
-  Scottish Architects Photo Display Pack
-  Scottish Architect: Alexander Thomson
-  Abstract Artists Fact Sheets
-  Buildings of the World (PowerPoint)
-  Antoni Gaudi (Information PowerPoint)
-  Gaudi Fact Cards
-  Gaudi Timeline Ordering Cards
-  Art and Design Parent Guide – What Your Child Will Learn Ages 7 – 11
-  Eiffel Tower Fact Sheet
-  Famous Designers and Engineers Fact Cards
-  Summer Holiday Craft Activity Pack
-  All About Amelia Earhart (Information PowerPoint, comprehension, biography)

*Answer to paper-folding puzzle on page 1: **2, 3 and 6 are the correct answers.**