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Experiential learning

TOUCH AND FEEL TO LEARN BETTER

According to research, learning through experiencing is when children are most engaged



Jane Ng
Senior Correspondent

Mum-of-two Nurul Aqilah Zakaria has been teaching families to concoct “magic soup” with ingredients like leaves, fizzy “rocks” and vinegar.

The 32-year-old founder of Playfully Grounded, who organises outdoor playdates, is passionate about nature and turning everyday moments into learning opportunities.

Madam Aqilah started taking her two boys – aged three and six – to parks since they were young, and would get them involved in simple activities like observing worms in a puddle or letting them play with water using a spade.

“When kids are in nature, they don’t learn just facts. They learn patience, courage and teamwork, which you can’t get by watching TV or the iPad,” says the weekend nature masterchef, who is a corporate communications specialist at a social service agency.

She started organising nature playdates for other families in July and has since held seven sessions for 95 children in different parks.

She prepares fizzy “rocks” made of bicarbonate of soda mixed with some water and food colouring, before they are moulded into rocks and frozen.

She also prepares squirt bottles filled with vinegar that children can pretend is oil and add to the soup. As the vinegar comes into contact with the coloured rocks, the soup will fizz and colour.

“A twig becomes a magic wand which we use to mix the nature soup. Working together to collect ingredients teaches teamwork,” says Madam Aqilah, who is married to Mr Alfi Muswaadi Appathi, 34, a quality executive.

She believes that letting children learn through experience, or experiential learning, develops confidence, problem-solving, emotional regulation and a sense of agency.

“The ‘aha!’ moments stick not because someone told them about it, but because they discovered it themselves,” says Madam Aqilah.

Unlike traditional classroom learning environments, where children passively receive information, experiential learning activities allow them to process ideas, find connections and create new knowledge, says Dr Rosanne Jocson, an education research scientist from the Centre for Research in Child Development at the National Institute of Education (NIE).

Dr Jocson says experiential learn-



Children, joined by their parents, paint on leaves and decorate them with flowers and sago seeds at an outdoor playdate organised by Playfully Grounded at Pasir Ris Park. ST PHOTOS: KEVIN LIM

ing is generally described as a process in which individuals actively engage in and reflect on an experience to develop new knowledge, skills or understanding.

“It is important because active participation and reflection deepen learning and support the transformation and application of knowledge to real-world situations,” she adds.

WHAT RESEARCH HAS FOUND

Studies have shown that students who took part in experiential learning activities have better learning outcomes compared with those taught using traditional methods such as lectures, says Dr Jocson.

In addition, experiential learning has a host of other benefits for children and adolescents, including better physical, cognitive and social-emotional outcomes ranging from healthy eating to academic achievement to positive behaviour like empathy.

Dr Teo Chew Lee, deputy centre director at NIE’s Centre for Research in Pedagogy & Practice, adds that students, whether they are three-year-olds or undergraduates, are most excited about learning when they are actively involved in the process.

“This is especially when the problems are what they really care

about, what they can connect with and see relevance and purpose in pursuing,” she says.

Studies on the area of knowledge building, which is a topic related to experiential learning where students are encouraged to explore ideas of their interest and build knowledge about it, have shown robust results in boosting responsibility and motivation in learning, adds Dr Teo.

Such studies in Singapore found an increase in primary school pupils’ conceptual understanding, secondary school students’ metacognition and all-round social-emotional growth when engaged in knowledge building.

ADVANTAGES IN DIFFERENT SETTINGS

Curriculum and programme designers have harnessed the power of hands-on learning to engage children more effectively.

At NTUC First Campus, experiential learning is not an optional teaching method, but one that is intentionally incorporated by its team of curriculum specialists to help children connect what they learn to the world around them and deepen their understanding and joy in learning.

NTUC First Campus operates three pre-school brands – My First



Mother-of-two and founder of Playfully Grounded Nurul Aqilah Zakaria (in pink) with (from left) her husband Alfi Muswaadi Appathi and their sons Adn Noah, three, and Adl Mash’al, six.



(From left) Dr Teo Chew Lee, deputy centre director at the Centre for Research in Pedagogy & Practice, and Dr Rosanne Jocson, an education research scientist from the Centre for Research in Child Development. Both centres are part of the National Institute of Education. ST PHOTO: JASON QUAH

Skool, Little Skool-House and Changemakers Explorer.

For example, children experiment with different wheel shapes and ramps to discover how speed and distance are affected, then design and test their own mini-cars. Or they may explore their centre’s outdoor space to observe plants and insects to hone their observational skills.

They also engage in role-play and dramatic activities, which enhance communication, empathy and self-expression.

Ms Coreen Soh, its chief child development and support officer, says experiential learning is necessary for optimal early childhood development.

“This aligns with how the young brain develops, promoting active engagement and forming stronger, more enduring neural connections than passive methods,” she says.

One advantage of such a pedagogy is that it builds intrinsic motivation in a child.

“The sense of accomplishment that comes from solving a real, tangible problem, for example, finally making the toy car go farther, provides powerful intrinsic motivation, teaching them that effort leads to mastery,” says Ms Soh.

CONTINUED on C2

Experiential learning



A child from Little Skool-House at Orchard Country Club acting during a drama lesson. PHOTO: NTUC FIRST CAMPUS

Children engage in playful, hands-on learning at KidsSTOP, a dedicated space for children aged two to eight to explore science through interactive exhibits and imaginative role play. PHOTO: SCIENCE CENTRE SINGAPORE



Children interacting with the magnetic papercut shapes at Colourful Play by local artist Fern Wong, as part of Gallery Children's Biennale 2025. PHOTO: NATIONAL GALLERY SINGAPORE

Embracing success and failure as part of discovery

FROM C2

Similarly, at the National Gallery Singapore, its tactile, installative, creative studios and open-ended art-making zones enable children to experience art as something to engage with.

Its spokesperson says this pedagogy is central to how they connect children with art.

"We believe that young minds learn best when they can touch, create and explore, and not just observe from a distance," she says. For instance, its GalleryTODdlers programme introduces one- to three-year-olds to art through sensory-rich play, storytelling and guided exploration, helping them build curiosity and visual literacy.

Picture One Artwork! encourages pre-schoolers to engage deeply with a single artwork before creating their own pieces, which are later exhibited at the gallery, turning the visit into a complete

learning cycle of observation, reflection and creation.

In addition to developing an appreciation for art, children develop lifelong skills. "When children experiment, observe and create, they are also learning to think critically, solve problems and express themselves with confidence," she says.

At Science Centre Singapore, experiential learning is integrated into all its programmes and exhibitions.

For instance, budding inventors aged four and above can explore The Tinkering Studio, a unique learning space where participants can design, build and test their own inventions, to learn about physics and engineering principles in an applied setting.

Dr Tan Mui Hua, Science Centre's assistant director of Stem Inc, schools and professional development, says experiential learning plays a crucial role in helping children understand and appreciate science from an early age.

"It bridges the gap between theory and real-world application, allowing young learners to engage directly with scientific concepts," she says. For instance, children may not understand what kinetic energy means, but by pushing a toy car and watching it roll forward, they grasp concepts like force and motion.

She says experiential learning empowers children to take an active role in their own learning as it encourages them to ask questions, test ideas and draw conclusions based on observation and experimentation.

When children see the outcomes of their own actions – regardless of whether an experiment succeeds – they learn to embrace both success and failure as part of discovery. This mindset fosters lifelong curiosity and adaptability, qualities that are vital today's rapidly evolving world," she says.



Children at My First Skool at 50 Sengkang West Way sorting out magnetic and non-magnetic items. PHOTO: NTUC FIRST CAMPUS

SIMPLE WAYS TO DO EXPERIENTIAL LEARNING AT HOME

Experiential learning is not restricted to a particular location. In fact, it can be infused into daily life at home.

Ms Soh suggests involving the child in cooking or baking, including measuring ingredients, pouring and observing how ingredients change when mixed or heated.

Another way to engage the child is to get him to help with laundry and sorting, including matching socks and folding clothes, as these develop fine motor skills.

Parents can also provide simple, open-ended materials like cardboard boxes, bottle caps, scarves,

funnels, cups and blocks.

"Let them use these items to build a fort, design a 'robot' or create a maze. The process of planning, testing and revising is like noticing how shadows change with the sun, how leaves differ in shape or how rain forms puddles that evaporate – show how science connects to everything around us," she says.

While some, such as Gardens by the Bay, are well-known attractions, they still contain hidden surprises. Here are five of them.

When outdoors, parents can point out patterns in plants or weather, and connect these observations to science.

"Simple, real-world moments – like noticing how shadows change with the sun, how leaves differ in shape or how rain forms puddles that evaporate – show how science connects to everything around us," she says.

The key is to create an environment where children feel comfortable exploring, questioning and experimenting."

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■ In partnership with the National Institute of Education.

A furious debate over autism's causes leaves US parents grasping for answers

Gina Kolata and Azeen Ghorayshi

NEW YORK – The first time Bill heard the term "autism" applied to his little boy, "it felt like a curse word," he said. Yes, little Billy was slow to learn language and did not seem to engage with people. But autism? What was in store for him? Would he be able to live independently? Drive a car? Get a job? Marry?

And why? Why did his beautiful, three-year-old toddler have this disorder, Bill, who asked that his last name not be used to protect Billy's privacy, recalled wondering.

"I want to know what causes it," he told clinical psychologist and autism expert Cathy Lord in a three-hour Zoom session from her office at UCLA.

His wife did not take Tylenol, but could it be red dyes in food that were the culprit? Or, as he saw on TikTok, a lack of vitamin B6?

"Do you think it has anything to do with vaccines?" he asked Dr Lord. Billy is fully vaccinated.

For Dr Lord, such questions are all too familiar.

Clinicians who treat children with autism must help their young patients' families navigate a cacophony of theories and advice. As autism diagnoses have risen over the last decades and debate over its causes has intensified, they have been forced to explain to desperate parents the few knowns and the many unknowns about what leads to autism's development.

Now that the federal government has entered the fray, often giving advice that doctors have to dispute, some families wonder whom they should believe.

Dr Joseph Buxbaum, a neuroscientist who studies the genetics of autism, said families of children with the condition that he has worked with for a decade or more are not sure what to think when they hear American President Donald Trump and Mr Robert F. Kennedy Jr, the health secretary, talk about autism, blaming it on discredited theories like vaccines or unproven ones like acetaminophen, the active ingredient in Tylenol.

"Even people who trust us and know we disagree vehemently, it affects them," said Dr Buxbaum, a professor at the Icahn School of Medicine at Mount Sinai. "It's a shocking time."

ROLE OF GENETIC MUTATIONS

Decades of scientific research point most compellingly to genetic mutations affecting brain development as a primary driver of autism. Researchers have already identified hundreds of mutations linked to the disorder. And while most scientists say genetics likely interact with some way with environmental factors, research has disproved some of the most widespread notions and has produced weak or conflicting evidence for others.

Yet Mr Kennedy, who has referred to the rise in autism cases as an "epidemic," has been dismissive of genetics research, calling it a "dead end".

Like other parents, Bill said he had heard plenty about the rising incidence of autism, with cases increasing to one in 31 children from an estimated two to four children per 10,000 in 1980. He has to wonder, he told Dr Lord, whether the soaring rate indicates that something in the environment is causing the disorder.

Not necessarily, Dr Lord said. "Mostly the numbers are bigger because the categories are so much larger now," she said.

When she began studying autism 50 years ago, she told Bill, the disorder included only the most severe cases. Now, there is an autism spectrum that includes people who have trouble reading social cues or making friends, as well as those who are severely disabled.

Awareness has also played a large role in the increased prevalence, Dr Lord said, along with special services for children with an autism diagnosis and increased screening by paediatricians.

Assuaging Bill's fears that maybe he or his wife did something to cause Billy's autism, Dr Lord pointed out that autism rates are similar in different countries, despite vastly different environments.

Dr Lord and others who have spent decades studying autism tell their patients that the only consistent and well-documented explanation for autism is mutations in genes critical for brain development. But genetic mutations still explain only about 30 per cent of cases, typically those with the most severe forms of the disorder.

The role of genes has been known about since the 1970s. Autism, studies found, was more likely to occur in identical twins than in fraternal twins, who do not share the same genetic make-up.

A landmark publication in 2007 showed that children with autism were much more likely to have so-called de novo mutations, spontaneous mutations that were not present in their mother's or father's genome. Such mutations often occur in the sperm or eggs even before a baby is conceived.

The more researchers looked, the more mutations – de novo and inherited – they found. In the most recent work, led by Dr Buxbaum, an international consortium funded by the National Institutes of Health found more than 250 different genes that, when disrupted, make profound autism extremely likely.

Different people may have different mutations within the same gene, but in every case, the mutations alter the gene's function.

"These are not little flags in the genome that are pointing at some susceptibility," said Dr Jonathan Sebat, a geneticist at the University of California, San Diego and lead author of the 2007 study. "These are causal mutations."

In contrast, studies have so far found only weak evidence for environmental factors – like pollution or certain chemicals – that might contribute to autism. They find correlations, but not causal evidence.

SOLACE OF FINDING OUT

Some doctors are increasingly offering genetic testing to parents when their children are diagnosed.

When testing does find a related genetic mutation,

some parents who have spent decades wondering why their child developed autism say they have found solace.

Mr LeVar Baxter, a police officer who lives in Gersbersville, Pennsylvania, said that had been the case for him. When his son, Khalil, was an infant, he hit his developmental milestones ahead of schedule. Mr Baxter and his wife confidently predicted that Khalil would be walking by the time he was nine months old.

But everything changed when Khalil was about four months old. He regressed, losing his developmental skills. Now 21, he is a seemingly happy young man who, Mr Baxter said, smiles every day. But he does not talk, and he cannot live independently.

Mr Baxter had not been able to put the worries out of his mind. Did he or his wife do something that brought on Khalil's autism? Was it caused by something in the environment? Or, he wondered, could it be the vaccines his baby received? "We know some people are allergic to milk or to peanuts," he said. "Is it possible some people are allergic to vaccines?"

After seeing a notice that the Simons Foundation was seeking families who would be willing to provide samples for genetic research, Mr Baxter decided he would do it. "I wanted to know if I had a gene that I'd passed on to Khalil," he said.

Ten years went by. Then, in 2024, Mr Baxter said, he got a letter from the Simons Foundation. They had found a gene. He was almost afraid to find out more. That notification, he said, "reset my anxiety".

The mutation, he learnt, is a rare one, CLCN4, associated with neurological development and speech. "I couldn't believe it," Mr Baxter said. "The first question I asked was, 'Was there anything I did or that I could have done differently?'"

No, the counsellor told him. Her analogy: Carmakers make a million cars a year. One of those cars will have engine troubles from Day 1.

"That took a major burden off my shoulders," Mr Baxter said. "For a long time, I had carried this guilt, letting doctors vaccinate him. I had blamed myself." NYT/MS

5 spots to wow kids and spark learning

In partnership with the National Institute of Education



Take your kids to see an olive tree that is 1,000 years old, cook an egg at a hot spring and explore a vegetable farm



Elisa Chia
Correspondent

Your kids are not just having fun when they explore, but they are also honing crucial skills such as critical thinking, creativity and problem-solving.

To bring out the explorer in children and foster curiosity, Dr Teo Chew Lee (below left), deputy centre director from the Centre for Research in Pedagogy & Practice at the



ST PHOTO:
JASON GUAH

by asking questions about topics that pique their interests.

There are learning opportunities all around, from the comfort of home to the neighbourhood playground.

During family outings, it is crucial to strike a balance: Ask your children questions to stimulate their thinking, but also allow them ample space and time to explore on their own.

The essence of experiential learning lies in igniting their excitement and curiosity, she adds.

While some, such as Gardens by the Bay, are well-known attractions, they still contain hidden surprises. Here are five of them.

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Visitors admiring the 1,000-year-old olive tree in the Flower Dome at Gardens by the Bay on Nov 5. It was imported from Spain in 2011. ST PHOTO: KEVIN LIM

1,000-YEAR-OLD OLIVE TREE IN THE FLOWER DOME

Beyond the beautiful seasonal floral displays, the Flower Dome at Gardens by the Bay holds a fascinating secret: an olive tree which is more than 1,000 years old.

Imported from Spain in 2011, its precise age is unknown, but it already holds the distinction of being the oldest tree in the gardens.

Take a moment to observe this

venerable olive tree with its silvery-green leaves, located near the entrance of Hortus restaurant.

Dr Teo suggests helping your children grasp its age by offering comparisons: "1,000 years old? That's 100 times your age, 30 times mummy's age and 15 times older than your grandparents."

Challenge them to spot 12 other

olive trees in Flower Dome, the youngest of which is 120 years old.

According to Mr Mihkaail Ng, deputy director of conservatory operations at Gardens by the Bay, an ancient olive tree is notably characterised by the wide circumference of its trunk, also known as its girth.

Unlike younger trees, which

receive monthly care, the 1,000-year-old olive tree in the Flower Dome is maintained weekly.

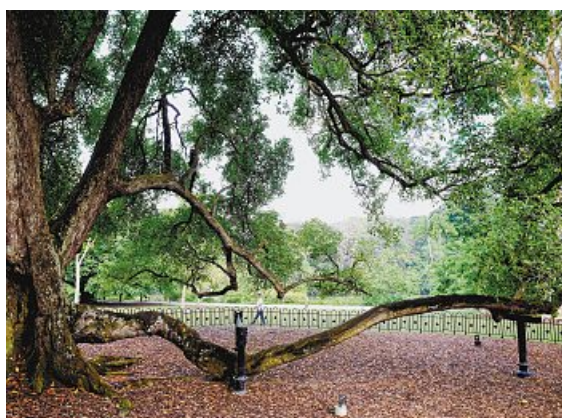
The horticulturists inspect this tree fortnightly, more often than the quarterly inspections for other trees.

Where: Flower Dome, Gardens by the Bay, 18 Marina Gardens Drive

MRT: Bayfront/Gardens by the Bay

Admission: For Singapore residents, tickets are priced at \$12 for adults and \$8 for children aged three to 12, and senior citizens aged 60 and above. While admission charges apply, free 15-minute guided tours are available on selected dates

Info: str.sg/w/Xt8D



The iconic Tembusu tree (above) at the Botanic Gardens is depicted in an artwork by Eng Siak Loy on one side of the \$5 Singapore note (below). PHOTO: LIANHE ZAOBAO FILE

'\$5 TREE' IN THE SINGAPORE BOTANIC GARDENS

Encourage

your kids to explore the Singapore Botanic Gardens to locate the Tembusu tree, the very one depicted on the \$5 Singapore note. Located on Lawn E near Swan Lake, it is easily identified by a distinctive curled, low-lying branch that sets it apart from other trees.

This Tembusu tree is believed to be at least as old as the Botanic Gardens – that is 166 years – if not more. Established in 1859, the Botanic Gardens became Singapore's first Unesco World Heritage Site in 2015. It is home to 62 heritage trees, among which is the iconic "\$5 Tembusu tree".

Artist Eng Siak Loy, a President's Design Award recipient and former graphics and art head for the National Parks Board (NParks), painted the tree featured on the \$5 note.

The tree got so popular with visitors that NParks put a fence around it in 2013 to keep it safe. Previously, some were drawn to sitting on its low branch and walking around its base, compacting the soil over its roots.

If you are taking your kids to see it, Dr Teo suggests letting them observe, smell and draw its features. She says: "Sometimes, we don't have to keep asking questions to encourage children to think."

Where: Singapore Botanic Gardens, 1 Cluny Road MRT: Botanic Gardens

Admission: Free

Info: str.sg/EHNF

PINK AXOLOTL IN SINGAPORE OCEANARIUM

Since its appearance in the video game Minecraft in 2021, the albino axolotl – with its pastel-pink skin and "feathery" gills that frame a seemingly smiling face – has become a viral sensation.

Now, see one in the flesh at the Singapore Oceanarium's Contouring Land zone. Sharing its habitat is another axolotl with a mottled brown-grey body.

The oceanarium's population sustainability manager Salam Marikan introduces the critically endangered salamander, which was rescued from the illegal pet trade.

"Our aim is to raise awareness that the commonly recognised 'pink' axolotls – often popularised as cute or ornamental pets – are selectively bred for aesthetic traits," she says.

"While albinism is a naturally oc-



A pink axolotl at the Singapore Oceanarium. ST PHOTO: LIM YAOHUI

curing trait, this selective breeding for the pet trade often results in only albino or leucistic individuals being sold.

"Such practices contribute to the illegal wildlife trade and its unethical practices, and do not represent the natural appearance or health of wild axolotls."

By showcasing the species, it is hoped that visitors will appreciate their true beauty and understand their vital environmental role.

She says axolotls have care requirements that differ greatly from the marine animals in the oceanarium, primarily because they are freshwater amphibians,

not marine species. Their habitats are specially designed to replicate the cool, still waters of the high-altitude lakes in Mexico, where they naturally occur.

Given that they lack eyelids and their gills extend outside their body, the habitat design also considers these unique physiological needs.

Where: Singapore Oceanarium, 24 Sentosa Gateway

MRT: HarbourFront

Admission: Tickets for Singapore residents start at \$42 for adults and \$35 for children aged four to 12, and senior citizens aged 60 and above

Info: singaporeoceanarium.com



Mr Nicholas Goh's farm inspired author Junaitha picture book, Bala At The Urban Farm. PHOTO: ST FILE

VEGETABLE FARM AT HDB CARPARK

Guess what is at the top deck of this HDB carpark in Tampines? Your kids will be awestruck to discover a vegetable farm here.

Since 2019, Mr Nicholas Goh, founder of Nature's International Commodity, has filled this 2,500 sq m area with rows of tiered planters. Among the vegetables grown here are kangkung, lettuce and xiao bai cai.

His farm allows members to harvest up to 2kg of fresh produce every Friday and Saturday morning through a \$50 monthly programme.

The place also doubles as a hands-on educational hub, with his team conducting tours for schools and families.

The farm's unique story even inspired the 2024 picture book, Bala At The Urban Farm, written in English and Tamil by Junaitha Gaffoor. Visiting a farm like this offers a valuable learning experience, as Dr Teo highlights that many children may mistakenly believe vegetables and fruit originate from supermarkets.

Encourage your kids to assist the farmers with planting seedlings so they can foster a deeper appreciation for the work involved.

During the school holidays, consider setting up a hydroponic system at home and get your kids to document its daily progress.

Where: Nature's International Commodity, Level 5, Block 723A Tampines Street 72

MRT: Tampines North/Tampines

Admission: A guided tour, which includes a bag of vegetables, costs between \$30 and \$60 a person, depending on the group size

Info: Go to fb.com/farmernicksingapore. WhatsApp 9743-6102 to schedule an appointment