SPECTRUM

The Assam Valley School Science Journal

VOL. 4 ISSUE 2

EDITOR'S NOTE

"In scientific work, those who refuse to go beyond fact rarely get as far as fact" - Thomas Huxley.

Welcome to another issue of Spectrum! In this issue, we delve into interesting topics, from the weird fluids that act as solids upon impact to phenomena like Deja Vu.

Be prepared to enthral yourself with the science behind these scientific phenomena. Open up your minds and broaden your horizons dear readers. Humanity has achieved a great deal of advancement and progress through science. Human curiosity has always led to many great inventions and innovations. I encourage you to keep your minds open and let your questions run wild while you enjoy this issue of Spectrum.

-Bariskhem K. Pohti

WHAT'S INSIDE:

A Bizzare Effect

-Khushi Todi, X

A word you may have heard your friends saying, deja vu. What does it mean? It is simply a bizarre feeling of having experienced a situation before, even though it is your first time experiencing it. This phenomenon has intrigued people for ages and continues to do so. Several theories have been proposed to clarify the idea of having this feeling. Many people believe that they experience déjà vu because they have lived through the exact moment in their past lives. In contrast, many others believe it to be a paranormal experience or a premonition of sorts. However, these are just theories and have no scientific basis.

There is no single agreed reason behind déjà vu. Different studies have proven different things. But they all agree on one thing, déjà vu is a memory phenomenon. We encounter a situation that is similar to an actual memory but we can't fully recall that memory. So, our brain recognises the similarities between both experiences and we are left with a feeling of familiarity which leaves us confused. A study using functional Magnetic Resonance Imaging (fMRI) to scan the brains of people found that the frontal cortex, which is responsible for decision-making, reasoning and fact-checking is more active than the hippocampus, responsible for memory retrieval.

A theory suggests that Deja Vu is due to split perception that occurs when the brain processes the same signal twice, back to back.

During the initial processing, it goes unnoticed by the conscious mind but then on the second passing, a sense of familiarity is produced due to the first signal which is not recalled.

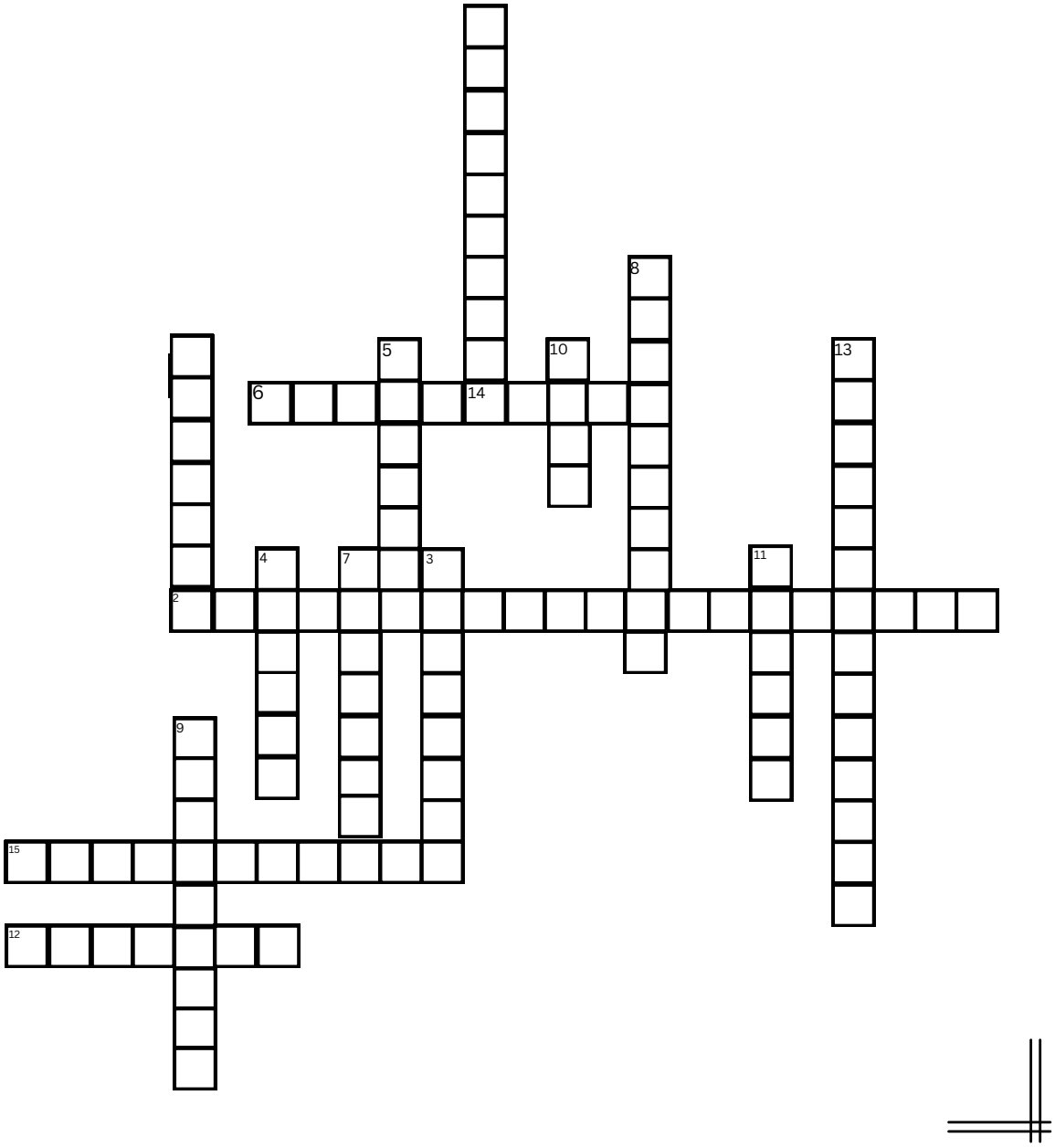
Most of the main competing theories share the same idea: déjà vu occurs when areas of the brain (such as the temporal lobe) feed the mind's frontal regions signals that an experience is repeating itself. After this, the frontal decision-making areas of the brain effectively check to see whether or not this signal is consistent with what is possible. It will ask 'Have I been here before?', and if you have been in that place before, you may try harder to retrieve more memories. If not, a déjà vu realisation can occur.

Getting deja vu is quite common, even among healthy minds. It assures that the brain's fact-checking area is functioning well. Deja Vu does not have any universally agreed upon scientific theory to explain it. It continues to captivate our curiosity and scientists believe more research is required to clarify this mysterious sensation.

References

https://www.jagranjosh.com/general-knowledge/what-is-dj-vu-what-is-the-science-behind-it-and-why-do-we-experience-it-so-often-1665486667-1
https://www.psychologytoday.com/us/blog/brain-reboot/202312/the-fascinating-science-of-deja-vu
https://www.sciencefocus.com/the-human-body/deja-vu
https://www.dw.com/en/deja-vu-the-speculation-and-the-science-behind-the-experience/a-65361512
https://www.bbc.co.uk/bitesize/articles/zdpbwsg
https://www.scientificamerican.com/article/can-science-explain-deja-vu/

CROSSWORD



1. What does DNA stand for?
2. A rare mineral that is very precious.
3. A gas used in airplane tyres.
4. What modern-day country was Marie Curie born in?
5. Which planet in the solar system has 95 moons?
6. What type of material is rubber?
7. What is the study of mushrooms called?
8. Which desert holds most of the world's freshwater?
9. What does a Geiger Counter measure?
10. What are natural satellites colloquially known as?
11. This is a precious metal.
12. What is the fastest predator on earth?
13. Which oath of ethics taken by doctors is named after an Ancient Greek physician?
14. What is the rarest blood type in humans?
15. What is desquamation the scientific term for?

NIMHANS Brain Museum

-Aahil Faraj, VII

“Neuroscience is by far the most exciting branch of science because the brain is the most fascinating object in the universe. Every human brain is different - each brain makes each human unique and defines who he or she is”.

-Stanley B. Prusiner

Now, the brain being as fascinating as it is, completes and processes more information in a day than a supercomputer can, due to its extraordinary ability of being able to use itself in parts so that, even though it is only one singular organ it can process and coordinate the actions of all the organs in human body. Have you ever heard that saying that we only use part of our brains well it's not true! We use the entirety of our brains each day, though, not at the same time. You see, we, as I said beforehand, use different parts of the brain at different times.

Now, the nerd in me is screaming to emphasize everything the brain is about, but l know half of you must be asleep by now so l will instead talk about the very place which is the birthplace of my interest in biology. A place called NIMHANS Brain Museum, where I first learned about the brain.

The place might not seem like anything big at first glance being the size of a regular room but inside it though, it’s a whole other story altogether! It is a treasure trove of knowledge. Inside it, you can even get to touch actual human organs and study them. The tour guide is very kind and patient. She answered everybody’s questions so graciously and patiently and then, there was the museum itself, so magnificent it was! There were specimens of brains belonging to goats and other animals, there were specimens of brain injuries, Parkinson’s and dementia and of course, the highlight of my trip, was preserved human organs that you can touch and feel. I strongly recommend that if you're in Bangalore and are free, to visit this museum though, I’m compelled to say that this museum is only open every Wednesday and Saturday from 3:30 pm – 4:30 pm.

NOMAD OF SPACE

-Vidhi Chopra, X

◆

Across the space so vast
Threads a forlorn comet, cold as stone.
Through the impenetrable void, it wanders silently alone,
A brief, glowing ember, in a world grown old with sin.

It moves through darkness, leaving a glowing ray,
A brief, shining beacon, in an endless night array.
And yet in all its blazing passage, it knows pain.
For stars that it passes, it can't borrow hope.

No moons to tail its flight, no planets to call home;
Only a lonely, endless journey, through the dark dome
It dreams of worlds where life is alive, and warmth abound,
But no solace can be found in its icy core.

Approaching sun, it flashes bright and bold,
A moment's glory, in the heart’s cold.
But even in its glory, it knows it must go away,
Once more to roam, with a heart that's lonely, sore, and gray.

In the vast dance of space, where stars and planets play,
The lone flight of the comet finds its story to this day.
For in its brief passage, it reflects human plight,
A reaching out for touch, in the dark of endless night.

Oobleck

The science of non-Newtonian fluids

-Bariskhem K Pohti, XII

When we think of a fluid, the most common answer is water. Smooth and gentle flowing, but there are some other liquids that do not behave the same way. Liquids like water are something that is known as a Newtonian fluid. These fluids obey Newton's law of constant viscosity. They always have the same viscosity throughout whereas non-Newtonian fluids like Oobleck do not possess this property. Oobleck's viscosity changes depending on the stress or forces applied to it. If you poke it with your finger and apply a large force, it becomes very viscous and stays in place. If you gently pour it, applying a little force, it will flow like water. This kind of fluid is called a dilatant material or a shear-thickening fluid. It becomes more viscous when agitated or compressed.

Anti-oobleck or ketchup is another non-Newtonian liquid. It behaves the opposite way of what Oobleck does. Upon agitation, it becomes less viscous and if left to stand still, the liquid becomes viscous and refuses to move until agitated heavily. If you leave a bottle of Ketchup on a shelf, it becomes thicker or more viscous. Nearly everyone has experienced this while trying to pour the liquid from a new bottle – it refuses to move.

If you shake the bottle or stir it up, it becomes less viscous and pours easily.

There is one explanation as to why Oobleck behaves the way it does. Scientist Cary Sneider says that when sitting still, the granules of starch are surrounded by water. The water has surface tension which prevents the water from flowing out of the crevices between the granules. The water provides cushion and lubrication which allows the granules to move freely. Suppose an abrupt movement is applied, the water is then squeezed out from between the granules and the friction between them increases drastically.

You can also try some experiments with Oobleck yourself. It can be made by adding cold water to cornstarch. Make sure to add water if the mixture seems too dry, and more cornstarch if it seems to have a more liquid consistency.

The first thing you have to do is simply place your hands into the Oobleck and start squeezing it. Have some fun! Try to make a ball by moving it around quickly in your palms. Once you stop applying pressure to the mixture, it will flow out of your hands like a liquid.

Try filling a pie plate with a thick layer of Oobleck and then slapping the surface with your open hand. Because of the dilatant properties, becoming more viscous when a force is applied, the liquid will all stay on the plate. Try the same experiment with water and compare the results!

References

https://www.imaginationstationtoledo.org/educators/diy-activities/oobleck#:~:text=Oobleck%20is%20a%20suspension%20of,flow%20out%20between%20your%20fingershttps://www.bbcgoodfood.com/howto/guide/oobleck

Science Behind Meditation

-Vidhi Bajaj, X

Meditation is widely practised in every religion. It is the cultivation of basic human qualities which create self-love, and stability of mind, and also helps in creating relations between our body and soul. It is a very simple practice and can be done anywhere. No equipment or workout attire is needed to practice it. It activates one's mind. There are three different kinds of meditation which include: focused attention meditation, open-monitoring meditation and traditional Buddhist meditation.

In **focused attention meditation** you focus on a particular object maybe it can be a point of light, sound or even numbers. It also includes quitting inner dialogue. When you think about a particular thing for some time and restrict your thoughts to enter inside the brain as your brain is focusing on a particular thing. This type of meditation is really good for people who are stressed. It also improves your attention span and maintains your focus for a longer period. When you stare at a particular object during the meditation, you learn to pay less attention to other distractions. Over time, focused meditation helps many people feel less bothered by disturbances such as car alarms and the sounds of people arguing

Open-monitoring meditation is the practice in which you simply allow your thoughts to come and go through your mind. It does not allow your brain to work that much as it does not restrict any thoughts. The thoughts can be anything thing you have already been thinking about, memories, feelings, or even smells. It might seem passive, and it is sometimes called a 'lazy person's meditation', but it can be surprisingly hard not to focus on something, and even experienced meditators will still find themselves engaging with their thoughts. This type of meditation helps to enhance mindfulness and happiness. It is a hard type of meditation to perform as there is no restriction offered.

The **traditional Buddhist meditation** practices are techniques that encourage and develop concentration, clarity, emotional positivity, and a calm seeing of the true nature of things. It relates to nature and creates a positive bond between nature and one's soul. It is also subdivided into Samatha, Vipassana and Metta Meditation. One of the other main kinds of Theravada meditation aims for inner insight and to see things as they are. The Samatha meditation aims for a calm environment to find internal peace by letting go of desires. In Buddhism, the desire is the cause of suffering. In Vipassana meditation, it aims for inner insight and to see things as they are and in Metta meditation, it aims for kindness and gratefulness of people.

Meditation is the way to develop one's thoughts and feelings, it provides inner peace and mental stability. It is a powerful weapon to change one's thoughts and to create a higher order of thinking. Everyone should practice meditation for one's benefit.

References

http://www.everydayhealth.com/
www.mindbodygreen.com
www.mindfulness.com

Wonder Herb

Moringa

-MIC Everyday Science Activity

Freshly prepared Moringa Khakhra

Moringa:

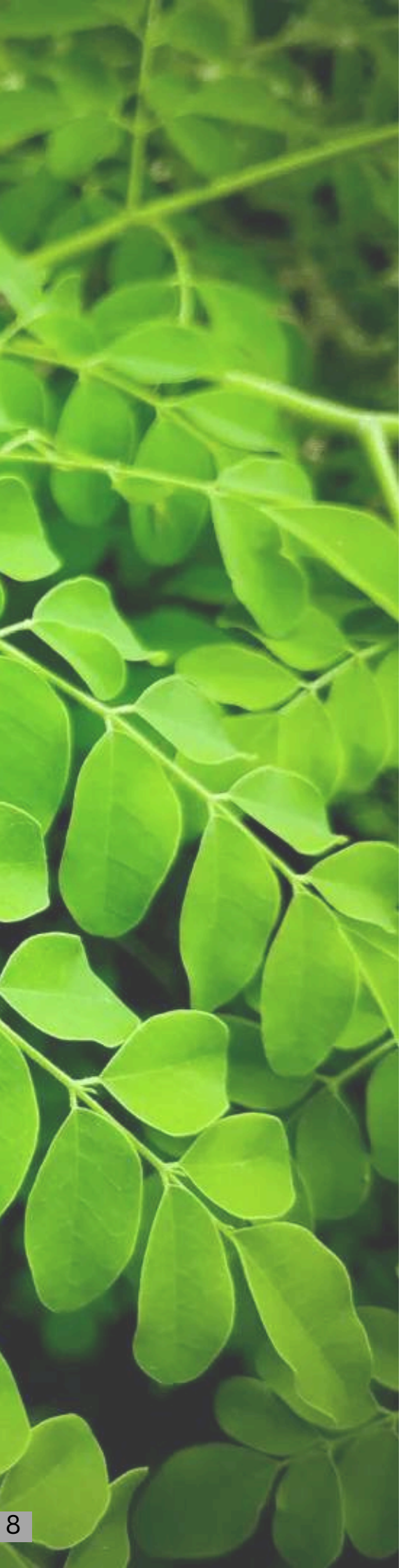
The Moringa (drum stick) plant is a local vegetation and its leaves are known for several health benefits.

Moringa leaves are known for their medicinal properties due to their rich nutrient content. In Asian nations the fruit of this tree is traditionally consumed as a vegetable, and it's leaves are driving the market for its widespread use in dietary supplements, and medicinal items. Presently 366 types of Moringa capsules/ products are available in the market.

Moringa Products Market Size was valued at USD 5.1 Billion in 2023, now industry is projected to grow from USD 5.5 Billion in 2024 to USD 11.2 Billion by 2032.

This wonder herb contains high levels of vitamins, minerals, and antioxidants that help reduce inflammation and lower blood sugar and cholesterol levels.

Moringa also exhibits antimicrobial and antifungal activity, promoting immune health and offering potential cancer-fighting properties that support brain health by reducing oxidative stress and improving cognitive function. Moringa leaves contain flavonoids, polyphenols, and ascorbic acid, which contribute to reducing oxidative stress and inflammation. It serves as a wonderful nutrient supplement for kids.



Method:

In everyday science activities, we advocate the usage of nutrient-rich food over the consumption of medicine. Therefore, we have tried to develop two food items that can be consumed daily as snacks. DIY (Do it yourself) and enjoy the taste with health.

(a) **Nutrient-Rich Moringa Chocolate Bar**-
(i) Take 250 gm of Cashew nuts and grind them to a smooth powder. Put fresh Moringa leaves to dry and grind them to fine powder, add 100 gm of Moringa leaves to powder and 100 gm of Jaggery, 50 gm milk powder and 100 gm of cocoa powder. Add 10 pieces of ground cardamom for flavour. Heat on low flame until everything combines into a large ball. Use a chocolate mould to shape it.

(b) **Moringa snacks (Khakhra)** - Khakhra is a thin cracker common in the Gujarati cuisine and Marwari cuisine of Western India. It is made from mat bean, and wheat flour. We have modified it a little and have added chopped moringa leaves to it to enhance its taste and nutritional value.

1. Take 80 gm corn flour and 20 gm gram flour. add 50 gm of chopped Moringa leaves.
2. Add 3 tablespoon of grounded green chilly garlic paste and salt, Garam masala for taste.
3. Now roll it into very thin sheets. Bake it on very low flame till it is crispy.

Your Moringa Khakra is ready.

References

https://www.marketresearchfuture.com/reports/moringa-products-market
https://www.tradeindia.com/manufacturers/moringa-capsules.html
https://www.medicalnewstoday.com/articles/319916#nutrients
https://www.sciencedirect.com/science/article/
https://en.wikipedia.org/wiki/Khakhra

Eco Friendly Recycled Paper Clay

-Anushka Mandal, XI &
Ishika Mandal, IX

In India, per year 16 million tons of waste paper is generated, out of which 13 million tons is recycled. In the Everyday science activity, we have made an eco-friendly clay with recycled paper and daily household items that will enable each home to recycle its own waste paper. This clay is so versatile that it can be used as casting material to make pots, pen stands and many different items.

RECYCLED PAPER CLAY

1. Soak paper in water for 24 hrs. Next day, grind it into fine paste.
2. Squeeze out extra water from the paper pulp and mix it with black lentils, refined flour and Lime.
3. The best-suited ratio is- 3 parts paper Mache, 1 part black lentil paste, 1 part lime and 1 part refined flour.
4. Lime and split black lentils are used to improve the strength of the clay. Refined flour maintains the texture of clay.
5. Knead the dough very properly, after that your eco-friendly is ready for use. You can add colours if you wish.

Products made in Everyday Science Activity

References

https://www.researchgate.net/publication/377815373_PAPER_WASTE_RECYCLING_IN_INDIA_CURRENT_SCENARIO_AND_FUTURE_PROSPECTS

https://ippta.co/wp-content/uploads/2023/11/88-94.pdf
https://www.kitchenpostcards.com/2022/02/18/urad-dal-creamy-split-black-gram/

The Last Frequency

The Science Fiction

-Aaryan K. Shullai

In the year 2130, Earth was silent. No birds sang, no machines hummed. All that remained were scattered remnants of humanity, forced underground after a solar storm knocked out the planet's electrical systems and poisoned the atmosphere. Communication across the globe ceased, and most believed they were the last survivors. Except for Dr. Ryan Huban, who had a theory.

Ryan was a physicist with a fading hope, spending his days tuning into the radio, searching for signals from other surviving pockets of humanity. His small underground lab was filled with rusted equipment, barely operational, but one radio still worked. He called it "The Whisper."

For years, it picked up only static. But one night, as Ryan dozed off, a faint sound broke through—a signal.

Startled awake, he fine-tuned the frequency. It was weak but clear: a voice.

"This is Gamma Station. Is anyone receiving it? Repeat, Gamma Station..."

His heart pounded. Gamma Station. A space station orbiting Mars that had supposedly gone silent years ago. Ryan couldn't believe it. He scrambled to respond.

"This is Dr Ryan Huban, the Earth survivor! Gamma Station, do you copy?"

A pause, and then the voice returned, clearer now. "Dr. Huban, we're receiving you. We thought everyone on Earth was lost."

Over the next few weeks, Ryan maintained contact with Gamma Station. They had a plan to retrieve Earth's survivors, but it was dangerous. With their oxygen supplies dwindling, they could only make one trip to the planet. The station was preparing to send a signal that would triangulate the locations of survivors, but Ryan had to transmit his position first—manually. He'd need to climb to the surface, braving the toxic atmosphere to power up an old satellite.

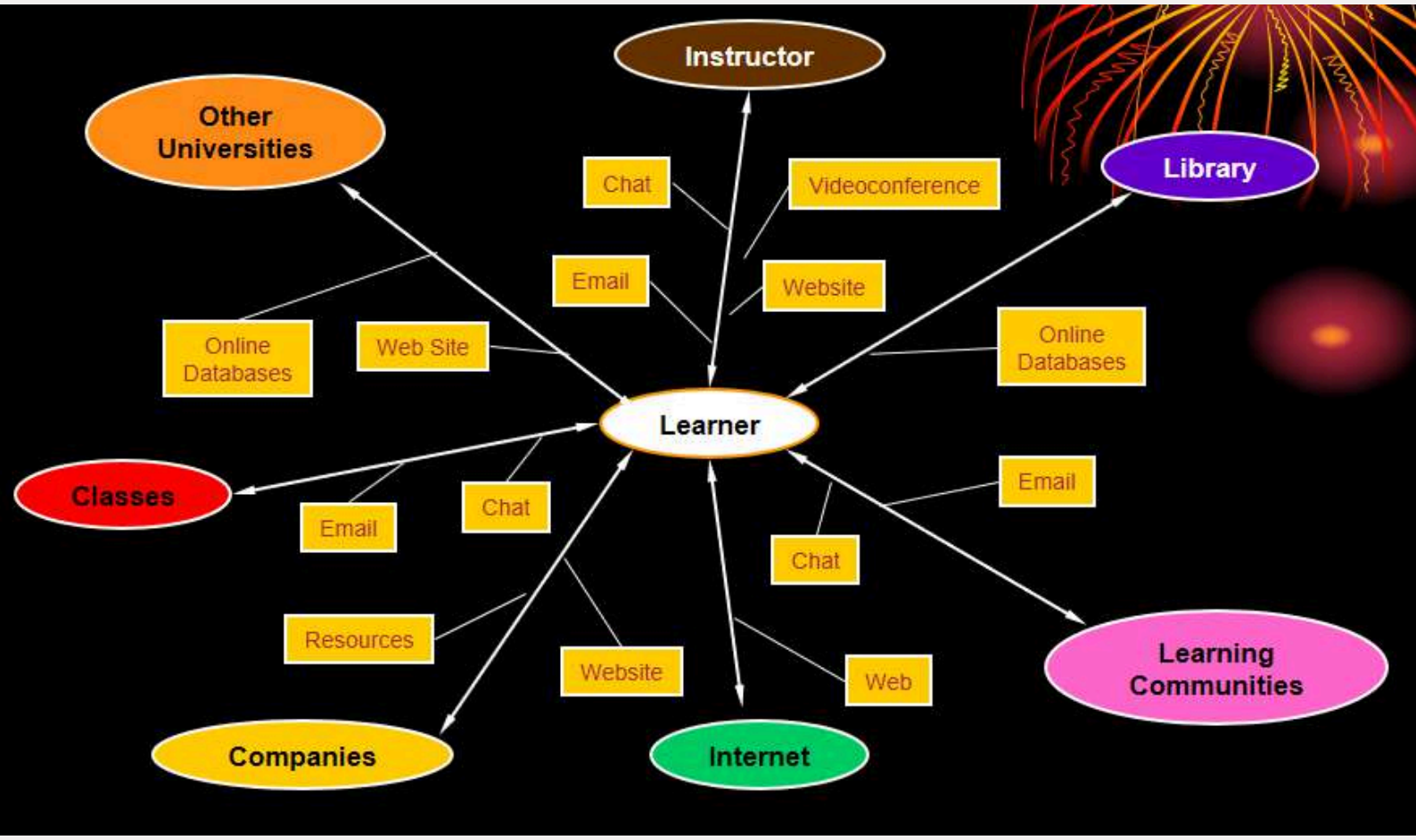
The day arrived, and Ryan set out in a damaged radiation suit, coughing as he struggled through the barren landscape. He reached the satellite just as his air supply was running low, his vision blurring. He connected the transmitter and sent the signal. Success.

The climax hit when his suit failed, alarms blaring. His breath shortened, but he collapsed with a smile, knowing he'd done it.

Days later, Gamma Station arrived. They picked up survivors based on Ryan's last transmission. He hadn't made it—but because of his sacrifice, humanity would get another chance.

E- Learning- A Gateway for Life Long Learners

-Mr. A.S. Huidrom



E-learning has become increasingly important in today's educational landscape for several reasons:

1. **Accessibility**: Breaking down geographical barriers and enabling education for people in remote or underserved areas.

2. **Flexibility**: It allows one to learn at one's own pace, accommodating different learning styles and schedules.

3. **Cost-Effectiveness**: E-learning can be more affordable than traditional education.

4. **Diverse Learning Resources**: Online platforms provide a wide range of resources, including videos, interactive quizzes, and discussion forums, enhancing the learning experience and catering to various learning preferences.

5. **Self-Discipline and Motivation**: E-learning encourages learners to take responsibility for their education, fostering skills like self-discipline, time management, and intrinsic motivation.

6. **Technological Proficiency**: Engaging in e-learning helps individuals become more comfortable with technology

7. **Personalized Learning Experiences**: Many e-learning platforms use algorithms to tailor content to individual learners' needs, helping them progress at their own pace.

8. **Global Collaboration**: E-learning facilitates connections between learners and educators from diverse backgrounds, fostering cross-cultural exchanges and collaborations.

Reference:
https://aace.org/pubs/jolr/

Credits

Editor-in-Chief

Bariskhem K Pohti

Designer

Bariskhem K Pohti

Content Developers

Khushi Todi | Vidhi Bajaj

Vidhi Chopra | Aahil Faraj

Bariskhem K Pohti | Aaryan K. Shullai

Teacher-in-Charge

Dr. Alpana Dey

Faculty Advisors

Mr. A.S. Huidrom | Mr. Umesh Singh

Patron

Dr. Amit Jugran