

SCIENCE FOR ALL

A Report on workshop conducted with the

Diversity in Science Grant

- Dr.Uthra Dorairajan, India

What, when, where and who? - The Ws

With Diversity in Science Grant by the Biochemical Society, London Science for ALL workshop was organised on 28, Oct, 2024 to execute my project “Taking Science to Neurodiverse learners and students with physical challenges”. This hands-on workshop was held in the Physics lab at Dwaraka Doss Goverdhan Doss Vaishnav College, Chennai, India with the permission and support from my college authorities. Nearly 40 undergrad students with disabilities from humanities, commerce and science streams from the host college and Shri Krishnaswamy College for women, as well 15 young adults from the Sankalp Open School immersed in this specially tailored experiential learning. Parents were also invited to join their wards, as I felt they need more inner strength to support their children’s curiosity. In general, students with disability move away from science after high school, being scared of accessibility issues in lab, rigour needed and societal pressure. For many of the neurodiverse learners, communication and social skills are a challenge, especially in a new environment. This workshop was designed to provide them a safe space where they can step up to face these and build their confidence. Participation of care givers in this workshop ensured this! Ten of them who accompanied their wards eagerly witnessed their children’s ability with a fresh perspective. It was a family time for them that opened up conversations on science, laughter and a sense of relief.

How? – Nurtured with empathy

This one of the kind interactive program was specifically designed to instil confidence about basic science concepts - physics, chemistry, mathematics and biology along with safety and hygiene among these young adults with disabilities. Small kits were assembled by every team after many brain-storming sessions. Objective type questionnaires to bring out the participants’ knowledge prior to the

activity served as icebreaking moments, especially to cull the fear of science. As this is crucial for learning, care was taken to ensure it had more pictures, simple phrases instead of typical textbook questions.

Doable and replicable science activities for real life

Through a set of easy to attempt activities, participants were able to understand basic concepts of magnetism, heat, waves, battery, sound, light, air pressure, geometrical designs, measurement in everyday life, vitamins, food adulteration, microbes around us, hygiene and safety measures in kitchen, electrical appliances and food. Activities like colouring a Newton's wheel setup, tracing the magnetic fields of different shapes of magnets with iron fillings, testing magnetic strength, measuring pH of various liquids, making a density column, visualising songs and sound as a laser show, solving missing square puzzles, creating a battery using coins, connecting batteries to glow LEDs engaged them completely. Guessing and verifying measurements that one requires in daily life on weights, volume and distance being a very important skill, many participants got to try their hands with weighing scale, digital balance, graduated beakers for the first time using hands-span/ feet and measuring tape. Living in a coastal area, understanding effects of atmospheric pressure, convection current helps them weather patterns and monsoon. With that in mind, simple activities with candles & paper fans, paper & rulers, paper cup tower, floating ball, balloon syringe, Torricelli water tank, every learner had a field-day with all elements – fire, air, water, sound and colour. Boyle's law and Bernoulli's theorem that they feared in regular classroom became their favourites here and our lab reverberated with this this contagious enthusiasm. Success through post activity quizzes, loads of stickers, badges enthralled every participant to attempt the next activity without inhibition. The idea to engage them kinaesthetically instead of making them passive observers proved fruitful. Students who generally move away from noise and loudness tried to understand what is sound, frequency and intensity through gentle experiments with straw flute, string telephone and roaring cups. Watching small organisms in pond water move through a under laser light in the dark room wall was impressive enough to make them conscious about potable water. Colourful lava lamps using

vegetable oil, simple holograms, illusions due to refraction, magnetic slime, squishy non-Newtonian liquids, wave pattern using straws caught their eyes that added charm while leaving them with tricky questions. Am sure, that this set of participants will no more be vulnerable to tricks of pranksters, cheats and bullies! The day is not far, they will stand up for themselves, as they have learnt how to figure out answers themselves through this workshop!!



Curiosity demands caution

Volunteers from microbiology joined hands to help the participants learn dental hygiene, physical and menstrual hygiene, using sanitisers, eating fibre rich, nutritious food and good sleeping pattern devoid of gadgets. With Diwali, the festival of light and crackers approaching along with monsoon and water-borne diseases waiting around the corner, it calls for safety measures. Instead of reading or hearing about safety norms, participants experienced them. Handling and disposal of fire crackers safely, checking expiry date of medicines before consuming, fire safety when we have sanitisers, chemicals, plastics, batteries, electrical circuits and switches around were evident in the lab. Parents were very happy that their wards were reinforced about these through peers!

Friendly space enables learning

Every participant got a chance to explore science based on their learning style. These fun based activities along with quizzes and crosswords catered to their tactile, visual, auditory needs. Most importantly, the entire environment, the

language spoken, the vocabulary used, infrastructure, moving space and experiments chosen ensured the workshop was participant friendly and non-judgemental. Though I have conducted arts workshop, tailor-made sports activities for people with special needs, this project on Science at this scale needed lot of planning and rehearsals with the team. Sensitising the entire set of volunteers about the diverse needs of the participants, to re-orient their perception about autistic and non-verbal students, to gear up their activities impromptu made a significant impact in the success of this program. In fact, at the end of the day, the entire perspective of volunteers changed and am thankful that this workshop has created a set of strong people who can communicate with neurodiverse learners and welcome them in their workplace.

Attitude of gratitude

Every participant felt empowered with their new found ability to explore science through activities which sure will make them self-learners. I must thank my colleagues Dr.Renganayaki, Dr.Sundari and Dr. Krithiga for their support in mentoring and thirty five volunteers from Physics, Microbiology and Commerce departments made this outreach activity very purposeful. Our team plans to conduct this workshop in nearby institutions soon. It is time to strengthen teachers and help parents understand their wards' kinaesthetic abilities, to make our society more inclusive, our labs disabled-friendly, our pedagogy more flexible. To make our society gear up in helping students with disabilities learn science, such workshops can go a long way. My sincere thanks to the Biochemical Society, London for this grant which made us step forward in this direction through this initiative.



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