# MDI EXPO

# GENERAL

# GUIDE

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# ABOUT MDI SCIENCE EXPO

The MDI Science Expo is an event that promises to inspire curiosity, innovation & a passion for science in young minds. It is an opportunity for learners to showcase their scientific talents, engage in hands-on activities and overall community Support. Learners who participate stand a chance to win exciting prizes and recognition in various categories. The expo serves as a platform for students to apply their scientific and technological skills to tackle real problems faced by their communities, schools, or homes. By creating "Dream Projects" that use Science, Technology, Engineering, or Mathematics (STEM), learners can present practical solutions and innovations relevant to everyday life. MDI invites learners from Matatiele and the surrounding Alfred Nzo Region to take part in the annual expo, which is a key component of MDI's Budding Scientist programme. This initiative is designed for young rural students to encourage creativity, innovative thinking, and the opportunity to showcase their skills.

# WHO CAN PARTICIPATE & HOW TO ENTER

Learners can register to participate by submitting Concept Notes of their idea/ Dream project at the MDI centre or MDI website or via email to scienceexpo@MDI-za.org. The Concept notes detail the purpose of a Dream project and the questions/problems it seeks to solve. The  Concept Notes are submitted through a concept form provided by MDI which details the following:

- Name of Your Project, Problem you identified/What need you want to meet
- How you think it can be solved
- What do you want your design to look like
- What problem do you think you would encounter in making your project a success
- How can you avoid each problem or make sure the problem does not stop your progress
- What material will you need
- What technical support do you think you will need

The MDI science Expo is open to learners in school(including home schooled) from grade 4 to grade 9. Learners are encouraged to work in groups of 3-4 members however, individual projects are also allowed. The expo is open to learners from Matatiele & surrounding Alfred Nzo District.

# WHAT ARE THE BENEFITS OF DOING AN EXPO PROJECT?

- Expo encourages learners to pursue their passion in the STEM related fields of study by preparing and allowing learners to conduct research based on their own interests.
- Learners acquire skills which are used throughout their lifetime i.e Critical thinking, Problem solving, Communication, Creativity & Collaboration
- Hands-on-learning in research and inquiry learning.
- Learners get an opportunity to connect with experienced researchers, scientists and engineers.
- Learners can showcase projects they have completed for assessment within the school environment, while also extending their research capabilities to well beyond the school environment.
- An opportunity to win amazing prizes for the learners & their schools.

# THE ROLE OF THE TEACHER/ PARENT

The teacher/parent must act as a mentor to the learners and a facilitator of the Expo processes, offering support to learners in creating their dream projects. Teachers/parents must guide learners through their Dream project, assist in acquiring of resources, safety measures and ensure that their selected type of project is done according to the MDI Expo guidelines. The MDI Expo relies on teachers/parents to share information about Expo with learners, assist with projects and to display notices about Expo. Enthusiastic teachers inspire learners to achieve great things, simply through their encouragement and support.

# ABOUT DREAM PROJECTS

A Dream project is a research project that a learner presents/showcases at the Expo, the project involves thorough research, experimentation and creativity under any topic of the learners choosing in STEM and Social Sciences, with the aim of clearly communicating the learners Investigation, understanding of the topic & engaging the audience. The Dream Project is presented verbally( Theory/research)and Visually (Practical Project).

# WHAT TYPE OF PROJECTS QUALIFY AS DREAM PROJECTS

Your Dream Project idea can be classified as one of four types of projects, namely:

- **Scientific Investigations/ Experimental** – these are projects that follow the scientific method; a process that answers a research question and tests a hypothesis, usually through observations and experimentation. It involves collecting and analysing data to reach a conclusion e.g. seeing how a plant reacts under different light conditions is an experiment.

- **Engineering/ Computer Science** – these types of projects follow a design process according to the criteria, to build, test-redesign and retest a prototype/ product/solution. They are models that show how a product works e.g. a device or a computer code.

- **Mathematics/ Theoretical** – these projects explore quantity, structure, space and change. Starting with an observation, problem or question, make conjectures/ hypothesis, prove your claim using new or existing methods, make valid deductions and test your ideas theoretically. Your reasoning and arguments must be logical e.g. exploring combinations & permutations related problems and applying them to finance or physics.

- **Social Sciences** – these projects follow a systematic approach that involves answering questions or testing a hypothesis of the functioning of human society by observations and analysing of human behaviour, social relationships, social issues, and other phenomena. Its method involves collecting qualitative and/or quantitative data. Surveys are often used to collect data.

*NB. A project can integrate more than one type.*

# DECIDING ON YOUR DREAM PROJECT

Start by finding something that interests you, it could be a problem that needs a solution or a phenomena that could be improved on. Focus on a single issue and narrow it down to an Expo research project idea. Ideas can come from anywhere, at any time. It can be;

- at home/ school/ community/ around the world,

- in nature,

- on the internet

•      on social media i.e. Facebook, newspapers, etc.

These ideas can be developed further either through discussions with other people (teachers/ professionals/ parents), reading books or academic articles. Once the idea has been developed, you need to do a thorough literature review on or around the idea.  This is done by further reading, to help identify what has not been done or what needs further research. When creating your Dream project, You need to ask yourself these questions: Why am I doing this project, how will I do this project and when must it be done, who else has done a similar project?

To find out what research has been done on your project idea, you can go to Google Scholar and type your project idea in the search area.

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Other public Search engines you can use for academic literature on your topic are:

- Pubmed.Ncbi.nml.nih.gov for  life sciences and biomedical topics
- Doaj.org for open-access, peer review science Journals
- Scienceopen.com for a freely accessible network of scientist & Scientific research
- Emis.d/journals for free access to different mathematical journals, conference proceeding and monograms
- ieeeplore.ieee.org for research articles and standards in electrical engineering, computer science & electronics

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# DREAM PROJECT IDEAS TO CONSIDER PER PROJECT TYPE

| EXPERIMENTAL | ENGINEERING/ COMPUTER SCIENCE | MATHEMATICAL | SOCIAL SCIENCES |
|---|---|---|---|
| Plant Growth and Soil Types: Investigate how different types of soil affect plant growth. Test variables like soil pH, nutrient content, and water retention. Bacterial Growth on Different Surfaces: Explore how different materials (plastic, metal, fabric) affect bacterial growth. Swab surfaces, incubate, and compare results. Water Quality Analysis: Test the quality of water from various sources (tap, river, bottled) for pH, turbidity, and microbial content. Effectiveness of Natural vs. Synthetic Pesticides: Compare the effectiveness of natural pesticides versus synthetic ones on plant pests. Biodegradability of | Solar Water Heating Systems: Design and build a solar water heater, then measure its efficiency compared to traditional heating methods. Water Filtration Systems: Create different water filtration systems using various materials (sand, charcoal, gravel) and test their effectiveness in removing impurities. Robotics and Automation: Build a simple robot and program it to complete specific tasks, then test its performance and reliability under different conditions. Data Visualization: Create a software tool to | Geometry in Nature: Identify and explain geometric shapes and patterns found in nature (e.g., honeycombs, leaves) and their significance. Maths in Daily Life: Explore how maths is used in everyday activities, such as budgeting, shopping, or farming, and present practical applications. Data Collection and Analysis: Conduct surveys or experiments (e.g., favourite foods, daily water usage) and present the data using graphs and charts. Mathematics of Cooking: Calculate measurements and conversions in cooking recipes, emphasizing the importance of accurate maths in cooking. Patterns and Sequences: | Local History Projects: Research and present the history of the Matatiele area, including significant events, cultural heritage, and traditional practices. Community Needs Assessment: Survey the community to identify pressing needs (e.g., healthcare, education, infrastructure) and propose solutions. Cultural Diversity and Traditions: Explore the cultural diversity within the community, showcasing traditional clothing, food, music, and customs. The Impact of Migration: Study how migration has affected the local community, including changes in demographics, economy, and culture. Community Health and Nutrition: |

| EXPERIMENTAL | ENGINEERING/ COMPUTER SCIENCE | MATHEMATICAL | SOCIAL SCIENCES |
|---|---|---|---|
| Different Materials: Investigate how quickly various materials such as plastic, paper & biodegradable plastic break down in different environments Antibiotic Resistance in Bacteria: Study the effect of different antibiotics on bacterial cultures to see how resistance develops over time. Air Quality and Plant Growth: Measure how air pollution .. | visualise large datasets in an intuitive way, then test its usability and effectiveness in conveying information. Renewable energy: Build simple models of alternative energy sources such as solar ovens or wind turbines. Demonstrate their potential in rural areas. | Investigate patterns in numbers (e.g., Fibonacci sequence, multiplication tables) and create visual representations. Probability in Games: Explore the concept of probability through simple games (e.g., dice, cards) and explain how it can predict outcomes. Measurement and Estimation: Measure and estimate the height of trees, the distance between landmarks, or the size of community structures. | Research common health issues in the community and propose initiatives to improve nutrition and wellness. Role of Women in Rural Development: Investigate the contributions of women in local development and discuss ways to empower women further. Rural and Urban Life Comparison: Compare and contrast the lifestyle, challenges, and opportunities in rural and urban settings. Sustainable Farming Practices: Research traditional and modern farming practices and their impact on sustainability and food security. |

Once you have Determined the type of project you will be doing, start thinking about what would be The correct category for it to fall under. The research focus of your dream project Will determine which category if falls under, NOT the complete projects applications.

*To learn HOW to research and present findings on your dreams project topic for each project type, refer to our REPORT GUIDELINES information Package!!!*

*To get guidance on narrowing down your research problem/question into a specific category, refer to our category information package!!!*

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