MESA National Engineering Design Competition

NATIONAL
ENGINEERING DESIGN
COMPETITION

Designing for Equity Locally to Affect Sustainability Globally

NOTICE:

In order to maximize each team's experience during this event, proper execution of all aspects of the judging process and event administration is very important. Although each MESA state may elect to present this event in a different format(s), the MESA USA host site and the corresponding National Event Planning Committee will adhere to the information outlined in this document.

CODE OF SPORTSMANSHIP:

At all times during the course of this event, MESA students, staff, advisors, and supporting family members should act in a professional and courteous manner. All judges' decisions are final. Staff, advisors, and parents shall not engage judges during the event. Students are responsible for ensuring they are present at required events/times.

CONTENTS:

CONTINUING PROJECTS: MESA USA recognizes that there is both an interest in and benefit for student teams to continue to work on a project started in previous years. **However, all projects must be new and original.** Teams cannot continue working on a project started in previous years.

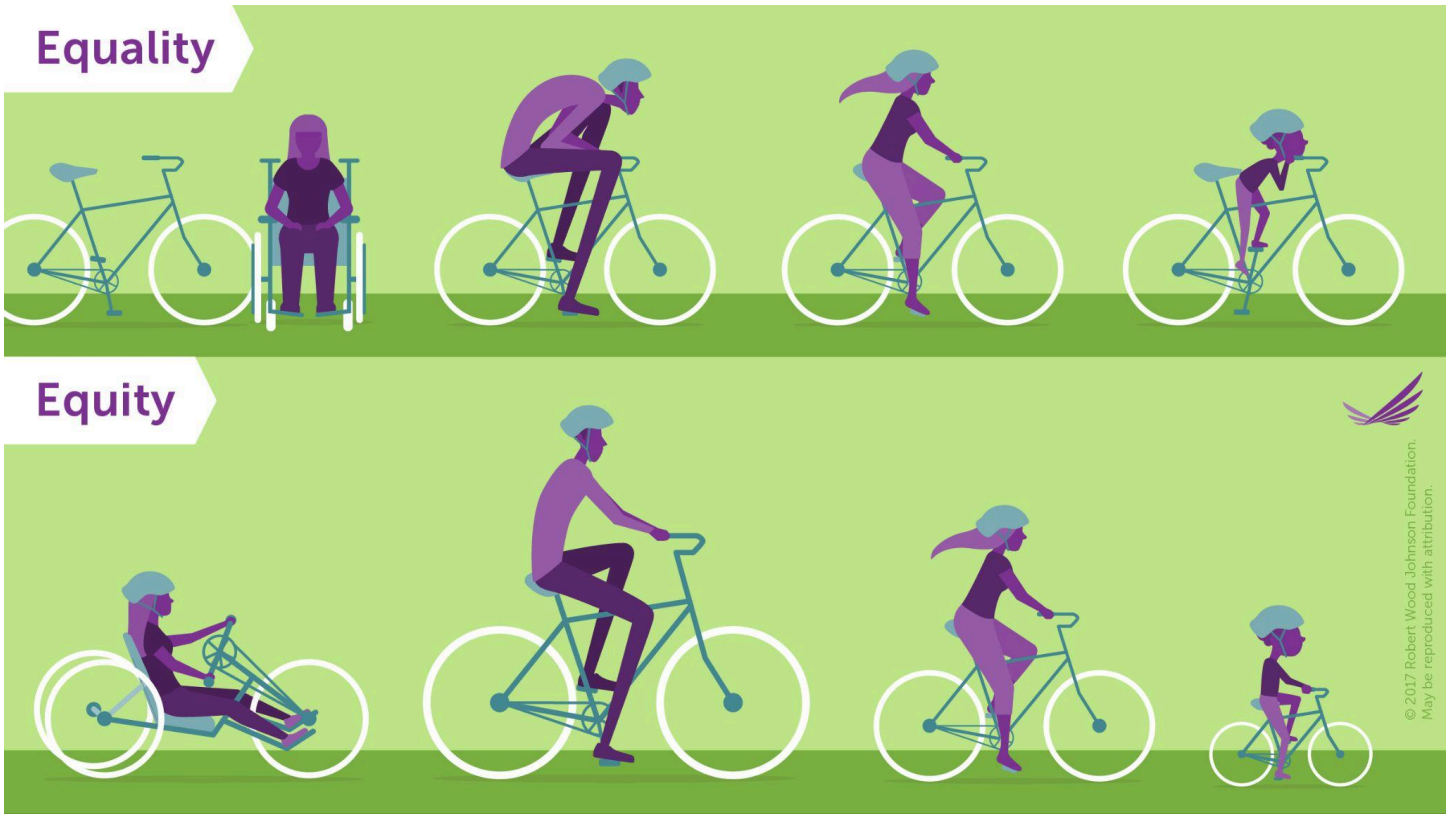
RESOURCES: MESA USA has developed resources to support all teams through the development process, from inception to design to implementation. The following links will direct you to these resources.

MESA USA NEDC Website	https://nedc.mesausa.org/nedc-overview/
	For Rules Handbook, Design Proposal Template & Sample, Academic Poster Template
MESA USA NEDC Curriculum	https://cole2.instructure.com/courses/2040326
	***Module 1**: Setting the Stage, **Module 2**: Intro to NEDC & UN Goals, **Module 3**: Refining the goal and direction **Module 4**: Develop a Plan, **Module 5**: Experiment and Build Prototype, **Module 6**: Revising/Finalizing Prototype **Module 7**: Project Deliverables*

The guidelines and scoring rubrics that follow provide detailed information about judging criteria.

INTRODUCTION

According to the World Health Organization, equity is the absence of avoidable or remediable differences. Those differences can be defined socially, physically, physiologically, geographically, economically, or demographically. Given the current state, we all should strive to live in a world where all people have access to the same opportunities and resources. However, in the race of life, not everyone starts at the same starting line. While we all face inequalities (differences in populations that lead to disparities), there are groups who face unfair inequities (disadvantages and barriers that are unjust, unnecessary, and avoidable) that keep them from joining the race fairly. An equitable race would be one that gives every group the same opportunities to succeed (see visual below).



Equality: Evenly distributed tools and assistance.
Equity: Custom tools that identify and address inequality.

You can begin to make an impact by looking in your community using innovation and creativity to make a change, otherwise known as ***Designing for Equity***. This can be your school, neighborhood, city, or county. Your community does not exist in a vacuum, and positive changes can inspire others to address the inequities around them. Keep in mind the competition theme of ***Designing for Equity Locally to Affect Sustainability Globally*** (which means designing to minimize or eliminate barriers to opportunities for success in your local community while thinking about the larger impact of global equity) when you research and define your inequity. A recommended starting point as you interview and empathize with the affected voices in your communities is to investigate the United Nations' (UN) Sustainable Development Goals (SDG). These goals, drafted and adopted by the UN in 2015, provide insight into the broader view of global equity, as these goals are a universal call to action with the ultimate goal of ensuring peace and prosperity worldwide by 2030.

COMPETITION OVERVIEW

Each competing team must consist of 2-4 students who are active members of a MESA program affiliated with the MESA USA national organization. The first-place middle and high school teams from State events will participate in the National Competition. This National Competition event will occur in June 2025 in California. The theme for the 24-25 MESA USA NEDC: *Designing for Equity Locally to Affect Sustainability Globally*.

Teams are being asked to:

- Identify an individual or group in their community who experiences some type of inequity (i.e., a user).
    - To reiterate, inequity is defined as unjust, unnecessary, and avoidable differences in individuals or groups.
- Use human-centered design practices to engineer a solution.
- Incorporate a coding element in their prototype.

Teams may use the United Nations Sustainable Development Goals (UN-SDGs) to help inspire how their prototype can address the inequities that are caused by the listed inequalities. See https://sdgs.un.org/goals for more information. Using the UN SDGs is an accessible way to connect how changes in your local community can be magnified to a global scale. By taking advantage of the UN SDGs, teams can globalize the project perspective and demonstrate a higher understanding of the effects of inequities.

PLAGIARISM POLICY

Academic honesty and personal integrity are essential to ensure future success as college students and STEM professionals. MESA USA expects that the work presented as a part of the NEDC will be solely the work of the students. If the work or ideas of another are used to further students' work, proper credit must be given to the owner. Failure to do so will result in an act of plagiarism. If it is determined that a student committed plagiarism, they will be disqualified and ineligible to receive any awards. They may also risk further sanctions from MESA USA and/or their MESA state organization.

COMPETITION COMPONENTS

The components listed below will be used to assess the effective implementation of a human-centered design approach in the context of designing for equity, the effective implementation of the engineering design process, and the functionality of the prototype.

High school and middle school teams who qualify to participate in the National Competition will compete in the four components below:

1. **Design Proposal—**The objective of the Design Proposal is to provide a brief, non-technical overview of the inspiration for the project and proposed solution. It should only include information from the start of the project until the first design idea. Students must use the provided Design Proposal Template.
2. **Academic Poster -** The objective of the Poster is to provide an overview of the project, highlight key points of the design process, discuss relevant testing and data collection, present the resulting prototype, and share recommendations for further development. Students will prepare a printed academic poster, which will be used during a public poster symposium to provide an overview of the project and the prototype.
3. **Technical Pitch**—The objective of the Technical Pitch is to allow students to establish their technical knowledge while providing an overview of their design process and demonstrating their prototype functionality.
4. **Symposium** - The objective of the symposium is to engage an audience in a conversation about the team's design and decision-making process. Students will share a verbal abstract of their project and be available to answer judges' questions and discuss their project using supporting material to emphasize their points in a conference-like setting.

MESA USA strongly encourages teams to participate in all components at state-level competitions. However, states may opt not to do all components or alter some requirements for their local and state events as needed. Individual states will determine the dates and locations of their respective events. Teams participating in the National Competition must compete in all four components described above.

SCORING SUMMARY

At the National Competition, awards will be presented for each competition component. Overall ranking will be based on the total score, derived by adding the scores for each component. See summary of the point values below:

Design Proposal	Academic Poster	Technical Pitch	Symposium	Total
40 points (15%)	60 points (22%)	92 points (33%)	83 points (30%)	**275 points (100%)**

The MESA USA NEDC reserves the right to present additional awards at the National Competition based on alternative criteria not associated with the raw point total score.

DEADLINES & SUBMISSION INSTRUCTIONS

Below is a breakdown of deadlines and instructions meant to assist the team's submission efforts. ***Please note for local/state competitions, check with your local MESA office about the procedure for submissions.***

For teams advancing to the **National Competition**, carefully review due dates and instructions below:

- General Event Logistics: Teams will be required to complete their team profile by **June 2, 2025**. Qualifying teams will receive a Deliverables Checklist listing requested items like a Team and Advisor Picture, School Logo, and Team Video. Note: Requests are subject to change.
- Competition Components: The Design Proposal, Academic Poster, and, if applicable, Additional Citations Template must be emailed to MESA USA at *mesanedc@gmail.com* before 4:00 pm in your local time zone on **June 9, 2025** (subject to change)**.** Additionally, team members must submit components in the correct file format (using file naming template provided below) and should copy their teacher and NEDC Rules Committee state representative. The submitted NEDC Components will be judged and scored prior to the National Competition. Late submissions will be assessed a 10-point deduction. NO EXCEPTIONS. No submissions will be accepted after **June 11, 2025 at 12 pm** (subject to change)**.**
    - The completed Design Proposal and Academic Poster **MUST** be submitted in Portable Document Format (PDF). Teams shall ensure the submissions can be opened using Adobe Reader (10.0 or newer) on a laptop/desktop/mobile device and that it matches your original document. NEDC Component Files submitted in a format other than PDF will be assessed at a 5-point penalty.
    - If using the Additional Citations Template, the team must submit the file along with their Academic Poster submission (same deadline: date and time).
    - The MESA USA National event host will print the Academic Poster from the submission, no exceptions. Teams must verify the Academic Poster meets the size dimensions (see Academic Poster: Required Elements #1 – *Pg.6*).
    - All submitted files must use the following file naming template:

File Naming Template: **STATE_DIVISION (MS or HS)_SUBMISSION TYPE_SCHOOL NAME(ABBRV)**
File Name Examples:1) **CA_HS_DesignProposal_ST** and 2) **WA_MS_Poster_WM**
1) *State=California, Division=High School, Submission Type=Design Proposal, School= Santa Teresa High*
2) State=Washington, Division=Middle School, Submission Type=Poster, School: Westwood Middle

Check the MESA USA national website at https://nedc.mesausa.org/ for further information.

Please note that MESA USA, the National host, and the Head Judges are not responsible for any internet service delays, misdirected submissions, or other technical difficulties. It is the responsibility of the student team members to ensure that the NEDC Components are delivered successfully in the proper format and size by the deadline. Therefore, submission of materials well in advance of the above-listed deadline is strongly recommended.

Design Proposal

Objective: The Design Proposal provides a non-technical overview of the inspiration for the project. It should only include information from the start of the project until the first design idea. Information on building, testing, and additional design iterations should not be included. This short document should help the reader understand why this project is needed and what it is intended to accomplish. The design proposal can be used alone or as support for the other components of the competition.

Typically, Design Proposals are used as a way for designers to share their ideas and gain buy-in or approval for a project. The design proposal should be completed before any work building your design has begun.

Format: Teams **must** use the Design Proposal Template and submit as a PDF.
The template is available as a Word document and Google Doc.
When completed, teams must save as a PDF and submit the PDF for competition.
A 5-point penalty will be assessed for any Design Proposals not submitted as a PDF.

Required Elements (Download the official Design Proposal Template and see a sample design proposal at MESA USA NEDC - Overview):

1. Project Title: The title should be creative and descriptive. Readers should get a general sense of what the project is about and want to read more. (20 word maximum)
2. Inequity Being Addressed: Describe the inequity that you will attempt to address with your proposed solution. To globalize the project perspective, you may include information about the related U.N. Sustainable Development Goal(s). (75 word maximum)
3. Community Research and User Identification: Explain the process used to identify the inequity and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (150 word maximum)
4. User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific user needs based on their feedback. (150 word maximum)
5. Project Goals: List your project goals and explain how these goals will address the inequity. Project goals should define the desired outcomes, not specific features of the proposed solution. (150 word maximum)
6. Proposed Solution: Describe your proposed solution, including any innovative and unique features, and explain how this solution will address your users' needs and the inequity they face. (150 word maximum)
7. Initial Design: Include a single (1) graphic of your first design idea. It should be easy to understand, and key features should be adequately labeled. The reader should have a general understanding of how the prototype might function by looking at the graphic. The graphic must be no larger than 8.5" (h) x 11" (w). The graphic may contain up to four views of the design. Graphics larger or with more views will receive a score of zero.

Academic Poster

Objective: The objective of the poster is to provide an overview of the project, highlight key points of the design process, discuss relevant testing and data collection, present the resulting prototype, and share recommendations for further development. Students will participate in a poster symposium at the National Competition.

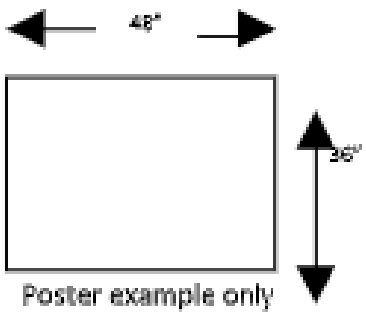
When done effectively, an academic poster is a way to showcase your work at conferences and meetings in a concise and aesthetically pleasing format. It is a summary of your project. At a poster session, your ultimate goal is to share the story of your work with as many people as possible. At its core, an effective poster is centered on a concise and powerful story. With the help of visuals, the presenter can share the story of the work in just few minutes.

The team's Design Proposal, Engineering Design Notebook, prototype, and other support materials should be available during the Poster Symposium.

Required Elements:

All sections should use as few words as possible to adequately present the information. Any section requiring written explanation should be succinct. Generally, it is encouraged to use bullet-pointed lists instead of text in paragraph form.

1. Size and Type: Teams must design a single poster for the National Competition. During the National Competition, the host will print posters for use during the competition. The maximum size of the poster is 36" (height) by 48" (width). The minimum size is 24"(height) by 36" (width).
    a. State and local events may opt to allow tri-fold presentation boards with maximum dimensions of 36" x 48".
    b. National host will print the team's poster for the symposium. Note: State and local events will determine how to receive posters and if/who is responsible for printing.



2. Title: Posters should include a title at the top. This section could include:
    a. A takeaway for people who read the poster.
    b. An identifier for the project.
3. Team Section: Must be present and include the following:
    a. School name.
    b. Grade level (Middle School or High School).
    c. State (optional at state and local events).
    d. Team members' names.
    e. Advisor's Name
4. Logo: An Official MESA USA logo must be included and used appropriately, as seen in the Logo Guidelines.
5. Problem Statement: This defines the problem to be addressed. This section could include:
    a. Description of problem(s) addressed by prototype.
    b. Identify the inequity being addressed.
    c. Scope of the project and any priorities in design.
    d. To globalize the project perspective, you may include information about the related U.N. Sustainable Development Goal(s)
6. Objective: This defines how the problem is being addressed. This section could include:
    a. Primary objectives being addressed.
    b. Any secondary objectives being addressed.
7. User Requirements: This section describes the needs of the user and how your prototype meets those needs. This section could include:
    a. Graphic explaining requirements.
    b. Bullet point list of requirements.
    c. **High School Teams Only:** Address any implicit requirements. For example, if your user wants to live in Alaska the entire year, an implicit requirement is that the design needs to work in below freezing temperatures
8. Prototype: A picture/schematic of the prototype. This section could include:
    a. Short descriptions of important pieces of the prototype using callouts (short descriptions of key elements on picture).
    b. Highlights of the prototype and labeling of main parts.
    c. Unique elements of prototype.
9. Design Process and Iterations: A graphic that shows the team's design process and the number of iterations the team experienced, including specifics. A general Engineering Design Process is NOT allowed. It must be specific to your team's design process. This section could include:
    a. Flow chart with steps for the team's iterative process.
    b. Engineering Design Process with specific steps outlined.

   c. Specific Information about when changes/modifications were made based on testing/user feedback.
10. Citations: At most 3 citations that team used in their research. One citation should be the interview with the client. The citations should be the ones that are most impactful on the prototype. More citations can be added to the citations template. A proper citation includes the name of author/person being interviewed, date published/interviewed, and title. Sources include, but are not limited to:
    a. Book
    b. Interview (client, expert, etc.)
    c. Website
11. Testing Process: A graphic or list that describes how the team tested the prototypes. This section could include:
    a. Specific tests used.
    b. Tests with users.
    c. User feedback.
12. Visual Data 1: The data about the potential users. This would include the user's requirements, what the user does and does not want the prototype to accomplish, and what the team chose to address with reasoning. This section could include:
    a. Table
    b. Chart
13. Visual Data 2: The testing data used to drive the prototype development. What tests were done and what were the results? What is the data from those tests? This section could include:
    a. Chart
    b. Table
    c. Graph
14. Visual Element: A graphic that describes any other important factors/elements in your prototype. This section could include:
    a. Decision tree.
    b. Design matrix.
    c. Key elements not addressed in other sections.
15. Results: The end result of the prototype. This section could include:
    a. Summary of results.
    b. How the prototype improves the user's capabilities because of the prototype.
    c. Changes to the user's experience in the world.
16. Conclusions: Description of the final takeaways for the user. This section could include:
    a. Success and/or failure to meet primary and secondary objectives.
    b. Next steps for the project.

Technical Pitch

Objective: The Technical Pitch allows judges the opportunity to determine student knowledge of their project, gain information about the design process used by the students and determine the technical functionality of the prototype.

Students will organize and deliver a focused, coherent presentation to provide an overview of the development of their design (including research, experimentation, iterations, and conclusions), the technical components of their design, and the functionality of the prototype. The presentation should provide an overview and demonstration of the prototype functionality as well as include an explanation of the mechanical operations, coding, and the integration of hardware and software. **Questions will not be allowed during Technical Pitch.**

Students can use their choice of support materials, including, but not limited to, an electronic presentation (PowerPoint, etc), prototype, and other relevant materials as support such as their engineering design notebook. Displays and speeches must be the original work of the students.

Required Elements:

The technical pitch is a summary of the technical aspects of the project. Together, they should address:

1. Background Information:
    a. Who is your user and what inequity is being addressed?
    b. How does your prototype fulfill the user's needs to overcome the identified inequity?
    c. Can your prototype connect your community's needs to a global inequity? If so, include information about the related U.N. Sustainable Development Goal(s).?
2. Engineering Design Process:
    a. What problems did you face and how did you solve them?
    b. What were your major prototype design choices and how were they influenced by the user?
    c. How did the iterations of the prototype change during the project through testing or evaluation?
    d. How did data and testing influence your final design choice(s)?
3. Description of Design:
    a. How does your prototype function?
    b. How did you integrate coding into your prototype design?
    c. What coding elements did you integrate (i.e., loops, conditional statements, etc.)?
    d. What was your reasoning for selected materials and technology?
4. Conclusion and Recommendations:
    a. What is your final assessment/evaluation of your prototype?
    b. What are the next steps for the implementation of your prototype?
    c. Are there any suggestions for improvement and/or redesign?
5. Prototype Demonstration:
    a. Teams must have a working prototype. If not, some areas will not be able to be scored.
    b. Teams must be able to adequately discuss their prototype design, including unique features of the design, and demonstrate the function of the prototype.
    c. Teams should demonstrate the usability of the prototype and how it meets the needs of the user.

Technical Pitch Rules:

1. Teams will be randomly selected to determine order. Students must conduct presentations in the order drawn. No exceptions or late arrivals are allowed.
2. Teams will have up to 10 minutes to deliver their Technical Pitch and demonstrate the prototype.
    a. Judges will notify teams when they have 1 minute remaining in the presentation time (at 9 minutes). At 10 minutes, the presentation will be stopped.
    b. Teams are allowed to incorporate time for judges to interact with their prototype, but the interaction must be concluded within the time allotted for the presentation.
    c. Judges will not be allowed to ask any questions or converse with the team at any point during the Technical Pitch.
3. Teams are to use support material during the technical pitch.
    a. Teams are strongly encouraged to use support materials such as an electronic presentation (PowerPoint, Prezi, etc.), poster, engineering notebook, code, or other visual aids as needed to supplement their technical pitch.
4. The pitch will be open to the public. States may opt for private sessions at state and local events.

Materials Provided:

- A table for display and/or demonstration and electricity will be available for the Technical Pitch.
- Wireless internet may be available but is not guaranteed.

Symposium

Objective: The objective of the Symposium is to engage an audience in a conversation about the team's design process. Discussion should use the STAR method interview technique to help share the team's processes in identifying the inequity addressed, selection of a target population, and decision-making strategies used throughout the design process to arrive at their proposed solution. Students will share a verbal abstract of their project and be available to answer questions and discuss their project using supporting material to underline their points. This event will be conducted in a conference-like setting, open to all event attendees, and will provide an opportunity for student teams to interact with one another and learn more about each other's projects. The team's Academic Poster, Prototype, Design Proposal, Engineering Design Notebook, and other support materials can be utilized during the Symposium. Electronic media is permitted, but keep in mind, there will be no access to Wi-Fi or electric outlets.

Symposiums typically take place at various STEM conferences to communicate the results of the latest research and innovation. You may be required to participate in a symposium, as soon as college, as you prepare for a career in STEM. For this reason, it's important to learn the various ways this community shares results.

Structure: Teams must be prepared to introduce themselves, deliver a verbal abstract that provides a brief oral overview of the project, and be available to discuss their project with a set of judges. A competition moderator will be present to assist with the flow of this component.

Required Elements:

1. Introduction of Team Members - should at least include first names, school, and MESA Center/State.
2. Verbal Abstract ***(Total Time Allotted: 3 minutes)***
    a. Research and Development *(Recommended Time Limit: 1 minute)*
        1. Inequity Being Addressed
            - To globalize the project perspective, teams can connect their inequity to a UN Sustainable Development Goal.
        2. Community/User Profile
    b. Description of Proposed Solution/Current Prototype Iteration *(Recommended Time Limit: 30 seconds)*
        1. Teams must give an overview of project features and functional elements
    c. Design, Innovation, and Conclusions *(Recommended Time Limit: 1.5 minutes)*
        1. Project Goals and Impact - Team should mention how effectively the current prototype meets their initial project goals regarding user Impact and their feedback, meeting initial goals and expectations, and data.
3. Response to Prompts – Assessment for each prompt is outlined below:
    a. Structure: Team must follow the STAR method structure when responding to discussion prompts. The STAR method is an interview technique used to answer behavioral or situational questions by describing the **S**ituation, explaining the **T**ask, the **A**ctions taken, and the **R**esults of said action. *(See Competition Resources (Pg.1) for additional information.)*
        1. The response must clearly contain each individual element of the STAR method (a stated Situation, Task, Action, and Result). The presence of the element (not the context) will gain the "Structure" points.
    b. Context: The STAR method is meant to package relevant details that demonstrate knowledge and experience. Answers that follow the STAR method should add context to the following:
        1. Situation - Describe the situation. "Set up the scene." When was the problem/challenge encountered? Why was the problem/challenge significant?

2. Task - Explain the task. What problem/challenge did the team address? Was it a team effort? Did one or more team members take charge? Why?
3. Action - What actions did the team or team member take to approach the problem/challenge?
4. Result - What was the result of the actions taken? Can the team point out what features were modified? Or can the team pinpoint what was gained from taking on this problem/challenge?

c. Overall Assessment: The team's response (to prompt and subsequent follow-ups) demonstrates adequate knowledge of the concepts and processes used in the project.

4. Extemporaneous Elements Assessed:
   a. Thinking on Your Feet: Teams are prepared to answer, prompt teammates, and/or entertain questions that they cannot answer.
   b. Preparedness - Note Usage: Team is not dependent on notes, notes are used as a reference and not a script.
   c. Integration of Supporting Materials are used to support the entirety of the conversation. This can include but is not limited to: Academic Poster, Design Proposal, Prototype, Additional Citations Template, and Design Notebooks. Electronic media is permitted, but keep in mind, there will be no access to Wi-Fi or electric outlets.
5. Quality of Presentation
   a. Communication: Team members' voices are clearly heard, tone is appropriate, and technical terms are used correctly.
   b. Body language: Team displays relaxed, self-confident nature and is mostly free of fidgeting and/or nervous movements.
   c. Conversational Flow: Transitions between team members appear natural and smooth. Team members are able to identify windows of opportunity to add additional information or notes to avoid interrupting each other during the interaction.
   d. Participation: All team members participate appropriately and adequately.

Symposium Rules:

1. All team members must be present at the symposium and at their poster during their judging window.
2. Team order will be randomly determined. Judges may approach a poster in any order in order to mimic the flow of a formal poster symposium. Judges may not interrupt students if they are already in the middle of their presentation with another judge or attendee.
3. Due to the way traditional poster symposiums are a more relaxed discussion after a brief overview of the project, hosts will provide timing guidelines to ensure that judges are able to speak to every team they are assigned to during the event. It is strongly recommended that interactions take up to 10 minutes:
   a. The verbal abstract should take no more than 3 minutes from start to finish.
      - If a team takes longer than the allotted time, it may affect the time judges have left to continue. If the judges must move on before all prompts can be asked, teams may risk the loss of points from unanswered prompts.
   b. The prompts should take up the remaining time to allow for conversation and any follow-up questions. A moderator will be assigned to make sure the interaction does not go over the recommended time as stated by the host.
4. Most of the interaction time should be spent answering the prompts to expand on the verbal abstract. Competition moderators may assist in moving along the discussion should the team go over their recommended abstract window, or judges go over their recommended judging window.

5. Teams must use the STAR Method to elaborate on the discussion prompt shared by the judges. The official discussion prompts will begin with one of the following imperatives: **"Describe" and "Explain"**. Judges are allowed to announce that a prompt will be asked and teams are allowed to confirm whether a question is a prompt. The STAR Method structure is not required for clarifying/follow-up questions, but can still add to the overall assessment of the prompt response.
6. Discussion Prompt Categories and a few examples are listed below. Judges will be given a set of discussion prompts to aid the discussion between the team. A few examples have been provided below. Teams will be judged and scored for three (3) prompt discussions. Any additional questions will further round out the topic and add any missing information needed by the judges.
    a. **Prompt Category #1: Community Insight & Brainstorming**
        i. Insight: Teams should be prepared to discuss your initial research, community discussions/interviews, inequities that affect user(s) in your community, and the early stages of your prototype ideas and sketches.
            1. *Explain what motivated your team to highlight this area of the community.*
            2. *Describe what inequity you observed in your community and how it led to the ideation of your proposed solution.*
    b. Prompt Category #2: Design Evolution and User Interface
        i. Insight: Teams should be prepared to discuss your prototype iterations, what inspired changes, and how project components were selected.
            1. *Explain how feedback from your user(s) was incorporated in the design process.*
            2. *Describe a moment during the prototyping process where you had to make changes to your design.*
    c. Prompt Category #3: Impact, Improvements, & Reflections
        i. Insight: Teams should be prepared to discuss in what ways their project impacted the user, what they learned during the process, and how they would improve their project if they were to continue working on it.
            1. *Explain how you would change your project if you started from the beginning knowing what you do now.*
            2. *Describe the ways your project impacted your user.*

Materials Provided:

- Easel, ample wall space, or cafeteria-style table (approximately 30" x 72" x 29"). If a table is provided, teams must supply their own poster stand (State and Local Competitions).
- For the National Competition, the poster will be printed by the host state and table/table cover/board will be provided for display.

MESA National Engineering Design Competition

2024-2025 MESA USA NEDC

Designing for Equity Locally to Affect Sustainability Globally

TEAM IDENTIFIER:	☐ MS	☐ HS

DESIGN PROPOSAL RUBRIC

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Project Title: Title is present (20 words maximum)			2	1	0
Inequity Being Addressed: Adequately describes the inequity the project will address. Students are able to consider a global perspective related to their inequity. (75 words maximum)	4	3	2	1	0
Community Research and User Identification: Information provided adequately explains the process used to identify the inequity and select the user. The research information provided is appropriate and supports their explanation. (2x points) (150 words maximum)	8	6	4	2	0
User Profile: Description provided adequately describes the user. The information provided is appropriate and provides insight into user challenges and how those challenges impact their life. Specific user needs are included and are based on user feedback. (2x points) (150 words maximum)	8	6	4	2	0
Project Goals: A specific list of goals is included and goals are appropriate for identified inequity and challenges faced by the user. Goals adequately address specific needs identified in the user profile. (2x points) (150 words maximum)	8	6	4	2	0
Proposed Solution: The description of the proposed solution provides enough information to understand its primary functions and how they will meet the project goals listed above. (2x points) (150 words maximum)	8	6	4	2	0
Initial Design: Graphic is easy to understand. Includes appropriate labels, and matches the description provided. Assign a zero if it does not fit on an 8.5" x 11" sheet of paper or has more than 4 views.			2	1	0

Comments:

Column Totals					
		Grand Total (40 Points)			

Judge Name: _____

MESA National Engineering Design Competition

2024-2025 MESA USA NEDC

Designing for Equity Locally to Affect Sustainability Globally

TEAM IDENTIFIER: ☐ **MS** ☐ **HS**

ACADEMIC POSTER RUBRIC

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Problem Statement: The team adequately identifies the user and defines the inequity being addressed. Students are able to consider a global perspective related to their inequity. (30 words or fewer)	4	3	2	1	0
Objective: The team provides a bulleted list of the primary objectives and any secondary objectives of the project, including all factors being addressed.	4	3	2	1	0
User Requirement: A graphic or list adequately shows requirements identified by the user. Middle school teams need to address explicit requirements. High school teams need to address explicit and implicit requirements.	4	3	2	1	0
Prototype: A graphic of the prototype is present and adequately highlights innovations and/or important components of the design.	4	3	2	1	0
Prototype Detail: Main components are labeled, and functionality is clear. Titles and descriptions are included. If needed, a scale is present.	4	3	2	1	0
Design Process: A graphic display adequately describes the team's design process and the number of iterations the team experienced.	4	3	2	1	0
Testing Process: An adequate description of the testing processes/procedures is included.	4	3	2	1	0
Visual Data 1: A graph and/or table adequately presents relevant information of the potential users from the results of interviews and testing that increases the observer's understanding of the project.	4	3	2	1	0
Visual Data 2: A graph and/or table adequately presents relevant information from the results of testing and increases the observer's understanding of the project.	4	3	2	1	0
Visual Elements: Visual material included enhances the observer's understanding of the project.	4	3	2	1	0
Results: The team adequately describes how the prototype works to achieve equity for the user.	4	3	2	1	0
Conclusions: Team includes an adequate assessment of how well their project meets the user requirements and adequately describes improvements if continuing this project.	4	3	2	1	0
Citations: Team includes, at most, 3 citations that are relevant to their project. The citations demonstrate the team researched their solution. One citation should be interview with their client.	4	3	2	1	0
Readability: The poster is easy to read and has a balanced amount of graphics and text. It is encouraged to use bullet-pointed lists instead of text in paragraph form.		**Graphics:** About half **Text:** Concise	**Graphics:** Some **Text:** About half	**Graphics:** A few **Text:** More than half	**Graphics:** None **Text:** Vast Majority
Title: A title is included.		Creative & Memorable	Sufficiently Explanatory	Simple Summarization	None

School Name Included		Team Members Name Included		Naming Totals (Part 1)
1	0	1	0	

Column Totals (Part 2)					
					Grand Total (Part 1 + Part 2 = 60 Total)

TEAM IDENTIFIER: ☐ **MS** ☐ **HS**

TECHNICAL PITCH: PAGE 1

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
User Overview: The team articulates how their prototype addresses the needs of the user and their selected inequity. Team should be able to consider a global perspective related to their inequity.	4	3	2	1	0
Design Knowledge: The team demonstrates knowledge of the prototype. All design elements are intentional and thought out.	4	3	2	1	0
Usability: The team can articulate prototype instructions and purpose. Judges can understand how the prototype is used by the user.	4	3	2	1	0
Prototype Demonstration: During the presentation time, the prototype is working and can be demonstrated effectively with ease. (2x points)	8	6	4	2	0
Materials: All materials are appropriate for design and for use by the user. Team can articulate and is knowledgeable about the rationale and purpose for materials used.	4	3	2	1	0
Technology Usage: Sensors, Wiring, Breadboard, Applications, 3D Modeling/Printing, Etc.: All technology is appropriate for the design. The team can articulate and is knowledgeable about all technology used. Rationale for selection of hardware/software components used is conveyed adequately. This can include any mechanical or coding design considerations. (2x points)	8	6	4	2	0
Code: Full coding used is available for view and integrated into the presentation. Code is commented and functions are understandable by the audience. The presented code has elements of originality and shows ownership by the team.	4	3	2	1	0
Coding Platform: The use and integration of selected coding platform (ie. microprocessor, application, website, sensors, etc) is innovative, effective, and relevant to the project. The code functions are specifically designed and appropriately utilized. (2x points)	8	6	4	2	0
Key Components of Code: The team can identify key coding elements such as variables, loops, conditional statements, etc. The team can explain with adequate detail, their programming logic, their coding choices, and any modifications they made to existing code. (2x points)	8	6	4	2	0
Prototype Functionality: The team is able to describe how the prototype works. They can adequately convey what data the device collects and/or what variables are used to result in an output. This includes mechanical operation if appropriate. (2x points)	8	6	4	2	0

Column Totals (Page 1)					
		Page 1 Total:			

Judge Name: _____

TEAM IDENTIFIER: ☐ **MS** ☐ **HS**

TECHNICAL PITCH: PAGE 2

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Engineering Design Process (EDP): The team conveys how their testing and/or data has informed their final design choices.	4	3	2	1	0
EDP Support Material: The team effectively uses support materials to specifically address their Engineering Design Process (Notebook, sketches, iterations, etc) and how they resulted in their final prototype.	4	3	2	1	0
Challenges and Solutions: The team conveys their project challenges and how they incorporated the Engineering Design Process to inform their solutions.	4	3	2	1	0
Prototype Iterations: Evaluation was conducted, documented, and used to improve the prototype design. The team can convey how evaluation helped to inform their final design choice(s).	4	3	2	1	0
Conclusions and Recommendations: The team is able to effectively present their current prototype and discuss conclusive findings, limitations, next steps, and recommendations for further development. The team is able to discuss the future of their prototype.	4	3	2	1	0
Delivery & Organization: Team delivers an engaging presentation. Presents ideas and information effectively.	4	3	2	1	0
Presentation Skills: Team appears prepared and voices can be heard.	4	3	2	1	0
Team Contribution: All members contribute equally to the presentation.	4	3	2	1	0

Comments:

Column Totals (Page 2)					
			Page 2 Total:		
			Grand Total (Page 1 + Page 2 = 92 Points)		

Judge Name: _____

MESA National Engineering Design Competition

2024-2025 MESA USA NEDC

Designing for Equity Locally to Affect Sustainability Globally

TEAM IDENTIFIER: ☐ **MS** ☐ **HS**

SYMPOSIUM: PAGE 1

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Verbal Abstract: Provides a brief oral project overview of the decision-making and design process.					
Research & Development: The team can thoroughly describe their inequity and the community selected. Students are able to consider a global perspective related to their inequity. (2x points)	8	6	4	2	0
Description of Proposed Solution/Current Prototype Iteration: The team is able to give an overview of their project, its features, and functional elements.	4	3	2	1	0
Design, Innovation, & Conclusions: The team is able to explain how their prototype meets their initial project goals and describe how they have arrived at their conclusion. (2x points)	8	6	4	2	0
Assessment of Discussion Prompts					
Prompt #1 - Structure: Ability to include each STAR Method element (1 point per element).	4	3	2	1	0
Prompt #1 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #1 - Overall: Demonstrates adequate knowledge of the concepts and processes used by answering prompt and follow-up questions.	4	3	2	1	0
Prompt #1 Notes/Feedback:					
Prompt #2 - Structure: Ability to include each STAR Method element (1 point per element).	4	3	2	1	0
Prompt #2 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #2 - Overall: Demonstrates adequate knowledge of the concepts and processes used by answering prompt and follow-up questions.	4	3	2	1	0
Prompt #2 Notes/Feedback:					
Prompt #3 - Structure: Ability to include each STAR Method element (1 point per element).	4	3	2	1	0
Prompt #3 - Context: Thoroughly explains the Situation, Task, Action. and Result.	4	3	2	1	0
Prompt #3 - Overall: Demonstrates adequate knowledge of the concepts and processes used by answering prompt and follow-up questions.	4	3	2	1	0
Prompt #3 Notes/Feedback:					

Column Totals (Part 1)					
		Page 1 Total:			

Judge Name: _____

TEAM IDENTIFIER: ☐ **MS** ☐ **HS**

SYMPOSIUM: PAGE 2

	LEVEL OF MASTERY				
	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Extemporaneous Elements and Quality of Presentation					
Thinking on Your Feet: Team members are prepared to answer follow-up questions, prompt teammates to fill-in, or professionally decline to know.	4	3	2	1	0
Preparedness: Team members are able to address prompts and answer questions without heavy reliance on notes. Notes are used as a reference.	4	3	2	1	0
Integration of Supporting Materials: Team members use supporting material to answer or emphasize points.	4	3	2	1	0
Communication: Team members speak clearly, with an appropriate tone, and can use technical terms correctly.		3	2	1	0
Body Language: Team members' posture is relatively relaxed and self-confident in nature. Mostly free of fidgeting and/or nervous movements.		3	2	1	0
Conversational Flow: Discussions flow naturally and smoothly. Team members are able to contribute without interrupting teammates.		3	2	1	0
Participation: All team members contribute to the discussion and/or answer questions.		3	2	1	0

Comments:

Column Totals (Part 2)					

One Point if Team Meets Criteria (Part 3)					
Introduction of Team Members Includes first names, school, and MESA Center/state.		**Dress Code:** (Enforced at Nationals) All team members are wearing their event t-shirts.		**Verbal Abstract:** Within three (3) minutes.	
1	0	1	0	1	0

			Page 2 Totals (Part 2 + Part 3)		
		Grand Totals (Page 1 + Page 2 = 83 Points)			

Judge Name: _____