Hints For Planning Your Design Process Challenge

Deciding when to do a design challenge/how many to do:
Most thematic clusters include a design process outcome. This is intended to serve as a reminder that your students should be doing design process activities. It is not intended to dictate or limit when/how you choose to incorporate these activities. The most important thing to remember is **do design a process activity where you feel it fits and do it well.** Quality, not quantity is important.

In your year planning, you may decide that one cluster has lends itself to a scientific inquiry focus where another is better suited to design challenges. Your primary purpose is to have students develop and practice scientific inquiry and design process skills in the most appropriate manner. It is not possible to address every Cluster 0 student learning outcome in every cluster, but by the end of a grade, they should have had exposure to all outcomes.

The question of how many design process challenges to do over the course of a year cannot be answered easily. Design process activities can range in duration from one hour to several weeks. You should conduct one or two short-duration design process activities to give students experience in the process before they tackle something big. This is especially important in the early years of implementation where students will not bring these skills with them from previous grades. Think of major design process activities in the same way you think about any major class project and decide how many fit in your plans for the year. Remember that design challenges can also be used in other subject areas. For example, student can apply/practice their design process skills in a social studies project. This allows students more opportunities to develop and practice their skills.

Setting the problem/challenge:
A focus on the problem and not the product is critical. For example, student should be asked construct a device (or thing) that can transport a load of marbles across a water table. The student should not be asked to build a boat. There is no purpose/problem to solve in the later statement and it becomes a craft activity rather than problem-solving.

A context (even an imaginary one) is important. It allows students to connect to the problem.

Some options related to materials:
- Teacher provided (eases materials management issues and cost, good starting point as it reduces the number of decisions students must make)
- Teacher provided, with an allowance for students to add one more material of their choice (starts to build ability to determine what materials are needed).
- Choices left up to students (difficult for students with limited experience in the design process, an ultimate goal that allows students to apply their understanding of materials).

Developing Criteria

- ideally, criteria should be developed by teacher AND students (however, the teacher may provide the criteria when the design process is first introduced to students)
- teacher can provide science related criteria, allowing students to apply their cluster-related learning
- students will add criteria that relate to the real-life context (e.g. the tower needs stairs for the boy to get up to the top)
- general guidance is provided by the Cluster 0 outcomes (e.g. function, reliability, aesthetics, cost)
- criteria should be set so that all groups can achieve them (may take trial and error and/or revision on the spot to find the right expectation level)
- criteria are easily modified to differentiate instruction for groups, including challenging groups who solve the problem quickly
- part of student assessment is whether or not they met all of the criteria, NOT how well they met the criteria (e.g. this is not a competition, if criteria is set so that all students can be successful, they should get full credit for this aspect of assessment)

Recording Information

It is very important that students become accustomed to recording their work. It is often difficult to get students to record a plan PRIOR to beginning work. They want to dive in. Recording a plan (even just a picture) forces students to reach consensus, a difficult task in itself. This will eliminate problems during the construction. The other important aspect is that the plan serves as a BEFORE picture and when they draw their final product it serves as an AFTER picture. This provides a record of what happened and something for the students to refer to in their analysis and presentation of what they did.

Assessment

Do

- check to ensure all criteria have been met and provide credit for this aspect of assessment (all student groups may receive 5/5, happy face, etc. for meeting criteria)
- assess what happens DURING the design activity (use tools for observing things like group work, problem-solving, etc.)
- require students to share what they have done (e.g. oral presentation, written or pictoral summary)
- require students to reflect on what they have done as a major component of the assessment (e.g. how did their plan change, what would they do differently next time, why did they make the design decisions they did)

Don't

- make this into a competition (e.g. who can build the tallest tower, the criteria should be set to indicate the height the tower needs to be and all students can achieve this)
- collect and grade the final product as the sole source of information (this is in fact least important to the design process *as long as* all of the criteria have been met, the process and the student analysis/explanation is the most important)