Engineering Design Decision Matrix

			Options			
			Option A	Option B	Option C	Option D
Selection Criteria/Category	Weight (1-5)	Multiply	Score / Weighted Score	Score / Weighted Score	Score / Weighted Score	Score / Weighted Score
		x				
		x				
		x				
		x				
		x				
		x				
		x				
	TOTAL SCORE	=				

General Instructions for Using the Decision Matrix

Criteria and Constraints

Complex decisions have certain ***criteria*** and ***constraints*** that must be considered when making a choice. ***Criteria*** define what characteristics the solution should have in order to meet the needs of the individuals or groups who are affected by the problem. ***Constraints*** place restrictions on the design solutions and limit the options that will work. Think of these as "deal breakers." Imagine your family needs a new car. You have a new baby in the family which makes five people plus a dog. Your family also likes to travel. You have a budget of $15,000.00. Considerations your family will need to think about when buying the new car might include: size, cost, gas mileage, color, # of doors, aesthetics, comfort, and how environmentally friendly the make and model is. We can define these considerations in further detail by specifying the criteria, qualities that the new car should have in order to meet your family's needs, and constraints, what will limit your options. In this example, some criteria are: the car should be roomy, affordable, and must get good gas mileage. Defining the constraints will help you narrow down your options. For example, if a car cannot seat 5 people plus a dog, or exceeds $15,000.00, that option will have to be eliminated. You may also have to decide which criteria are most important to your family. For example, you might want a car that is blue. However, a red car would still work for your family. You would just give more weight to a car that was blue, in your price range, and had good gas mileage if such a car were among your choices.

Using the Decision Matrix

1. List each criterion you need to consider when deciding on best overall solution or design.
2. Assign a weight for each criterion from 1 to 5, (with 5 as the highest value). This should reflect how important you think the criterion is. Thinking about whether it is a constraint vs a consideration may also help you determine its weight (a constraint should be weighted more heavily). This is a judgement call students should make. It is important for students to understand that they are not ranking these factors in order of importance. Multiple factors may have the same importance.
3. For each criterion, score each option on a scale of 0-5 (5 being best) based on how well that option seems to meet the criteria. Note, the only time you would assign a zero is when an option does not meet a constraint. If an option receives a zero for any category, that option should be eliminated.
4. Multiply the weight for each category by the score you gave each option to get the weighted score. Calculate total weighted scores for each option and compare.
5. Students should critically think about whether or not the outcome makes sense overall. If it doesn't, it may mean students need to go back and review how they assigned values or weighted certain categories. Alternatively, it may mean that the matrix is revealing an outcome they hadn't fully anticipated, and thus should consider that option more seriously. The more often students practice using matrices, the more meaningful and reliable this tool becomes.

Sample

What Should I Have for Lunch?			Options			
			Hamburger	Salad	Option C	Option D
Selection Criteria/Category	Weight (1-5)	Multiply	Score / Weighted Score	Score / Weighted Score	Score / Weighted Score	Score / Weighted Score
Taste (Should taste good)	5	x	5 =25	2 =10		
Nutrition (Should be healthy)	2	x	2 =4	5 =10		
Cost (Less expensive scores higher)	3	x	3 =9	3 =9		
	TOTAL SCORE	=	38	29		