The design & development of an Open Educational Resource entitled IDEATION MATRIX

A WEB-BASED PICTORIAL DECISION MATRIX OF MECHANICAL DESIGN ELEMENTS

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Introduction
Design Thinking a term used to describe the systematic process of design across a variety of industries. For the product designer, it acts as a series of stages that guide new product development, and every specific task within the process falls within one of the five stages of Design Thinking.

The Ideation Matrix resource will be designed to target the ideation stage of the Design Thinking process because this is the area which most heavily relies on understanding of mechanical design elements. Because the purpose of the resource is to help guide and clarify a decision-making process, it will be structured like a decision matrix. It is from these two attributes that the resource derives the name “Ideation Matrix”.

Here are some ideas based on your inputs

What does the released motion look like?
Select all that apply

What does the attachment look like?
Select all that apply

Start

Goal: What could work something like that?

The Ideation Matrix will consist of a website that contains images of a very large number of different existing mechanical design elements of various types. The use of images to spark ideation is a very common technique in the product design industry, but the Ideation Matrix will allow the user to filter the images by a simplified narrowing process, not specific knowledge of the desired result.

Application example

The hypothetical scenario outlined below illustrates how the Ideation Matrix works and the kind of situations in which it could be applied. The example is focused on the ideation phase of a mechanical design cycle in which a student (or other user) has been tasked with designing a product of some kind. The user has started to develop a design concept and now faces a design decision for which they have no previous frame of reference: How to attach the two tubular objects as shown.

Background
Historically, a basic level of mechanical aptitude was a common attribute of students entering mechanical fields of study. Recently, however, anecdotal evidence seems to suggest that incoming students are less familiar with the basic operation of mechanical objects than in the past.

This statement is not a criticism, but merely an observation regarding a specific resultant of the increased prominence of digital skills in our society. The acquisition of any skill takes time, and therefore the increase of time spent developing digital skills necessitates a reduction in the time spent acquiring mechanical skills.

Problem statement
This reduction of mechanical aptitude has resulted in a relative increase in the level of difficulty within courses that require exercise of skills such as generating design concepts, evaluating different design options, and solving mechanical problems. Furthermore, the quality of student work is reduced because more time is spent on these tasks, and non-optimal results are more frequent.

Further compounding the situation, there are currently very few resources that specifically address the problem of a lack of mechanical aptitude. While there are numerous texts available for designing mechanical elements (see excerpt at left), these are not helpful in this situation because the students frequently do not know where to begin. Only after a design element has been selected do these existing resources become helpful.

Objective
Create an Open Educational Resource (OER) that will test one possible way to compensate for and help correct a deficiency of mechanical aptitude in the learner.

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<thead>
<tr>
<th>Resource objective</th>
<th>Validation method</th>
<th>Target metric</th>
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<tbody>
<tr>
<td>Provide assistance in generation of mechanical design concepts</td>
<td>Post-project student survey</td>
<td>&gt;90% positive feedback</td>
</tr>
<tr>
<td>Increase familiarity with common mechanical design elements</td>
<td>Graduating student survey</td>
<td>&gt;90% positive feedback</td>
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<tr>
<td>Comply with requirements for classification as an OER</td>
<td>Evaluation by Ferris OER community</td>
<td>OER team approval</td>
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Logistics & Planning
The development of this resource will largely take place over the summer of 2017, and will be simultaneously integrated into a Fall 2017 course (PDET 311, Product Design Seminar) to be used for evaluation purposes.