FabLab Assignment (20%)

Students will visit and take a tour of the FabLab at the university library (Feb. 28th). Thinking about Maker Spaces and the DIT community, how might teachers working in K-12 classrooms solve problems by generating ideas or using the tools of Maker communities? How could a 3D printer be used in teaching and learning? How might one "make" instead of "buy?" Read Maker Competencies list to gain a better understanding of what Maker Literacies entail.

a) For this assignment, in teams of 2-3, students will complete a series of steps using the FabLab.

   Steps:

   (1) Due March 19 - Identify a K-12 Classroom Problem (a real problem that you've observed)
   (2) Due March 21 - Propose a Solution to this Problem (using the FabLab)
   (3) Due March 26 - Create/"Make" Solution using Software/Hardware in Fablab (this will result in a software (or sketches) <u>and</u> hardware "objects")
   (4) Test the Solution, Reflect, Tweak & Rework
   (5) Due April 11 - Present Ideas & Objects

b) Students will be graded on following these five steps, writing a 1-page paper on the problem and solution (solved by using Maker Literacies), turning in notes/sketches showing your process of thinking and tweaking, making a solution using Fablab software and hardware, and presenting the final solution to the class.

The “Maker-Literate” student:

- identifies the need to invent, design, fabricate, build, repurpose or repair some “thing” in order to express an idea or emotion, or to solve a problem
  - recognizes unmet needs that may be filled by making
  - expresses curiosity about how things are made and how they work
  - “hacks” and “tinkers” to learn how things are made and how they work
  - evaluates the costs & benefits of making as an alternative to buying or hiring
- applies design praxis
  - defines the problem
  - analyses the problem and breaks it into component parts
  - acquires reliable and relevant background information
  - identifies stakeholders
  - specifies project requirements
  - identifies and works effectively within project constraints, be they financial, temporal, proximal, or material
  - brainstorms for a variety of solutions & chooses the best one
  - evaluates the costs & benefits of using off-the-shelf parts or kits as opposed to making from scratch
  - creates and tests prototypes
  - revises and modifies prototype design over multiple iterations
  - takes intelligent risks and learns from failures
- demonstrates time management best-practices
  - outlines project milestones and identifies dependencies
  - constructs critical paths
  - builds in extra time to allow for multiple prototype iterations
- assembles effective teams
  - recognizes opportunities to collaborate with others
  - evaluates the costs & benefits of “Doing-it-Together” (DIT) vs. “Doing-it-Yourself” (DIY)
  - seeks team members with skills appropriate for specific project requirements
  - joins a team where his/her skills are sought and valued
  - solicits advice, knowledge and specific skills succinctly from experts
- employs effective knowledge management practices
  - communicates clearly with team members and stakeholders
  - restates technical and “maker” jargon in plain English
  - documents work clearly
  - uses version control to manage project outputs and documentation
  - preserves project outputs and documentation for long-term access
- assesses the availability of tools
  - selects the best tools for the job
  - acquires the necessary tools or revises project to conform to tool availability
  - seeks alternate tools when a required tool is not available

    - creates necessary tools that can’t be acquired or when an alternate is not an option
- assesses the availability of materials
    - selects the best materials for the job
    - acquires the necessary materials or revises project to conform to materials availability
    - seeks alternate materials when a required material is not available
- demonstrates understanding of digital fabrication process
    - recognizes additive and subtractive fabrication techniques
    - applies 3D modeling principles
    - creates 3D models using appropriate software
- understands many of the ethical, legal and socio-economic issues surrounding making
    - demonstrates an understanding of intellectual property rights and protections
    - identifies project outputs that may be protectable by trade secret, patent, trademark or copyright
    - compares the costs & benefits of seeking intellectual property protections v. making project outputs open and freely available to others
    - evaluates the costs & benefits of open source and proprietary systems
    - recognizes and respects the intellectual property rights of other makers
- employs safety precautions
    - seeks training for dangerous equipment and materials
    - wears personal protective gear when appropriate
    - teaches safety precautions to others
- transfers knowledge gained into workforce, community, and real-world situations
    - teaches what he/she knows to less experienced makers