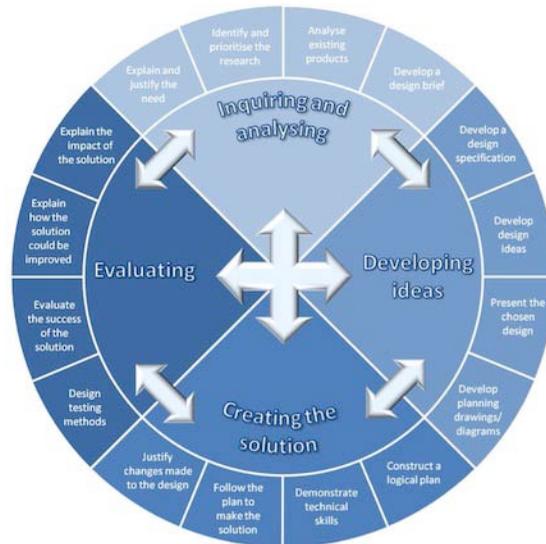


Erwin Middle School IB Design 7

Level 2: 7th Grade

Jake Marshall

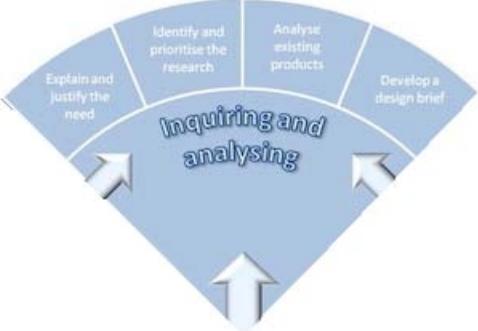
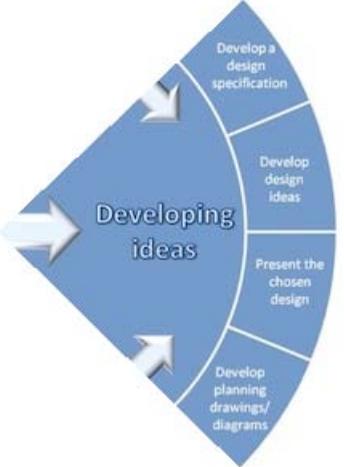
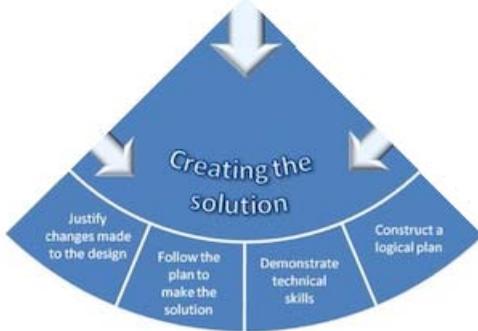
This semester course aims to provide the means and the context to help students become inquirers, thinkers and open-minded skillful problem solvers through the lens of Scientific and Technical Innovation and the design cycle using material technology. The students will create and use a Design Portfolio as a tool to document their Design Cycle Process through the creation of their projects. The hands on projects will be completed through the use of the design cycle implementing communication through technology, transportation, manufacturing, construction, Power and Energy.



Essential Learning's

1. Students will understand the importance of Tech Operations/Concepts.
 - Techniques and Lab Safety
 - Design Cycle
 - Categories of Technology
2. Students will develop knowledge, understanding and skills (*measurement, following and creating a plan of procedures, technical reading/writing learning to read and begin drawing mechanical drawings*) relating to the use of materials, tools and machines.
3. Students will focus on, Creativity, Collaboration, Critical Thinking, and Problem Solving on practical projects as the basis of their learning in Industrial Technology. (*21st Century Learner*)
4. Students will be provided opportunities to be engaged in the Design Cycle, from Investigation to the Evaluation of every project.
5. Students will leave with the concept of producing quality work and what that means in our society.

Standards and Design Cycle Objectives

ISTE State Standards	Design Cycle Objectives
<p>1. Creativity and Innovation</p>	<p>Criterion A Inquiring and Analyzing The student:</p> <ul style="list-style-type: none"> explains and justifies the need for a solution to a problem for a familiar group of people constructs a research plan which states and prioritizes the research needed to develop a solution to the problem independently analyses a group of similar products that inspire a solution to the problem presents the analysis of the findings from a range of sources relevant to the development of a possible solution, cited appropriately. 
<p>2. Communication and Collaboration</p>	<p>Criterion B Developing Ideas The student:</p> <ul style="list-style-type: none"> develops a design specification which outlines the success criteria for the design of a solution based on the data collected presents a range of feasible design ideas using an appropriate medium(s) and annotation, and which can be correctly interpreted by others presents and outlines the reasons for choosing the final design with reference to the design specification develops accurate planning drawings/diagrams and outlines requirements for the creation of the chosen solution. 
<p>3. Research and Information Fluency</p>	<p>Criterion C Creation The Solution The student:</p> <ul style="list-style-type: none"> constructs a logical plan, which outlines the efficient use of time and resources, sufficient for peers to be able to follow the plan to create the solution demonstrates excellent technical skills when making the solution follows the plan to make the solution which functions as intended and is presented appropriately explains changes made to the chosen design and the plan when making the solution. 

<p>4. Critical Thinking, Problem Solving, and Decision Making</p>	<p>Criterion D Evaluating The student:</p> <ul style="list-style-type: none"> • describes detailed and relevant testing methods, which generate accurate data, to measure the success of the solution • explains the success of the solution against the requirements of the design specification based on authentic product testing • describes how the solution could be improved • describes the impact of the solution on the client/target market. 
<p>5. Digital Citizenship</p>	<p style="background-color: #cccccc;"> </p>
<p>6. Technology Operations and Concepts</p>	<p style="background-color: #cccccc;"> </p>

Units of Study

See Definitions of Terms Below

<i>Unit Length</i>	<i>Unit Name</i>	<i>Statement of Inquiry</i>	<i>Key Concept</i>	<i>Related Concept</i>	<i>Global Context</i>	Standards	<i>ATL</i>	<i>Criterion</i>
2wks Integrated	Lab Safety And Design Cycle	Communities function better when systems and safe ergonomics are in place.	Systems	Ergonomics and Function	Scientific and Technical Innovation	5 and 6	Self-Management Cluster: Organizational, Affective and Reflection skills	N/A
2wks	CAD Fundamentals	Resources and Design Communication impacts product innovation.	Communication	Resources and Innovation	Scientific and Technical Innovation	1 and 2	Communication Cluster: Communication skills	Criterion A Criterion F
3wks	3D Design 1	Development through technical innovation creates successful products functioning as designed.	Development	Function and Innovation	Scientific and Technical Innovation	1-6	Communication Cluster: Communication skills	All IB Design Criterion
2 wks	Water Rockets	Development through technical innovation creates successful products and have appropriate form for performance.	Development	Form and Innovation	Scientific and Technical Innovation	1-6	Thinking Cluster: Critical Thinking, Creativity and Innovation Skills	All IB Design Criterion
3wks	Truss Bridges	Communities adapt and collaborate on products to solve a problem.	Communities	Adaptation and Collaboration	Scientific and Technical Innovation	1-6	Thinking Cluster: Critical Thinking, Creativity and Innovation Skills	All IB Design Criterion

3wks	Alternative Energy	Product functions as designed and has appropriate form.	Development	Form and Function	Scientific and Technical Innovation	1-6	Thinking Cluster: Critical Thinking, Creativity and Innovation Skills	All IB Design Criterion
3wks	Mouse Trap Cars	Constant evaluation aids in the development of technical innovation creating successful products.	Development	Innovation and Evaluation	Scientific and Technical Innovation	1-6	Thinking Cluster: Critical Thinking, Creativity and Innovation Skills	All IB Design Criterion

Definitions

KEY CONCEPTS:

SYSTEMS: Systems are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.

While exploring the concept of systems, students develop an awareness and understanding that everything is connected to a single system or multiple systems. Products and solutions are systems of components combined to carry out a specific function. Systems also structure processes: the design cycle is an example of a system. Open loop systems have an input, process and output. Closed loop systems have an input, process, output and mechanism for feedback.

Communication: Communication is the exchange or transfer of signals, facts, ideas and symbols. It requires a sender, a message and an intended receiver. Communication involves the activity of conveying information or meaning. Effective communication requires a common “language” (which may be written, spoken or non-verbal). While exploring the concept of communication, students develop an awareness and understanding of how, why and when we need to ensure that clear messages are given and received throughout the design process. It ensures that ideas can be communicated clearly and each person involved in the development of an idea from conception to use has a common and consistent understanding of the solution and its function. Communication drives invention to become innovation. When inquiring and analyzing, students need to communicate with clients and target markets to identify the design need. When developing ideas, students engage in internal dialogue, using design sketches and models to think through the feasibility of their ideas. When creating the solution, students need to develop clear plans that can be followed easily. The final product must also clearly communicate its intent and how a user interacts with it.

Development: Development is the act or process of growth, progress or evolution, sometimes through iterative improvements. All ideas need refinement, through development, to become successful, appropriate and feasible. The development of solutions allows problems to be solved with greater success. Even though the name suggests that the main focus of development would be found in developing ideas, students have to develop research plans as and when they realize that there is further information they need in order to solve the problem. Students constantly adapt and change their plans when creating the solution, dependent on the thoroughness of their planning and, when evaluating, students develop testing methods to assess the success of the solution.

Communities: Are groups that exist in proximity defined by space, time or relationship? Communities include, for example, groups of people sharing particular characteristics, beliefs or values, as well as groups of interdependent organisms living together in a specific habitat. Through MYP design, students will develop an understanding that a solution to a problem for one community will create problems for another, some on a small or even personal scale, while others may be far-reaching, affecting communities thousands of miles away or the global community. When establishing the need and developing the design brief, the student always considers the community, whether this is a community that affects the design (target audience) or one that is affected by it. When developing ideas, engagement with the target audience and client drives the development to ensure it is fit-for-purpose, and the student must engage with the communities that effect and are affected by the solution when evaluating its effectiveness in solving the problem.

RELATED CONCEPTS:

Ergonomics: Ergonomics is the application of scientific information and understanding of how humans relate to products, systems, interfaces and environments.

Function: The function of a solution refers to what it has been designed to do and how effective it is at enabling that action to be performed.

Resources: Resources relate to the supply of a commodity. In MYP design, these commodities can be classified as information, materials and equipment.

Innovation: Innovation is the successful diffusion of an invention into the marketplace.

Adaptation: Adaptation involves incorporating ideas found in one product into the development of a new product.

Collaboration: Collaboration involves two or more people sharing expertise and experience, working together to solve a problem and realize shared goals.

Evaluation: In design, evaluation involves the gathering and processing of data to determine an action. Evaluation involves feedback, which can be used to control, revise or modify.

Form: Form concerns the overall shape and configuration of a product. It relates to aspects such as aesthetics, shape, colour, and texture.

GLOBAL CONTEXT:**Scientific and Technical Innovation:**

How do we understand the worlds in which we live?

Students will explore the natural world and its laws; the interaction between people and the natural world; how humans use their understanding of scientific principles; the impact of scientific and technological advances on communities and environments; the impact of environments on human activity; how humans adapt environments to their needs.

Possible explorations to develop:

- Systems, models, methods; products, processes and solutions
- Adaptation, ingenuity and progress
- Opportunity, risk, consequences and responsibility
- Modernization, industrialization and engineering
- digital life, virtual environments and the

APPROACHES TO LEARNING:

Skills and Clusters:

Communication: Exchange thoughts, messages and information effectively through interaction.

Clusters: Communication Skills

- Use appropriate forms of writing for different purposes and audiences
- Use a variety of media to communicate with a range of audiences
- Negotiate ideas and knowledge with peers and teachers.
- Collaborate with peers and experts using a variety of digital environments and media.

Self-Management: Managing time and tasks effectively

Clusters: Organizational Skills, Affective Skills, and Reflection

- Bring necessary equipment and supplies to class.
- Keep an organized and logical system if information files/notebooks
- Select and use technology effectively and productively.
- Mindfulness: Practice focus and concentration
- Resilience: Practice failing well

Research: Finding, interpreting, judging, and creating information.

Clusters: Information and Media Literacy

- Make connection between various sources of information.
- Understand and use technology systems.
- Communicate information and ideas effectively to multiple audiences using a variety of media and formats.

Thinking: Analyzing and Evaluating Issues and ideas

Clusters: Critical Thinking and Creativity and Innovation

- Consider ideas from multiple perspectives
- Purpose and evaluate a variety of solutions.
- Troubleshoot systems and applications
- Use brainstorming and mind mapping to generate new ideas
- Design improvements to existing machines, media technologies
- Design new machines
- Create original works and ideas