TEACHER LESSON PLAN

Summary

The ISEA212 STEMArts curriculum tool was built around and for the International Symposium of Electronic Arts 2012 Machine Wilderness (ISEA2012). It is a 21st Century teaching tool for middle and high school students. The ISEA2012 curriculum content is organized around the work and personal stories of featured ISEA2012 artists with a focus on STEM, creativity and innovation. These artists from diverse cultural and academic backgrounds dance gracefully across disciplines and have powerful stories to share that can directly inspire and engage our youth. Our Web 2.0 tools compile an array of STEM + Arts activities and resources, harnessing the collective knowledge available online. Our STEM Concept tool provides core ideas from the Next Generation Science Standards reflected in the artist's work, and a personal perspective on the artists unique STEM innovations. The *STEMArts Framework* provides meaningful ways to engage youth in developing STEM skills through creativity, while inspiring their passion for learning.

How it works

The concept is simple. All the content is organized around featured ISEA2012 artists working with exciting new mediums and interdisciplinary concepts that serve as a springboard for learning. Each artist is highlighted on a page where you can see examples of their art, read an interview with the artist talking about their creative process, and explore/contribute to our Wiki-Resource including activities, articles, tutorials and other content around the STEM topics found in the artists work. Students participating in the ISEA2012 project travel through these pages, investigate the tools, and select an artist or topic as a model for their own art piece. They are guided through the project using the STEMArts Design Tool based on core science standards and P21 Framework for 21st Century Learning. Teachers co-collaborate and mentor students through the process with a lesson plan, online assessment tools and handouts.

Using the ISEA2012 Curriculum Content.

The ISEA2012 STEM ARTS curriculum harnesses the immense knowledge already available online. A 21st Century student needs to be able to find relevant information, critically assess it and apply it in a range of contexts and circumstances. Some of these skills are difficult to acquire using conventional teaching methods.

When using the ISEA2012 STEMArts curriculum both the student and the teacher should be mindful that these are open resources, uploaded by amateurs and professionals alike. Rather than viewing this with concern this is an opportunity for learning as the students, with the support of their teacher peers and other users can begin to critically assess the information they find online.

The curriculum encourages the students to use integrated and blended learning; other disciplines that encourage understanding and diverse methods that support different learning styles. These modes of learning encourage students to make meaning out of the curriculum and what they learn making it easier to apply the knowledge they have learned as it is related and connected. This approach to learning encourages ‘deep learning’ through engaging more parts of the brain (Zull, 2002) and maximizing the density and number of neural connections made in the brain. The brain then becomes connected enabling more useful information to be applied at any one time and consequently re-enforces the learning. The brain processes using biological and electrochemical principles and does not segregate information into exclusive regions separate from the cerebral cortex (Wesson, 2000). Teaching and learning that uses integrated and blended learning approaches encourages a complex neural circuitry that is representative of what we have experienced, uncompartmentalized and what Ken Wesson (2000) calls Brain-considerate learning.

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For Educators:
The ISEA2012 STEMArts curriculum should be used as a resource that can supplement existing teaching practice and lesson plans, through the introduction of the wealth of materials already online. We hope the Wiki-Resource inspires educators and encourages confidence to try new ideas from beyond their own discipline. The curriculum's content has been organized thematically around the artist's projects, their influences and the underlying principals that inform their work. By undertaking a project and exploring the resources, the student is encouraged to develop, design and research skills as well as practical ART/SCI techniques and knowledge.

The curriculum should not be considered as a replacement for a teacher's experience or to teach STEM subjects but more as an engaging and stimulating way to develop an understanding of the principals and concepts of STEM and how it contributes to the world we live in.

For Students:
By using the ISEA2012 STEM ARTS curriculum you are encouraged to explore a diverse range of practices and techniques that develop a broad understanding of the key areas and principals that the artists have engaged with. Its important to remember to ask questions if there's anything you aren't sure with or encounter problems with some of the resources. Just like anything you find online it's important to consider the quality of information, the source and if it is effective e.g. where the instructions easy to understand and did it work. Learning to assess information critically is really important and being able to apply what you have learned whether that is the skills and techniques from the resource or the ability to assess the quality of the resource will be valuable in all your learning experiences.

Getting to know the website

1. Read the ABOUT page to get an overview of the vision and curriculum features.
2. Explore the HOW IT WORKS page to understand how the content is organized throughout the website pages. This section, also, shows relevant content for students, teachers, or anyone interested in ISEA2012 themes.
3. Go to EXPLORE ARTISTS page to access the Artist Directory to enter individual ARTIST PORTAL pages.
4. The ARTIST PORTAL pages are where students will access most of the content. This section includes many tools outlined in the HOW IT WORKS page.
5. TOOLS, contain tools that assist in the learning and teaching process. This may be the STEMArts Survey for administrators, the Design Tool for students, the Museum Handout for the ISEA2012 exhibit, or the Teacher's Lesson Plan.
6. The WIKIFORUM is a resource for the educator with research reports, practical activities, interesting projects and links to other resources.
7. In the ISEA2012 FAQ, we are gathering ISEA2012 terms, including often confounding terms such as data visualization, DIY, and Arduino controllers. This FAQ is a wiki that allows anyone to add and edit terms.
8. In the STEM CONCEPT TOOL , you will see the artist photo slider. Select an artist to take you to the page that outlines the STEM concepts associated with each artist project.

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Lesson Overview

The ISEA2012 Teacher Lesson Plan is designed to guide you and your students through the *STEMArts Design Tool, which is based on the National STEM Standards for Engineering. The lesson plan ~~using~~ uses the ISEA2012 event and the work of the featured artists as a springboard for collaborative learning and teaching. This process provides a deep and meaningful experience that aligns with 21st century standards:

- Focuses on 21st century skills, content knowledge and expertise.
- Builds understanding across and among core subjects as well as 21st century interdisciplinary themes
- Emphasizes deep understanding rather than shallow knowledge
- Engages students with the real world data, tools, and experts they will encounter in college, on the job, and in life--students learn best when actively engaged in solving meaningful problems
- Allows for multiple measures of mastery

Preparation

1. Review the website and this lesson plan so that you understand the project steps to introduce to the class. Decide how you will integrate this project into your curriculum. Will it be part of a science fair? Part of your core curriculum? An after school project? Time needs to be allocated for the students to explore this project as part of their school curriculum.
2. Go to the TOOLS page and select STEMArts Survey. Have the students take the survey. save the responses to compare with the After survey in order to see the impact of the ISEA2012 project.
3. Set a day to review the website and the ISEA2012 project with the students. If possible, project the website, and review together the steps to the project.
4. If you have access to a computer lab, have the students review the website individually.
5. Print out the Student Tools for the different stages of the process so that you understand the tools that they will be using. i.e. Troubleshoot, Feedback and Self-Reflect Survey.
6. If you are able to take your class to a field trip to the ISEA2012 exhibit, schedule ~~a day~~ in advance with the museum so that they are prepared for your visit. If you are not able to take your class to the exhibit skip to next step
7. ISEA2012 Field Trip: The purpose of this trip is for students to have a real world experience of this exciting symposium, They get to see first hand the works of the featured artists that they will be studying in the curriculum, and participate in a STEM game. During the exhibit, they will search the show to answer STEM questions.
    - Print out the STEMArts Trail handout for each student.
    - Review the activity with the class explaining that they will search for the pieces in the exhibit that answer the STEM questions outlined in the handout. Explain that not only is this a game, but also a way to learn more about the art pieces by reflecting on the artist's unique medium and process.
    - Review the TEACHER MUSEUM HANDOUT before the field trip. Use these questions as a guideline to develop dialogue and critical thinking around the art pieces that you explore as a class. Ask the students to ask themselves these questions as they explore the exhibit on their own.
    - When you return to class after the field trip, review these questions with the class and see how the experience impacted the students.

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The ISEA2012 project is divided into seven stages outlined in the STEMArts Design Tool. Below are the steps with guidelines to help you guide them through the project.

Define Purpose

1. The first stage of the design process is to define the project and purpose, which includes identifying the artist(s) from the selection of featured ISEA2012 artists. If the school does not have individual computers for the class, make this a homework assignment.
2. Allow time for exploring each of the artists, reading the artist interviews, and perusing the associated Wiki-Resource with suggested activities and information about the medium.
3. Have discussions with the students about the content that they are exploring;
    - Examine the similarities and differences between the artists' creative process as expressed in the interviews.
    - Explore how the Design Tool process works and how they will be identifying, organizing, and carrying out their own art project to completion.
    - Review the STEM topics associated with each artist's work and ask them to reflect on which ones they may be interested in exploring.
    - Relate the Artists' STEM topic to science or math assignments or projects whenever possible.
    - Explain that the final piece can be anything they want. The artists' projects are meant to inspire ideas as opposed to being reproduced. The idea is for them to innovate.
    - Review how the Wiki-Resource is an important tool for getting ideas, as well as a starting point.
4. Print out the STEMArts Design Tool and review the process with the class.
5. Guide the students in selecting their project idea. It could be a project that takes ideas from several artists or it could a project that is directly inspired by one artist's work. Each artist Wiki-Resource also includes a simple ready made activity that students can choose if time is limited, or if they are not able to come up with an idea of their own.
6. Once they have their project selected, they will follow the Design Tool process which will walk them through the stages of designing and creating their project/piece.

Brainstorm and Research

1. Students will start to move into the BRAINSTORM stage and will need to think creatively to come up with an idea. Have them review questions #1-7 from the Artist Interviews for tips from the artists.
2. The BRAINSTORM phase and RESEARCH phase go hand in hand. Review the RESEARCH stage with class.
3. Have the students identify the Research Tools that they will use to document their findings. We suggest a tool such as Evernote or Pinterest, as well as a paper journal for note taking. The digital tools will also serve as an online portfolio for the student and for the school it is highly encouraged in order to develop 21st century skills.
4. Students are encouraged to collaborate with each other and with others in their community to brainstorm, research, and realize their project. Assist as needed to help make these collaborations possible. This may involve bringing in a guest speaker, or helping them to find a person or organization that can help with their project.

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Design and Collaborate

1. In this stage, students have identified their project and are now making a materials list. Assist students with what they will need. Learning how to work with a budget is part of the creative process. Necessity is the mother of invention!
2. This project can be part of a Science Fair, an assignment for a core subject area, or an after school project.

Troubleshoot and Feedback

1. As the projects begin to form and they experience challenges, review the TROUBLESHOOT stage. Print out the handout and guide them through the process.
2. As explained in the TROUBLESHOOT handout, ask the students to seek specific people in or outside the school, or through internet forums help troubleshoot their problems.
3. Once the projects are near completion, review the FEEDBACK stage with the students. Students can get up in front of the class and share their project to get feedback. For this stage, they should read the FEEDBACK handout which helps them prepare for this presentation. Encourage smaller breakout sessions where students can individually ask each other for feedback.
4. As explained in the STEMArts Design Tool, have the students find 2-3 people from outside the school to approach and get specific feedback relating to problems or concerns that they have identified.

Present and Share

1. Once they feel that their project/piece is complete, review the PRESENT stage. Guide students in the process of identifying the best medium and format for presenting their work, either to the class, the school, to the community and/or as an online portfolio.
2. Review the SHARE stage of the process and help coordinate the presentation of students work i.e. science fair, art exhibit, school presentation, family night etc.
3. Students explore the online share tools and put together an online representation of their work. This may involve photographing the piece and uploading to Youtube, Vimeo, Flickr or Pinterest.

Reflect and Evaluate

1. Once the project is complete and they have shared their work, have the students fill out the REFLECTIVE LOG so that they can develop awareness of their process, their feelings, and their observations.
2. Have the students fill out the STEMArts Survey to see what they learned and how the project impacted them personally.
3. Share the results of the STEMArts survey with your school and email us at learn@stemarts.com to be part of the greater STEMArts Research project, which will provide insight to what is working and not working in schools in order to help us improve this curriculum.