

SYSTEMS THINKING TEACHING STRATEGIES USING THE UN SUSTAINABLE
DEVELOPMENT GOALS TO HELP BEST PREPARE STUDENTS TO BE FUTURE READY

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This project starts with the research question: How can I best integrate the United Nation Sustainable Development Goals into my Understanding By Design and C-3 Inquiry frameworks, Compass Systems Thinking models, and student profile attributes to best prepare our high school students for meaningful action in a rapidly changing world? The ninth grade students in their Global Issues in Action course open the year with an exploration and inquiry project called *Sustainability Initiatives at ASD*.

In this project the students are introduced to ten sustainability initiatives currently in place at their school. As an introduction to each of the initiatives, the students were taken on a tour of the campus and given data on those which can't be physically seen. The Sustainability Initiatives they had to choose from were: use AQI monitors to monitor air pollution, composting program, solar panels, pesticide concerns, waste, central AC efficiency, water bubblers, sustainability in ASD maker space and reusable dishes and cutlery, and carbon emissions data for school trips. The students then took a survey selecting the initiatives they were most interested in learning and investigating more. The essential question during this unit was *How can the sustainable initiatives that are in place at ASD be improved upon to make the school even more sustainable?* The students were put into groups of two to three members. As the students worked through the unit, they conducted research specific to their initiative and how it affected the ASD community, the United Arab Emirates, and the world. Each of the students interviewed leaders of the school responsible for each of the initiatives in order to gain more data and background knowledge. The students then participated in several system thinking exercises, applying their research material and breaking that information down to the mental models that needed to be addressed to make meaningful change in habits and school and community structures within their initiatives to make them more sustainable. In order to make meaningful action, the students

then shared their recommendation of change with their classmates, the leaders with the school in charge of those initiatives, and an action project where they could measure their effectiveness.

The project was created through many frameworks and lenses: Understanding By Design (UBD): The Understanding by Design framework is the structured process that allows the unit to be planned through well framed curriculum, assessments, and lessons. (McTighe & Wiggins, 2011) The framework focuses on working on teaching and assessing strategies that check for understanding to ensure the transfer of learning and starting from the end when it comes to design. (McTighe & Wiggins, 2011) Through UbD unit planning the collaboration team planned out the outcomes and the College, Career, and Civic Life (C3) Framework for Social Studies Standards we wanted to teach and assess. C3 is an inquiry arch that takes the students through the journey development of research skills using quality resources and discipline content, in order to develop supported claims that support taking meaningful action. (Swan et al., 2013) Through the unit we stafforded the project through seven assessments of the following standards: Construct supporting questions, Determine Helpful Sources, Make Global Connections, Determine Causation and Argumentation, Analysis Perspectives, Summarize and Conclude Claims, Create a Final Product, Take Informed Action, and Create proper MLA citations.

This investigation enabled students to learn more about The UN Sustainable Development Goals: a compilation of seventeen interconnected outlined goals shared as a guide to assist global citizens in solving current international problems to ensure a sustainable future. (United Nations, 2015) The system systems thinking practices that were introduced and practiced were a collection of sustainability systems thinking frameworks including the compass and iceberg. (Compass Education Online) Compass practices hope to be reflective, critical, and meaningful systems thinking tools. (Compass Education Online) After their research, students

put their findings within well-being, nature, economics, and society when examining an issue, topic, or question (*AtKisson, 2000*). After inputting their research, they made connections, which helped them process at a deeper level how their sustainability initiatives touch all parts of their world. The compass connections create a map of causes and effects. Once these can be seen, the students worked through the practice applying these findings to an iceberg model to even deeper in determining habit, structures, and mental models that continue to support inefficient sustainable practices.

All these steps and frameworks scaffolded out to an opportunity for the ninth grade students to be real changemakers within their own school community through answering the question *How can their sustainable initiative that is in place at ASD be improved upon to make the school even more sustainable?* Students started with a group of five formative assessments building their skills. First with the introduction or review of the UN Sustainable Development Goals. We took some of those topics and used them to work through the Compass systems thinking process introducing the connections between Wellbeing, Nature, Economics, and Society. We used those connections to apply the deep problem systems thinking process to the Iceberg method of discovering patterns and the structures in place that allow the patterns/habits to exist and then the mental models that are present that allow the structures to exist and where to start with change at all levels. The students then applied the student profile attributes to discuss what needs to be strengthened to solve these problems. When we were at a good formative spot, it was time to summatively test the students in their learning. After a tour of the campus's sustainability initiatives the students selected which ones they most wanted to learn more about and make recommendations for improvement. The students repeated this process again in groups of two or three. They were individually assessed by completing their group work in separate

colors, so it was clear who did what work and if real collaboration and team problem solving was taking place. The assessments were scaffolded into seven parts; research, compass connections, development of interview questions, interviews of experts, reflection, creating an iceberg model, proposed solutions, going through a fast fail feedback session, presentations, and taking action. Through the unit we scaffolded the project through seven assessments of the following standards: construct supporting questions, determine helpful sources, make global connections, determine causation and argumentation, analyze perspectives, summarize and conclude claims, create a final product, take informed action, and create proper MLA citations.

Learning Materials:

#	Lesson Title	Lesson Activities	Resources
1	1.1 Introduce and Practice the Compass	GIA Kickoff: Climate Change 1.1 Sustainability Initiatives @ ASD: Compass Intro	1.1 Sustainability Initiatives@ ASD: Compass Intro Worksheet
2	1.2 Introduce and Practice the Iceberg	1.2 The Iceberg Model	
3	1.3 Introduce and Examine the Student Profile	1.3 ASD Student Profile	Copy of ASD Student Profile Handout
4	1.4 Check for understanding of Compass, Iceberg, & Student Profile	1.4 Putting it all together....	1.4 Putting it all together... Worksheet
5	1.5 Ms Carden & Mr Myers Introduce the Earth Prize and Possible Campus Topics with a Campus Tour	1.5 ASD Sustainability Initiatives Walks ASD Sustainability Investigation Project Survey (Student Choice)	

6	1.6 (Part 1) Start ASD Initiative investigations Break into groups Investigation Begins!	1.6 (Part 1) ASD Initiative Investigations Summative	1.6 (Part 1) ASD Initiative investigations Summative Worksheet
7	Investigation Time Research time 1.6 (Part 2) Introduce Compass	1.6 (Part 2) ASD Initiative Investigations Summative	1.6 (Part 2) ASD Initiative Investigations Summative: Compass Summative Worksheet
8	Research Due Work on Compass 1.6 (Part 3) Introduce How to create Interview Questions	1.6 Part 3: How to Interview: Sustainability Initiatives @ ASD	1.6 (Part 3) Interview Questions: ASD Initiative Investigations Summative
9	Compass Due Work on Interview Questions		Letter to ASD Sustainability Experts
10	Interview Questions Due Welcome Panel for Group Questions		
11	1.6 Part 4: Re-access work Compass/Research Work after interviews Correct and add to work Introduce Iceberg and work on Iceberg	1.6 Part 4: Completing Research/Compass & Iceberg	1.6 ASD Initiative Investigations Summative Part 4: Completing Research/Compass & Iceberg
12	Re-access work Compass/Research Work Due		
13	Iceberg Due 1.6 Part 5: Work on creating new solutions & how has your work connected to the student profile?	1.6 Part 5: Solutions	1.6 Part 5: Solutions Worksheet
14	Work on creating new solutions & how has your work connected to the student profile?	Fail Fast Directions Oct 6-7	1.6 Fail Fast Activity Group Slides (to be edited per class)
15	1.11 Rough drafts due Fast Fail exercise	GIA 1: (Hickey) Fail Fast Activity Group Slides GIA 3: (Hickey) Fail Fast Activity Group Slides	

		GIA 8: (Hickey) Fail Fast Activity Group Slides	
16	10/13 PSAT shortened classes 1.6 Part 6: Take feedback and continue to work on creating solutions	GIA 1.6 Part 6: Taking Action & Presentation	
17	Continue with corrections and final presentation		
18	Finalize final presentation		
19	1.13 Final Presentations	GIA 1 Group Presentation Links GIA 3 Group Presentation Links GIA 8 Group Presentation Links	
20	Final Reflection	1.6 Reflection Part 7: Student Profile	

Unit Planning and Summative Materials:

[Unit 1 UBD Completed Unit](#)

Attach rubric to Unit Scaffolded Summatives

 1.6 Parts 1-6 ASD Initiative investigations Summative Master!

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