EDSNG 100
Section 004

Saeed Aljneibi
Edward Brand
Bolor-Erdene Zolbayar
Ali Kerim Zuvin

STEM House
Agricultural Subsystem

TABLE OF CONTENTS

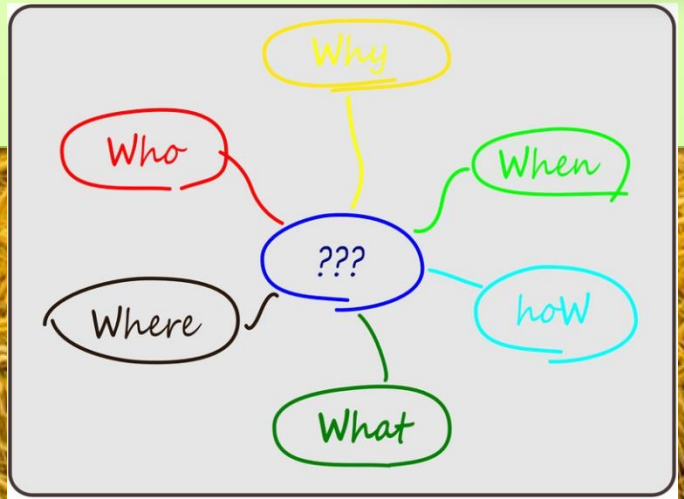
- Recognizing the opportunity
- Specifications
- Brainstorming
- Evaluation
- Engineering Analysis Prototype/Model
- Summary and conclusions

RECOGNIZING THE OPPORTUNITY

- Mission Statement:
  - Create a business that will produce a virtual, educational, and sustainable STEM house focusing on agricultural aspects for 6-8 graders.

DEFINING THE PROBLEM

- Follow the educational standards of PA
- Technical
  - Levels, difficulty
- Social
  - Operation, parts, money
- Interviews
- Surveys
- Questions



- Safety
- Meets educational standards
- Simple/easy to use
- High-tech
- Affordable
- Aesthetically pleasing
- Durable
- Portable/Modifiable
- Interesting/Engaging
- Upgradable
- Sustainable
- Marketable

- Standard Area - CC.3.5: Reading Informational Text: Students read, understand, and respond to informational text – with emphasis on comprehension, making connections among ideas and between texts with focus on textual evidence.
- Standard Area - CC.3.6: Writing: Students write for different purposes and audiences. Students write clear and focused text to convey a well-defined perspective and appropriate content.

BRAINSTORMING

- Virtual Room
  1. Single plant with adjustable factors that affect its growth
  2. Cross pollinate plants
  3. Water cycle
  4. Names of animals
  5. Photosynthesis/Aerobic Respiration
  6. Animal characteristics (mammals , birds, amphibians, reptiles, fish, insects)
- Physical
  - Students grow plants themselves
- Virtual/Physical
  - Based on adjustments online, students are to create their own physical environment to grow the plants

0 : Neutral
+ : Advantage
- : Disadvantage

EVALUATING IDEAS

Ideas

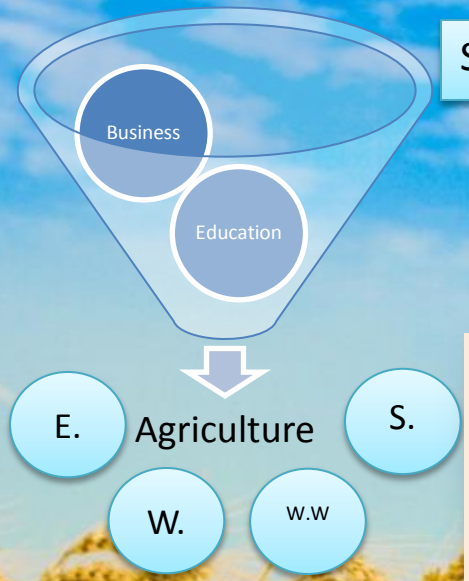
Specifications	1)Virtual	**a)Single plant with adjustable factors**	b)Cross-Pollinate	c)Water Cycle	d)Animals	2)Virtual/ Physical	3)Physical
Safety	+	+	+	+	+	0	-
Meets educational Standards	+	+	+	+	+	+	+
Simple	+	+	-	+	-	-	-
High-tech	+	0	0	0	0	+	0
Affordable	+	+	+	+	+	0	0
Aesthetically pleasing	+	+	+	+	+	+	+
Durable	+	+	+	+	+	0	0
Portable/Modifiable	+	+	+	+	+	0	-
Interesting/Engaging	+	+	+	+	+	+	+
Upgradable	+	+	+	+	+	+	+
Sustainable	+	+	+	+	+	0	0
Marketable	+	+	+	+	+	+	+

WEIGHTED MATRIX

Virtual

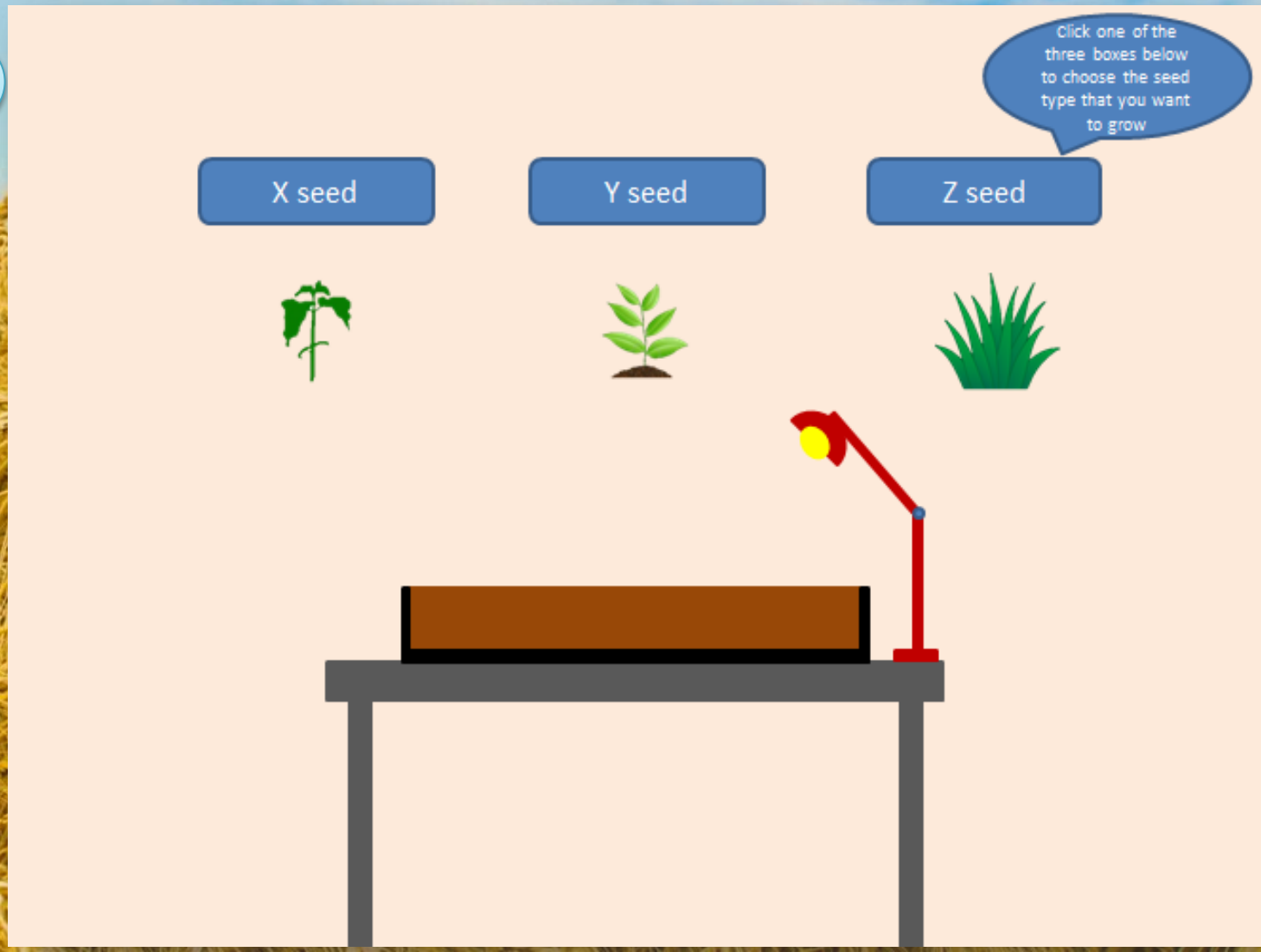
Single Plant With Adjustable Factors

		Relevance (3)	Importance (4)	Implementation (3)	**Total (10)**
Specifications	Safety	0	1	3	4
	Meets educational Standards	3	4	2	9
	Simple	2	3	2	7
	High-tech	3	4	1	8
	Affordable	1	4	1	6
	Aesthetically pleasing	1	3	2	6
	Durable	3	3	1	7
	Portable/Modifiable	1	3	2	6
	Interesting/Engaging	2	2	2	6
	Upgradable	2	2	1	5
	Sustainable	1	2	3	6
	Marketable	0	3	2	5

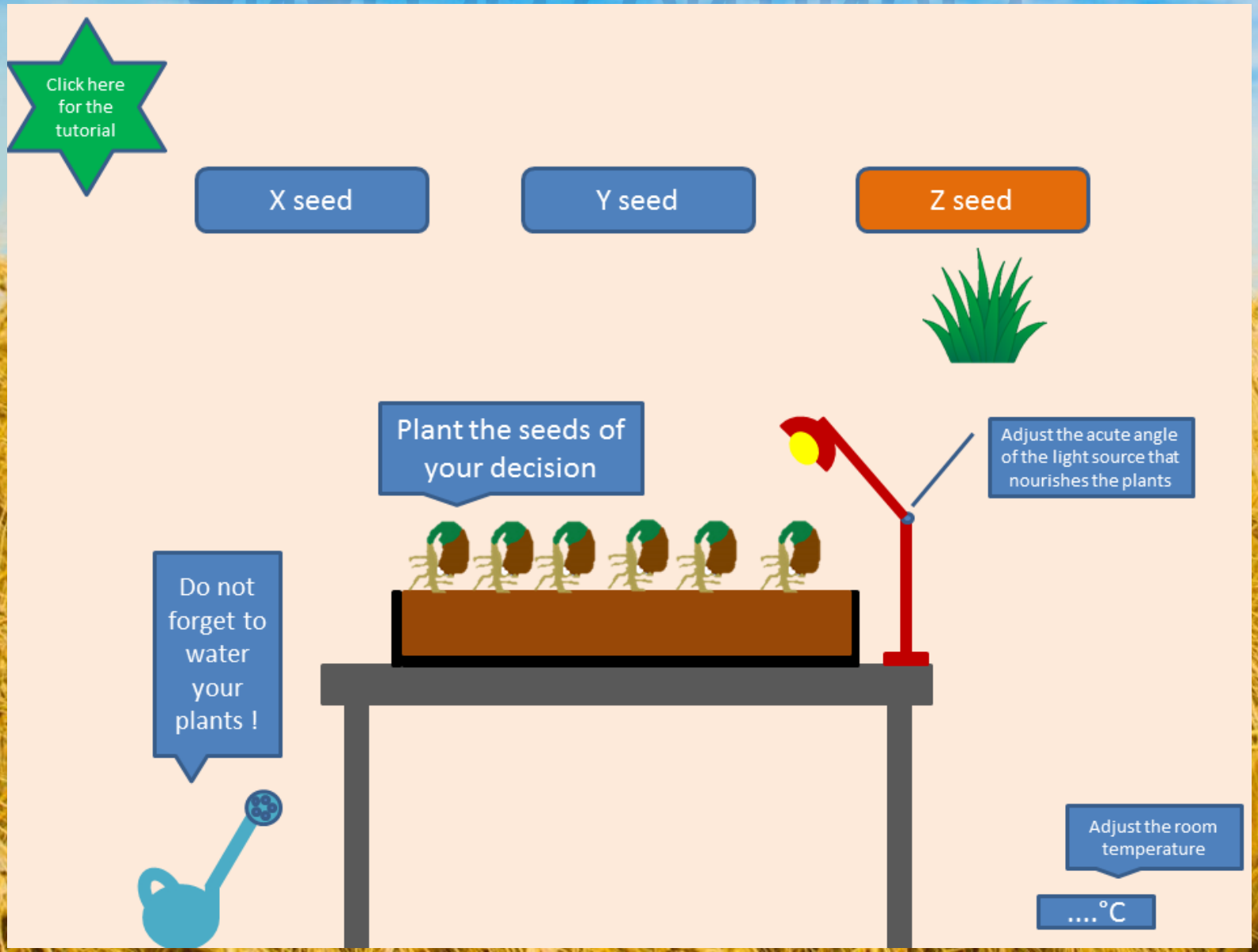


System integration

ANALYSIS



ANALYSIS CONTINUES

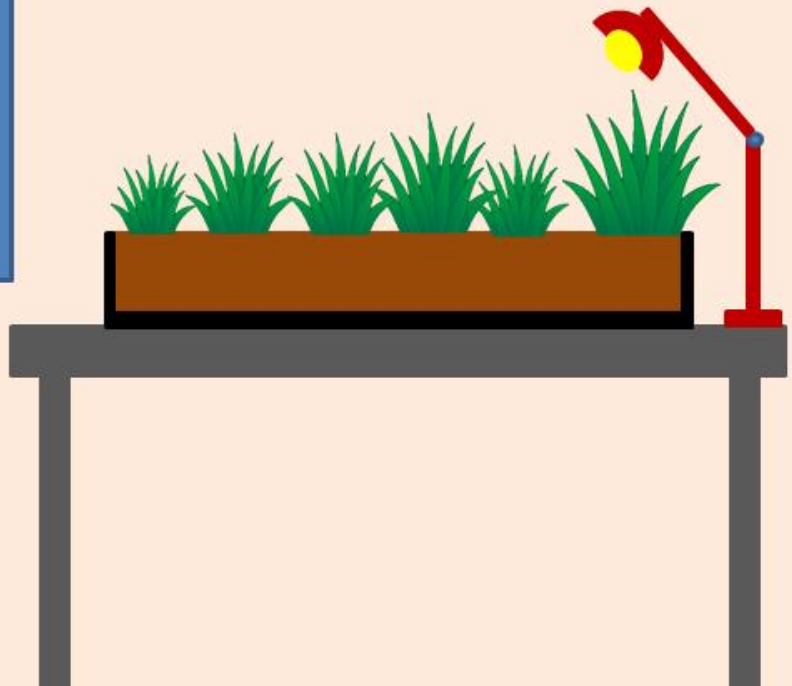


ANALYSIS CONTINUES

Click here if you need help!

Specify the roles of the factors that affect plant growth such as;
1.Water
2.Temperature
3.Light
4.Soil
5.Seed Type

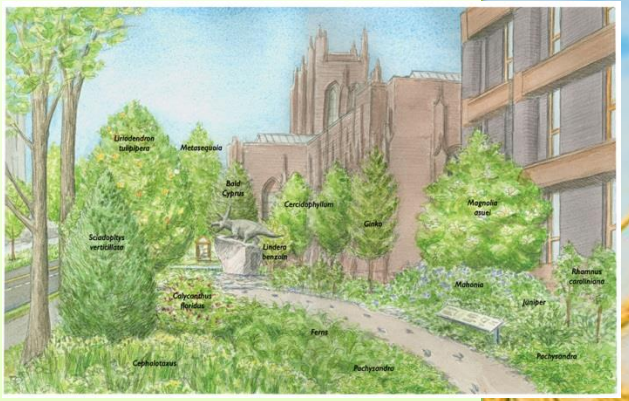
Z seed



....°C

PROTOTYPE PROCEDURE

1. Approach the housekeeper to pose questions and obtain task for the challenge (source of information as well as ID the challenge)
2. Options:
   1. Learning Module
      - Proceed to the Learning Modules
   2. Assessment Test
      - Pass: Proceed to the challenge
      - Fail: Proceed to the Learning Modules
3. Learning Modules:
   - Educational objectives addressed
4. Challenge:
   - Maximize the growth of the plant with given factors
5. After challenge
6. Assignment
   - Write a report of what you did and your outcomes.



PROTOTYPE SCREENSHOTS

SUMMARY

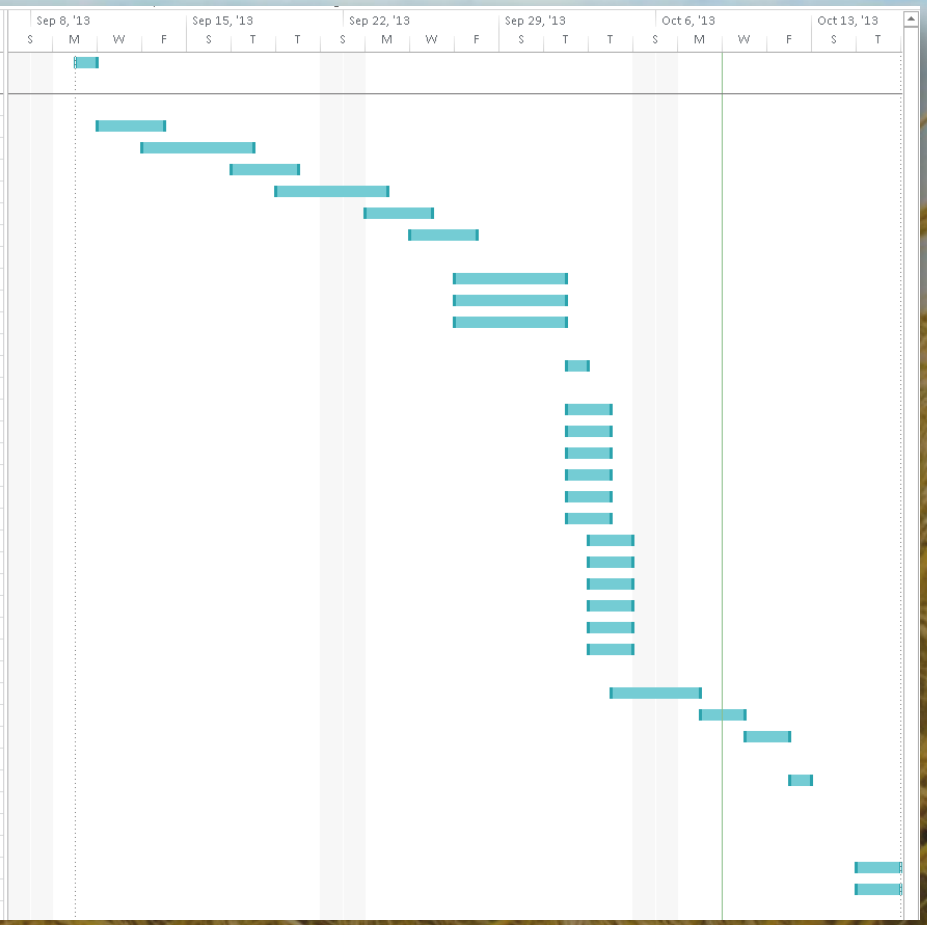
Final design that meets specifications

- Safety
  - Virtual, no hazards
- Meets educational standards
- Simple/easy to use
  - By a click of a button
- High-tech
  - Computerized, Online interaction
- Affordable
  - Virtual
- Aesthetically pleasing
  - Graphics, media
- Durable
  - No physical decay of the structure
- Portable/Modifiable
  - Access from anywhere
- Interesting/Engaging
  - Interacting housekeeper
- Upgradable
  - Programmable
- Sustainable
  - No need for physical maintenance
- Marketable
  - Easy to advertise

PROJECT MANAGEMENT

Gantt Chart

Task Name	SubTask Name	Resposibility	Duration	Start	Finish
Recognize the Opportunity	Mission Statement	All	1 day	Tue 9/10/13	Tue 9/10/13
Define Problems	Research Standards of Education	Ed	3 days	Wed 9/11/13	Fri 9/13/13
	How to focus on Agriculture	Bolor	3 days	Fri 9/13/13	Tue 9/17/13
	Create a survey	Saeed	3 days	Tue 9/17/13	Thu 9/19/13
	Possibilities of stakeholders (needs)	Ed	3 days	Thu 9/19/13	Mon 9/23/13
	Cost(tools and classes)	Saeed	3 days	Mon 9/23/13	Wed 9/25/13
	Interviews	Ali	3 days	Wed 9/25/13	Fri 9/27/13
Specifications	Analyze Similar Project	Class	3 days	Fri 9/27/13	Tue 10/1/13
	Physical Needs	Class	3 days	Fri 9/27/13	Tue 10/1/13
	Key Characteristics	Class	3 days	Fri 9/27/13	Tue 10/1/13
Brainstorm	Produces Ideas for Possible Solutions	All	1 day	Wed 10/2/13	Wed 10/2/13
Evaluate Ideas	Safety	Saeed	2 days	Wed 10/2/13	Thu 10/3/13
	Meets educational standards	Saeed	2 days	Wed 10/2/13	Thu 10/3/13
	Simple/easy to use	Saeed	2 days	Wed 10/2/13	Thu 10/3/13
	High-tech	Ed	2 days	Wed 10/2/13	Thu 10/3/13
	Affordable	Ed	2 days	Wed 10/2/13	Thu 10/3/13
	Aesthetically pleasing	Ed	2 days	Wed 10/2/13	Thu 10/3/13
	Durable	Bolor	2 days	Thu 10/3/13	Fri 10/4/13
	Portable/Modifiable	Bolor	2 days	Thu 10/3/13	Fri 10/4/13
	Interesting/Engaging	Bolor	2 days	Thu 10/3/13	Fri 10/4/13
	Upgradable	Ali	2 days	Thu 10/3/13	Fri 10/4/13
	Sustainable	Ali	2 days	Thu 10/3/13	Fri 10/4/13
	Marketable	Ali	2 days	Thu 10/3/13	Fri 10/4/13
Analysis	Improving the best solution	All	2 days	Fri 10/4/13	Mon 10/7/13
	Perfecting it	All	2 days	Tue 10/8/13	Wed 10/9/13
	Finding errors	All	2 days	Thu 10/10/13	Fri 10/11/13
Test/Prototype	Graphic Design	Bolor/Ali	1 day	Sat 10/12/13	Sat 10/12/13
	Prototype Procedure	Ed	1 day	Fri 9/13/13	Fri 9/13/13
	Vigorously Test	All	1 day	Sat 9/14/13	Sat 9/14/13
Communicate Ideas	Gantt Chart	Saeed	2 days	Tue 10/15/13	Wed 10/16/13
	Presentation	All	2 days	Tue 10/15/13	Wed 10/16/13



REFERENCES

"AZ Master Gardener Manual: Environmental Factors (Indoor Plants)." *AZ Master Gardener Manual: Environmental Factors (Indoor Plants)*. N.p., n.d. Web. 15 Oct. 2013.

"SAS - Pennsylvania Department of Education Standards Aligned System." *SAS - Pennsylvania Department of Education Standards Aligned System*. N.p., n.d. Web. 09 Oct. 2013.

QUESTIONS

Communicate design

- Verbally – All
- Written – Ed, Saeed
- Graphically – Bolor, Kerim

THE TEST

LIGHT

1. Name the aspects.

Shape, size, color, and growth depend on light's 3 important aspects:

/intensity, duration, and quality/

WATER

2. Choose the right answer.

Overwatering and under-watering are account for a large percentage of any types of plant losses.

Plant roots are usually in the bottom **y/x** of the pot, so do not water until the bottom **y/x** starts to dry out slightly. For a 6-inch pot, you can stick your finger about 2 inches into the soil. If the soil feels damp, don't water.

a) y/x=4/3

b) y/x=9/7

c) y/x=2/6

d) y/x=2/3

/y/x=2/3/

TEMPERATURE

3. Choose the right answer.

In general, indoor foliage plants grow best between *X and Y F* during the day and from *M to N F* at night.

a) X and Y = 70 and 80 F ; M and N = 60 and 68 F

b) X and Y = 75 and 90 F ; M and N = 50 and 55 F

c) X and Y = 80 and 95 F ; M and N = 40 and 50 F

d) X and Y = 60 and 70 F ; M and N = 70 and 80 F

/right answer is A/

SOLUBLE SALTS

4. Fill the blank

Reduced growth, brown leaf-tips, dropping of lower leaves, small new growth, dead root-tips, and wilting are all signs of _____.

As the_____ in the soil become more and more concentrated, plants find it harder and harder to take up water.

To decrease the concentration, what do we have to do?

/high soluble water in the soil; salt/

/-Stop use of all fertilizer

-Flush the soil with as much as water you can for several days/

FERTILIZATION

5. Write the right answer in space.

Indoor plants, like most other plants, need fertilizers containing three major plant food elements:

1.

2.

3.

/nitrogen (N), phosphorus acid (P), and *potassium (K)/*

FULL PROTOTYPE PROCEDURE

1. Walk into the room “Agriculture (level 1)”
2. Approach the housekeeper to pose questions and obtain task for the challenge (source of information as well as ID the challenge)
3. Options:
    1. Learning Module
        - Proceed to the Learning Modules
    2. Assessment Test
        - Pass: Proceed to the challenge
        - Fail: Proceed to the Learning Modules

4. Learning Modules:
    - Educational objectives addressed
5. Challenge:
    - Maximize the growth of the plant with given factors
6. Approach the set up
    - Little garden with fresh soil
7. Choose the type of the plant to grow
    - Read provided summary for chosen plant
8. Adjust growth factors
9. Adjust secondary (maintenance) factors
10. Click “Grow”
11. Results (two pop up windows)
    - Specs of the grown plant
    - Processes that took place
12. Assignment
    - Write a report of what you did and your outcomes.
13. Depending on the grade teacher gave, you will either continue to level two or stay in level one in the room