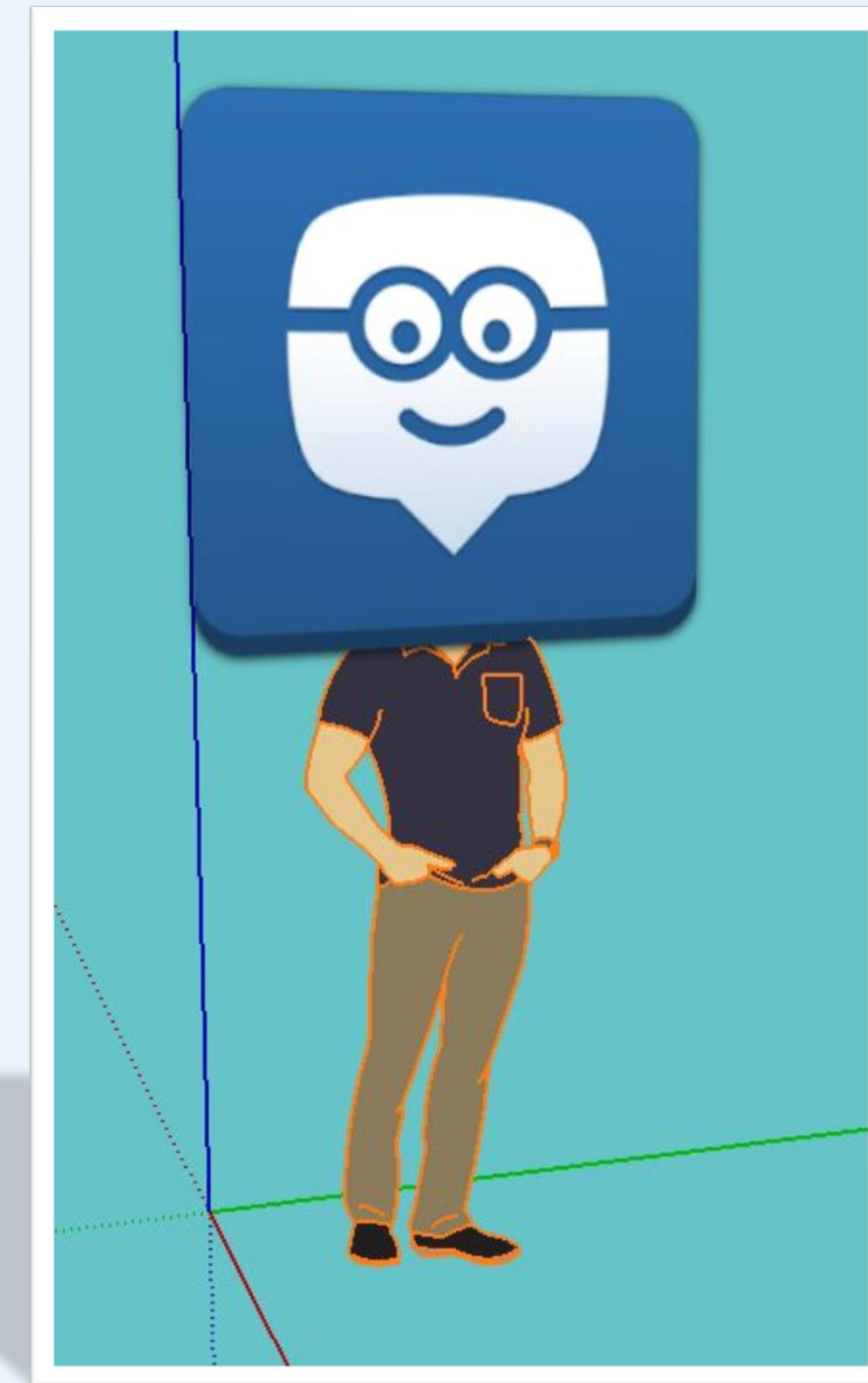




edmodocon 2018

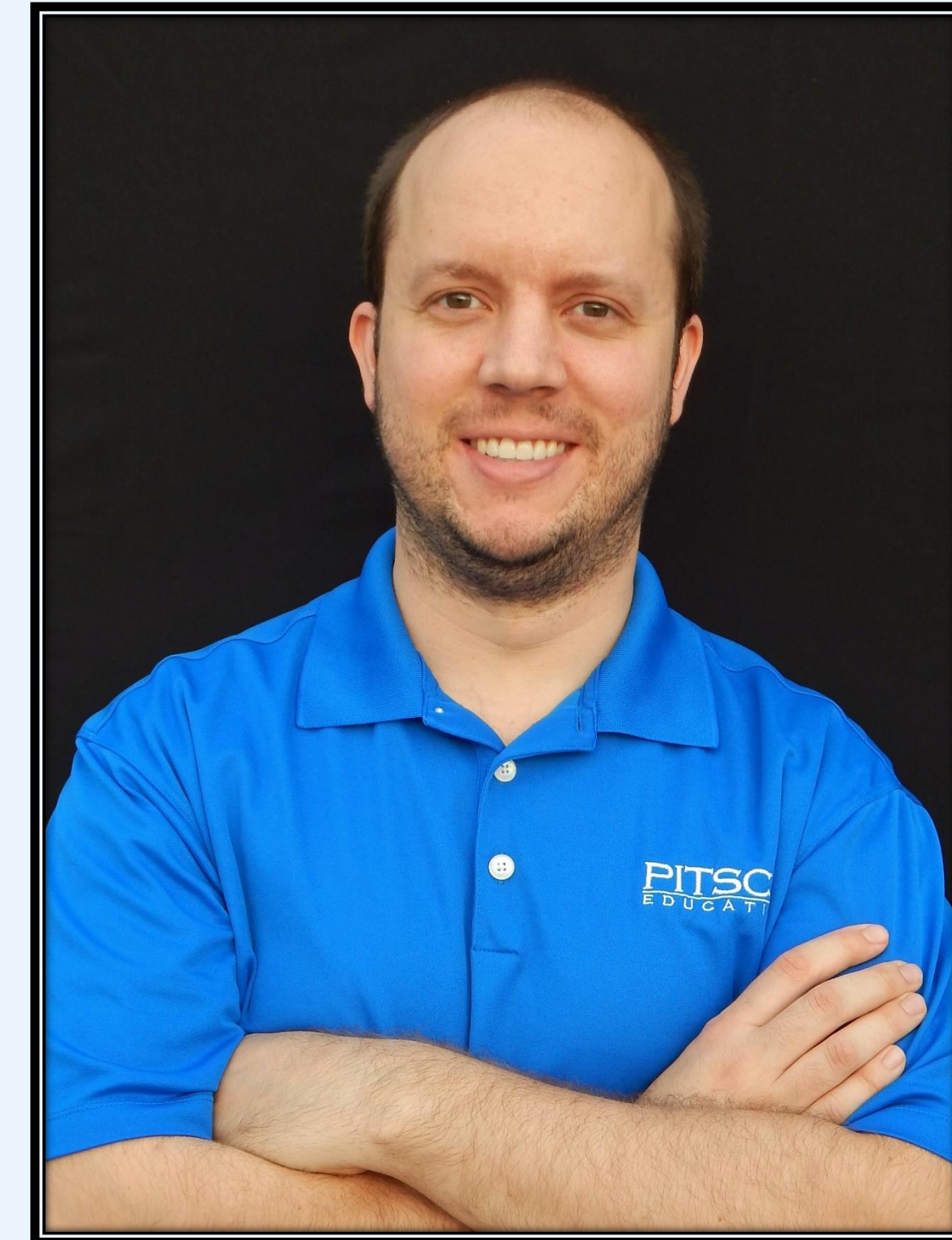
Don't be Afraid of PBL: A Real Example with 3D Printing

Michael Clark
@TigerSTEM386



Michael Clark

- United Kingdom to USA
- Volusia County Schools
- STEM Teacher - Title I & CTE
Program Assistant
- Grades 6-8th
- Hands-on Learning



What's the Plan?

Step by step guide to PBL (Project Based Learning)

Using a 3D printing project I created & use in my classroom

Apply these same steps to any PBL lesson

Plan it out

Develop Real World Problem
Keep it relevant and
organized

Implementation

How I did it in my classroom
and how you can do it in
yours tomorrow

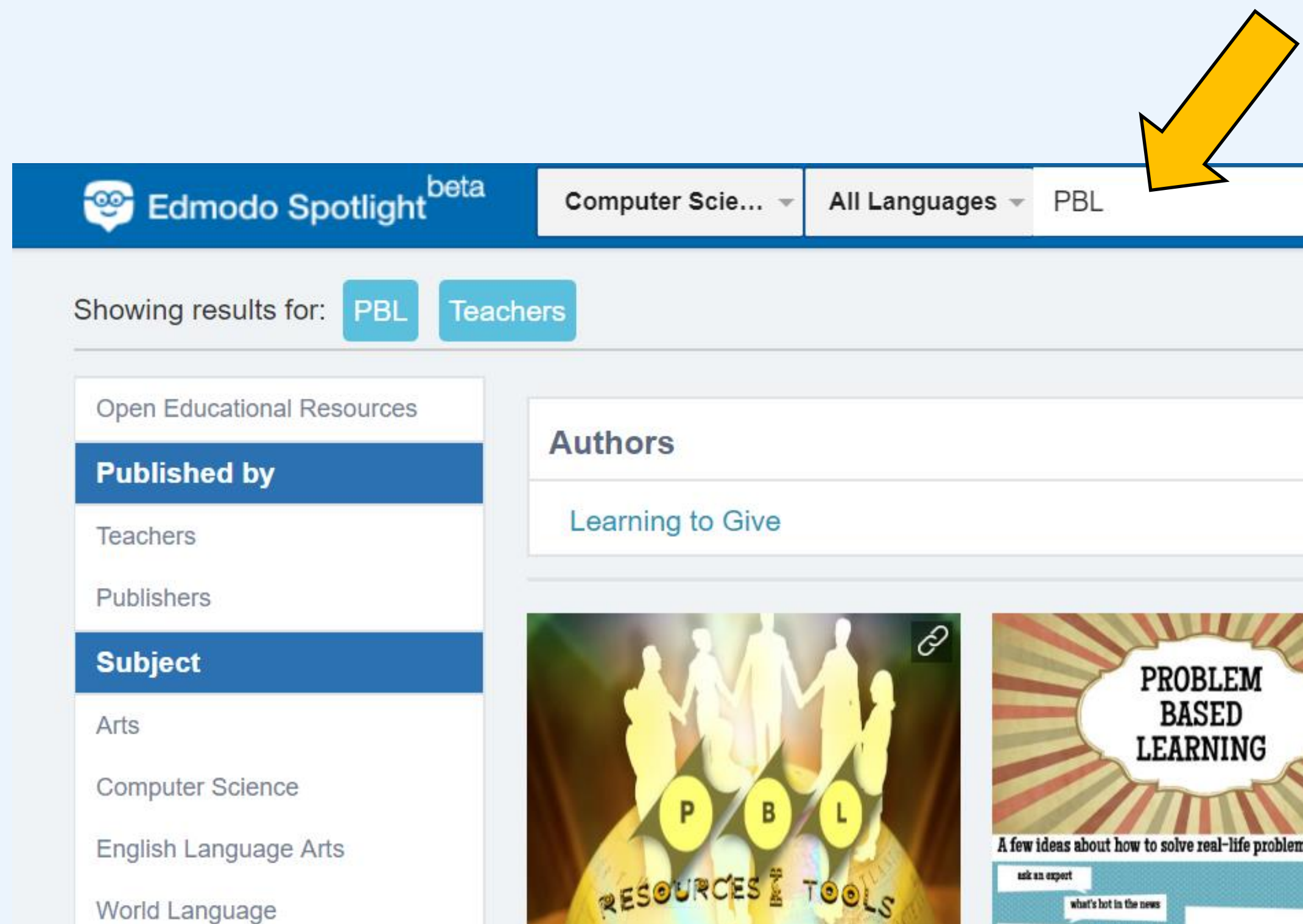
Share

Students sharing with
students
Teachers sharing with
teachers



Plan

Spotlight



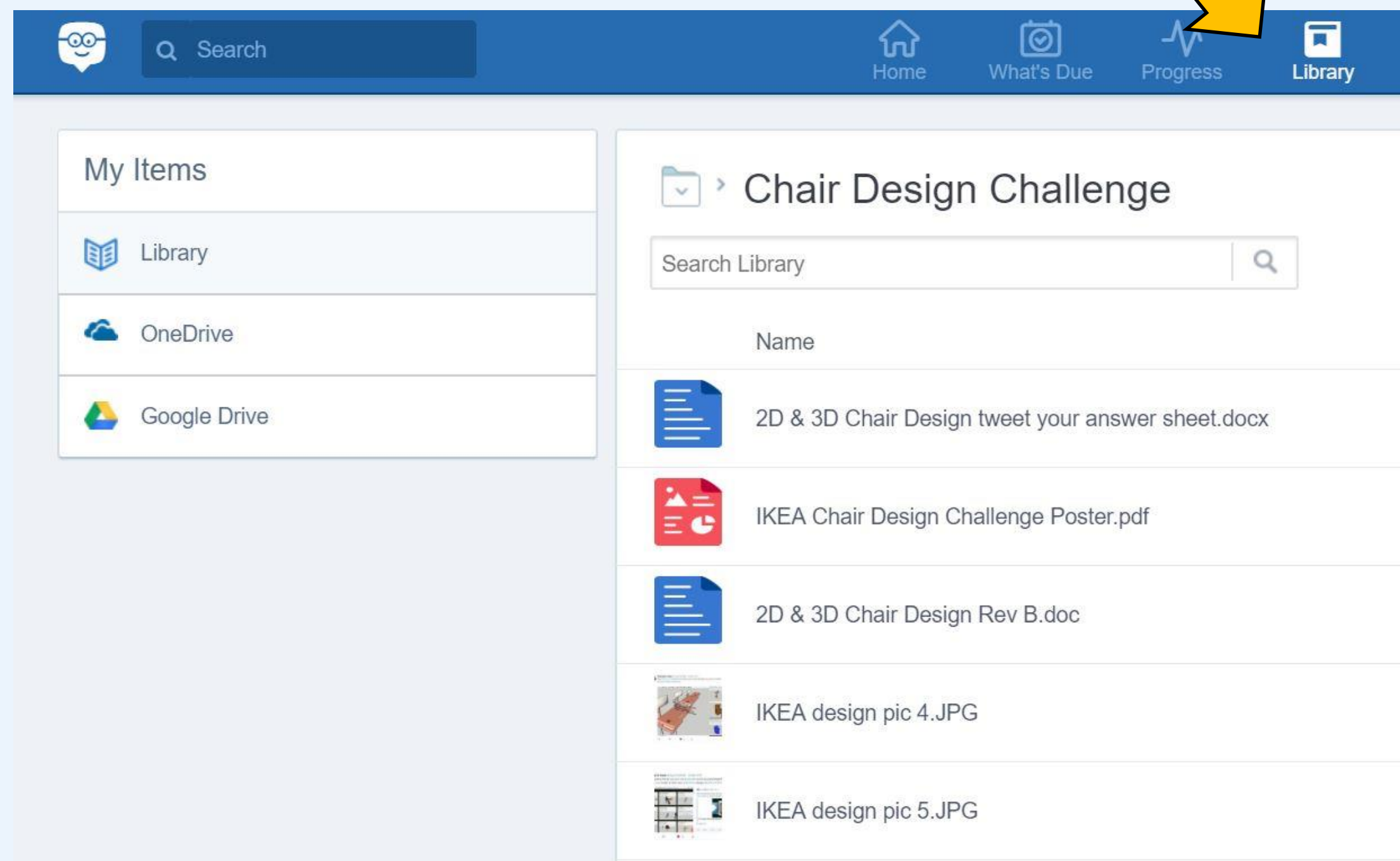
The screenshot shows the Edmodo Spotlight interface. At the top, there is a navigation bar with the Edmodo logo and the text "Edmodo Spotlight beta". Below this, there are three dropdown menus: "Computer Scie...", "All Languages", and "PBL". A yellow arrow points to the "PBL" dropdown. Below the navigation bar, there is a section titled "Showing results for:" with two buttons: "PBL" and "Teachers". On the left side, there is a sidebar with a list of filters under the heading "Open Educational Resources". The filters are: "Published by" (Teachers, Publishers), "Subject" (Arts, Computer Science, English Language Arts, World Language), and "Authors" (Learning to Give). Below the filters, there are two preview cards. The first card shows a group of people holding hands, with the letters "P", "B", and "L" in yellow circles, and the text "RESOURCES & TOOLS" at the bottom. The second card has a sunburst background and the text "PROBLEM BASED LEARNING" in a white cloud, with a subtitle "A few ideas about how to solve real-life problems" and a button "ask an expert".

Teacher Tip: If you have a great lesson idea, share it for free!



Plan

Library



The screenshot shows the Microsoft OneDrive interface. At the top, there is a navigation bar with icons for Home, What's Due, Progress, and Library. A yellow arrow points to the Library icon. Below the navigation bar, the 'My Items' section on the left lists Library, OneDrive, and Google Drive. The main area displays a folder named 'Chair Design Challenge' with a search bar and a list of files:

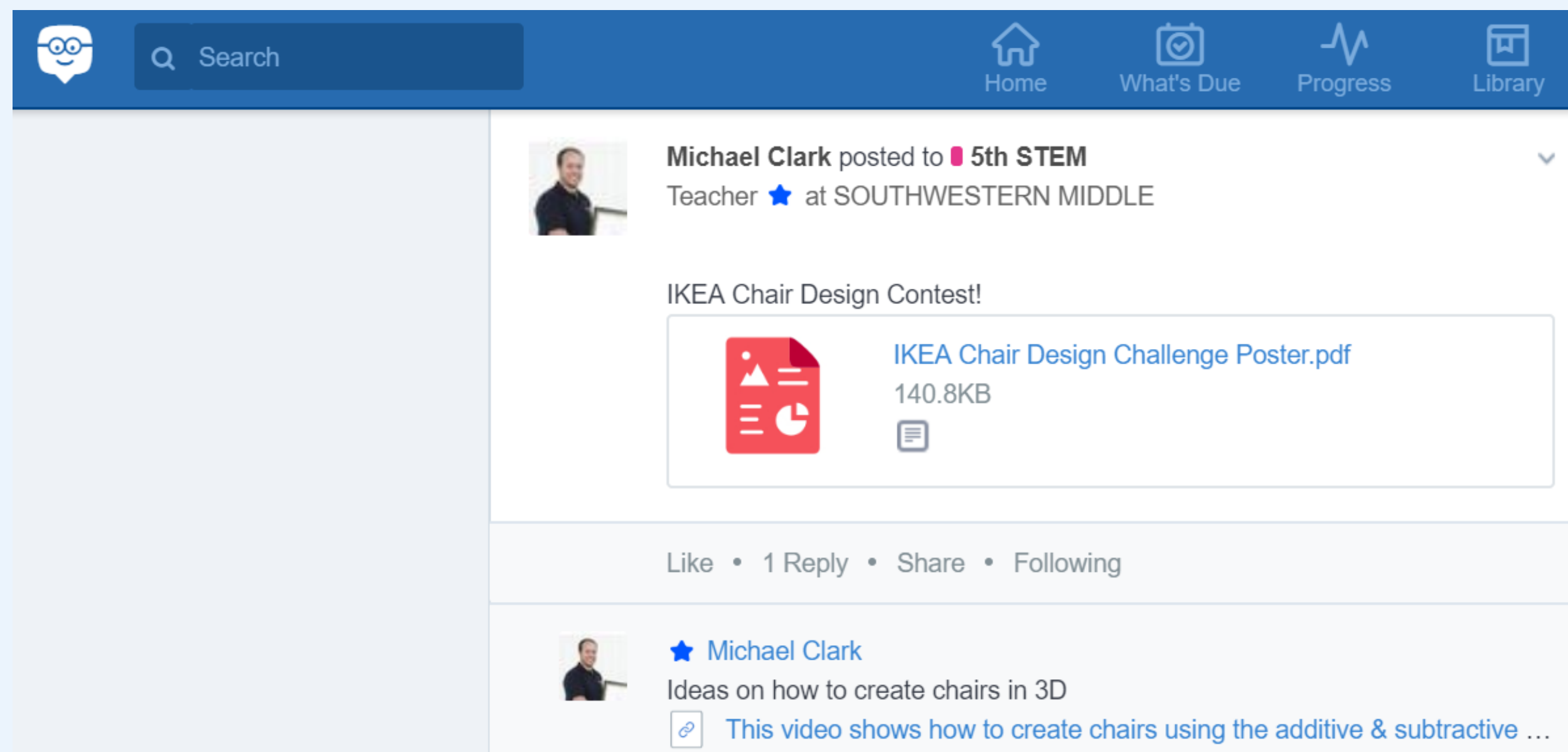
| Name |
|---|
| 2D & 3D Chair Design tweet your answer sheet.docx |
| IKEA Chair Design Challenge Poster.pdf |
| 2D & 3D Chair Design Rev B.doc |
| IKEA design pic 4.JPG |
| IKEA design pic 5.JPG |

Teacher Tip: Use folders to keep PBL resources organized.



Plan

Promote Your Project



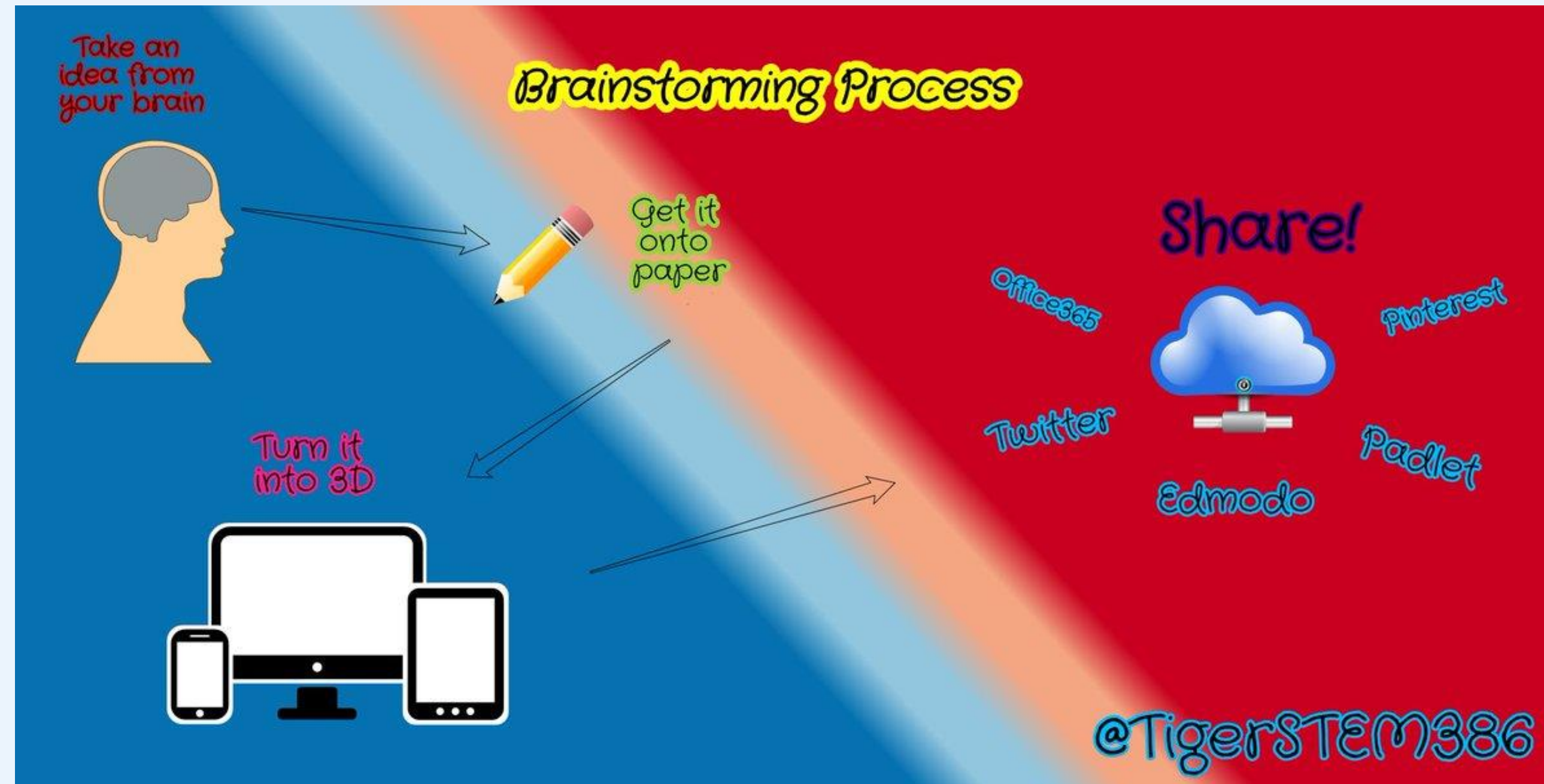
A screenshot of a social media post. At the top is a navigation bar with a search icon and the text "Search", and icons for Home, What's Due, Progress, and Library. The post is from Michael Clark, a teacher at Southwestern Middle School, posted to a group called "5th STEM". The post text says "IKEA Chair Design Contest!". Below the text is a PDF attachment titled "IKEA Chair Design Challenge Poster.pdf" with a size of 140.8KB. Below the attachment are interaction options: "Like", "1 Reply", "Share", and "Following". At the bottom, there is a comment from Michael Clark with a star icon, saying "Ideas on how to create chairs in 3D" and including a link to a video: "This video shows how to create chairs using the additive & subtractive ...".



A vertical poster for the "IKEA Chair Design Challenge". At the top, there are two 3D renderings of a red and black chair. The main text in white on a green background reads "IKEA Chair Design Challenge". Below this, in white text on a dark green background, it says "Winning Design Will be 3D Printed & Tweeted to IKEA". At the bottom, in white text on a dark green background, it says "Southwestern Middle School @TigerSTEM386". The poster has decorative borders: an orange patterned border on the right side and a green patterned border at the bottom.



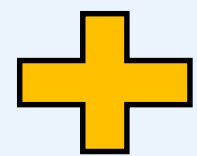
Plan



Brain -> Paper -> Digital -> Share



Plan



Period: _____

Design Process: 2D & 3D Chair Project

Research & Identify the need and constraints

Scenario: Southwestern Middle School has teamed up with IKEA to replace the aging student chairs. IKEA has agreed to give a \$700,000 donation to produce the chair design that most effectively addresses one of the following design constraints:

- 1) Made 100% with recycled materials
- 2) Increases students focus
- 3) Help students stay hydrated

Pick **one** category that your chair design will address: _____

Develop Possible Solutions

Describe how your selection will benefit Southwestern Middle School students, classrooms, or campus:

Create

Design a two-dimensional (2D) sketch of your new product:

Project Title: _____

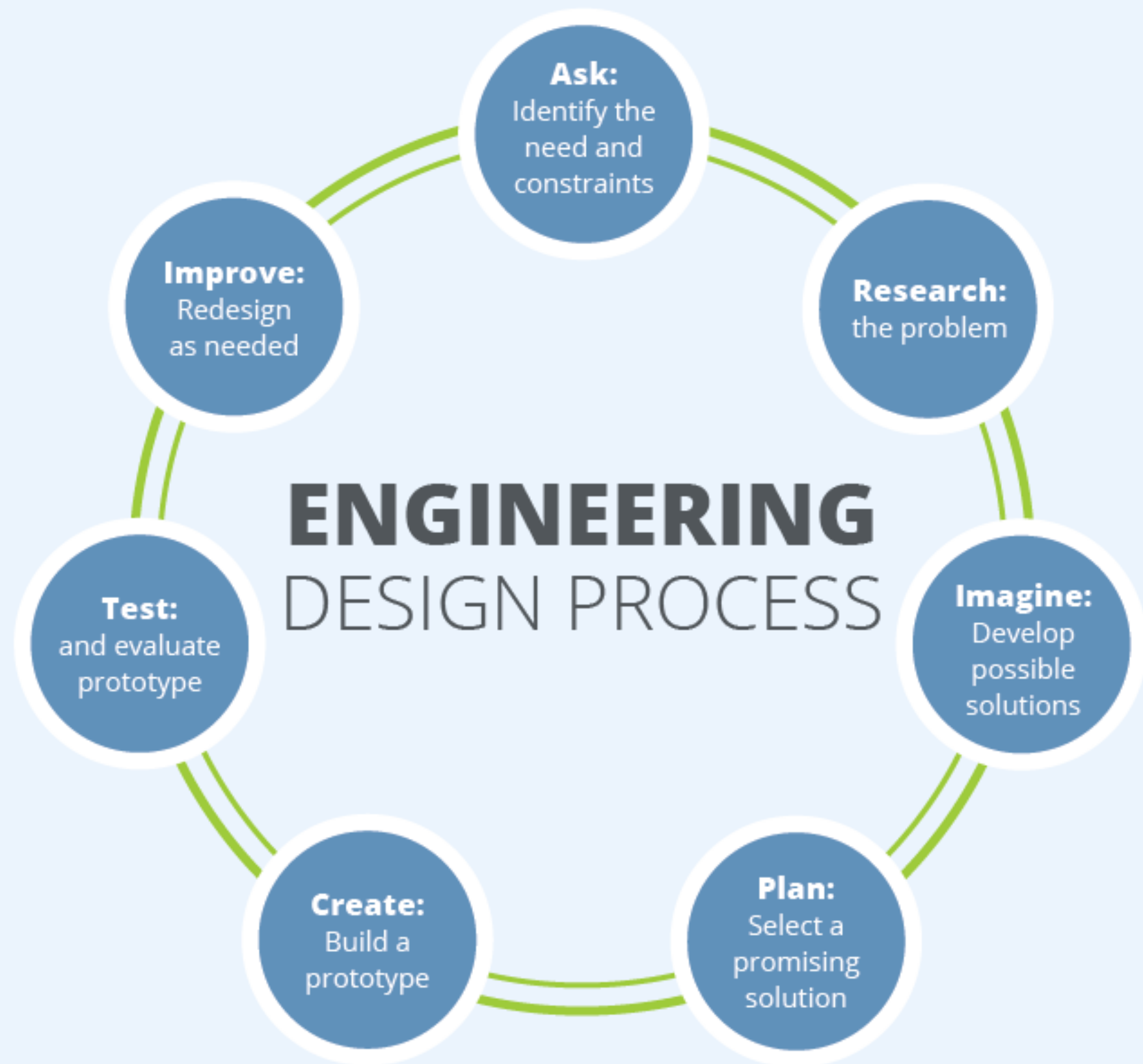
Design a three-dimensional (3D) sketch of your new product using Google SketchUp



Implement

Student Skills

- Engineering Fundamentals
- Leadership
- 2D & 3D Design
- Problem solving
- Digital Communication



Implement



Assign Roles

Teacher Tip: Groups of 2 - 4 worked best for me (depending on class size).



Implement

Scenario

- Southwestern Middle School has teamed up with IKEA to replace the aging student chairs. IKEA has agreed to give a \$700,000 donation to produce the chair design that most effectively addresses one of the following design constraints:

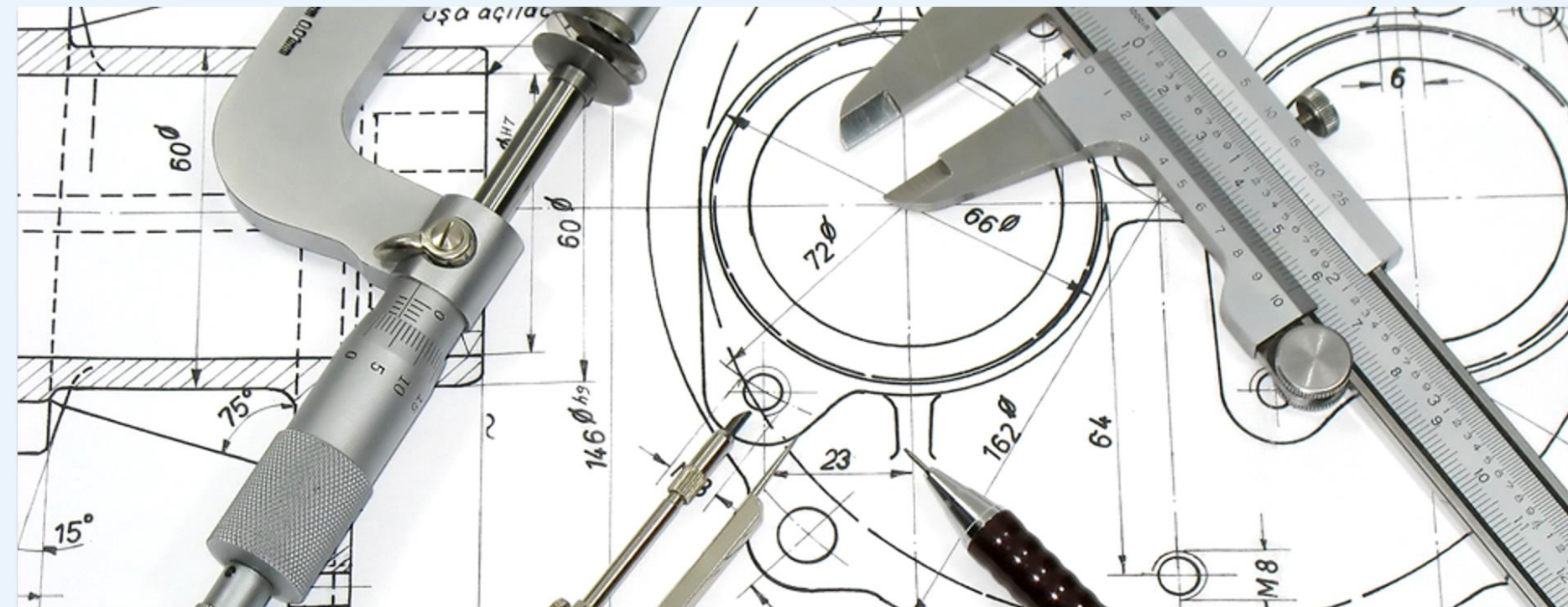
- 1) Made 100% with recycled materials
- 2) Increases students focus
- 3) Help students stay hydrated
- *4) Each group creates their own



Implement

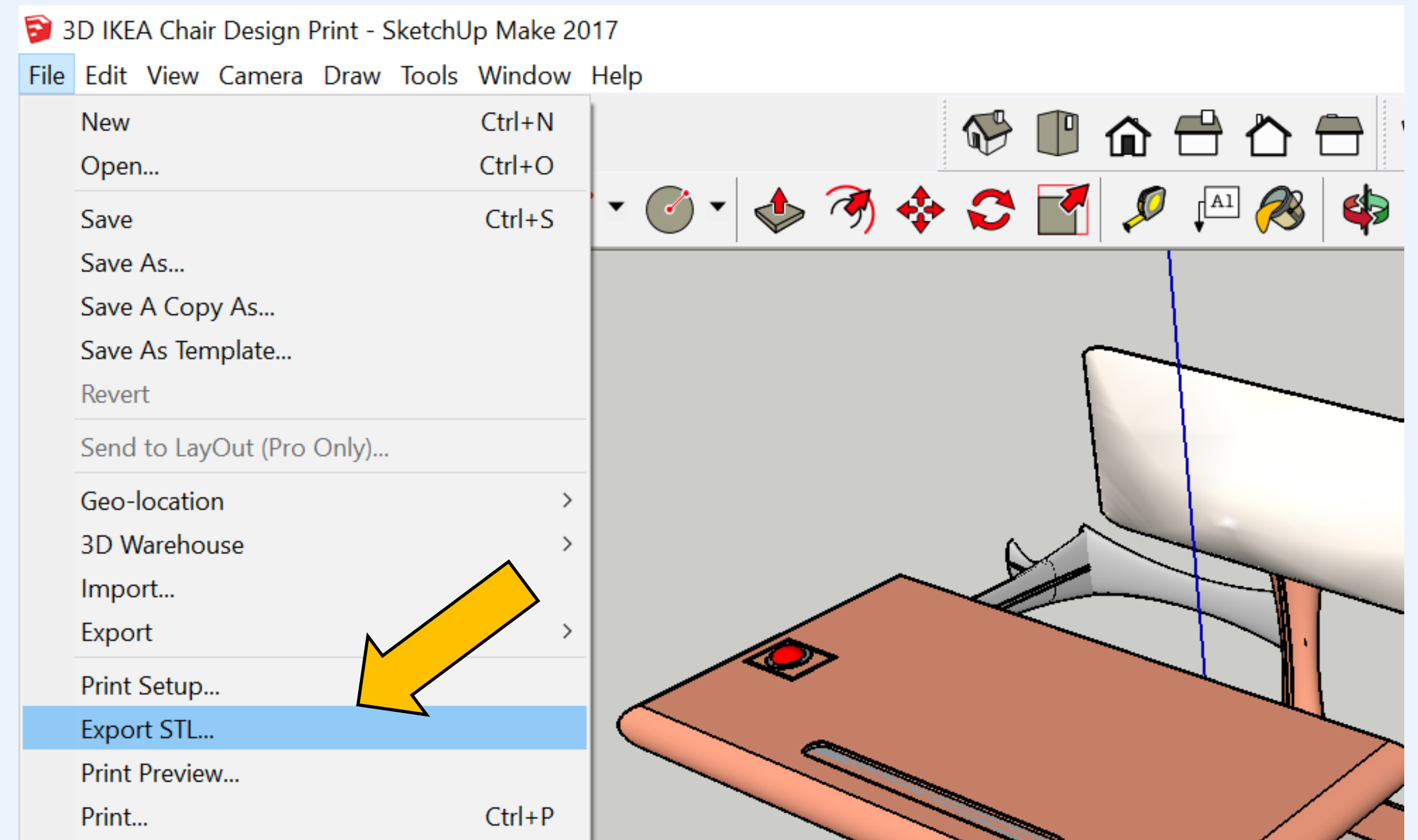
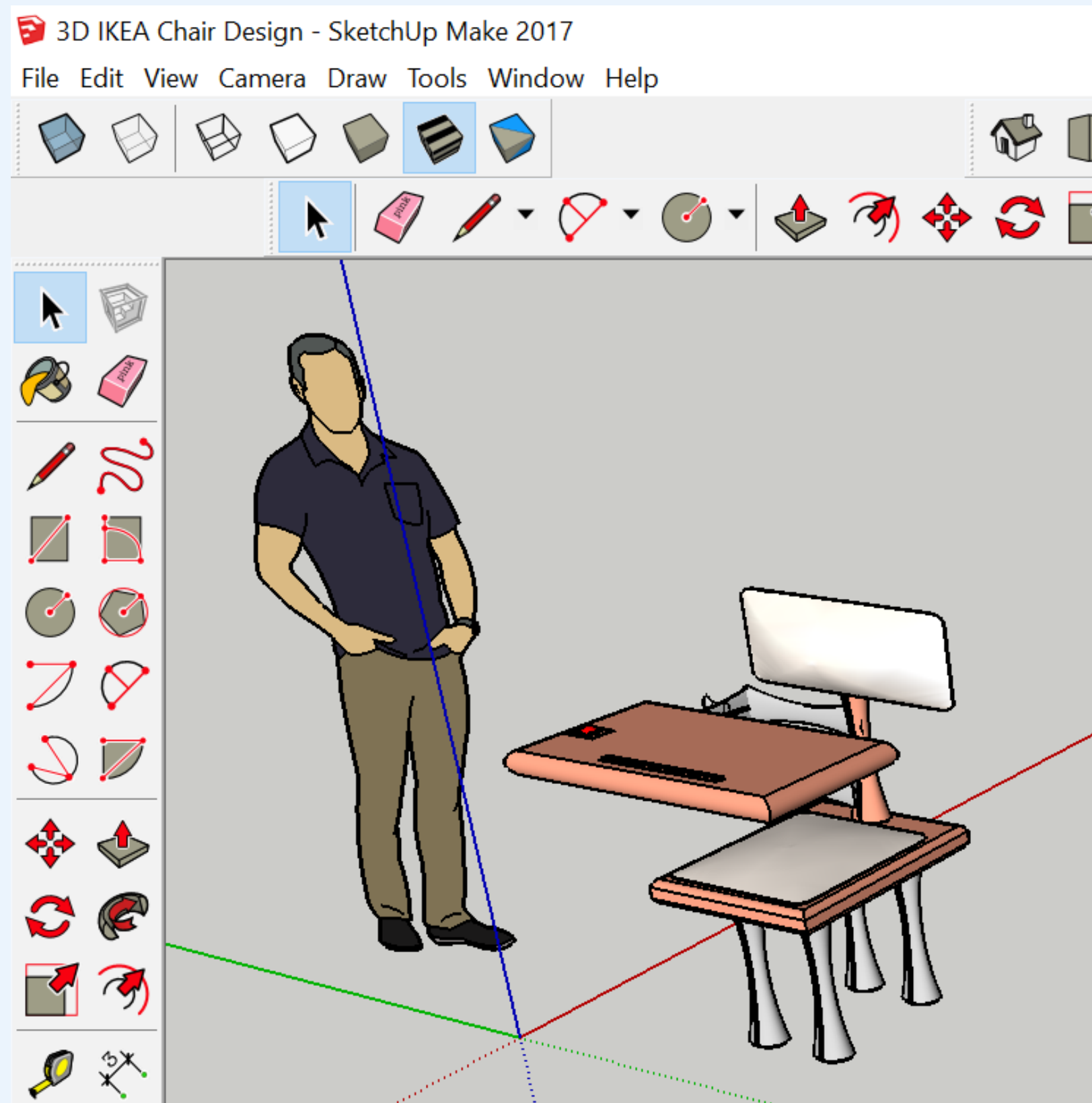
Develop Solutions

- 2D Sketches
- 3D Models
- Defend design choices
- *Create prototypes (large or small)



Implement

Develop Solutions



Implement

Simplify3D (Licensed to Mike Clark)
File Edit View Mesh Repair Tools Add-Ins Account Help

Models (double-click to edit)
[x] 3D IKEA Chair Desi...

Processes (double-click to edit)

| Name | Type |
|----------|------|
| Process1 | FFF |

Buttons: Import, Remove, Center and Arrange, Add, Delete, Edit Process Settings, Prepare to Print

Toolhead Retractions
Coloring | Movement Speed

Real-time Updates
 Live preview tracking
Update interval 5.0 sec

Begin Printing over USB

Save Toolpaths to Disk

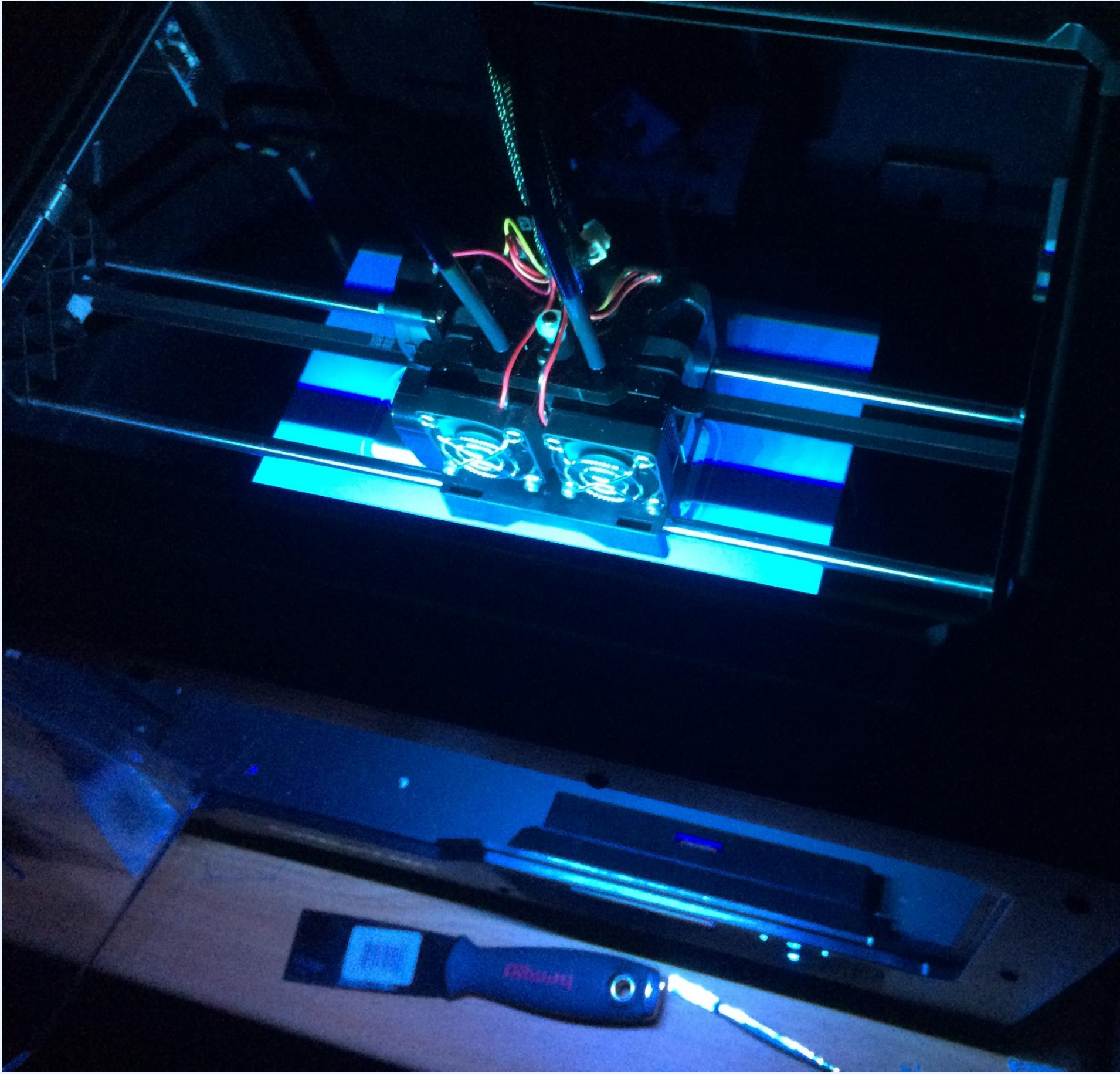
Exit Preview Mode

Toolhead Position
X: -40.993
Y: -40.432
Z: 91.957

Animation
Play/Pause
Speed: [Slider]

Control Options
Preview By Layer
 Only show 1 layers

Layer Range to Show
Min [Slider]
Max [Slider]



Implement

Teacher Example




NILS Armchair - IKEA x Staff Applications - x 5th STEM 16-17 | E x

www.ikea.com/us/en/catalog/products/S9903100

Apps Home | FIRST Logon myvolusiaschools.org Synergy Vol

Product information



NILS
Armchair
\$99.00

Good to know
May be completed with floor protectors to protect surface against wear. For increased stability, screws about two weeks. This chair has been tested and meets the requirements and safety standards: EN 12520

Product dimensions
Tested for: 243 lb
Width: 23 5/8 "
Depth: 22 1/2 "
Seat width: 18 1/2 "
Seat depth: 16 7/8 "
Seat height: 18 7/8 "
Height: 31 1/2 "

Care instructions
Frame
Wipe clean with a damp cloth
Wipe dry with a clean cloth

Key features
- You sit comfortably thanks to the padded seat, padded back and armrests.
- The cover can be machine washed.

Removable cover
Machine wash, hot 140°F
Do not bleach.
Do not tumble dry.
Iron, medium temperature
Dryclean, normal cycle

Designer:
Mikael Warnhammar/IKEA of Sweden

Product description
Chair frame with armrests
Leg: Solid birch, Acrylic
Back and seat frame: Solid birch
Back/ Armrest: Solid birch

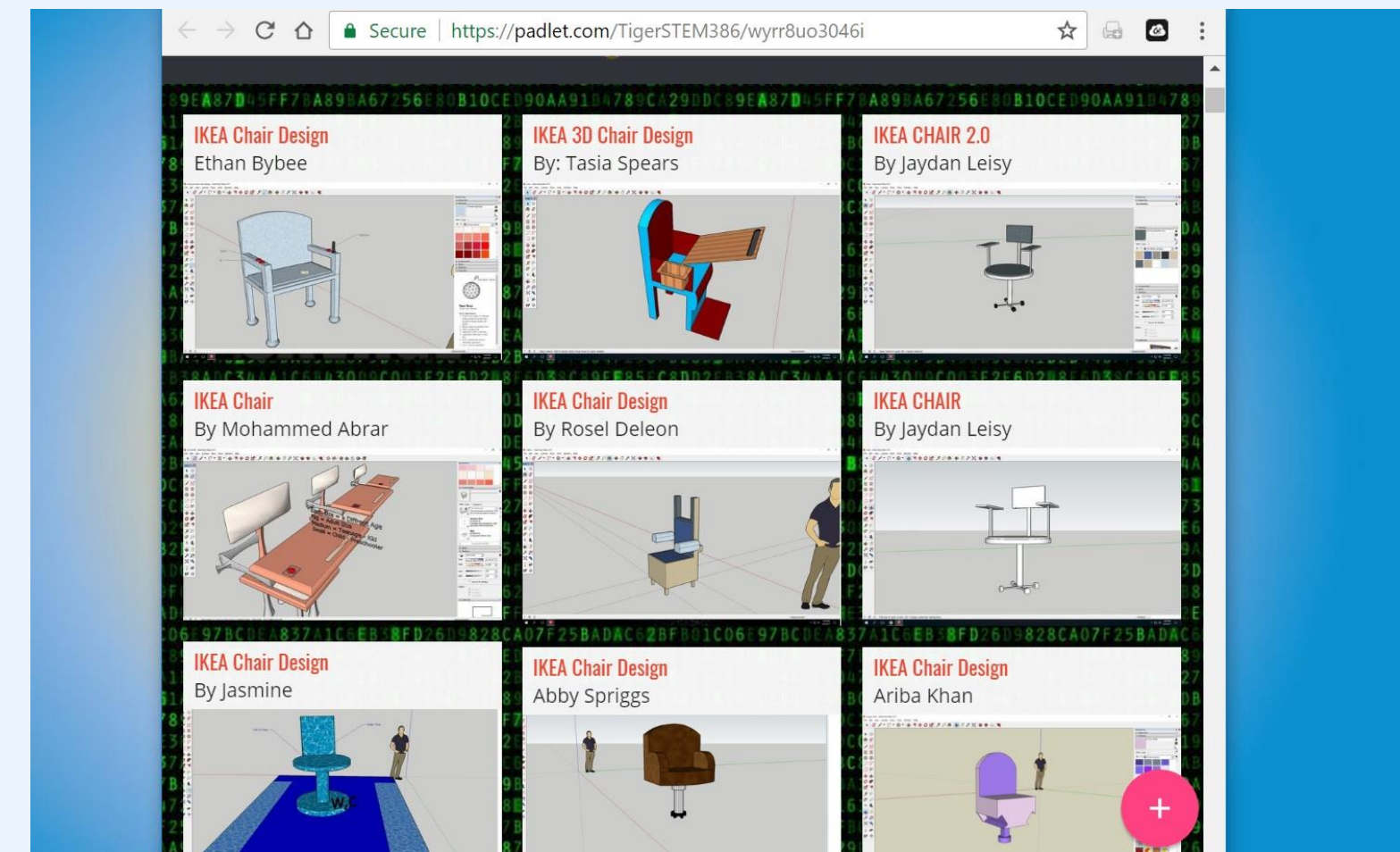
Package measurements and weight

Implement

Assessment(s) Throughout

3D Model Rubric

| CATEGORY | 4 – Excellent! | 3 - Satisfactory | 2 - Fair | 0/1 - Poor |
|-------------------------|---|---|--|--|
| Realistic Design | Size of model is accurately proportional to size of average human | Size of model is somewhat proportional to size of average human | Size of model is not proportional to size of average human | Size of model is not proportional to size of average human |
| Texture | Student applied appropriate texture to 3D model | Student applied appropriate texture to 3D model, but not to all surfaces | Student applied some texture to 3D model, but not to all surfaces | Student applied inappropriate texture to 3D model |
| Exit Slip | Student was able to appropriately defend their design choice within the constraints of the scenario | Student defended their design choice within the constraints of the scenario | Student did not support their design choice within the constraints of the scenario | Student response was not related to their design choice within the constraints of the scenario |
| Total | | | | |



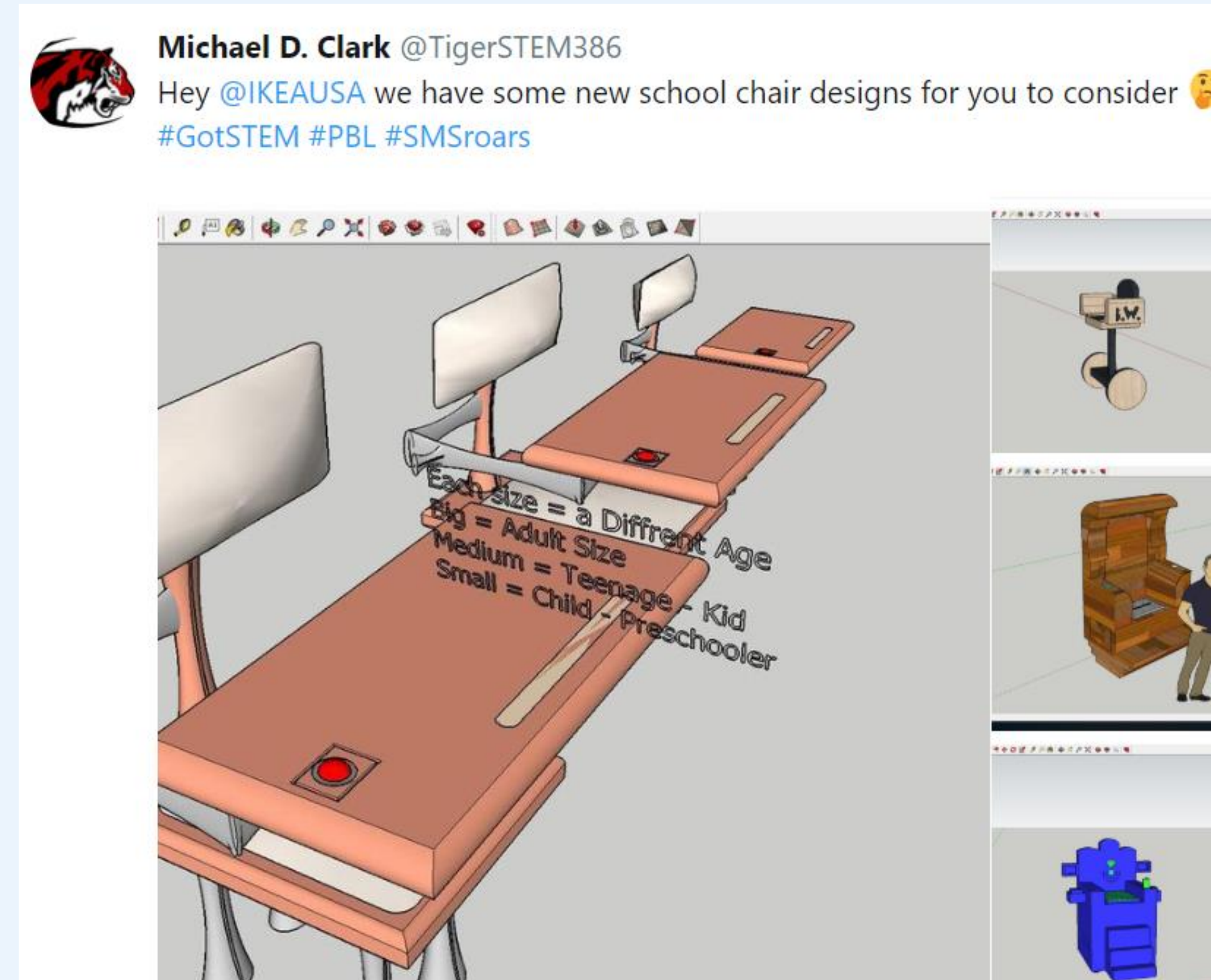
Teacher Tip: Have student(s) help develop assessments.



Type About It

Post solutions to:

- Class Twitter
- Student Twitter
- Edmodo post
- Padlet page



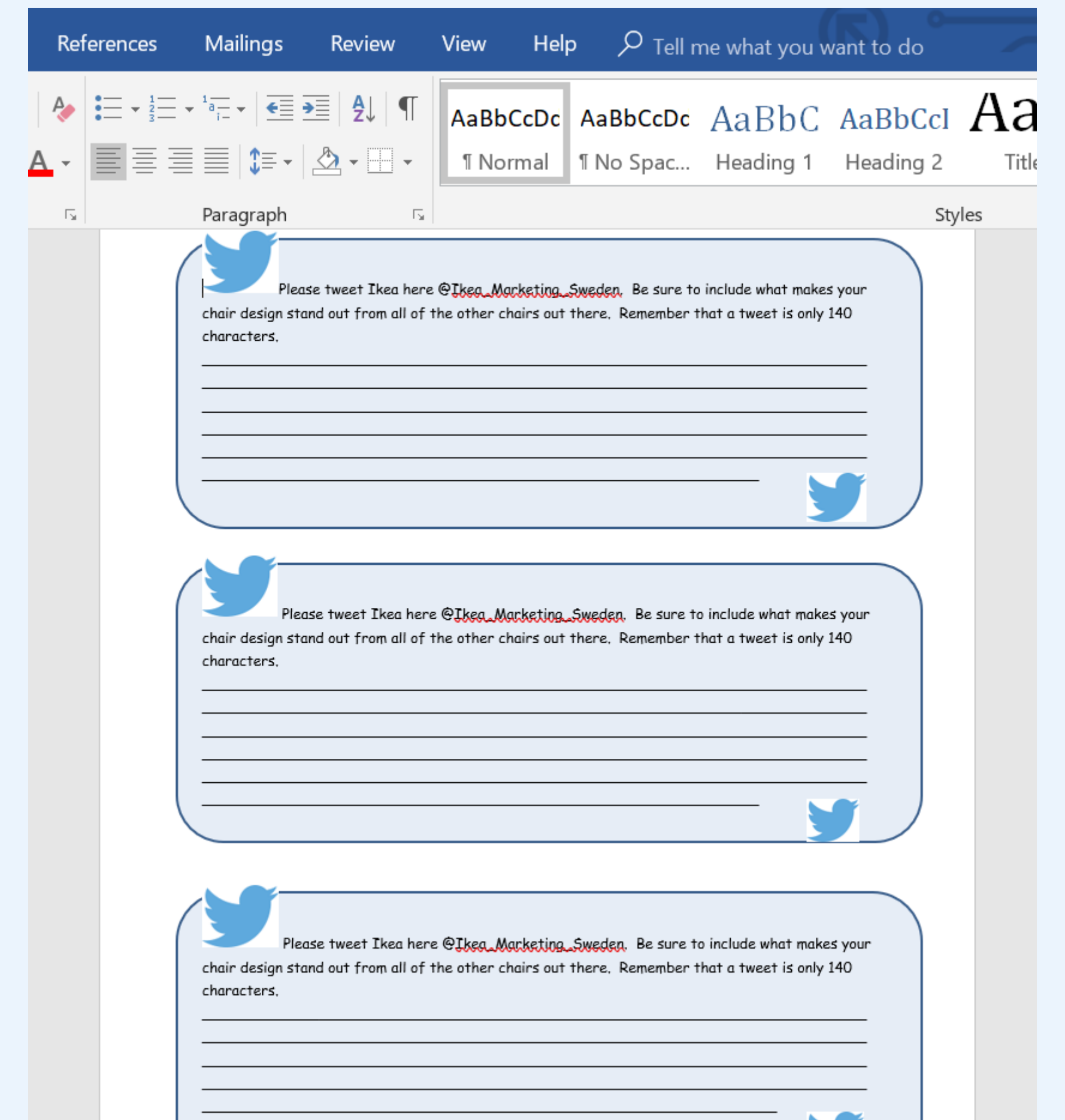
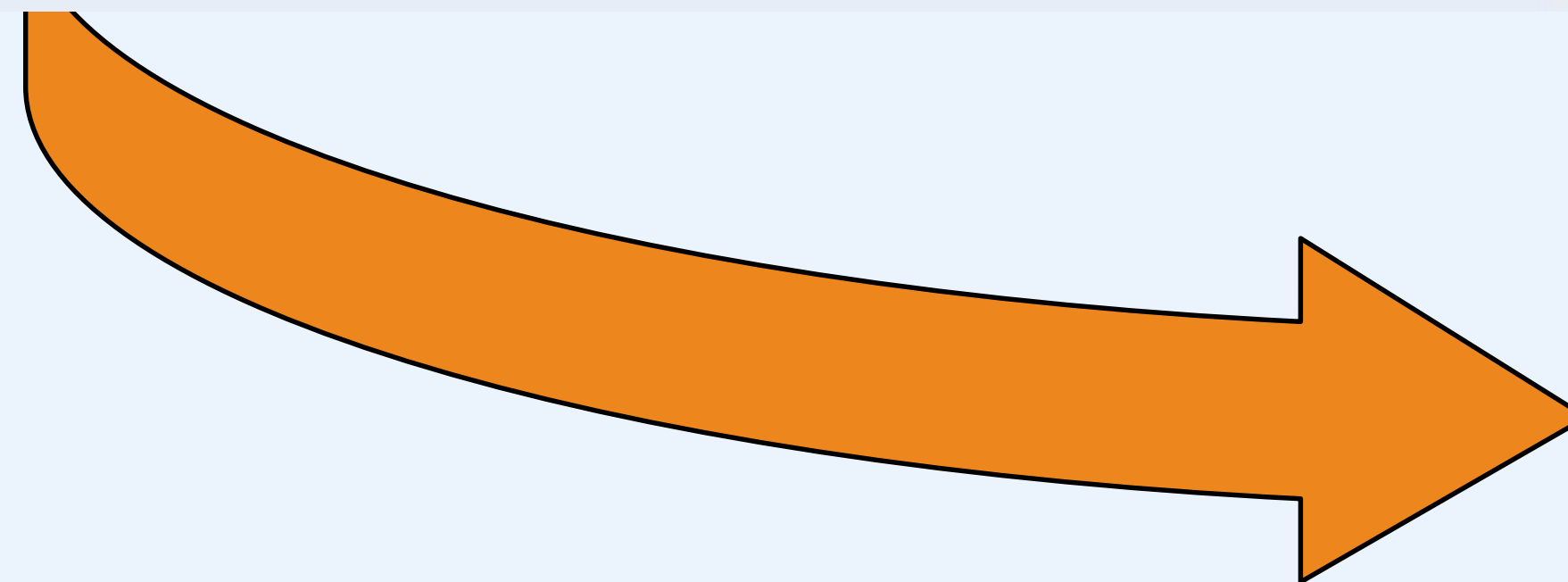
Teacher Tip: If you aren't ready for a live Twitter account, start with a paper or non live version (template on next slide).

Share

Write About It



Please tweet Ikea here @Ikea_Marketing_Sweden. Be sure to include what makes your chair design stand out from all of the other chairs out there. Remember that a tweet is only 140 characters.



References Mailings Review View Help Tell me what you want to do

AaBbCcDc AaBbCcDc AaBbC AaBbCcl Aa

Normal No Spac... Heading 1 Heading 2 Title

Paragraph Styles

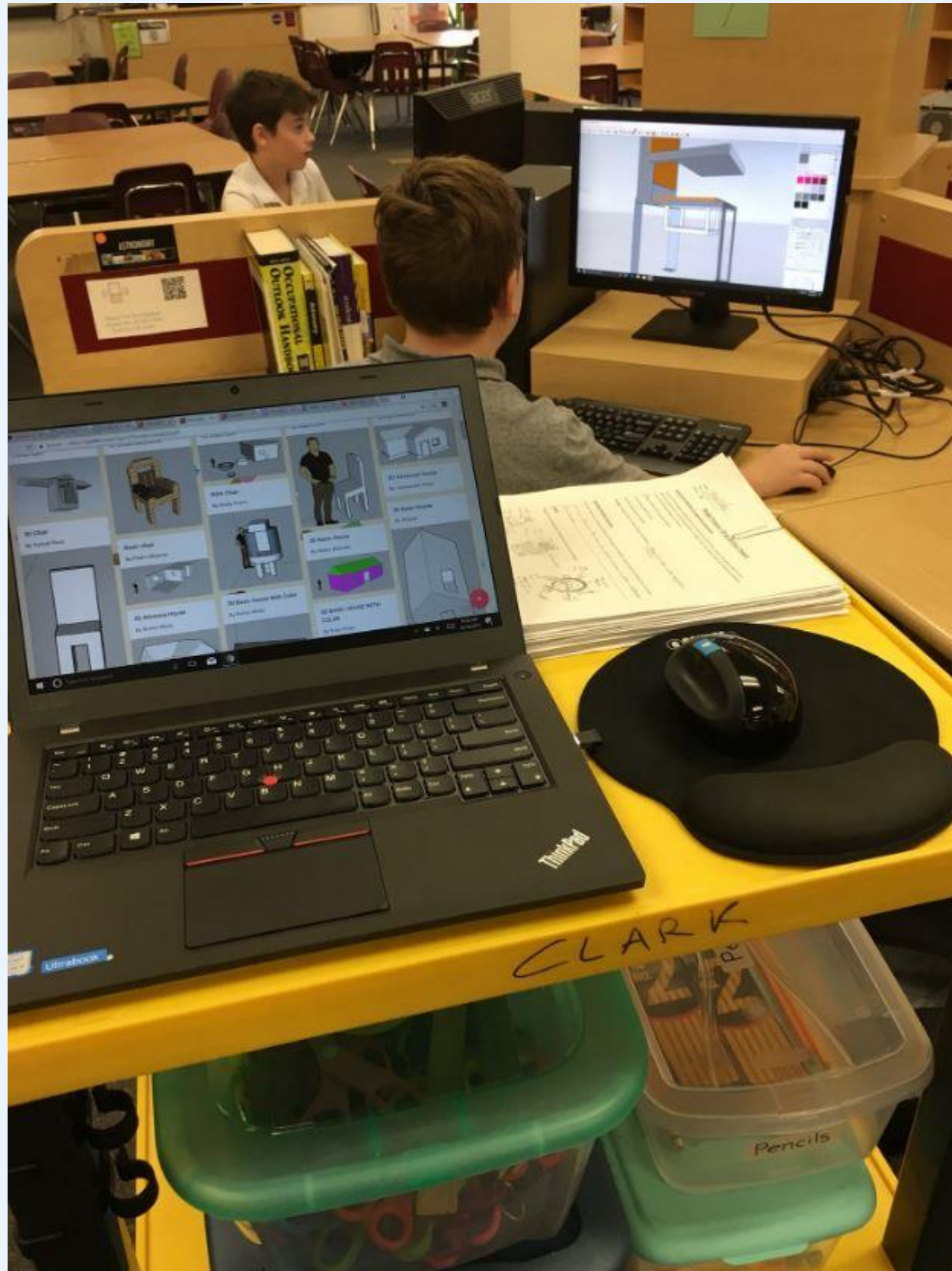
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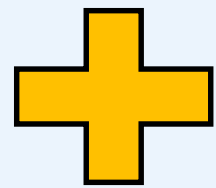
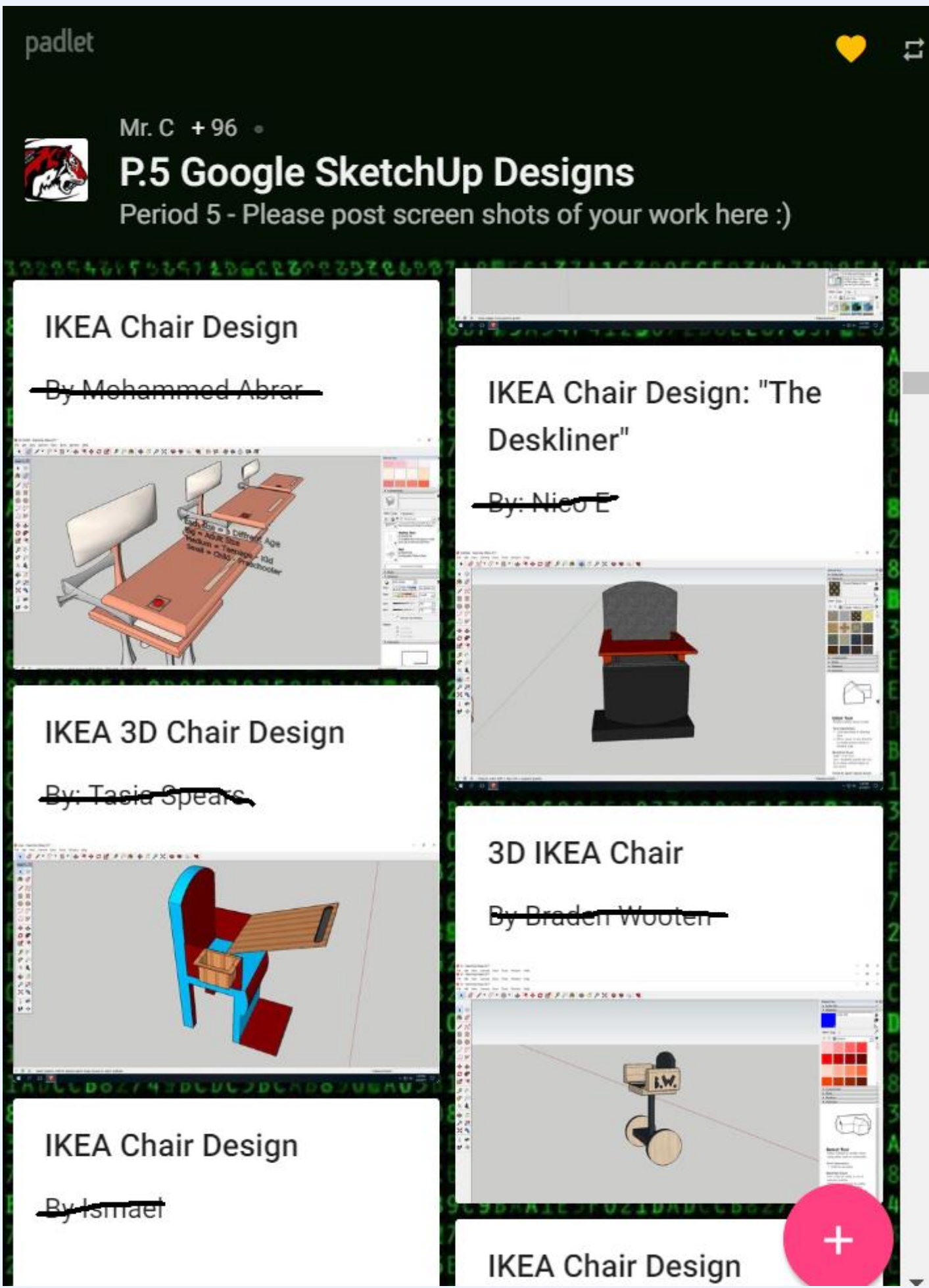
Share



Teacher Tip: If you do not have a 3D printer, have students build prototypes of their solutions using recycled materials.



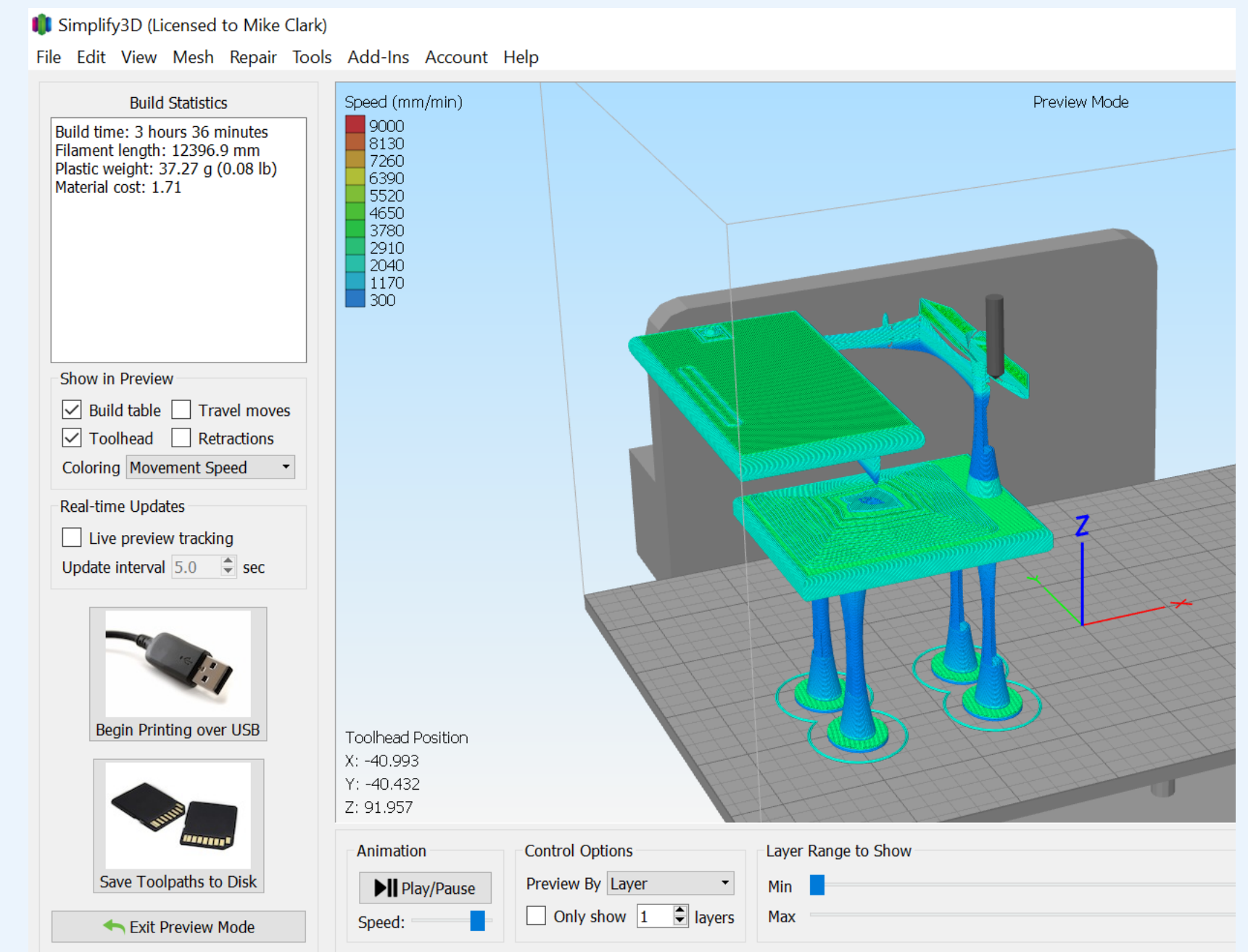
Share



Key steps for a successful PBL

Remember to:

- 1) Keep it Real World
- 2) Keep it Organized
- 3) Just Try it!
- 4) Share, Share, Share Your Progress





Thank you!



Connect



<https://goo.gl/JuZaDG>



@TigerSTEM386



clarkstem.weebly.com

