NC State College of Education

iScholar
Curriculum Resource Guide

Lesson 4

Protecting Our Investments
The purpose of this lesson is to demonstrate how teachers can strike a balance between cultural relevance and STEM learning among middle school students. An understanding of the design process positions individuals to develop products that change the world around them. Yet, design lessons for middle schoolers sometimes emphasize STEM learning at the expense of a substantive rationale for how the learning activity connects with students’ lives. Conveying the relevance of STEM learning is critical for engaging students in novel STEM activities. This lesson encourages the use of relevant media articles and clips to expose students to, and create solutions for, local community issues. Teachers will learn ways The iScholar project has adopted a culturally relevant teaching pedagogy to provide instruction that promotes social action and innovation. Teachers will learn strategies for supporting students’ identities as engineers and social change agents through collaborative activities, software-based exercises and group discussion. The lesson is important for teachers of all disciplines, especially those who focus on engineering, innovation, and critical thinking.
Outline of Lesson

1. About This iScholar Lesson
2. Learning Objectives & Related Standards
3. Introduction
   - What could Durham do?
   - What steps do change agents take?
4. DEAL Step 1: Define the Problem
5. DEAL Step 2: Explore the Solution
6. Let’s Move!
7. DEAL Step 3: Apply a Solution
   - Sketching
   - Legos
   - Google SketchUp
8. DEAL Step 4: Look Back and Learn
9. Lead Developers
## Standards for Students

<table>
<thead>
<tr>
<th>Lesson Objectives</th>
<th>NCDPI Essential Standards: Information and Technology</th>
<th>Description of Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the engineering design process to research local issues in your community. Then, propose solutions to the problems you have identified.</td>
<td>6.RP.1</td>
<td>Apply a research process for collaborative or individual research</td>
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<td></td>
<td>7.RP.1</td>
<td>Apply a research process to complete given tasks</td>
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<td>8.RP.1</td>
<td>Apply a research process to complete project based activities</td>
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<tr>
<td>In response to local housing issues in your community, use Google SketchUp to show how a Tiny House can be a solution to these issues. Present your findings to the class.</td>
<td>6.TT.1</td>
<td>Use technology and other resources for the purpose of accessing, organizing, and sharing information</td>
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<td></td>
<td>7.TT.1</td>
<td>Use technology and other resources for assigned tasks</td>
</tr>
<tr>
<td></td>
<td>8.TT.1</td>
<td>Use technology and other resources for assigned tasks</td>
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</tbody>
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## Standards for Teachers

<table>
<thead>
<tr>
<th>Lesson Objectives</th>
<th>North Carolina Professional Teaching Standards</th>
<th>Description of Standard</th>
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<tbody>
<tr>
<td>Incorporate a variety of disciplinary perspectives to help students see how multiple content areas are needed to address pressing societal issues.</td>
<td>Standard 3: Teachers Know the Content They Teach</td>
<td>Teachers recognize the interconnectedness of content areas and disciplines.</td>
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<td>Teachers make instruction relevant to students.</td>
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<td>Use an array of digital resources to support students in using technology to address community issues.</td>
<td>Standard 4: Teachers Facilitate Learning for Their Students</td>
<td>Teachers integrate a variety of instructional methods</td>
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<td>Teachers help students to develop critical thinking and problem-solving skills</td>
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<td></td>
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<td>Teachers integrate and utilize technology in their instruction</td>
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Change Agents Take Creative Risks
Teacher will play video of the Charlotte citizen who is participating in the Tiny House Movement. Teacher will ask students questions about tiny houses and the tiny house movement.

Guiding Questions For Students
- What was the need in the community?
- Who does tiny houses benefit? How do we know?
- Would tiny houses be fitting for our community? Why or why not?
- What do you think goes into designing a tiny house then building it?
- Why did this citizen invest in a tiny house?

Click here to watch how this Charlotte neighborhood revolts against tiny houses.
What could Durham do?

Teacher will show information about home shortage in Durham. This article describes an issue in the Durham community in which there are more section i housing vouchers available than housing options. This problem leaves citizens in need of shelter without a home.

Click [here](#) to read this article about the struggles Durham citizens are facing when it comes to housing.

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**DURHAM / DURHAM COUNTY / ECONOMY**

**Section 8 Voucher Holders Are Having a Hard Time Finding Housing in Durham**

Posted by [Sarah Willets](#) on Wed, Jul 12, 2017 at 10:29 AM

Durham Mayor Bill Bell is challenging local landlords and the Durham Housing Authority to house another thirty homeless households with rent vouchers within in the next seven months.

It's part of an effort, discussed Tuesday morning during the annual Mayor’s Landlord Roundtable, to get more local landlords to accept rent subsidies from the U.S. Department of Housing and Urban Development's Housing Choice Voucher program, also known as Section 8. The DHA administers the vouchers locally.

Thirty is a small number compared with how many people need affordable housing, but, as Bell said, it's part of a larger "vision" to end homelessness in Durham. According to a January 2016 count, there were 354 homeless individuals in Durham County.
What Steps Do Change Agents Take?

The teacher will then ask students to describe the steps they take to come up with solutions to problems in their lives such as picking a video game to buy or completing a school project. The teacher will then introduce the DEAL at Neal, a modified version of the engineering design process. The engineering design process is a series of steps that engineers use to come up with solutions.

In this lesson, we will follow the Deal at Neal to design tiny houses for the citizens of Durham.
Step 1: Define the Problem

The teacher will help students to understand how housing can be a problem for individuals in various communities, while simultaneously encouraging students to investigate the problem within their own community.

Guiding Questions For Students

💡 Why is this issue important?
💡 Do you know people who are homeless or have issues with consistent shelter?
💡 Does homelessness affect our community?
💡 What solutions currently exist for citizens without homes?
💡 Who benefits from fixing this problem?
Step 2: Explore the Solution

The teacher and students will explore different resources to learn more about the tiny house movement and what they can do to find a solution for their community.

Click [here](#) to watch a Tiny House tour or click [here](#) to see the 9 benefits of living in a tiny house.
Walk the Line

This half of the lesson will begin with an activity that allows students to share their opinions by their movements. All students will begin on a line. After each statement is read, students will move forward if they agree with the first answer or backward if they agree with the second answer.

Change agents acknowledge their strengths, weaknesses and areas of growth in order to invest and create change.

Walk the Line Questions available on the next page.
<table>
<thead>
<tr>
<th>Question</th>
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<tbody>
<tr>
<td>If faced with a difficult task, do you ask someone for help or Google it?</td>
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<td>When faced with new challenges, do you persist longer or quit early?</td>
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<td>Would you rather own a mansion or tiny house?</td>
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<td>Would you rather invest in an iPhone or college fund?</td>
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<tr>
<td>Would you rather fame or respect?</td>
</tr>
<tr>
<td>Would you rather invest in a school wide recycling program or buy new computers?</td>
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<td>Do you disengage when you are comfortable or approach things with an open mind?</td>
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<td>Are you comfortable taking risks or rather play by the rules?</td>
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<tr>
<td>To learn about a subject, do you read about information or watch a video?</td>
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<tr>
<td>Would you rather buy or rent an item?</td>
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<tr>
<td>Do you believe you’re fixed in ability or that you can grow in your abilities?</td>
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<td>What is more important, reading fast or doing math correctly?</td>
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Step 3: Apply a Solution

In order to create change, change agents like engineers, follow a series of steps to come up with solutions. First, change agents define their problems, then they do their research before applying a solution. In this lesson, there are at least three ways to design your tiny house:

- **SKETCHING**
  Sketching helps to put your ideas onto paper. Using the architecture blueprint symbols, design your tiny house like a professional.

- **LEGOS**
  LEGO's are a great way to construct your tiny house and see a 3D model of your product as you build.

- **GOOGLE SKETCHUP**
  Tiny Houses are only one example of how we can use Google SketchUp to create investments beneficial to the community. How can students consider using Google SketchUp in your class?

Remind students that they will be presenting their designs in an Open House Walk at the end.
Sketching

Those who build houses often use pen and paper first to sketch or blueprint their ideas. Here are some different resources to help you sketch your tiny house.

5th Grade House Floor Plan

Click here to watch this video on creating house plans.

Blueprint Symbols

Click here to access a blueprint symbols glossary.

Printable Sketch Paper

Click here to access printable sketch paper.
Another way to apply your tiny house design is by building 3D models. LEGO are a great way to bring your tiny house idea to life and alter your designs as you go.

Click here to learn about lego architecture.
Change agents often take creative risks to see the changes they would like to see. Google SketchUp is a 3D modeling software that allows users to design cool objects from necklaces to houses and even print their designs. Learning Google SketchUp requires time and energy to learn new tools and develop the skills to use Google SketchUp for this project and others.
Google SketchUp Resources

To start, download Google SketchUp (https://www.sketchup.com)

It is important for students to become familiar with the toolbar. Allow students time to practice with Google SketchUp before focusing on their tiny house design.

Click here to access this video.

Click here to access this video.

Click here to access this video.
Step 4: Look Back and Learn

The final step of the Deal at Neal is Look Back and Learn which is an opportunity to reflect on the whole process. The teacher should also inquire about what the students learned about themselves, the Durham community, the Tiny House Movement or about designing the tiny houses. The teacher should emphasize skill development and the risk taking involved with learning a new software such as Google SketchUp or skill such as architectural design.

Open House Walk

Another way to showcase skills learned throughout this lesson is to allow students the opportunity to participate in an Open House Walk. The purpose of the Open House Walk is for students to share their designs with one another and the invited community.

What were the biggest takeaways from this lesson?
This resource guide was developed from a set of lessons designed for The iScholar Project, a university and school partnership with the goal of empowering Black adolescents to consider how they can substantively contribute, and have a positive impact on, their social and physical conditions. The lessons integrate STEM concepts with a focus on increasing computer and electrical engineering literacies and motivating students to see themselves as change agents in the school and local communities.

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