



The Doreen Nelson Method  
of Design-Based Learning

*The*  
**STARTER**  
*CITY of*  
**the FUTURE**  
**GUIDEBOOK**

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Building Community  
in K-12 Classrooms

**Doreen  
GehryNelson**

with Lynne Heffley

*Throughout this Guidebook, I did my best to avoid the words “should and “can.” You’re always being told, “you should do this, you can do that.” I’ve tried instead to simply suggest some of what the teachers I’ve worked with have tried over the past 50 years. I hope these suggestions speak to your creative spirit.*

## THIS K-12 GUIDEBOOK PROVIDES:

- ✓ A step-by-step plan for getting students ready to build a Starter City of the Future with criteria to set limits for assessment
- ✓ A description of how building a Starter City of the Future connects to required lessons organized around Themes/Big Topics and Essential Questions named in the K-12 State Standards (Community, Sustainability, Protection, Energy, and Climate Change, etc.)
- ✓ Ways to use a Starter City of the Future to engage students in practicing back-and-forth questioning and higher-level thinking skills
- ✓ Examples of practical basic and advanced K-12 Guided Lessons across subject content areas, connecting a student-built City to required curriculum
- ✓ A brief history of Doreen Gehry Nelson and a description of her Backwards Thinking Design-Based Learning time tested methodology.

## TEACHING OBJECTIVES

- ✓ Express their original ideas about the future by building a Starter City, while trying to meet a preset Criteria List of don't wants and needs for any city
- ✓ Name places and spaces, the geography, the resources, and the jobs that are needed for a city to function
- ✓ Practice oral and written language skills by presenting, self-assessing, and writing about what they built for the Starter City of the Future according to the preset Criteria List
- ✓ Identify problems in their Starter City and practice higher level thinking skills by asking “why” questions—preparation for navigating the complexities of Artificial Intelligence
- ✓ Debate, justify, and record their findings to determine how their Starter City of the Future could change and become better



# 3 DAYS

## IN THE LIFE OF A STARTER CITY OF THE FUTURE

A sample script to get the ball rolling,  
compiled from K-12 teachers.

### ☀ DAY 1:

💬 **ASK:** *““What is a city?” “Who do you think builds cities?” “Why do you think they do it?” “Do you think cities always stay the same?”*

Show a map of the students’ community and outline a 20-block area that includes the school.

💬 **SAY:** *“You’re going to use this 20-block area as the place for actually building your ideas for a small, Never-Before-Seen City of the Future. Let’s look at what’s there now and imagine what could be there in the future. Let’s pretend 10,000 people will be living there.”*

Project the map of the 20-block school neighborhood onto a piece of cardboard or foamcore of at least 30x30 inches, to make the land site for building. [For younger students with developing motor

skills, the bigger the land site is, the better.] Mark only the main landmarks, such as the school, major roads, freeways, mountains and water sources, so that students have freedom to imagine the future on the land site without being constrained by everything that is already there. Place the cardboard or foamcore land site on top of a few tables pushed together, cut it into individual or group pieces. To have students meet the needs of 10,000 people, on the back of each piece write the number of people that will live on it (100 people, 500 people, 1,000 people, etc). Using a different color marker, give each piece of the landsite a number so that once students build their spaces and places it will be easy to put the city back together again.

## ☀ DAY 1 (continued)



**SAY:** “You are going to turn your community into an imaginary Starter City of the Future for 10,000 people. You or your group will get a piece of the land site. Everyone will have a different number of people written on the back. Build anything you want for your population, as long as what you build is new to you and not a copy of something that already exists.”

**SAY:** “You’re going to do it fast so don’t worry about making what you build ‘pretty’ or ‘perfect.’ I just want to see your original, Never-Before-Seen ideas. When you’re finished building, I want you to explain what you built and why. There aren’t many materials to build with [colored paper, scotch tape, and other simple supplies], so you’re going to have to figure out how to use what we have.”

**SAY:** “Before we build, let’s make a list of what you don’t want in your future City and another list of what your City will absolutely need.”

Hand out the land site pieces.

**SAY:** “Let’s build. You have 45 minutes [or up to 90 minutes] to build your ideas for you want your future City to look like on your pieces of the land site. If you have any questions or are having a hard time getting started, look at our lists of don’t wants and needs. Along the way, you’ll hear how much time you’ve used and how much time is left. Then we’ll all get together and see what was built.”

## ☀ DAY 1 (continued) or DAY 2

**SAY:** “You and your neighbor have 5 minutes to quickly explain to each other everything you built on your pieces of the Starter City of the Future and why.”

**SAY:** “When I call time, choose your most original place or space to get ready to present to the whole class. You will have 5 more minutes to practice explaining your most original place or space to four other students and to listen to them as they describe what they chose and why.”

**SAY:** “Put all the pieces back together on the tables to make one Starter City of the Future. Take turns listening as everyone describes in detail their most original place and space.”

**SAY:** “Now that you’ve put your land pieces together, look at your Starter City of the Future. What do you like the most about it? Are there places where you would want to live? What do you notice there is too much of? What is there too little of? What do you think works best? What problems did you see when you put the pieces together and what caused those problems? How would you fix them? If you could rebuild your City of the Future, what would you do differently?”



It may seem as if the students think that they have just been playing for the past two days, even while they were speaking and listening. The fun captures their imagination and once they’re engaged, teach the curriculum and connect it to what they built so that they think subject matter is part of the fun.

**SAY:** “Write a short story describing what you did in detail: what materials you used, what you made out of them, and how your places or spaces function. When you’re done with your story, make a drawing your favorite place or space and write a caption explaining why it’s different from things we see today.”



The Starter City of the Future, created out of students' imaginations as they were having fun, gives you a physical platform for teaching them that there is a connection between original thinking and what they are required to learn. As they learn how to ask the right questions and identify lots of city-related themes —such as Community, Interdependence, Sustainability, and Climate Change—they see why they need to learn subject content.

**The following are examples of Guided Lessons organized around Community:**

### LANGUAGE ARTS

**SAY:** "Write a detailed account of what a day in the Starter City of the Future might be like and ask Artificial Intelligence (AI) to write the same story, then compare the two."

### CIVICS

**SAY:** "You identified problems in our City. How do people in real cities work together to solve problems? Let's read about how governments are organized and run and then we'll make our own government for our City."

### MATH

**SAY:** "Look at the lists of what's needed in the City and [depending on grade level], count how many shelters there are, how many places for learning and recreation.

*"Measure and compare the heights of the tallest buildings."*

*"Determine the area and perimeter of the whole City."*

*"Examine the scale of the shelters that were built to see if they can hold enough people."*

### SCIENCE

**SAY:** "Identify types of pollution that are created by life in a city such as energy, noise, trash, waste, etc., and choose one to research in-depth and write a report with drawings or photographs."

### HISTORY & SOCIAL SCIENCE

**SAY:** "Identify inventions and events that have led to the development of ways that cities

## ☀ DAY 3 (continued)

*meet the needs of growing populations and respond to social and political change.”*

### GEOGRAPHY

🗨 **SAY:** “What is a map and why do people use them? Apply map and globe skills to determine the absolute location of the Starter City.

*“Explain the meaning of a map or globe legend, scale, and symbolic representations.”*

### ECONOMICS/TRADE

🗨 **SAY:** “What is money and how do people living in a city get money and use it to buy things they want or need from places outside their city.”

### ENGINEERING & DESIGN

🗨 **SAY:** “Design a building based on an organic form like a honeycomb, tree, or a shell.”

### TECHNOLOGY

🗨 **SAY:** “Name the technologies necessary for a city to function.”

*“Ask AI why some cities thrive and others fail.”*

### THE ARTS

🗨 **SAY:** “Create banners, posters, songs, and dances for a ceremony to commemorate your City.”

*“Draw front, side, and overhead views of one structure that was built for the Starter City.”*

*“Identify specific buildings or spaces with sounds (high, low, loud, rhythmic, monotone).”*

*“Dance the shapes of buildings, enlarging them through gestures.”*

***Take advantage of your students’ enthusiasm and use the Starter City of the Future that sits in front of them every day to teach them the high-level thinking skills named in Bloom’s Taxonomy. They’ll go on having fun as you slow down the process with in-depth studies of thematic topics (Community, Energy, Adaptation, Sustainability, Climate Change, etc.). With each thematic topic taught weekly or monthly, students learn that factual information is needed to “fix” the problems they identified in their Starter City to rebuild it into a refined City of the Future.***



## ABOUT THE STARTER CITY OF THE FUTURE

The sheer number of staff development trainings required for K-12 teachers to learn strategies and techniques for teaching subject matter, managing the classroom, and cultivating student interaction and civic responsibility are overwhelming. You're constantly being told what you need to do and you're left wondering how to actually do it all. It's beyond frustrating.

You are the expert. You know what really matters. You know that students thrive when they work together, when they feel free to express their opinions and ideas, and when they find meaning in what they are learning. You know the art of teaching comes alive when you do the unexpected to teach what you are expected to teach, and when you see your students thinking about, and applying what they are being taught.

It sounds simple, but by challenging students of any grade level to build a small, tabletop Starter City of the Future that connects to content you are already teaching, they see that you're serious about giving them a physical place to display their thinking, and they see that there is a purpose for what they are learning.



Push a few tables together, put some cardboard or foam core on top, show your students a map of their community, and tell them they are “future people” with the power to design their dream community. They might think they already know all about what's in a City and will have ideas about what would make life better. They for sure know that what is familiar in their real community sometimes changes. Start out with a bang... ask for their opinions.

At first, they might think you don't mean it, but the playfulness of inventing a Starter City of the Future taps into their natural curiosity and hooks them, as does their perception of the classroom as a place for active, not passive, learning.

## ABOUT THE STARTER CITY OF THE FUTURE



Under pressure of time—45 to 90 minutes or more, depending on grade level —your students roughly build their ideas for how their future City will look and function. Tell them that since it is the future, there are no wrong answers as long as their ideas are original to them, and they are able to describe how their designs work (without magical solutions). What they build using recycled materials, such as rolled up pieces of paper, is not meant to be “accurate” or “pretty.” This is not arts-and-crafts or a fixed project. It is a

way for students to see that there are different ways to transform a simple thing into something more complex, to learn that it is possible to change the function of things—a skill practiced by scientists, mathematicians, and artists.

After time is called, students put their individual or group parts of the Starter City of the Future together as a whole and present what they built. They listen to each other as they describe their buildings or spaces in detail and explain how their original ideas were intended to solve problems.

***The Starter City of the Future works at any grade level. Students never tire of building a City in the classroom. Even if they repeat it from one grade and/or subject to another, what’s studied each year is always different.***

## ABOUT THE STARTER CITY OF THE FUTURE



As they practice higher-level thinking skills to justify how the requirements of a City were met, critical problems jump out: “Your road goes into my front door.” “Your garbage dump is next to my school.” “Your house is too close to my river.” More often than not, after they identify what they built too much of or not enough of, they want to work together to imagine and discuss a plan for how to make their Starter City better.

Keep letting students know that it matters, that it’s not just a game. So that the benefits of this quick activity don’t come to a screeching halt, look at your required curriculum, and use the City to

teach a few subject matter Guided Lessons to reinforce the speaking and writing skills required across all grades and subjects. You’ve got nothing to lose, and if you decide to go on, take the Starter City of the Future and run with it. Use their interest in their Starter City of the Future to spark their willingness to learn basic subject-related information and skills and to practice higher level thinking skills. Let them see how everything needed in any city connects to content subject requirements. Then, what began as a standalone, hands-on activity lives on.

For Language Arts, have students write a story—or a tour guide booklet—about their Starter City of the Future. For Math, get them to measure their City, count all the buildings of the same color, name the shapes, or calculate volume to determine how many people are able to live in their buildings. Or, have them figure out the relationship between how long it takes to get from what “I” built to what “you” built, and calculate distances in moving within and beyond the City. For Science, ask them how they will feed the City’s population and how people will adapt to natural or human-made disasters affecting their City. For Art, ask them to make drawings of what they built.

Their City is a physical representation of the complexities of working and living together as a community. Your students might know that the word “community” means different kinds of people with different ideas living together within a city. They may not know that there is an organizational structure in real cities for deciding what gets fixed or redone so that citizens can get along. Citizenship skills and those hard-to-get-at skills for getting along and feeling confident develop as your students learn that they matter as individuals united for a common cause, and who understand why learning is relevant to their lives, and as future citizens with the power to make their voices heard.

All of those things that may be hard to get students to care about learning are sitting right there on the tabletop in front of them in the City that they built. Themes/Big Topics (Community, Shelter/Protection, Civics/Government, Sustainability, Adaptability, Energy, etc.) point to Essential Questions in any K-12 subject matter content to be taught weekly or monthly, giving students factual information to turn their Starter City of the Future into a refined City of the Future. (See *Refining the Starter City of the Future Guidebook*.)

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As I close out each year with my students, I reflect on how scared they are initially to use their own observational skills to make sense of the world. How they lack the confidence in their own judgment to make quick decisions and relate them to each other. I am also reminded of the importance of how authentically students are required to conduct themselves as they approach a Design Challenge—and how the cognitive load rests on students’ shoulders as they use their original, built 3-D designs in their City front of them to interact, play, and consume new information delivered through Guided Lessons.

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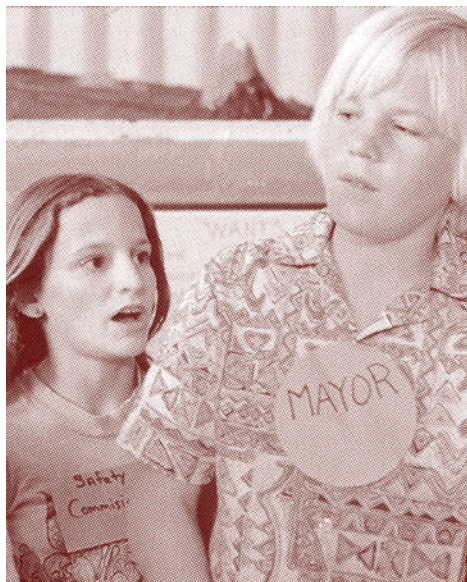
— Dave Cameron,  
*history and science*  
*teacher, San Gabriel*  
*High School, a contributor*  
*to this publication.*

## 50+ YEARS OF RESULTS

Collected data from K-12 classrooms over 50 years show that students benefit from the Doreen Nelson Method of Design-Based Learning that is kicked off with a Starter City of the Future. They test at grade level or beyond on Standardized Tests. All types of learners develop a keen interest in learning by starting with self-expression. English Language learners, those with learning difficulties, and accelerated learners experience significant growth. They are able to apply learned information to new settings and ask complex questions as an everyday skill—needed for interacting with Artificial Intelligence (AI)—so they no longer say, “why do I have to learn this?”



Working together as a community to question and self-evaluate their efforts, they gain self-confidence and feel better about themselves and others as they improve their speaking and listening skills. Civic responsibility is not a tag-on.



For K-12 teachers, developing a Starter City of the Future in the classroom provides a context for using strategies, techniques, and projects taught in staff development trainings. They report that it's easy to use the student-built City to give meaning to selected Themes/Big Topics and Essential Questions taught through Guided Lessons—and that asking for students' original thinking develops a positive change in the dynamic of the classroom, making teaching subject matter easier.



I was a 5th grader in 1969 in the first class that built and refined a City. I want educators to understand that what we did invited our creativity. “You have an idea—what do you want to do with that idea?” We had to plan our City, we had to put it to scale. If we wanted transportation, we were asked how we were going to do it. I wanted to be mayor so I had to study what it was to be a mayor and learn about civics. If I wanted my building higher than yours and it was blocking your view, or if someone said your road can’t run into my area, we had to work together to figure it out. We were learning how to get along.

We thought we were just having fun, coming up with ideas for building our dream city. When you feel like that as a student, and then you have to do a science paper or a project that relates the City to what is being taught, you’re feeling good and learning skills are no big deal. When you teach us writing, math, social studies, or science we have a reason to learn.



— Portia Grimes Stots’ 2023 SXSW SPEECH  
(edited for clarity)

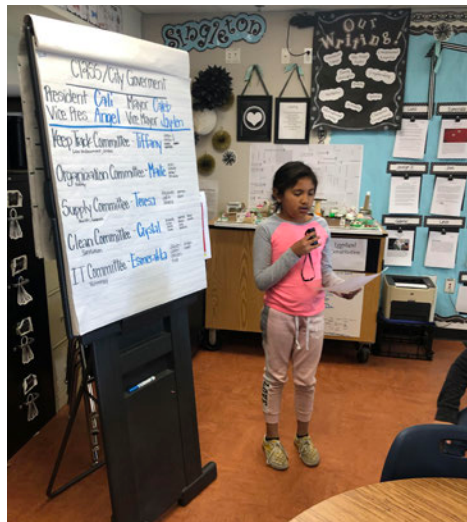
## WHAT IS BACKWARDS THINKING™?

**The Doreen Nelson Method of Design-Based Learning, Backwards Thinking**, is not a new curriculum or another new program. It is a pedagogy, a practical philosophy. The activity of building a Starter City of the Future, which lies at the heart of the methodology, is more than just an activity for students to enjoy. It is a context that brings to life any K-12 curriculum, while channeling students' creativity, energy and inquisitive nature as a classroom resource.

Backwards Thinking™, Doreen Nelson's 6 ½ -Step method of Design-Based Learning, reverses conventional "frontward" teaching, starting with the unexpected to pique students' interest, and going right for the gold mine: higher-level thinking skills.

From the beginning, by building a Starter City of the Future, learning goes into students' big muscles as they give free rein to their imagination by designing and roughly building their ideas for changing the places and spaces in their city.

Their original, physical creations are made *before* formal subject content instruction begins. ("You know something about this topic. Let's see it!") The original places or spaces students quickly build



for their City from rolled up pieces of paper or folded cardboard are transformed by their ideas into objects with personal meaning. They want to talk about what they built, write about it, hear what others have to say, and based on feedback, think about what they could change or rearrange to refine their thinking.

The pay-off: by having original ideas for the future and exploring different uses for their ideas, based on factual information from subject fields across the curriculum, students practice the critical thinking skills need to adapt to change.

(For more information, see *Cultivating Curiosity: Teaching & Learning Reimagined*, Doreen Gehry Nelson © 2022)

## NEVER-BEFORE-SEEN (NBS) VS. ALREADY-BEFORE-SEEN (ABS)

Never-Before-Seen (NBS) presents students with a Design Challenge that requires them to look into the future, beyond the ordinary and the existing (Already-Before-Seen). They learn to transform one thing into another as they imagine and build new solutions to old problems (i.e. Shelter/Protection, Energy, Sustainability) in a “pretend” environment.

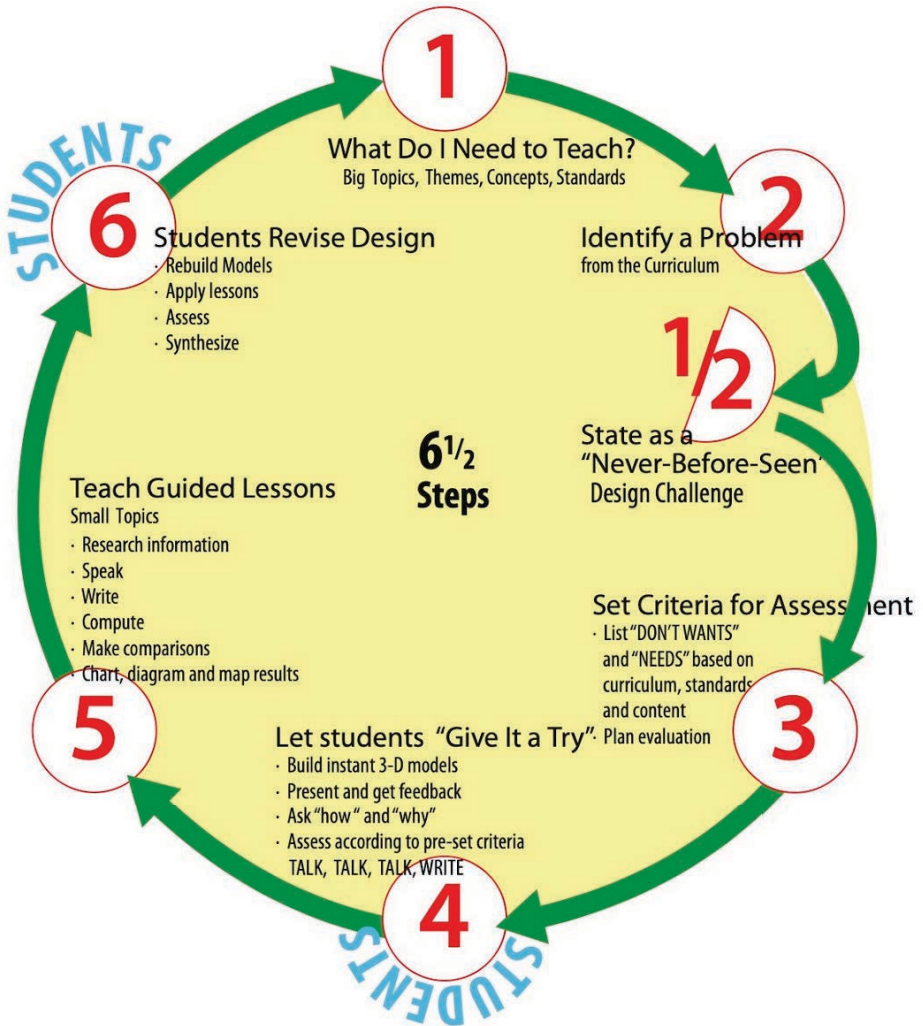
Building a Starter City of the Future lives in the world of Never-Before-Seen. If what students build is new to them and they justify their thinking, they can't be wrong. This boosts their willingness to express themselves, engage in research, and compare what they're taught with what they've done.





# THE 6½ STEPS FOR BUILDING THE STARTER CITY

This 6 ½ Steps graphic shows the Design-Based Learning Backward Thinking process. This flexible guide prepares students to imagine, then build and debrief a Starter City of the Future as one Design Challenge connected to K-12 required subject content.



## The Doreen Nelson Method of Design-Based Learning Backwards Thinking Process™



# 6½ STEPS

## FOR BUILDING THE STARTER CITY OF THE FUTURE

STEPS 1, 2, 2½: MEETING THE STANDARDS —  
ESTABLISHING THE REQUIRED CURRICULUM

### ➔ STEP 1: WHAT DO I NEED TO TEACH?

- ▶ Themes/Big Topics
- ▶ Essential Questions
- ▶ Concepts
- ▶ Standards

Use the Starter City to teach a standards-based Theme/Big Topic or Essential Question that shows up over and over in the required curriculum throughout the grades and subjects.

### ..... EXAMPLES .....

**Community** is the Theme/Big Topic for a kindergarten teacher using the Starter City to have students identify the roles of people in the City and what citizens need for a healthy community.

**Interdependence** is the Theme/Big Topic in a sixth grade study of ancient civilizations using the Starter City to have students to learn how people long ago adapted to their environment and developed ways to exchange goods and services.

**Environment/Sustainability** is the Theme/Big Topic for a high school chemistry teacher using the Starter City to teach how combustion and chemical reactions affect air quality.

## ➔ STEP 2: IDENTIFY A THEME/BIG TOPIC FROM THE CURRICULUM, CONNECT IT TO AN ESSENTIAL QUESTION

### EXAMPLES

**Kindergarten:** If the Theme or Big Topic is Community, the Essential Question could be “How are communities organized to serve all the people?”

**High school:** If the Theme or Big Topic in Science is Climate Change, the Essential Question could be: “How does global warming affect natural resources?”

**Middle school:** If the Theme or Big Topic is Ancient Civilizations, the Essential Question might be “How does a location affect the sustainability of a community?”

### OTHER POSSIBILITIES

## THEME/BIG TOPIC: COMMUNITY

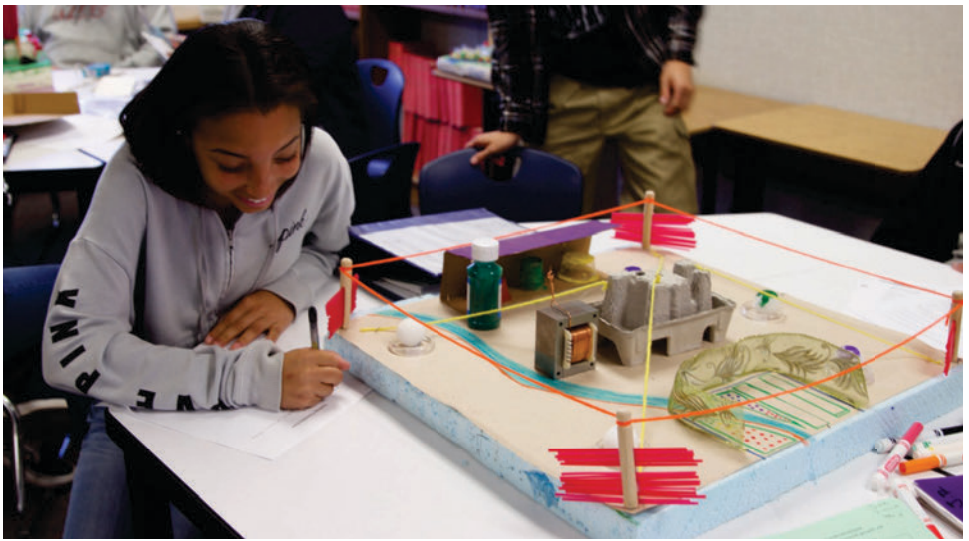
### *Essential Questions:*

- ▶ Why did cities come into being?
- ▶ What was on the land before cities were built?
- ▶ Were indigenous people on the land first?
- ▶ How does a location affect a community?
- ▶ How do people form and grow a community?
- ▶ How does interaction between people affect the appearance of a city?
- ▶ How does the distribution of resources affect citizens?

## THEME/BIG TOPIC: INTERDEPENDENCY

### *Essential Questions:*

- ▶ How do people in one part of a city become part of the larger community? How does the city provide an equitable living environment for all of its citizens? How do citizens share space, goods and services?
- ▶ How do citizens rely on one another to stay safe?
- ▶ How does immigration affect the growth of a city.



## ➔ STEP 2: IDENTIFY A THEME/BIG TOPIC FROM THE CURRICULUM, CONNECT IT TO AN ESSENTIAL QUESTION

### THEME/BIG TOPIC: ENVIRONMENT/SUSTAINABILITY

#### *Essential Questions:*

- ▶ How does human activity affect the environment?
- ▶ How does a physical landscape affect human survival?
- ▶ How do the resources in any given environment affect survival?
- ▶ How do innovations change, affect, or contribute/relate to growth and sustainability?

## ➔ STEP 2½: STATE AS A NEVER-BEFORE-SEEN (NBS) DESIGN CHALLENGE

*“Your Design Challenge is to build a Never-Before-Seen Starter City of the Future.”*

“Never-Before-Seen” asks students to think of themselves as designers/artists/originators, building their original ideas for a Starter City. (Their designs cannot be wrong if they are Never-Before-Seen to the student, not copied, and are justified.)

## ➤ STEP 3: SETTING CRITERIA FOR ASSESSMENT

- ▶ List **“DON’T WANTS”** and **“NEEDS”** based on curriculum, standards, and concepts
- ▶ Plan Evaluation

Surprise your students by asking them what they don’t want in their Starter City of the Future, and to imagine what their City will need in the future. Call it a Criteria List so that students know what is essential for their original designs and meet as many of those requirements as possible as they quickly build in a short period of time without copying what already exists. (See sample Criteria List.)

When they say, “I don’t know what to do,” the Criteria List becomes a teacher’s surrogate, prompting students to review what is required so they learn to self-assess.

By having a short time to build a Starter City students can’t possibly build spaces and places to meet all the **NEEDS** on the Criteria List. What’s great is that once the building stops, they identify what is missing, observe what others have done, and describe what they might have done with more time.

*Some teachers develop the Criteria List in advance, putting it on the wall or handing out copies if appropriate for grade level. Others do it collaboratively with students.*



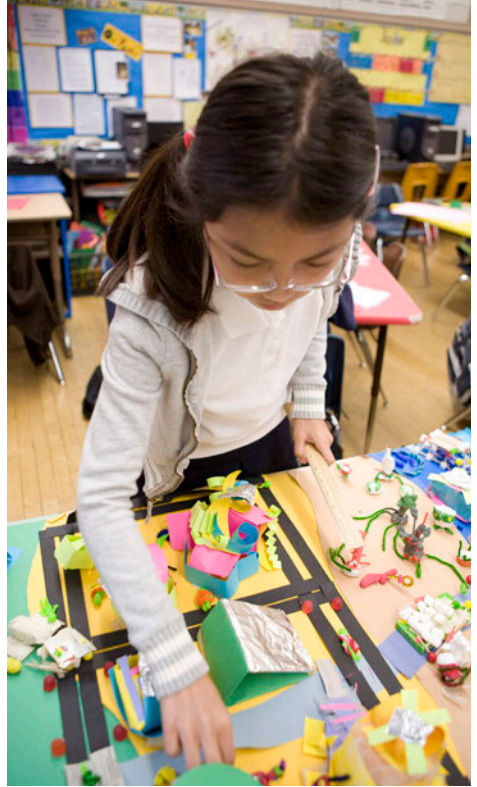
### A TWO- OR THREE-COLUMN CRITERIA LIST

Students refer to a two- or three-column Criteria List of **DON'T WANTS** and **NEEDS** as they build. The third column, **POINTS**, gives a numerical value to the **DON'T WANTS** and **NEEDS** that they meet.

**“DON'T WANTS”** in red indicate STOP.

**“NEEDS”** in green indicate GO. These are universal requirements for a city to be a city, listed as Themes/Big Topics. (**Write Shelter/Protection** instead of “housing” to avoid replication of ordinary houses. Write **Movement/Mobility** instead of “roads” to invite original thinking about ways to get around the City. Write **Places to Exchange Goods and Services** to avoid typical shopping malls.)

**NEEDS** are general requirements for a city to be a city, tailored according to Themes/Big Topics across the K-12 curriculum.



- ➕ **TIP:** Ask questions like: “What kind of Shelters will you build for the future to ensure no one is homeless?” “What are some things that are important to have a good place to live?” “Where will the trash go?” “Where will energy be produced?” “What kind of places will you build for citizens to meet and have their voices heard?”
- ➕ **TIP:** Discuss scale after building. Examples: a 2”=20’ scale means that 2” will be the size of a single shelter, the equivalent of 20 square feet. A 1”=5’ scale makes a 2” shelter the equivalent of 10 square feet.

## ➔ STEP 3: SETTING CRITERIA FOR ASSESSMENT

### SAMPLE CRITERIA LIST

*Number of items on the list depends on grade level or subject content*

| <b>DON'T WANTS</b><br><i>(Are wide open: anything goes)</i>                                 | <b>NEEDS</b>  | <b>POINTS</b><br><i>optional</i> |
|---|---|----------------------------------|
| Already-Before-Seen (ABS)   | Never-Before- Seen (NBS)  |                                  |
| 2-D   | 3-D   |                                  |
| Homeless people   | Places for People to Live for Protection and Shelter  |                                  |
| Hard to go from one place to another and communicate with others                            | Ways to Move People, Things & Information   |                                  |
| No place to buy things you need   | Places to Make Goods and Exchange Goods & Services  |                                  |
| Places that are overheated, too cold, or without electricity                                | Places to Get & Store Energy & Ways to Deliver It   |                                  |
| Lots of rules   | Places for Government to Meet   |                                  |
| No way to get help  | Places for Medical & Social Services  |                                  |
| Trash and Pollution   | Places to Recycle and Reuse Waste, Places to Research and Implement Ways to Provide Clean Air and Water, Places to Research and Implement Ways to Reduce Sound and Visual Pollution |                                  |
| No room to have fun   | Places for Recreation & Exercise  |                                  |
| Uneducated people   | Places to Learn   |                                  |
| No creativity.  | Places to Exchange & Present Stories, Places to Explore all the Arts; Give Performances, and Display Works of Art   |                                  |
| Being too crowded   | Open Spaces In-Between Places   |                                  |
| Mean people   |   |                                  |
| Ugly buildings  |   |                                  |
| Magical Solutions<br>(Included so that students don't think the activity is fiction-based.) |   |                                  |

## ➔ STEP 3: SETTING CRITERIA FOR ASSESSMENT

### TIPS FOR CREATING THE CRITERIA LIST

- ➕ **TIP:** Add subject matter items to the **NEEDS** list at any time during the building process. For example, to teach mathematics and engineering, add specifications such as scale, structural safety, and protection from natural disasters.
- ➕ **TIP:** A Criteria List benefits English Language Learners who have an ever-present, visible reference as they build their ideas and learn vocabulary from watching others, expanding the meaning of single words that are new to them.
- ➕ **TIP:** Use the Criteria List format as a rubric for evaluating other assignments. For example, as a Language Arts writing rubric, list **DON'T WANTS** as incomplete sentences, fragments, lack of supporting evidence. **NEEDS** are topic sentences, arguments supported with data, transitions, a conclusion.





## ➔ STEP 4: LET STUDENTS GIVE IT A TRY

### Students' imagination at work: An unexpected experience of creation and self-expression they'll never forget.

- ▶ Build instant 3-D models
- ▶ Present and give feedback
- ▶ Ask “how” and “why”
- ▶ Assess according to preset criteria
- ▶ TALK, TALK, TALK, WRITE

#### SUGGESTED DURATION

*(Depending on Grade Level and Scheduling, One Day to a Week)*

- ▶ 1 hour to map the location of the Starter City and prepare a physical land site with individual or group land parcels. (Doing it in advance saves time.)
- ▶ Half hour for setting criteria (with students or preset by teacher to speed things up).
- ▶ 45 to 90 minutes for students to build.
- ▶ 45 minutes to 1 hour for debriefing and evaluating what was built.
- ▶ 1 to 2 hours for students to write and do visual documentation.

#### GETTING READY TO BUILD

Select and outline the borders of a 20-block section of the community on the cardboard or foam-core to define the perimeter of the Starter City of the Future.

Project the real map of the students' community onto a 30"×30" piece of cardboard or foamcore. (For younger students with developing motor skills, the bigger the better.)

Trace only main landmarks, the school, major roads, freeways, mountains and water sources so that students have freedom to imagine the future without being constrained by what is already there.

***The shape of this 20-block section could be a square, parallelogram, or irregular hexagon; to link math content, students would call the section by its applicable geometric term. One class called their city Irregular Hexagon City.***

## ➔ STEP 4: LET STUDENTS GIVE IT A TRY

### DIVIDING THE LOCATION INTO INDIVIDUAL OR GROUP LAND PARCELS

Cut the designated 20-block section into land parcels, one 12 x 16 inches parcel per student (or larger parcels for students working together in collaborative groups).

On the back, number each parcel and name how many citizens have to live there. Suggested population: approximately 3,000 to 10,000 people. (To address patterns of inequality in land ownership, distribute the population unevenly among the land parcels.)

Give students their individual or group land parcels.

Optional: appoint, or have students quickly elect, a Mayor to represent everyone and call time, and to start students thinking about the need for a government to run a city.

- ⊕ **TIP:** Have students look at USGS maps to learn to identify the topography of various locations.
- ⊕ **TIP:** Give students a copy of the real map and ask them to walk around their community and notice how details and locations correspond to what they see on the map.
- ⊕ **TIP:** To identify Civics and leadership skills in an informal and playful way as the building progresses, the teacher role-plays a federal government representative, overseeing how the NEEDS for the Starter City named on the Criteria List are being met for the required population (“Is this really Never-Before-Seen?” “How will people move from the shelter you made to see friends or go shopping?”) As the student Mayor communicates directives from the teacher, the whole class becomes a government.
- ⊕ **TIP:** Make an identical second map of the 20-block area on white paper and label the location of each land parcel with the names of students or groups. Post the paper map on the wall for students to refer to as they build. After debriefing the activity, students roughly draw on the paper map what they built and where as a record of their contribution to the Starter City.





## ➔ STEP 4: LET STUDENTS GIVE IT A TRY

### START THE CLOCK

#### *Building the Starter City of the Future*

- ▶ Review the map showing the 20-block area, asking “What’s there now?” and “What Never-Before-Seen places and spaces do you imagine being there?”
- ▶ Review the Criteria List (see STEP 3).

**+** **TIP:** To simulate the growth and development of cities, pretend there has been a discovery (oil, gold, rich soil for farming, etc.) in the location of the Starter City, or that people are flooding there due to poverty or the need for political asylum, so the population is expanding. “How will the Starter City grow to sustain the increase in population and not deplete the City’s resources?”

- For 45 to 90 minutes (depending on grade level) students build places and spaces they imagine on their land parcels referring to the Criteria List.
- Announce time remaining along the way.

**+** **TIP:** When students get stuck, don’t want to build, or are slow to start: “What do you think is the most important place in the city?” If they say, “my home”: “O.K., where is it and what will it look like in the future?”

## ➔ STEP 4: LET STUDENTS GIVE IT A TRY

### STOP THE CLOCK

*Debriefing, Reflection and Analysis*

#### TALK TALK TALK WRITE

*(Depending on Grade Level and Scheduling This Takes Place Over a Day or a Week)*

Because of the deliberate, short time limit, many **NEEDS** on the Criteria List are missing and when students put their land parcels together after the quick first and second TALKS, they will see that they have littered their Starter City with other “mistakes.” “Are there sufficient shelters and other facilities for the population?” “Do your buildings have a way in and way out?” “Are they stable, or are they at risk for falling over?” “Is there pollution?” “Has the natural environment been preserved?”



Other possible dilemmas: Already-Before-Seen (ABS) houses, too many amusement parks, no green spaces, no water supply, no places for medical care, a building or tower may even be blocking movement in the City. Is that road going into someone’s front door? Have too many places for recreation left some citizens homeless? These “mistakes” become rich topics that connect to grade level content.

#### EXAMPLE OF A TALK, TALK, TALK, WRITE SEQUENCE

At first, students may not want to talk about what they built, why they built it, and why it matters for their City. Once they get rolling, it’s hard to stop them from giving their opinion about what’s wrong and what they want to “fix.” These discussions set up descriptive writing, drawing and labeling, teaching required Guided Lessons, and having students revise their thinking about their original designs as they dig into Themes/Big Topics with Essential Questions. *(See Refining the Starter City of the Future Guidebook)*

## ➔ STEP 4: LET STUDENTS GIVE IT A TRY

### TALK TALK TALK

#### ▶ FIRST TALK

In pairs, students describe their favorite and most Never-Before-Seen place or space that they built (5 minutes). They physically hold what they built or use their social media to show what they did.

#### ▶ SECOND TALK

In small groups, students take turns again (5 minutes).

#### ▶ THIRD TALK

Have students put the land parcels together and crouch down to get a “street level” look at what was created, so that details such as open vistas, clutter, and congestion take on a depth and dimension not visible when seen from above.

To the whole class, each student or group leader makes an oral presentation about how their favorite places or spaces function, and to get feedback and agreement about problems they see, and how what they have built will meet the needs of citizens of the future. The fun they had in building takes on meaning as they see they are part of a whole community. They see that “this is where I am, this is who’s next to me, this is what I’m doing that affects my neighbors. I’m not just on my own.” All of this exchange forms the roots of an interdependent organization—a community in the classroom.

### WRITE

Students document what they have done. Examples: They write about, draw and/or diagram what is on their land parcels (Language Arts), identify geometric shapes in the Starter City (Math), explain energy, water, and food requirements (Science), focus on problems and solutions in the physical environment (Geography); and consider who is in charge of the Starter City of the Future and what necessary rules and regulations are needed (Civics).

- ➕ **TIP:** Have students discuss and vote on what **NEEDS** on the Criteria List were fulfilled and what **DON'T WANTS** were successfully omitted.

## ➔ STEP 4: LET STUDENTS GIVE IT A TRY



- ➕ **TIP:** Some teachers provide students with individual copies of the Criteria List and have them rate themselves and write what they would propose to do to fix their “mistakes.”
- ➕ **TIP:** If the **POINTS** column is used, students add up their points to evaluate their contribution to the Starter City. Some teachers use this rubric for teaching content lessons such as data gathering, or for hard data to assess and grade students’ participation and adherence to the Criteria List.
- ➕ **TIP:** Place a checkmark next to each item on the Criteria List that students were able provide in their Starter City. Have them identify what is missing, talk about the problems and the trade-offs they chose, and consider what they would do to make the Starter City better. Did they meet the needs for their Starter City? What can be improved? Is their Starter City a place where they would want to live? What have they learned from mistakes? What isn’t possible? What might be possible?
- ➕ **TIP:** To commemorate the Starter City of the Future and emphasize a sense of community, students write an original song and/or create banners and invite visitors (administrators, parents, and others) to attend a ribbon-cutting ceremony and ask questions about their original designs during a tour of their City.



## ➔ STEP 5: TEACH GUIDED LESSONS

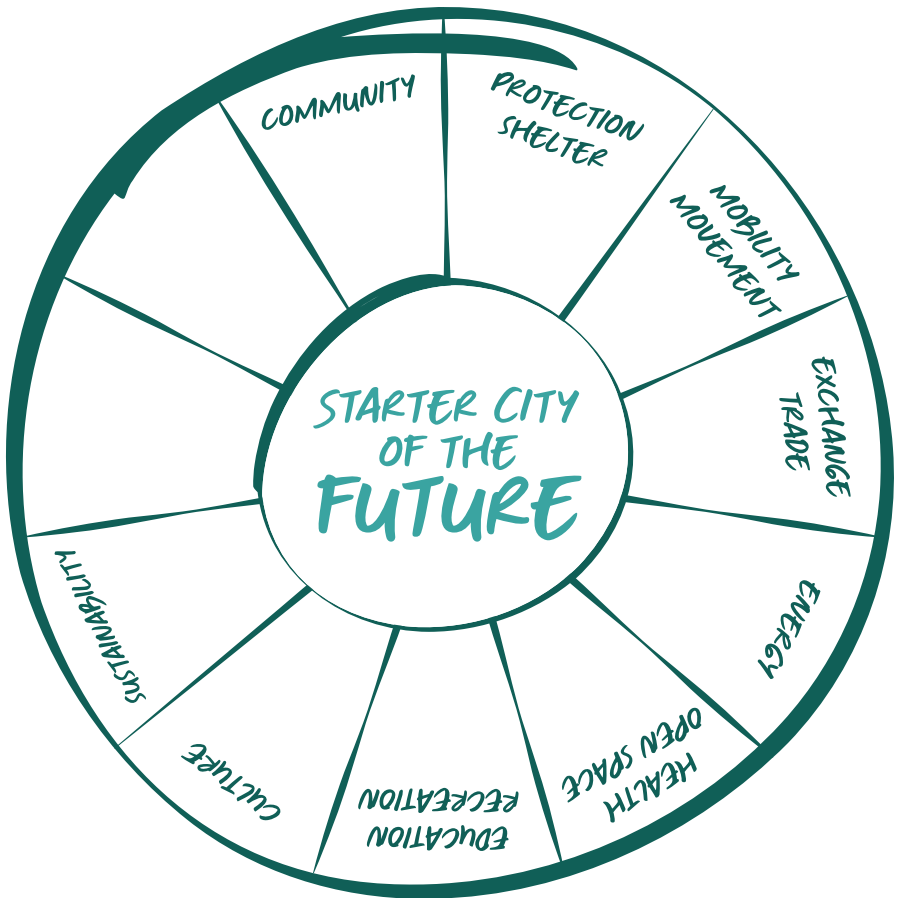
### STUDENTS:

- ▶ Research information
- ▶ Speak
- ▶ Write
- ▶ Compute
- ▶ Make comparisons
- ▶ Chart, diagram, map results

The purposeful play that unleashed self-expression in the Starter City of the Future turns into intellectual rigor. The Starter City is milked for all it's worth through Basic and Advanced Guided Lessons over weeks, a semester, or school year. Students learn factual information around Big Topics and Essential Questions across content subject matter. They develop decision-making procedures to systematically revise the Starter City into a refined City of the Future.



SUBJECT  
**REQUIRED CONTENT**  
THEMES/BIG TOPICS



## EXAMPLE THEME/BIG TOPIC: COMMUNITY

Connecting the Starter City to Basic and Advanced Guided Lesson Across Grade Levels and Content Subjects: Civics/Government, Language Arts, Math, Economics, Science (Physical, Life, Earth and Space), Social Sciences & History, Geography, Engineering & Design Technology, Arts (Visual, Music, Theater, Dance)

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### CIVICS/GOVERNMENT

*Civic Responsibility & Government Studies*

#### BASIC

- ▶ Develop a simple government structure with representatives to govern the refinement of the Starter City.

#### ADVANCED

- ▶ Have an election for the government roles in the city.
- ▶ Divide the Starter City land site into an uneven number of color-coded Districts labeled District A,B,C, D, and E, each in a different color and each having an uneven number of land parcels to avoid ties in voting.
- ▶ Select a Council District Representative for each District and City Commissioners based on functions named on the Criteria List “Needs”: Protection/Shelter, Movement, Energy, Environment, etc.
- ▶ Explain how government policy comes into being, i.e., building heights, rules and neighbors concerns.

- ⊕ **TIP:** Focus on Civics and Government studies by having the class pretend that they were hired by the Federal government to imagine their future community by role-playing the structure and functioning of a City government to run their City, and then use that structure to redesign the Starter City. Appoint or have students elect a Mayor, Council District Representatives, and Commissioners for Housing, Movement, or Energy, Building and Safety, Education, Cultural Affairs, Utilities, Health, Parks and Recreation, and Waste Disposal. (See *Refining the Starter City of the Future Guidebook*)

## ➔ STEP 5: TEACH GUIDED LESSONS



### LANGUAGE ARTS

*Communication Skills: Reading, Writing, Speaking & Listening, Presentation & Data Gathering & Recording Skills*

#### BASIC

- ▶ Write a personal definition of a City after building Starter City.
- ▶ Speak, then write the answer to questions like: How many places and spaces did you build? What kind of buildings or spaces did you build? What was your favorite place or space and why? Who are your neighbors?
- ▶ Write about citizens using what you built and how your designs will function.
- ▶ Write a short story imagining one day in the Starter City.

#### ADVANCED

- ▶ Write a detailed account of what a day in the Starter City might be like and ask Artificial Intelligence (AI) to write the same story, then compare the two.
- ▶ Discuss the City as a metaphor for the human body or other biological entity, for multiculturalism, natural environments (ocean, jungle), or interdisciplinary thinking.



## ➔ STEP 5: TEACH GUIDED LESSONS

### MATH

*Content & Practice, Reasoning, Number and Quantity, Algebra Functions, Modeling, Geometry, Statistics and Probability*

#### BASIC

- ▶ Count the number of letters or syllables in each type of place or space in the Starter City (Shelters, Commercial Buildings, Places to Learn, Open Spaces, Green Spaces, etc.).
- ▶ Group buildings and spaces by height, volume, area.
- ▶ Measure the tallest structures in the Starter City.
- ▶ Measure the distances in inches and centimeters from individual Shelters to the nearest food and water sources.

#### ADVANCED

- ▶ Define a scale for the Starter City and estimate how big a person living there would be.
- ▶ Create a detailed mathematical function (an equation) using a measurement in the Starter City.
- ▶ Calculate the vertex quadratic functions of a parabola based on the measurements of a structure in the city.

## ➔ STEP 5: TEACH GUIDED LESSONS

### ECONOMICS

*Costs, Benefits, Scarcity, Equity, Resources, Supply & Demand, Commodities, Fluctuation, Financial Structures, Modes Of Exchange, Wages, Taxes & Fines*

#### BASIC

- ▶ Distinguish ways that commodities such as food, water, energy, land, space, time, objects, and ideas are traded.
- ▶ Discuss the significance of natural resources as economic commodities and the ownership and control of natural products such as lumber, oil, water, minerals, air, etc.

#### ADVANCED

- ▶ Explore the relationship between the means of exchange and the development of a community.
  - ▶ Discuss the economic effects of poverty and malnutrition in various countries.
- 

### SCIENCE

*Physical, Life, Earth & Space Sciences  
(Chemistry/Biology/Energy/Geology/Environment/Climate)*

#### BASIC

- ▶ List the physical properties of materials in the Starter City.
- ▶ Identify and describe sources for water, food and air needed for populations to survive.

#### ADVANCED

- ▶ Determine types of pollution created by life in the city such as energy, noise, trash, waste, etc.
- ▶ Describe the elements involved in chemical reactions in the City, i.e., fires, industrial pollution

### SOCIAL SCIENCE & HISTORY

#### BASIC

- ▶ Discover the history of cities and why cities are formed.
- ▶ Compare the Starter City location to places being studied (ancient cities like Rome or Greece, or modern cities like Paris or Tokyo).

#### ADVANCED

- ▶ Contrast ways that the population of cities responded to physical and social changes in the past and in the present.
  - ▶ Distinguish the causes and effects of historical events.
  - ▶ Identify inventions and events that have led to the development of new ways that people live in cities.
- 

### GEOGRAPHY

#### BASIC

- ▶ Apply map and globe skills to determine the absolute location of the Starter City Explain the meaning of a map or globe legend, scale, and symbolic representations.
- ▶ Identify sources of pollution or danger near residential areas in the real location of the Starter City (landfills, polluting factories, contaminated water, nuclear plants).

#### ADVANCED

- ▶ Illustrate what is required for a biome, i.e., appropriate plant life based on climate and location.
- 

### ENGINEERING & DESIGN

#### *Structure and Models*

#### BASIC

- ▶ Identify patterns of movement from one area to another.
- ▶ Design a building based on an organic form like a honeycomb, tree, or a shell.

## ➔ STEP 5: TEACH GUIDED LESSONS

### ENGINEERING & DESIGN (CONT.)

#### ADVANCED

- ▶ Propose alternative materials and processes for areas where resources are diminishing.
  - ▶ Discuss mass production of buildings and the creation of modular parts.
- 

### TECHNOLOGY

#### BASIC

- ▶ Compare the computer game SimCity to the Starter City.
- ▶ Name the technologies necessary for a city to function.

#### ADVANCED

- ▶ Build a Starter City with another class and create a user interface for connecting the two.
  - ▶ Ask Artificial Intelligence (AI) for topics for creating a collaborative user interface.
- 

### THE ARTS

*Visual, Sculptural, Music, Theatre, Dance*

#### BASIC

- ▶ Draw front, side, and overhead views of one structure that was built for the Starter City.
- ▶ Identify specific buildings or spaces with musical sounds (high, low, loud, soft, rhythmic, monotone).

#### ADVANCED

- ▶ Dance the shapes of buildings, enlarging them through gestures
- ▶ Identify the components of music, a musical production, a symphony orchestra, musical instruments, etc., as forms of structure.



## BEYOND THE STARTER CITY OF THE FUTURE

DOING MORE WITH INFORMATION LEARNED IN GUIDED LESSONS

### ➔ STEP 6: STUDENTS REVISE DESIGNS

#### STUDENTS:

- ▶ Rebuild Models
- ▶ Apply Lessons
- ▶ Assess
- ▶ Synthesize

With each Theme/Big Topic students practice ways to work together and achieve consensus about how they want their revised city to look and function. They learn Guided Lessons or do projects to become informed citizens and compare their initial designs to what they've learned. They either describe or actually rebuild their revisions to the Starter City of the Future to make it better. (See *Beyond the Starter City of the Future Guidebook*)

The tabletop City remains in daily view as a mnemonic device, bringing metacognition off the page. Students “get” why they have to learn subject matter. They see a reason to work together, and are more likely to gain fluency in using and reusing learned information across the curriculum and in real life.

- ➕ **TIP:** How did learning about Shelter and Protection change your thinking about what you built for the population of your Starter City? How would you revise your designs, based on what you've learned?
- ➕ **TIP:** Now that you've learned about scale, how would you use that information to redesign what you originally built for the Starter City?



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An award-winning, 50-year veteran educator, published author in the field of education, and public school K-12 teacher for 15 years, Nelson developed her Design-Based Learning methodology in the 1960s. Named one of 30 top American innovators in education in 1991 by the New York Times, she is the recipient of both the American Institute of Architecture's prestigious Lifetime Honorary Membership and the California State University's statewide Wang Award for Excellence in Education.

Nelson has taught her methodology to thousands of educators worldwide, at Harvard, Stanford, and the Smithsonian Institution, London's Royal College of Art, and Japan's Sendai Science Museum, and in the computer world, she worked with Apple Computer researchers and contributed to the original Maxis SimCity simulation.

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