

Lesson: **Civil Engineering: Intro to Architecture**

Grade Level: 8-9 – Time Required: 30 minutes – Lesson Dependency: None – Subject Areas:

- Science
- Technology

Summary

Students will learn about what architecture is and what it encompasses. An architect is someone who plans, designs and oversees the construction of buildings and structures. Students will learn how factors dictate and change the parameters of their design. Then they will learn about the architectural advancements surrounding green cities. Finally, students will learn about function and aesthetics and how they're rivals concerning design. To help reinforce the topic and interact with the students, there will be an activity after where students will search for the weirdest designed building and share it with the class.

Engineering Connection

The jobs of both engineers and architects overlap frequently. Both are very engaged in the designing and building of structures we see daily. Every bridge, building, and construction project was made by architects and engineers. While an engineer mainly makes sure that the structure is built to code, is safe, and is exactly as designed, architects design and concern themselves with the plans for the building. Both need to communicate, however, to make sure the structure is built. Using drawings, plans, and more, architects must transmit their ideas.

Learning Objectives

After this lesson, students should be able to:

- Explain what architecture is and what it entails.
- Describe how factors such as cost, codes, function, and area dictate the implementation of a building and its design.
- Explain the relationship between utilitarian design and aesthetics.
- Describe and define a green city.
- Explain the benefits and disadvantages of green cities.

Educational Standards

- International Technology and Engineering Educators Association- Technology
 - [The selection of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function.](#) (Grades 6-8)
 - [Structures rest on a foundation.](#) (Grades 6-8)
 - [Infrastructure is the underlying base or basic framework of a system.](#) (Grades 9-12)
- [VA.912.C.2.8](#)
 - Compare artwork, architecture, designs, and/or models to understand how technical and utilitarian components impact aesthetic qualities.

Attachments

- [Presentation Slides](#) (Slides 1-10)

Materials

- Each student will need a device or computer to participate in the Wackiest Scavenger Hunt Activity

Lesson Background and Concepts for Teachers

The text and lessons that follow coordinate with the attached Google Slides Presentation. Starting from slides 1-10. Each will break down the key objectives in each slide and the points/ideas supporting them and leading to their discussion. You may modify and adapt the examples and explanations to suit your classroom's needs.

Slide 1-

Begin by introducing the topic of architecture. A small introduction of the world around us and the structures encompassing us. Maybe you can take some words from the engineering connection section or start with a question to gauge their interest and to see how much they know of the topic.

Slide 2-

After introducing the topic, define architecture and what architects do. Remember that architects plan, design, and often oversee the construction of their projects. Architecture also differs and changes. For example, both the picture of the castle and the modern house are examples of architecture. Although they look different and have different styles, both were made and designed by an architect.

In the end, what mainly dictates what an architect designs are the different factors and parameters they have.

Slide 3-

Here on this slide, different examples of factors are given. While there are many more, some more specific than others, these are the leading factors when it comes to design. First, define what factors are and then list them. Each of the factors have their example in the form of a picture on the right.

The first is cost. The amount of money and funding a company has will certainly affect the newest design or construction of a new office. When considering a budget, the architect needs to be efficient with the layout.

The area surrounding the new construction project will affect the design. For example, if built in a rural area, there will most likely be plenty of space. In contrast, a more urban area will have less space and the designer has to be conscious of the buildings surrounding it. The landforms such as hills and bodies of water also can change the design.

The purpose of the building changes the design as well. If the purpose of the new project is to contain large quantities of storage it will be big, spacious, and make the most of the space. If the project is for an office, there will most likely be sections, entrances, and exits.

Lastly, building codes will be a major factor in the design of a building. Due to the many standards buildings have to reach to be safe and operable, all the projects have to meet the requirements given. Some of which concerns the materials the building is made of, ventilation, proper exits and sprinklers system, etc.

Slide 4-

Architects have to also keep in mind aesthetics and function. Aesthetics is defined as the way something looks while the function of something is defined as the job or purpose something has to accomplish. These two are clashing and often counterbalance each other. It is the job of the architects to find a balance between the two.

To illustrate this, there are two cars pictured on the right. One is an SUV while the other is a sports car. While both fulfill the purpose of transportation, there are very different benefits and features to each. The SUV is more functional. It has more space, can last longer, takes less gas, and costs less. The sports car, on the other hand, costs more, has less space, and is more fragile, but is more luxurious and looks better.

Slide 5-

Next, we'll go over Green cities. A Green City is an area designed with consideration towards the social, economic, and the environmental impact of the population. Green cities utilize the land, resources, and infrastructure to diminish the environmental impact of the city.

One way of doing so is by incorporating more trees and plants into the city. It would help the environment and also improve the looks of the city as well. City architects have to plan the city and they can build parks as well as incorporate more plant life into the city. They can also efficiently plan the layout of the city to minimize the amount of land used.

Another example would be green initiatives such as supporting electric cars more or investing in smart transportation systems. These would lessen the use of fossil fuels and emissions and also lower the amount of cars on the road.

Finally, measures to save water would not only save money, but help preserve the water sources nearby.

Slide 6-

To further explain this topic, there are listed positives of green cities. The lecturer can decide how deep they want to go into each and explain them.

One easy benefit is less pollution as explained before. Another benefit is that it fights against environmental degradation. Environmental degradation is the deterioration of the environment, due to the depletion and destruction of the resources around it. The more green a city is, the less they pollute and therefore the less degradation there is. With fewer cars on the road, the air, water, and land quality is elevated.

Continuing with the benefits, the value of the properties and cities that are greener are higher than the ones that aren't. The more plant life in the area, the more uses it has, and therefore the value is higher. One example of this is rooftop or community gardens. These are easy sources of produce and are great for the environment and the community involved. With a greener city, recycling is promoted. This leads to less waste, less costs for certain products, and less wasted energy.

Finally, with more trees and shrubs in the area, the biodiversity and wildlife in the surrounding area will be higher. This will benefit the birds and animals, giving them homes and preserving their habitats. This relates to green cities because they have to plan, design, and try to integrate this in their drawings. From city roads to public spaces, architects can use these concepts to benefit the community.

Slide 7-

When introducing greener aspects to a city, there is a very big benefit that many can take advantage of. Fluorescent lighting can be expensive, bothersome, and negative to some people's health. It can cause eye strains and headaches. A more efficient and green approach would be to use normal sunlight. It can conserve energy and heating costs, as well as improve a person's health. It can be therapeutic and it gives important vitamin D. It also helps promote airflow and it makes rooms look bigger, improving the aesthetic.

In the same way, architects can make cities green, they can bring the environmentalist approach to house or office plans. It is on a smaller scale, but architects still take a big part in it.

Slide 8-

The famous landmark of Australia, The Sydney Opera House, is a well known and interesting building. While being unique in its structure and design, the building uses the nearby seawater to help power both its heating and electricity systems. It is an extremely cool feature that had to be both thought of and designed by architects.

Slide 9-

A grand gesture of scientific discovery and progress in the late '50s, Atomium was built at the 1958 Brussels World Fair. This 335' tall building has an unusual design. With its nine, iron spheres, the extremely heavy structure is still standing and as strong as ever due to the design of its architects: Jean and André Polak.

Slide 10-

To conclude the lesson, introduce the activity "Wackiest Scavenger Hunt". Encourage the students to research and find the weirdest and most wacky piece of architecture or building they can find. Once they find it they can share it with the class. The lecturer can choose the amount of time given to find it or maybe assign it as homework. Perhaps when presenting the activity, they can turn it into a competition to see who can submit the most unique one.

Associated Activities

Wackiest Scavenger Hunt- After the examples of two distinct architectural marvels on slides 5 and 6, comes the activity "Wackiest Scavenger Hunt". The premise is simple, invite the students to do some of their own research and present them with the challenge of finding the craziest, most bizarre architectural constructions and designs. As they find the absurd designs, look at their suggestions with them. You can use this as an opportunity to discuss things such as functionality, cost, and convenience while encouraging discussion and participation.

Design Process and Drawings- Another related lesson I suggest looking into is the "Design Process and Drawings". The lesson and activities tie into architecture and the basics of how buildings are designed, drawn, and discussed. You can learn more in the "Lesson Extension" section, or investigate it for yourself [here](#).

Lesson Closure

Lesson closure begins after the activity ends. The presenter can choose to have a small class discussion about the topics they learned or they can dismiss the class after naming the winner of the scavenger hunt. The

lecturer can also extend the lesson if they choose to do so. Read the “Lesson Extension” section for more ideas or suggestions on how to extend the topic.

Vocabulary/Definitions

Architecture - *The art or practice of designing and constructing buildings.*

Green Cities - *A city designed with consideration for social, economic, and environmental impact.*

Ecological - *Relating to or concerned with the relation of living organisms to one another and their physical surroundings.*

Criteria - *A principle or standard by which something may be judged or decided.*

Infrastructure - *The basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.*

Aesthetic - *Concerned with beauty or the appreciation of beauty.*

Utilitarian - *Designed to be useful or practical rather than attractive.*

Assessment

Pre-lesson Assessment

As a pre-lesson assessment to gauge the level of knowledge of the students attending the instruction, the lecturer may start the lesson with a question (slide 1). For example, “Does anyone know what an architect does?” is a simple way to encourage participation and at the same time serve as an indicator for their level of familiarity with the topic.

During the Lesson

During the lesson, there are many instances where a quick question or poll would be a good idea to motivate the students’ analytical sides. When contrasting aesthetics and design, the presenter can choose to ask what some benefits and drawbacks are of certain examples. One example could be an office. What beneficial features does the office have for its function, and what features does the office have that affect its looks.

Post-Lesson Assessment

A mini discussion or question regarding what they learned or liked of the topic could be a great post-lesson assessment. The idea behind it is not really to encourage them to think, but just to motivate the students to share something they liked or to just recall something new they encountered or found interesting throughout the presentation.

Lesson Extension

Consider adding and using the lecture plan “Design Process and Drawings” to further your lesson and to help reinforce the topic of architecture. The lesson goes over the engineering design process, how it is used, its importance, and how drawings are integral in the world of engineering. Those topics can tie in with architecture, as both the design process and technical drawings are essential in the field.

If you choose not to add the “Design Process and Drawings” lecture plan, then contemplate adding another activity such as Kahoot, Quizizz, or Nearpod’s Race to The Top, which are education-friendly sites that aid in the recall and revision of the material taught.

References

All of the references towards the pictures used during the lesson presentation have the credits in the slide notes.

Dictionary.com. Lexico Publishing Group, LLC.. (Source of most vocabulary definitions, most of which were done in my own words) <http://www.dictionary.com>

CPALMS Standards and Achievement Standards Network (Source of educational standards)
<https://www.cpalms.org/Public/search/Standard> <http://asn.jesandco.org/resources/ASNJurisdiction>

Contributors

Abiel Vasallo, Jorge Diaz, Reuben Latorre, Kyle Kamiya, Victoria Velazquez, Justin Barroso, Alex Garrido

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