



Architecture and Construction

A Note on Teamwork and Presentations to Further Connect WRS to the Activity:

- Identify the competency or unit in your program that would be most appropriate for teaching this activity synchronously. Students learn best in context.
- Divide the class into competitive teams (at least two).
- Have the teams brainstorm ideas and establish rules for brainstorming: all ideas are accepted.
- Have teams arrive at consensus and choose their best idea to propose.
- Teams should establish norms, roles, and expectations for team members.
- Teams will clearly define their mission and the idea of their proposals.
- The teacher should act as the judge of the quality and feasibility of the ideas.
- Teacher should also provide enough background to get students started and monitor student behavior along the way, providing helpful feedback when necessary.

Students should share work and reflect on how well the team worked together.

Scenario(s)

The emergence of BIM technologies are rapidly impacting the capabilities and interactions between concept and finished structures in the architecture and construction industry. Consider the following technologies and apply them as your proposal or solution:

- 3-D Printing
- Digital Twinning
- Augmented Reality

Divide the class up into three teams, each with one of these core BIM technologies (above) as their focus.

Teachers may choose one or both of the following scenarios for their students, depending on the mix of students and their career pathways.

If you are in an Architecture-related program:

You work for an architectural design firm that wants to add one of the BIM technologies listed above. Your team is assigned one of the technologies and you must create a presentation to your CEO (i.e., employer) on the technology describing

- what it is exactly



- its potential benefits to your business
- some of the concerns about acquiring this new technology, including
 - cost, acceptance, obsolescence, and cost of training and maintenance required.
- You must also address the five WRS within your presentations. These could be benefits of adopting the new technology, the effects on the individual worker or designer in your firm, or you may choose to apply those WRS to analyze the dynamics of working within your team to create the presentation. Some process questions are provided beneath each skill area.

Note: Teachers in Architecture: Please provide your students with the basic makeup of the design firm they work for and the types of customers they serve.

If you are in a Construction-related program:

Based on your career pathway, the teacher will assign you to one of the BIM technologies in which to earn a credential. You will present your findings to the teacher and class on

- the credential options you have found
- what it takes to get into the program, and how much each option will cost, including the time it will take to earn the credential.

Note: Students may work with others of similar credential pathway and present findings as a team assigned to one of the BIM technologies.

Resource

What are BIM technologies?: <https://www.evolemep.com/top-3-innovations-likely-to-transform-bim/>

Note: Teachers, divide your class into teams of at least two students each to cover the following topics. You may first ask students to divide themselves, based on interest or career path, but try to assign all the topics or as many as you feel would be worthy of their time.



WRS Connection

Each of the following Workplace Readiness Skills with their definitions is followed by a series of process questions that students may pull from and answer to include within their presentations.

1. Creativity and Innovation—We define creativity and innovation as:

- Discussing the importance of creativity and innovation in the workplace
- Brainstorming and contributing ideas, strategies, and solutions
- Developing and/or improving products, services, or processes
- Identifying and allocating available resources.

Process Questions (Architecture):

- a) Describe the primary or initial creativity that is required within any design field. How do these creative requirements effect your choices of BIM technologies? In other words, how does BIM aid your creativity?
- b) How can BIM affect innovation?
- c) What are the differences between creativity and innovation?
- d) What were your creative considerations for your presentation?
- e) In the design field, what are some basic strategies you might use to maintain or increase your creativity?
- f) What importance do you attribute to creativity and innovation within your career path?
- g) How does allocation of available resources affect your decision to acquire a new technology?

Process Questions (Construction):

- a) Why do individuals involved in construction need to be extremely resourceful? Provide examples.
- b) How might BIM affect your ability to innovate?
- c) What are the differences between creativity and innovation?
- d) What were your creative considerations for your presentation?
- e) Why do you need to be resourceful and creative when considering options to promote your career path success? Or to seek out educational opportunities?
- f) What do creativity and continuous learning have in common?
- g) What is the essential connection between creativity and construction?



2. Critical Thinking and Problem Solving—We define critical thinking and problem solving as:

- Recognizing and analyzing problems
- Evaluating potential solutions and resources
- Using a logical approach to make decisions and solve problems
- Implementing effective courses of action.

Process Questions (Architecture):

- a) How can BIM aid your ability to analyze problems?
- b) How can BIM aid your ability to evaluate potential solutions and consider applications of diverse resources?
- c) How does BIM embody one's ability to consider effective courses of action? What is the benefit of quickly and effectively considering multiple models and a variety of changes?
- d) How does cost of adopting BIM for your workplace ultimately affect decisions regarding its purchase and implementation? What do you need to prove by recommending the adoption of this technology?

Process Questions (Construction):

- a) When considering certification or education options, what essential problem are you trying to solve?
- b) How do you effectively evaluate certification or education options within your career pathway?
- c) Why is it important to set appropriate goals before making decisions about your future?
- d) How often should you evaluate your career goals and education?

3. Initiative and Self-Direction—We define initiative and self-direction as:

- recognizing the importance of proactive, independent, decision-making
- identifying workplace needs
- completing tasks with minimal direct supervision
- applying solutions.

Process Questions (Architecture):

- a) In what ways can BIM encourage proactive, independent, decision-making?
- b) What is the positive effect of proactive, independent, decision-making on anyone's business enterprise?
- c) How can you make your presentation an example of initiative and self-direction?
- d) How can using BIM reduce the need for the amount of supervision or management?



- e) Small teams can often increase the need for and benefits of initiative. How might this be an improvement over larger operational structures in the workplace?
- f) What are the benefits of proposing your BIM solution or innovation to your superiors in the workplace?

Process Questions (Construction):

- a) In what ways does seeking career advancement and continual education require proactive, independent, decision-making?
- b) What is the positive effect of proactive, independent, decision-making on anyone's business enterprise?
- c) How can you make your presentation an example of initiative and self-direction?
- d) How might you demonstrate initiative on a construction work site? What is the connection to your educational preparedness?
- e) How might keeping up with your education, certifications, and awareness of technological advances make you more attractive to potential employers? What does it demonstrate beyond skill advancement?

4. Integrity—We define integrity as:

- recognizing the importance of having integrity in the workplace
- complying with local, state, and federal laws
- adhering to workplace policies and procedures
- exhibiting honesty, fairness, and respect toward self, others, and property.

Process Questions (Architecture):

- a) How would adoption of your BIM option assist compliance with local, state, and federal laws governing building codes and structural integrity?
- b) How could adoption of your BIM option affect company policy or procedures?
- c) What is technological obsolescence and how do you recognize it?
- d) When creating proposals, it is important to present factual information, even when it may work against your objectives. Why is it important that you try NOT to misrepresent costs and other features in your proposals?

Process Questions (Construction):

- a) How would adoption of your BIM-related certification assist compliance with local, state, and federal laws governing building codes and structural integrity?



- b) What is the basic connection between integrity and any certification or standard, code, procedure, or regulation in the construction industry? Why are they important?
- c) Describe how your certification or educational option complies with local, state, and federal law.

5. Work Ethic—We define work ethic as:

- demonstrating diligence (e.g., working with persistence to accomplish a task)
- maintaining dependability (e.g., being reliable)
- accounting for one’s decisions and actions
- accepting the consequences of decisions and actions.

Process Questions (Architecture):

- a) Describe how your BIM option could affect designer diligence.
- b) Describe how your BIM option could affect dependability.
- c) Describe how your BIM option could affect designer accountability and confidence in decisions.

Process Questions (Construction):

- a) How might successfully earning industry certification demonstrate a strong work ethic?
- b) How do certifications and educational accomplishments help employers recognize that workers are dependable, competent, and reliable?
- c) What could happen to work ethic and company morale if employees did not participate in professional growth opportunities?

We strongly encourage teacher feedback on these activities, if implemented, as well as success stories and examples of your completed work. Reviews may be sent to Darren Morris, Instructional Designer, CTECS, dmorris@cteecs.org.

For teachers who wish to expand the activity into a larger project, the following PBL Design Principles and Teaching Practices are provided

PBL Project Design Principles

1. **A Challenging Problem or Question:** The project is framed by a meaningful problem to be solved or a question to answer, at the appropriate level of challenge



2. **Sustained Inquiry:** Students engage in a rigorous, extended process of posing questions, finding resources, and applying information.
3. **Authenticity:** The project involves real-world context, tasks and tools, quality standards, or impact, or the project speaks to personal concerns, interests, and issues in the students' lives.
4. **Student Voice & Choice:** Students make some decisions about the project, including how they work and what they create, and express their own ideas in their own voice.
5. **Reflection:** Students and teachers reflect on the learning, the effectiveness of their inquiry and project activities, the quality of student work, and obstacles that arise and strategies for overcoming them.
6. **Critique & Revision:** Students give, receive, and apply feedback to improve their process and products.
7. **Public Product:** Students make their project work public by sharing it with and explaining or presenting it to people beyond the classroom.

PBL Teaching Practices

1. **Design & Plan:** Teachers create or adapt a project for their context and students, and plan its implementation from launch to culmination while allowing for some degree of student voice and choice.
2. **Align to Standards:** Teachers use standards to plan the project and make sure it addresses key knowledge and understanding from subject areas to be included.
3. **Build the Culture:** Teachers explicitly and implicitly promote student independence and growth, open-ended inquiry, team spirit, and attention to quality.
4. **Manage Activities:** Teachers work with students to organize tasks and schedules, set checkpoints and deadlines, find and use resources, create products and make them public.
5. **Scaffold Student Learning:** Teachers employ a variety of lessons, tools, and instructional strategies to support all students in reaching project goals.
6. **Assess Student Learning:** Teachers use formative and summative assessments of knowledge, understanding, and success skills, and include self and peer assessment of team and individual work.
7. **Engage & Coach:** Teachers engage in learning and creating alongside students, and identify when they need skill-building, redirection, encouragement, and celebration.