

Chapter 2: Designing and Assessing 21st Century Learning

INSTRUCTOR NOTES

This chapter addresses ISTE NETS-T 2, 4, and 5.

Chapter Goal

Understand how to design and assess 21st century learning.

Knowledge Outcomes

By the end of the chapter, students should be able to do the following:

1. Describe the similarities and differences in learning theories.
2. List the eight principles of effective instruction for 21st century learners.
3. Describe the similarities and differences in the principles of effective technology and media utilization.
4. Describe the similarities and differences between the types of effective learning assessment.

Chapter Overview

This chapter builds on the 21st century framework for learning discussed in Chapter 1. The chapter begins with an overview of learning theories, followed by principles of effective instruction, effective technology utilization, effective media utilization, and effective learning assessments.

Using This Chapter

The “Principles of Effective Learning Assessment” section offers several possibilities for teachers interested in exploring authentic assessments. This complements the chapter’s discussion on learning theories.

Professional Vocabulary

AUTHENTIC ASSESSMENT- As a performance-based evaluation of a student’s demonstration of learning in a natural context.

BEHAVIORISM- A theory that equates learning with changes in observable behavior; with this theory, there is no speculating about mental events that may mediate learning.

BENCHMARKS- Standards which students are tested against.

COGNITIVISM- A theory according to which mental processes mediate learning and learning entails the construction or reshaping of mental schemata.

CONSTRUCTIVISM- A theory that considers the engagement of students in meaningful experiences as the essence of learning.

ELECTRONIC PORTFOLIO (E-PORTFOLIO)- A digital collection of student work that demonstrates progress in learning as shown in student self-reflections of the portfolio contents.

INFORMATION- Knowledge, facts, news, comments, and content as presented in memos, lectures, textbooks, or websites.

INSTRUCTION- Any intentional effort to stimulate learning by the deliberate arrangement of experiences to help learners achieve a desirable change in capability.

LEARNING- The development of new knowledge, skills, or attitudes as an individual interacts with information and the environment.

MEDIA LITERACY- The ability to interpret and produce a wide variety of media, including text, audio, visuals, and video, which are often combined to form multimedia.

METACOGNITION- The ability to oversee one's personal learning and to understand how to regulate oneself in the learning process.

MULTIPLE INTELLIGENCES- A concept developed by Howard Gardner, the theory states that not everyone has the same abilities nor do they learn in the same way. There are nine aspects of intelligence.

NETS-S- National Education Technology Standards for Students; six critical skills students need to achieve success in school and in future careers.

PORTFOLIO- An integrated collection of student work including a variety of media to demonstrate progress and accomplishments.

RUBRIC- A set of assessment criteria for appraising or judging student products or performances.

SOCIAL PSYCHOLOGY- The study of the effects of the social organization of the classroom on learning.

STANDARDIZED TESTS- State-wide tests that are administered in a consistent manner and using the same scoring procedures. These are used to identify student learning that is meeting or exceeding state standards and to determine where there is a need for improvement.

TECHNOLOGY LITERACY – Students' abilities to engage in the use of technology to support their learning and show competency in six key areas: creativity and innovation; communication and collaboration; research and information fluency; critical thinking, problem solving, and decision making; digital citizenship; and technology operations and concept.

INSTRUCTIONAL ACTIVITIES

Suggested Materials

1. There are a number of free Internet videos on the topic of technology in schools and student assessments. You may wish to search for a video to introduce Chapter 2.
2. Post-it notes
3. Photos and/or video of media collected by your students in Chapter 1
4. Television or Internet commercial (pre-record, download, or stream)
5. K-12 text books and other text-based instructional materials

Introduction

Suggested Activity. Ask your students about their own learning styles. How do they learn best? How do they know when they have learned something? What roles do technology and media play in their learning?

Learning Theories

BEHAVIORIST PERSPECTIVE

Suggested Activity. Many students have no background in Skinner's work in operant conditioning. It would be ideal for students to see or, preferably, participate in an actual animal conditioning experiment as a way to make operant conditioning principles more concrete and meaningful. There are logistical difficulties entailed that will prevent most

instructors from offering this experience. If you have access to the Plato computer software you can use a program called “Rat Lab” which gives the learner a graphically simulated rat in a Skinner box. By pressing keys on the keyboard you can control the dispensing of food pellets as the rat moves around the box. It is programmed to respond as a real animal would. By applying previously learned principles of reinforcement, it is possible to shape the behavior of the simulated rat.

It is possible, however, to offer an analogous exercise in class with no equipment, supplies, or specialized experience necessary. In this exercise, one of the class members will have his behavior “shaped.” Actually, you will not be using real reinforcements, so this is really an analogy or simulation. The procedures are as follows:

- Ask for volunteers to be the experimental subject and select one of them by some random method.
- Send the subject out of the room.
- Collaborate with the remaining students to choose some simple task to be “shaped.” A behavior such as standing on one leg with hands on head, pulling down a window shade, drawing a simple geometric figure on the chalkboard, or the like works well.
- Bring the experimental subject back into the room.
- The instructor becomes the conditioner. You shape the subject’s behavior by giving positive feedback to each action that tends in the correct direction. For example, you say “good” every time his right foot rises... “very good” as he tentatively holds the foot in mid-air... “excellent” as he stands for a few seconds on one leg...and so on. The key is to ignore all unwanted actions and to positively reinforce each movement in the correct direction (“successive approximations” in the terms of operant conditioning).
- Conclude the exercise as soon as the desired behavior is achieved. Stop after about five minutes whether or not complete success has been achieved. (In our experience, it works out well about 80% of the time.)

If the experiment has failed to some extent, use this to lead into a discussion of where it went wrong. Interview the subject to find out what might have confused him/her. In any event, conclude with a discussion of the elements of operant conditioning that were observed. Note that your procedures did not allow the use of “prompts” as in a prompt-response-reinforcer paradigm. Discuss how the shaping could have been speeded up by the use of prompts, a different form of feedback, and so on.

COGNITIVIST PERSPECTIVE

Suggested Activity. Cognitivism explores the mental processes individuals use to respond to their environment. In other words, cognitivism is about how people think, solve problems, and make decisions. Point out the active nature of the learner in the cognitive perspective. Then, ask your students to think about their last trip to the grocery store. What mental models did they use to 1) Decide a trip to the grocery store was necessary, 2) Plan the trip, 3) Navigate the store, 4) Choose items, and 5) Successfully check out.

CONSTRUCTIVIST PERSPECTIVE

The heart of constructivism lies in active learning. New knowledge is created when prior knowledge is activated and learners actively participate in new experiences. Constructivists believe that learning occurs most effectively when learners are engaged in authentic tasks that relate to meaningful contexts. Jonassen advocates using problem-solving as an instructional technique and suggests that the computer is a necessary tool for students. He suggests that

students need to have access to computer technologies in order to be able to resolve real-world problems. His book, *Learning to Solve Problems with Technology: A Constructivist Perspective* (2003), is a resource students might wish to read for a report in class.

Suggested Activity. Divide the class into groups. Each group will use their laptops or mobile devices to locate a newsworthy current event. The topic might be local, national, or global but should involve an unresolved problem. Have your students decide on a hypothetical constructivist strategy for teaching the current event. The strategy should be a draft to stimulate thinking rather than a full lesson plan. Your pre-service teachers might consider the following:

1. What problem(s) are my students attempting to resolve?
2. What do I want my students to learn from this activity?
3. How will I activate their prior knowledge?
4. What is the context of the situation or problem?
5. How will I ensure all students actively participate?
6. What is the role of technology in this learning experience?

You may wish to have each group present their constructivist strategies informally.

SOCIAL PSYCHOLOGY PERSPECTIVE

Suggested activity: Group discussion. Discuss some or all of the following as they relate to the social organization of a classroom and learning: furniture, independent study, small groups, whole class, student control, rewards, competition, cooperation, and technology-based social networking. You may wish for your students to research and design learning activities using their knowledge of social psychology.

Information and Instruction

Suggested activity: role-play. Provide an instructional topic and select one student to play the role of teacher and another to be a student. In a classroom context, the teacher will defend his/her presentation of information while the student argues that no instruction occurred. Here is a hypothetical example on the topic of photosynthesis.

Teacher: Bobby, you made a 69 on your science test. What happened?

Bobby: You didn't teach me about photosynthesis.

Teacher: Yes I did, I stood here and told the whole class about photosynthesis. You must not have listened.

Bobby: I remember you talking about photosynthesis but I did not learn it.

Teacher: What do you mean you didn't learn it? I told you all about photosynthesis.

Bobby: I suppose you did tell us but I cannot remember the details. I have to DO something or I don't remember...

Allow the role-play to continue for a few minutes, each participant defending his/her point of view. Then, open the topic for class discussion; what is the difference between information and instruction?

Principles of Effective Instruction for 21st Century Learners

Suggested activity. List and number the eight principles of effective instruction on the whiteboard or other display surface. Have the students in your class number off 1 – 8. Each number will correspond to one of the eight principles of effective instruction. Provide students with a few Post-it notes. Set a timer for 5 minutes and ask your students to develop a strategy for meeting the corresponding principle of effective instruction. Upon completion, students should place the Post-it under the corresponding principle. (Example: Grouping students according to hobbies or interests would be posted under the fifth principle of providing social interaction.) In order to avoid duplication and encourage creativity you may wish to have students return to their seat and develop a new instructional strategy if their

Post-it duplicates another. Conclude the activity by inviting students to tour the strategies and vote for their favorite, the most original, or the most practical strategy. If your class has created a class website or social network, an alternative to using Post-it notes could be to post their ideas online in discussion threads organized by the principles of effective instruction.

Principles of Effective Technology Utilization

The authors' emphasize use of technology by instructors and students. The NETS-S specifically outline expectations for student use of technology to guide their learning.

Principles of Effective Media Utilization

Teachers should guide their students to use media as sources for their learning in ways that are wise, safe, and productive.

Suggested Activities.

1. Revisit the media activity from Chapter 1. View the instructional media examples collected by your class and discuss the intended audience, message, medium and setting.
2. View a television commercial and discuss the commercial in relation to the intended audience, message, medium and setting.
3. View an information or news website and discuss the intended audience, message, medium and setting.

Have your students determine the accuracy of the above media messages by finding multiple sources to support or discredit the original media. Point out that the NETS-S address many of the skills learners need to be successful consumers of the media resources. Finally, ask your students to discuss ways in which they might share their media knowledge with others. How would your students create their own instructional media?

Principles of Effective Learning Assessment

The type of assessment depends on the learning activity. The ability to determine which type of assessment fits the objective is an important skill for teachers to possess. In addition, the use of rubrics and a variety of portfolio and authentic assessments will assure a fair and meaningful assessment for students.

Suggested Activities.

1. Explore <http://electronicportfolios.org> for examples of an e-portfolio. Discuss how these might be used in the classroom – both by the teacher and the student.
2. Divide the class in half or into multiple groups. Ask half the class to formulate an argument in favor of traditional portfolios and the other half in favor of electronic portfolios. Discuss the advantages and disadvantages of each.
3. Examine a lesson plan found on the web. Determine an appropriate authentic assessment.

Questions for Thought

At the end of the chapter the authors have included *Demonstrating Professional Knowledge and Skills*. Included in those questions and activities are opportunities for students to reflect on their learning. You might wish to expand their reflections by asking questions such as these:

1. Does one learning theory address your particular content area more than another?
2. Which of the eight principles of effective instruction is most important? Which is more intuitive for a 21st century learner?
3. As a teacher, how do you know when it is the right time to utilize technology and media?

4. Regardless of the assessment type, why are rubrics an important tool?

TEST BANK

Chapter Two: Designing and Assessing 21st Century Learning

True-False.

1. Students learn, or process information, in similar ways. (p.28)
A. TRUE
B. FALSE
2. According to the principles of effective instruction, classroom teachers need to continually think about the best ways to engage their students in the learning process and how to meet the needs of all their learners. (p.23)
A. TRUE
B. FALSE

3. Students should be taught that a single media source, such as a television program or a web site, used to conduct research or form an opinion, is a reliable source of information. (p.29)
 - A. TRUE
 - B. FALSE
4. According to the National Education Technology Standards, students should use technology to guide their learning and are expected to show creativity and innovation. (p.28)
 - A. TRUE
 - B. FALSE
5. Rubrics are used to appraise or judge student work. (p.31)
 - A. TRUE
 - B. FALSE
6. Technology tools such as *Storymaker* allow students to demonstrate multiple intelligences in a single activity for project. (p.28)
 - A. TRUE
 - B. FALSE

Multiple Choice Questions.

7. _____ is the development of new knowledge, skills, or attitudes as an individual interacts with information and the environment. (p.21)
 - A. Multitasking
 - B. Evaluation
 - C. Motivation
 - D. Learning
8. Which statement best describes metacognition? (p.22)
 - A. The development of new knowledge, skills, or attitudes
 - B. The ability to oversee one's own learning
 - C. The desire to see a task to completion
 - D. Strong interpersonal skills
9. Learning can take place (p.21)
 - A. When learners interact with each other, teachers, or media
 - B. Without learner interaction
 - C. Without new information
 - D. When learners sit quietly in their desks
10. The concept of multiple intelligences was developed by (p.28)
 - A. Skinner
 - B. Gardner
 - C. Piaget
 - D. Slavin

11. Bodily/kinesthetic, Verbal/linguistic, and Logical/mathematical are examples of (p.28)
- A. Behaviorism
 - B. Cognitive
 - C. Multiple Intelligences
 - D. Constructive
12. The engagement of learners in meaningful experiences is a part of (p.22)
- A. Constructivism
 - B. Behaviorism
 - C. Cognitivism
 - D. Social Psychology
13. Mrs. Standora is developing a science lesson for her 8th graders. Her presentation on the plant life cycle will include PowerPoint slides and a teacher-made handout. Afterward, students will use information from class along with their own research to publish an online petition against deforestation. Their work is an example of: (p.30)
- A. E-portfolio
 - B. Authentic Assessment
 - C. Behavior Theory
 - D. Common Core Learning Standards

Short-Answer and Essay Questions.

14. Describe the Behaviorist learning theory. (p.21-22)
15. Describe the Cognitivist learning theory. (p.22)
16. Describe the Constructivist learning theory. (p.22-23)
17. Describe the Social Psychology learning theory. (p.23)
18. Compare and contrast information and instruction. (p.25)
19. Describe the eight principles of effective instruction as they are described in the text. (p.24)
 - a. Assess prior knowledge
 - b. Consider individual differences
 - c. State objectives
 - d. Develop metacognitive skills
 - e. Provide social interactions
 - f. Incorporate realistic contexts
 - g. Engage students in relevant practice
 - h. Offer frequent, timely, and constructive feedback
20. Suppose you are developing a classroom activity, project, or lesson and you want to utilize principles of effective technology and media. Discuss the most important learning objectives, content, technology and media skills/concepts students will need to know and

develop as they work on the project. Then, determine the best type of assessment for the activity. (p.24)

21. Create a rubric that could be used to assess a student blog. Assume the blog contains posts related to chapters in a classic work of fiction suitable for a high school student. (p.30-34)

Chapter Two: Designing and Assessing 21st Century Learning Answer Key

1. B. FALSE
 2. A. TRUE
 3. B. FALSE
 4. A. TRUE
 5. A. TRUE
 6. A. TRUE
 7. D. Learning
 8. B. The ability to oversee one's own learning
 9. A. When learners interact with each other, teachers, or media
 10. B. Gardner
 11. C. Multiple Intelligences
 12. A. Constructivism
 13. B. Authentic Assessment
14. B.F. Skinner proposed that rewarding desired responses shapes behavior patterns. Behaviorists rely on observable behaviors.
15. Cognitivist Theory: Models for how learners receive, process, and manipulate information. Learners depend on their own cognitive strategies rather than being dependent on the teacher. Students develop cognitive strategies when they combine information and skills stored in long and short-term memory to deal with complex tasks.
16. Constructivist Theory: Students interact with meaningful experiences to problem solve and discover. Teachers create environments to facilitate student-centered learning and create their own knowledge.
17. Social Psychology Theory: The social organization of a classroom impacts learning. Robert Slavin proposed cooperative learning strategies and techniques that include small-groups, learner-controlled instruction and rewarding group successes.
18. Information is general in nature and provides an overview or background for a topic; it is not meant to be memorized. Instruction however, is designed to stimulate learning. Instruction is a careful design of experiences intended to help learners engage with content in order to gain new knowledge and skills.
19. a. Assess prior knowledge: What do your students already know?
b. Consider individual differences: Lessons should provide for the multiple learning needs of your students; allowing them to progress at different rates, use different materials, and participate in different activities.
c. State objectives: What do you want your students to learn?
d. Develop metacognitive skills: Help students understand how they learn and the resources that will assist them.
e. Provide social interactions: Allow students to learn by collaborating with others.
f. Incorporate realistic contexts: How does the new knowledge fit into their real world?
g. Engage students in relevant practice: Participation and practice lead to deeper levels of learning.

h. Offer frequent, timely, and constructive feedback: Students need to know if they are on the right track. Feedback can come from a teacher, peer, computer software, etc.

20. Answers will vary.

21. Answers will vary.