Simulation Learning

This guide is intended to help faculty members who instruct a portion of a course in a science laboratory or practical space. It provides information on alternate methods for completing lab-based exercises.

What is simulation learning?

- Simulation learning is a generic term that refers to an artificial representation of a real world process to achieve educational goals through experiential learning (Abdulmohsen, 2010).
- Simulation-based education is defined as any educational activity that uses simulation aides to replicate real world scenarios.

Types of simulation learning

- **Human-assisted learning:** An assistant sits with a student, and the student provides direction on the steps of the experiment. (Example: a laboratory or technical assistant; see *Hiring Lab Assistants for Students with Disabilities*.)
- **Mechanical assistance:** A machine is used as a physical surrogate, performing defined tasks in lieu of a person providing assistance to the student. (Examples: rapid prototyping lab in an art and design studio setting; robotics in a science lab environment.) Of note, the technologies employed in mechanical assistance are not specifically designed for use by persons with disabilities; rather they are mainstream technologies that can be adapted for specific applications in the learning environment.
- **Virtual learning:** A student sits in front of a computer and watches or participates in an online or virtual experiment or demonstration. (Example: the digital dissection of a frog, which simulates the actual dissection process.)

Important considerations when applying simulation learning

- Traditional simulation learning allows the acquisition of skills through deliberate practice rather than an apprentice style of learning (Abdulmohsen, 2010).
- Simulation tools serve as alternatives to conducting experiments or directly performing required tasks in a laboratory or practical space setting.
- One key construct that differentiates simulation learning from other forms of learning is that, in many cases, the student is “virtually” present, rather than physically present or engaged in the learning environment.

- Of the three types of simulation learning, human-assisted learning provides the student with the opportunity to have the most closely associated interaction with the task(s). Virtual learning, which is mostly removed from the lab or practical space setting, would offer the least opportunity for direct interaction with the task(s).
- Human-assisted learning and mechanical assistance are potentially costly and resource-intensive to implement and maintain. It may be difficult to recruit and retain technical assistants with the appropriate skills set and qualifications.
- The application of mechanical assistance depends on readily available technological resources. Many of these pieces of equipment are expensive to purchase and maintain, so their use may be outside the financial scope of many learning environments.
- Because simulation learning lacks a direct hands-on component, it is important to determine up front whether simulation learning allows the student to achieve all required competencies that would be met through direct physical interaction with the task (see *Identifying the Essential Requirements of a Course or Program*). Otherwise, it is possible that students may miss key steps in the learning process.
- Relying on virtual learning can be difficult, because the student does not have the opportunity to interact with the required tasks in the same manner as if a laboratory or technical assistant were provided.
- Where possible, virtual learning should be a secondary option, and only used in cases where a laboratory or hands-on experience is not feasible.