



## Simulation as a Teaching Strategy

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### What is a Simulation?

Experiential learning such as simulation has been promoted as a means to challenge student's misconceptions (McClintock, 2000). Experiential learning encourages higher-order learning, which promotes critical thinking abilities and self-directed learning (Kreber, 2001). Hakeem (2001) found that students involved in experiential learning have a greater understanding of their subject matter than students in a traditional lecture-only class. Rocha (2000) reported that students enrolled in classes where experiential learning methods are used perceived themselves as more competent practitioners than students in classes without these methods.

One form of experiential learning used in educational and community settings is simulations, engaging an audience in active learning where participants learn from each other, not just from the "sage on the stage" (Dorn, 1989). In business-related classes, simulations have been used to model international trade (Truscott, Rustogi, & Young, 2000) and the development of business enterprises (Goosen, Jensen, & Wells, 2001). In family life education, they have been used to illustrate divorced and remarried families (Crosbie-Burnett & Eisen, 1992) and interactions between partners (Osmond, 1979). Social science courses studying institutions and individuals have simulated life in mental hospitals (Claiborn & Lemberg, 1974), and in prison (Haney, Banks, & Zimbardo, 1973). For teaching about poverty, Jessup (2001) maintains that: "Simulations are also more effective than conventional teaching methods at emphasizing abstract concepts over factual information, engendering empathy, and serving as a reference for ongoing discussions regarding social inequality" (p.103).

### Implementation

Three elements are necessary for effective simulations; preparation, active student participation, and post-simulation debrief.

#### Preparation

Although instructional simulations can be very effective in encouraging student's engagement, many simulations require intensive pre-simulation lesson preparation. Preparation varies with the type and complexity of the simulation. Most simulation creators suggest that simulations are best when:

- Simulations are tied to the course goals.
- Facilitators read ALL the supporting material for the simulation.
- Facilitators do a trial run or participate in the simulation before assigning the simulation to students, when possible.
- Facilitators make sure that university facilities support the simulation when facilities are needed.
- Instructors integrate instructional simulations with other pedagogies such as cooperative learning.
- Instructors should anticipate ways the simulation can go wrong and include this in their pre-simulation discussion with the class.





## Active Student Participation

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Effective learning comes through simulations when students are actively engaged.

- Students should predict and explain the outcome they expect the simulation to generate.
- Every effort should be made to make it difficult for students to become passive during the simulation. Every student must assume a role that they may or may not know before the simulation. Often it is not known until the simulation.

## Post-Simulation Debrief

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Post-simulation discussion with students leads to deeper learning. The instructor should:

- Provide sufficient time for students to reflect on and discuss what they learned from the simulation.
- Prepare question to ask during the debrief to ensure students see alignment between the simulation and the course goals.

Although this Teaching Tool describes face-to-face simulation, this may not always be possible. The following online simulations may be helpful.

- A poverty simulation: <http://playspent.org/html/>
- A refugee experience: <https://www.bbc.com/news/world-middle-east-32057601>
- Physics, Math, Chemistry, and Biology Simulations: <https://phet.colorado.edu/>
- Climate, Weather, Atmosphere: <https://scied.ucar.edu/games-sims-weather-climate-atmosphere>
- Business simulations (for pay online): <https://www.advantexe.com>

## Frequently Asked Questions

For an informative questions and answers video go to...

<https://www.youtube.com/watch?v=MUIxeNlgBUg> (University of Waterloo)

*a) What is the difference between a simulation and a game? Case study?* A game is an activity where students are active and someone is winning or losing to demonstrate a viewpoint. Simulations are more involved, involving taking on a role and trying to solve a problem or work through an event. In a case study, you look inside and outside—no roles are given. Part of the goal of a simulation is to put students in a situation where they are actively involved.

*b) Why are simulations a preference over traditional, transmission-type/lecture approaches to teaching?* Simulations are a preference as it helps students understand (by experience) the time and decision-based conditions in a way a lecture can only mention. Also, “group think” can be taught but not deeply understood until one experiences it. The experience of simulation can increase long-term retention and memory of material.

*c) How do you prepare students for simulations?* In some cases, you do not, but in other cases you do. It all depends if by telling them, it will affect their performance. The discussion should be after. By preparing students it may lessen the reaction. In other cases, you may want them to know basic expectations—take on a role, actively engage, fill out forms as you go?

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- d) *Where do you get questions for your simulation debrief?* The questions for must address the purpose of the simulation and be aligned to your course objectives. Examples include: “What happened?”, “Was this easy or difficult”, “What would happen if?”, “How can this be applied?”, “How it helped them understand the course goals”, or “How it may have made the goals more confusing.” Encourage members of the community who have actually encountered the real-life events of the simulation to comment during the debrief.
- e) *Do simulations ever go awry?* Yes, when they do, you have to reign them in. Students can get carried away or are not prepared. Try to anticipate some challenges and guide students back if they have gotten away from a particular learning objective. Don’t be afraid to pick your best students to play a particular role to help the simulation go as planned; but remember that often, even the best students do not step up and play the role.
- f) *What happens if students do not prefer experiential learning?* This happens occasionally. You must have a point to the simulation. You can share something you observed or experienced related to reluctant participants. During the debrief, it is important to explain the purpose of the simulation and the expectations. Students enjoy the interaction and the majority of students see that this is a very effective way of learning.
- g) *Can simulations work in any courses?* Simulations can work in many subjects: economics, physics, chemistry, mathematics, nursing, political science, and education. There are resources listed below by content areas but do not hesitate to contact the CTL if you are interested and have questions.
- h) *What is the ideal number of persons for a simulation?* The size of the simulation depends on the type of simulation. For example, a poverty simulation may work with between 40-88 persons. It is important to know the number of persons participating before the simulation to ensure all roles are covered.

## References for Subject-Specific Simulations

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