

## REFLECTION POINTS

Viewing game design as a problem creation activity can offer great insight into the designed games. You can take into consideration some or all of the following thematic questions:

- Is the information you want to pass on presented correctly in your games? In order to answer this question, take into consideration the following points:
  - Is the necessary information for the game presented in the correct way?
  - Is the question you want the players to answer correctly formed?
  - Do you provide enough information to explain the problem?
  - How complex is the problem you present?
- How does your game support players' problem-solving skills?
  - Have players encountered similar problems before?
  - Should the players be presented with similar problems beforehand?
  - Do your problems offer multiple solution possibilities?
- Does your game provide the opportunity for players to evaluate their decisions?

## PERSPECTIVE

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**Can games be used in educational contexts and, if yes, what learning theories do you use?**  
I think games are really useful in many occasions, from preschool through adult learning settings. They make learning a more playful experience, and this process makes clear what the learning goals and objectives are.

Furthermore, when it comes to such contexts, I like to see how **designing** games, not just playing them, can reveal what students have learned. I use a range of learning theories for this, one of which is **constructionist theory**, which focuses on how people externalize their thinking by creating "objects to think with" that are both personally meaningful as well as shared with others for feedback and iteration. Through this process of design, learners reformulate what they know and grow their understanding over time. Games learning often connects to other larger concepts, like systems thinking and computational thinking. When we use tools like games or simulations, we can actually introduce those ideas to very young children instead of delaying them until high school or college, which is usually when they are introduced. A few examples of games that are in this direction are **Sims**, **Minecraft**, or other popular games that have more of a constructionist orientation. We have built games about architecture that have introduced big ideas about this topic in ways that allow students to create and design buildings, for example, and share them with others.

**Considering that games require the collaboration of several people, how would it be possible for them to cooperate effectively in order to design educational games that could have a meaningful impact on players?**

The design of games brings diverse groups together; we see it time and time again in our work, in both children and adults. I think that the most important thing is to start designing and playing the game in an iterative fashion that later allows people to figure out what they would do differently, share their opinions, and learn from one another. So, I would encourage diverse groups to build an early prototype or just play some games together that they think are provocative. When you try to build a new group, it is nice to do your research together, share games, explain what you are thinking about the game and learning perspective, and share the same language. Then you can go on to building an early prototype that you can design and play. In fact, you can iterate between those two things. This makes the collaboration more robust.

For example, in our work, we wanted to design high-quality games to help young children understand complex concepts, like biology and systems thinking. For this, it was important that we work iteratively with biologists, young children, and classroom teachers. The biologists were able to distill the content into its most powerfully succinct form, young children offered us feedback on what was exciting about the game (which isn't always what we'd assume), and the classroom teachers helped us view the game from the perspective of the users, ultimately adapting the game for their specific settings. So, we worked together with our colleagues, after-school groups, and classrooms to design such experiences, taking into account the complexity of the topic and the learning theories we'd apply to understanding what youth are learning when they experience the game.

**How do you combine the learning and the gaming elements together in order to make the games?**

We have a backwards design approach where we think of the objective we want to learn in a particular context. So, we usually start by brainstorming rather widely with those objectives in mind. For example, we may want the kids to learn about systems thinking and complexity. Those decisions set up our design constraints. This could then lead us to designing games based on specific themes, which, in our case, were the complex systems of bees, ants, blood circulation, or ecologies. We then evaluate those different ideas in terms of how hard it would be to build them, as well as how much kids would really like the system. So, we are looking for ideas that attract children's interest as well as really good examples that help them learn and grow. The learning contexts that we work on are usually the things that aren't often well-presented in schools, yet we strive to make an impact on how children understand domains like math, science, language, or the arts, long term. Gaming can embody key ideas that can be difficult to capture traditionally in other media such as text, diagrams, or animations alone.

**Do you have any advice that you would like to give to potential educational game designers?**

I would say that getting to know more about learning theories and methodologies such as design-based research is important. You should add a person to your team who is knowledgeable on these areas, which can improve the game as well as the overall learning outcomes. It can make clear the learning objectives and get rid of all the distracting elements, clarifying the game mechanics in the process for the game designers. Once all this is clear and you know what your objectives are, it ultimately allows you to be more creative. I would also advise trying not to put too many objectives into one game, as the core mechanics of the game will end up suffering as a result.

**What are your sources of inspiration and your influences?**

I try to get influences from different places; my background as an artist is often helpful. For example, when I think about games I think about interactive design as a kind of human-to-human interaction and how I can get people to interact differently. So, I look for games and experiences that are interesting, that attract players' interest. Game players don't want to stop playing because it is exciting. I like games that put learners in a lifelong learning trajectory, where the learning can deepen with repeated play over time. In this way, games actually grow with the learner.