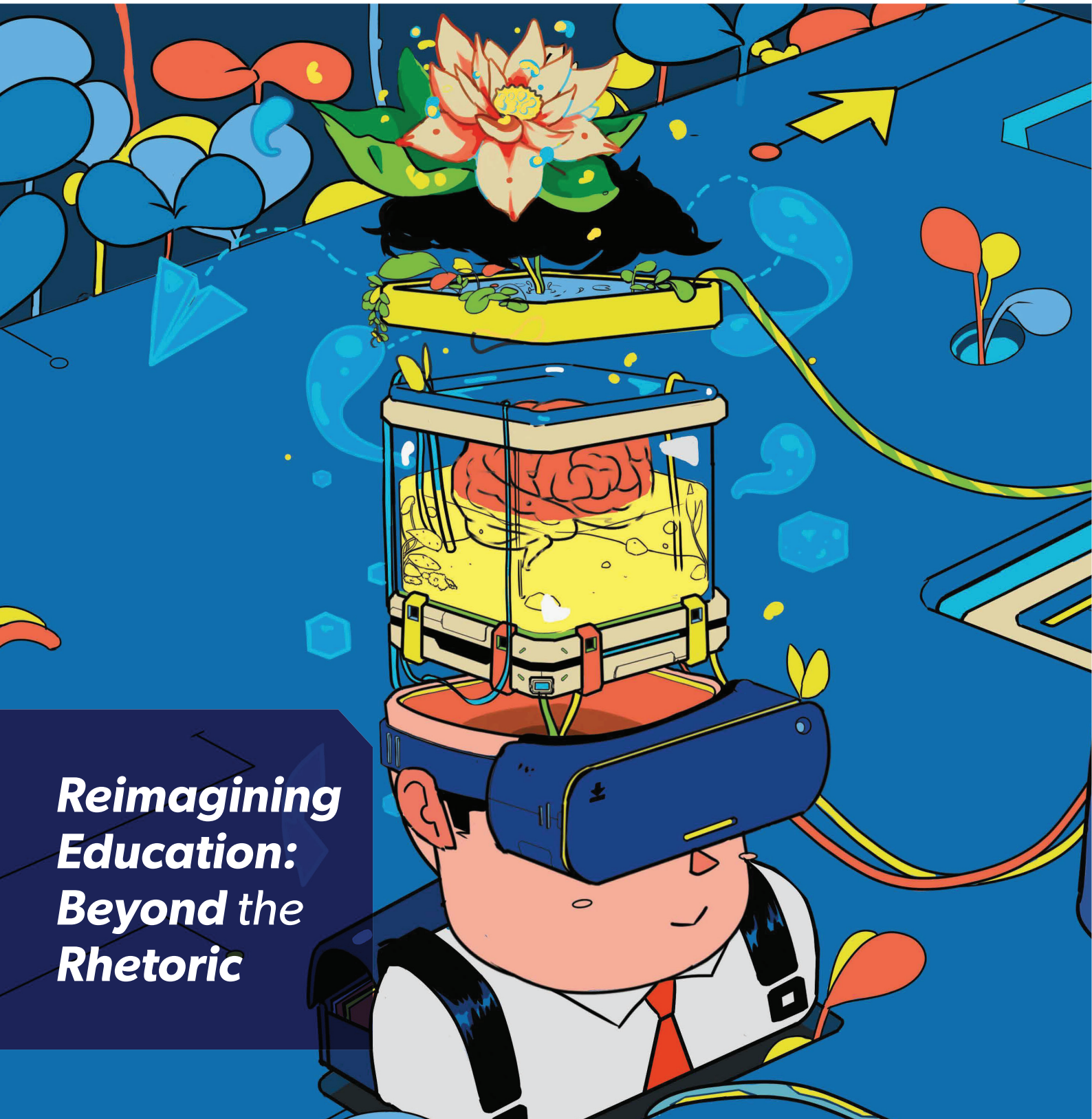


*The*BlueDot

Issue No. 13 | Feb - 2021 | UNESCO MGIEP

**Reimagining
Education:
Beyond the
Rhetoric**



Towards the Use of Commercial Games as Education Tools

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In the last two decades²¹, the rise of video games has spurred many educators and researchers to explore their potential as learning tools. **The genre of games specifically designed to target the acquisition of knowledge that is generally useful or specific to an academic context is called “learning games”¹⁶**. Although research on the effectiveness of learning games is still inconclusive and contains contradictory empirical evidence¹⁴, the educational gaming industry is growing rapidly¹.





The Potential of Commercial Games for Learning

Given the immense costs of developing high quality and visually appealing video games, many researchers have explored the potential of existing commercial-off-the-shelf (COTS) games for education. This refers to not using a “learning game” but a commercial game, developed for entertainment purposes as an educational tool inside or outside of classrooms. Berger and Staley³ made recommendations for teachers on how to use the non-educational version of Assassin’s Creed III as an educational tool in history classrooms. Similarly, researchers and teachers independently “repurpose” COTS games to fit curricular and learning needs. Some recent examples include the use of the game Angry Birds for teaching physics²⁴; World of Warcraft for teaching civics⁶, general science²³ and language⁵; and Minecraft for teaching mathematics⁴.

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Many studies have examined the ability of different COTS games to lend themselves to an educational context. Let

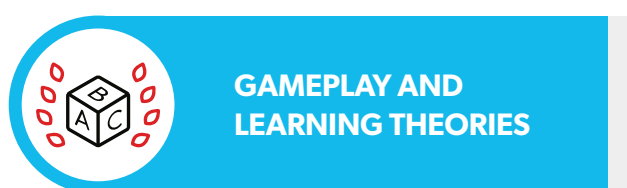
us discuss the example of SimCity. SimCity is a simulation game that enables players to create cities as planners and helps them understand the phenomena from a more authentic perspective. It creates space for exploration and creativity as players can work with self-defined goals and strategies. Simulation games are those where the core mechanics involve “interacting and discovering an underlying model or system”¹⁴. Recently, it was used with university students to teach urban planning²⁶ and with adolescents to explore if playing the game changed students’ perception of the city they live in²⁷. Kim and Shin¹⁵ used it as an authoring tool for undergraduate students studying urban geography where they observed improvement in learning outcomes, interest, and engagement. It was an appropriate educational tool as it aligned with the intended learning objectives of the course which revolved around topics like urban transportation, growth and management, and theories of city development. It allowed players to construct cities, considering what they had learnt in class. Overall, SimCity is a popular game used by many researchers that demonstrates the potential of repurposing COTS simulation games for learning.

Another widely used commercial game is Minecraft. As a sandbox game, it has been used with different age groups and disciplines. Sandbox games provide open interactions between the player and game objects with no pre-defined game goals. The open-ended nature of sandbox games presents opportunities for players to express creativity and problem solving. Researchers¹³ used Minecraft with elementary school students for learning computer programming. They designed contextual learning activities within the game for the students, including 30 in-game tasks spread over 10 game levels. In addition to improved computer science competencies, they observed increase in motivation and collaboration skills. Bos and colleagues⁴ outlined various Minecraft activities that can be implemented in a mathematics classroom. Each activity aligned with the Common Core State Standards for Mathematics (CCSSM) and, together, created a useful approach for teachers attempting to use commercial games as educational tools. The availability of Minecraft Education Edition, a version of the game allowing teachers to create and share lesson plans and students to access digital educational resources and collaborate with peers, has provided several opportunities for its use across various disciplines. Hence, well-designed COTS sandbox games have also shown promise to be employed as educational tools in diverse settings.

Thus, games with highly structured rule sets (i.e., simulations) and ones with practically no rule sets (i.e., sandbox games) can be used as learning tools and this demonstrates the broad range of learning experiences that can be supported with the correct use of COTS games in classrooms. However, ‘correct use’ is the key and research has provided some practical recommendations in this regard.

Pedagogical Benefits and Practical Recommendations

In this section, we look at some benefits and make recommendations for using COTS games from three different perspectives. These are, ‘learning theories’ that can be applied to the context of game-based learning, the ‘role of teachers’ and how they can maximize the use of a COTS game to suit the needs of their course, and ‘implementation’ challenges that must be considered prior to the use of COTS games.



GAMEPLAY AND LEARNING THEORIES

Haphazard inclusion of COTS games is not enough to ensure learning. Instead, games must be adopted into classrooms based around learning theories²⁰. Playing games in isolation without associated curricular activities (e.g., presentations, article writing, debrief sessions) is not likely to have a significant positive impact on learning^{6,7}. Instead, adopting a project-based structure around curricular activities is particularly beneficial². Activities create space for students to reflect on their learning as they progress through a course and are central to students translating the in-game learning to the academic context⁸. A key tip is to include some form of peer interaction (e.g., collaboration) that engages with a social constructivist approach to learning¹⁰. Peer-evaluations of presentations in the middle of the semester helped students “clarify the strengths and weakness of their ideas” and incorporate feedback into their designs¹⁵. Such activities can be useful to reinforce and translate in-game actions to out-of-game academic context⁸.

Using an existing commercial game for learning is an activity that is consistent with the technology savviness and game playing habits of the current generation¹⁵. Further, a student-centered activity can help enhance interest and active participation in the learning process. In the case of using Sim City, learners actively participated in applying the theories of urban geography while designing their cities. The open-ended nature of the game makes it possible for students to express themselves creatively, test hypothesis, and apply knowledge. Critically, these recommendations stem from constructionism and situated theories of learning⁹, which offer a rich and multifaceted experience to learners by providing opportunities to construct models that represent knowledge. Therefore, learning theories should guide the practice of using COTS games in classrooms.



ROLE OF TEACHERS

The role of the teacher in the use of COTS games is critical as they make key decisions about game selection, alignment of the game with learning goals, and fit within the classroom setting and context. Teachers and instructors also need to plan and create new “in-game objectives” for the students that are aligned with the intended learning objectives of the class. A teacher’s knowledge on how to use COTS games for learning is termed their TPACK-G (Technological, Pedagogical, Content Knowledge)^{11,18}. In addition to content and pedagogical knowledge, a teacher’s familiarity with the game and the game environment is essential for them to provide feedback and scaffolding to students. Sufficient time and training need to be allocated so that teachers understand the gameplay, design projects, curricular activities, and assessments that make the use of COTS games as effective learning tools. In particular, game selection should be a central concern as the game genre, environment, and narrative must align with the learning goals and theory that underpin the teacher’s pedagogical approach.



IMPLEMENTATION AND LOGISTICS

Simply identifying potentially effective COTS games is just the first step to their use in classrooms. Students need to be provided with sufficient gameplay training sessions before engaging in game-based learning activities. As not all students will be familiar with the nature and operational style of specific commercial games and need time to learn how to play⁸. Teachers will have to make decisions about replacing other, previously planned curricular activities to make room for games²² and design new activities to support COTS game use. Also, sufficient technological infrastructure and personnel support needs to be provided for teachers to effectively use games in class. The most fundamental supports include the availability of devices and other hardware, software, and connectivity. More advanced supports include the repurposing and rearranging of limited learning spaces in schools such that they are more conducive to collaboration and peer learning¹². The use of mobile devices is one way to address issues with technological infrastructure when high-end computers and consoles are not available or there are limitations with physical space¹⁷. Thus, implementing COTS games in classrooms requires training and supporting learners and teachers, addressing device availability, and rethinking classroom resources and environments.

Conclusion

Although there is a limit to the number of academic topics that can be covered in COTS games and sometimes the content might be incomplete or inaccurate²⁵, carefully curated COTS games have the potential to lend themselves well to an educational setting. Simultaneously, to successfully employ

COTS games as educational tools, it is important that they form a part of a larger, carefully curated learning experience. Finally, it is crucial that logistical barriers like availability of hardware, software, technical and administrative support are overcome. Lack of infrastructure is a major concern preventing the use of games in classrooms¹⁹. There is so much more to game-based learning than just finding that one good game.

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