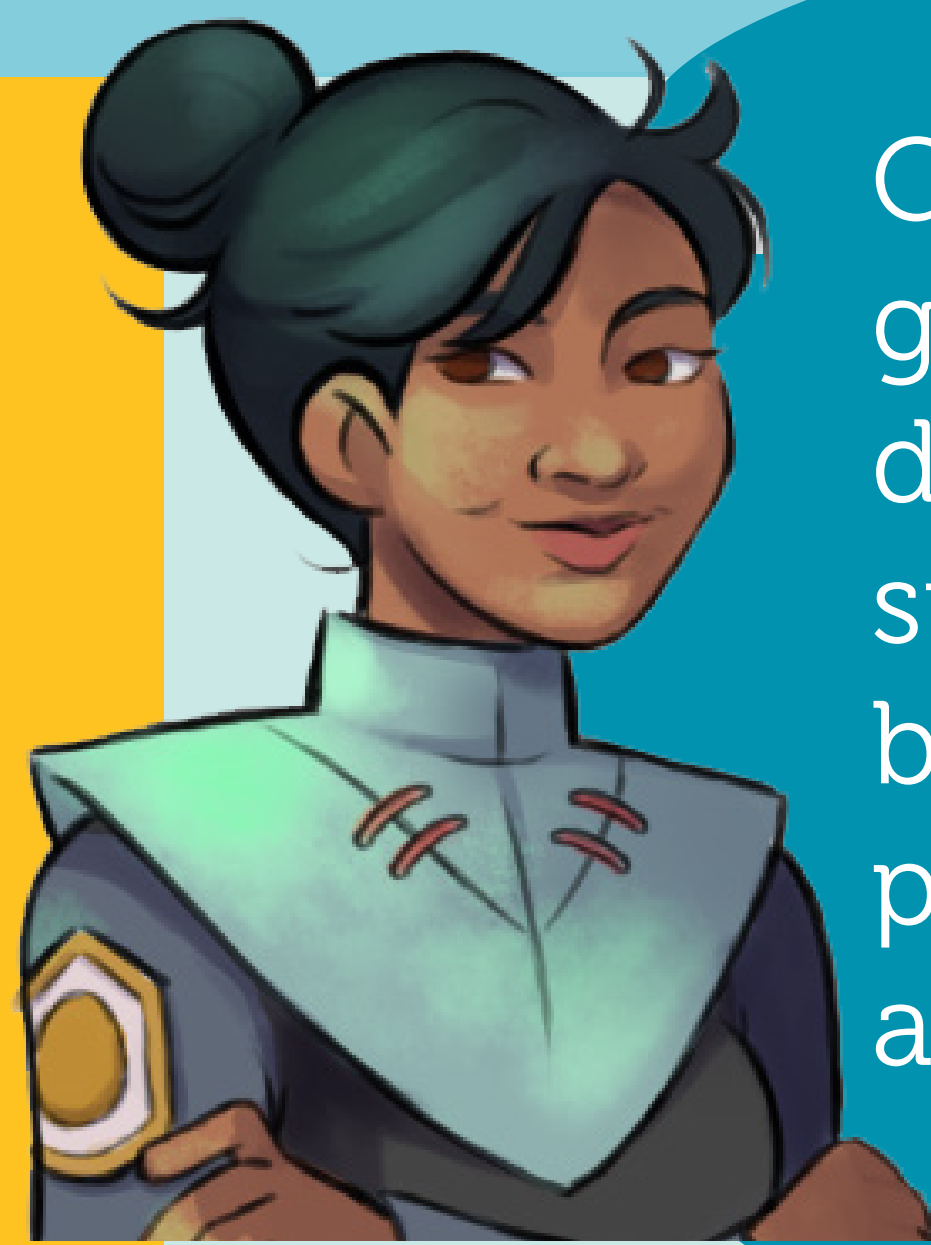


GeniConnect: Game-based learning, connections with scientists, and laboratory experiences: A model for industry/afterschool partnerships



Geniverse is an immersive digital game for learning genetics – by breeding dragons. In GeniConnect, middle school students play Geniverse with local biotechnology professionals to build personal connections and increase awareness of STEM careers.

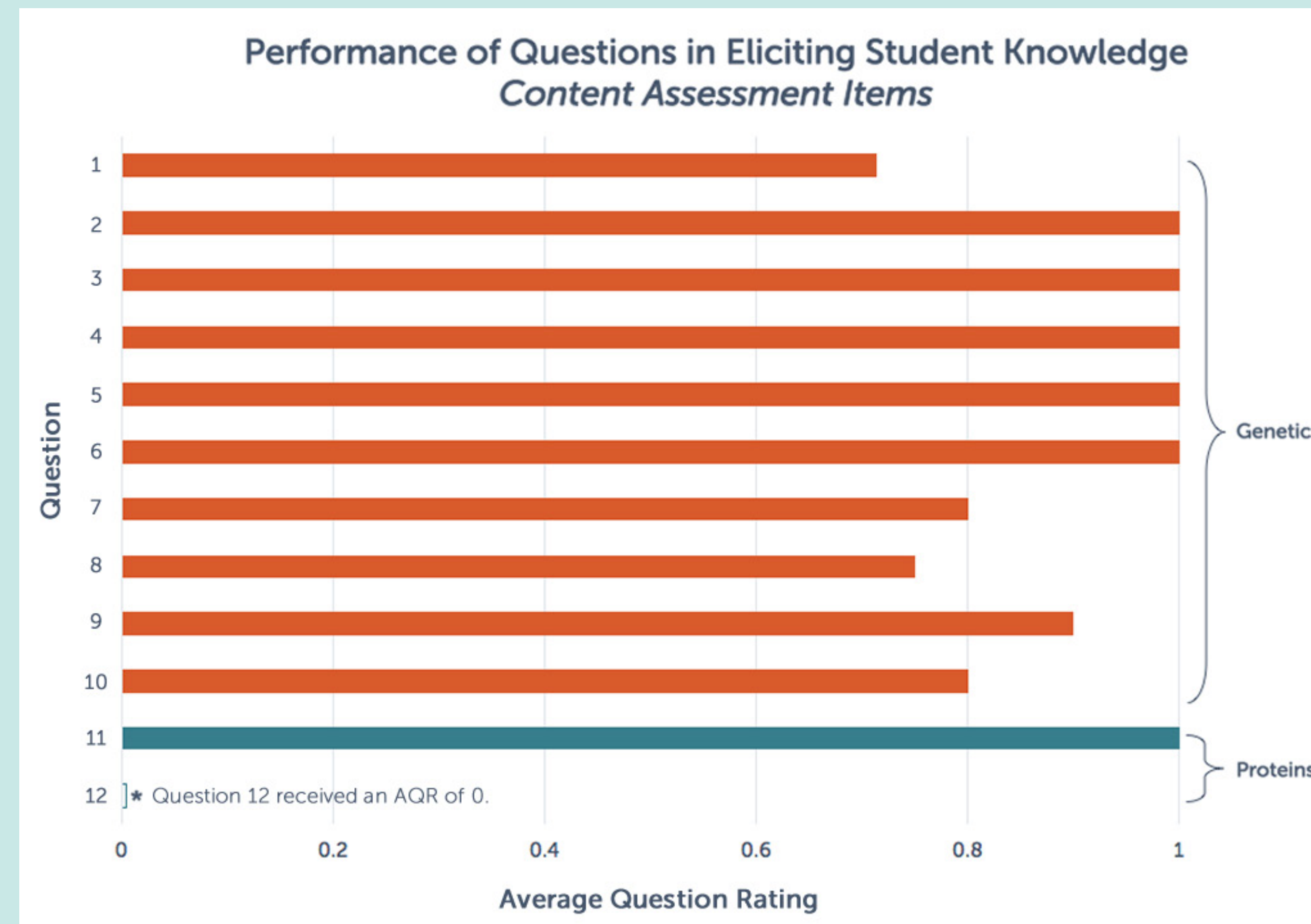
Game-based Learning

Learning from digital games holds great potential due to their immersive nature, interactivity, and sound learning principles. In classrooms, well-designed educational games can lead to learning gains commensurate with or significantly higher than non-game instruction. We are adapting a genetics game made for classrooms to be used in out-of-school settings such as afterschool centers with middle school students.



Middle school students embark on an adventure where they uncover genetic mechanisms.

- NGSS places new emphasis on the central role of proteins in genetic phenomena starting in middle school.
- Students become immersed in a fantasy world where they select challenges and missions to solve.
- Students are motivated to play by earning crystals.



Performance of Questions in Eliciting Student Knowledge: Content Assessment Items. Average Question Rating (AQR) for questions in the 2016 interview protocol that received 5 or more responses and an inter-rater reliability of 80% or greater. Sample size = 8 students. Questions with an AQR of ≤ 0.5 require major revision for use in future implementations, 0.51-0.89 require minor revision, and ≥ 0.9 do not require any revision.

The Research

Evaluating Questions for Content Understanding

Following the 2016 pilot implementation of GeniConnect, we conducted interviews with 8 students to assess our content instrument in its effectiveness at eliciting information about proteins and genetics understanding.

Student responses were scored using a binary scoring system (0, 1), with a score of 0 indicating that the student was unable to provide a meaningful response and a score of 1 indicating that the question elicited the type of information intended.

The Average Question Rating is an average of scores assigned to all student responses per question.

Average Question Rating		
≤ 0.5	0.51 - 0.89	≥ 0.9
Question does not elicit information as intended and requires major revision.	Question elicits information as intended from some students and requires minor revision.	Question elicits information as intended and does not require any revision.

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Authentic Laboratory Experiences

GeniConnect is a collaborative effort with a local community center, which provides a connection to the surrounding community and biotechnology industries. We recruited local academics and biotechnology professionals to serve as volunteer coaches. These scientists provide coaching and mentoring to middle school students throughout the eight-week program.

During the 2016 implementation of GeniConnect, middle school students visited the Biogen Community Lab in Cambridge, MA, where they conducted a GFP bacterial transformation lab. Students experienced using micropipettors and PCR equipment with the help of their biotech coaches.

Our goal is to focus future laboratory experiences at middle school learning levels and to expand to other local community labs.



Students engage in authentic laboratory experiences at local labs to better understand biotechnology careers and gain emerging lab skill sets.

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