Supporting a Passion for Science through Genius Hour

The concept of Genius Hour has school administrators and teachers talking.

Some regard it as pure genius that will inspire lifelong learners both in and out of school by empowering students to investigate a topic *they choose* to know more about. Others express concerns about its feasibility in the classroom and among remote learners when considering busy schedules and the potential of students' freedom of choice turning into a free-for-all—or the choice to do nothing at all.

When it comes to inquiry-based science education, however, Genius Hour can be a win-win opportunity for both students and teachers.

- Investigating phenomena through problem-based, hands-on science instruction can lead aspiring young scientists to even richer learning during Genius Hour as they not only discover more about a phenomenon they are curious or passionate about but also have an opportunity to gain experience in something they can apply to the world around them.
- For teachers, the student-driven learning experience can be an extension of a hands-on science curriculum that promotes additional questions from students and can build standards-based skills such as those aligned with the Next Generation Science Standards* (NGSS) and social-emotional skills considered necessary to be successful in educational endeavors and future careers.

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"Engaging students through investigations of questions that are relevant to them and their immediate surroundings makes for a more impactful understanding of phenomena," David Heller says. As director of Curriculum Products and Development at Carolina Biological Supply Company and a former middle school science teacher, Heller has an unmediated appreciation of challenges teachers face in achieving learning goals while keeping students motivated. He explains, "NGSS-based curriculum . . . can help develop students' investigative skills—such as asking questions, planning investigations, modeling solutions, analyzing results, and presenting information—which can be transferred to personalized independent investigations in Genius Hour projects."

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What Is Genius Hour?

Genius Hour, also called "passion pursuit" and "20 percent time," is the inquiry-based, educational initiative where students are given space, time, and support during the school week to choose what they want to investigate, encouraging them to be active instead of passive learners. The concept originated in the business world where blogger Daniel Pink promoted motivating people through autonomy, purpose, and mastery (Pink, 2009) and was most famously instituted at Google, leading to developments such as Gmail.

In education, the intent of Genius Hour is to nurture students as thinkers, creators, and leaders who push innovation from within. It's designed to encourage creativity and risk-taking as students develop problem-solving, critical-thinking, and social-emotional skills through research, experimentation, and collaboration. As a student-driven endeavor, Genius Hour is adaptable for remote learners as well as students in a classroom. Time spent can vary; it can be one hour a week, one day a week, or even a week out of a semester, depending on each educator's preference. While many recommend that work isn't graded, teachers can assess learning based on students' creativity, discovery, and perseverance, recognizing failures along the way as steps to success.

A guide from teachers at the San Dieguito Union High School District summarizes it well: "Genius Hour allows students the flexibility to choose a topic, research the content that is necessary to learn about their topic, and then solve a problem or present about a topic they are passionate about without the constraints of the typical teacher driven instructional time."

Setting a Framework

The crux of Genius Hour is that it's an opportunity for students to explore unique interests through self-directed learning. But teachers may initially feel as if they are walking a tightrope: they need to provide enough structure for students to be successful but allow enough flexibility for students to make their own choices.

In this truly differentiated environment, teachers are challenged to ensure all students are working to the best of their abilities. To guide students, they can choose a framework and facilitate the process to provide direction and keep students on task.

"In a successful Genius Hour format, the teacher works as an architect, designing the invisible ecosystem in which student voice and agency can thrive," John Spencer, a 10-year-plus veteran Genius Hour teacher, writes (Spencer 2017). In his classroom, Spencer adopted design thinking as the framework for his students' projects, tapping into their curiosity to develop products that solve real-world problems, but other viable options include inquiry-based learning and project-based learning frameworks. These are the types of frameworks that enable teachers to support science standards, allowing students to build on

the science curriculum for their grade level or opening the door for them to explore other science disciplines they'd like to learn more about.

"Science curriculum that is centered around phenomena will engage students in developing questions about the how and why of that phenomena and related phenomena," Heller says. Students' hands-on experiences with phenomena in their formal science instruction can encourage them to ask more questions, leading them to design their own investigations—to research, model, analyze, and make claims based on evidence they experience. "This," Heller notes, "seems to be where Genius Hour goals and NGSS-designed curriculum overlap and complement each other."

Blending Genius Hour and Science Standards

Genius Hour Steps	Science and Engineering Practices	Engineering Design Challenges that Build on Science Curricula*
Select a topic and determine an essential question.	✳ Asking questions and defining problems	Students list questions to investigate that will demonstrate energy transfer and transformation.
Gather data.	✳ Planning and carrying out investigations	Students plan and carry out an investigation to test the structure they designed to keep sand from heating up under light.
Answer the essential question through investigation and engineering design.	✳ Developing and using models ✳ Analyzing and interpreting data ✳ Using mathematics and computational thinking ✳ Constructing explanations and designing solutions ✳ Engaging in argument from evidence	Students are presented with different scenarios and must determine which materials are suitable to solve a problem based on the properties of the materials. Students design, test, analyze, and refine a process for filtering contaminated water.
Present the projects.	✳ Engaging in argument from evidence ✳ Obtaining, evaluating, and communicating information	Student groups develop solutions to reduce human impact on ecosystems based on various scenarios, create posters to communicate the solutions, and present the solutions to the class.

***Engineering design challenge examples are from Building Blocks of Science™ 3D.**

Smoothing Out the Rough Patches

There is a learning curve for both teachers and students who are accustomed to structured environments. "Genius Hour projects are not guaranteed to go smoothly. In fact, they're almost guaranteed to have rough patches," Spencer says. With that in mind, setting a strategy around four basic steps can help both teachers and students navigate the process.

1. **Select a topic and determine a driving question.** Having the opportunity to choose any topic can be challenging for students who are accustomed to being directed in their educational initiatives. For students who are "stuck," try having a conversation about their personal interests, guiding them to home in on something they wonder about. To spark discussions about science in the real world, introduce students to curriculum-supported online simulations or videos about phenomena, such as those available through the Building Blocks of Science™ 3D curriculum. Once a topic is identified, students develop an essential question that they will answer through scientific investigation and engineering design. The essential, or driving, question should identify what the student wants to learn.

2. **Gather data.** Acquiring information can take several weeks. During this time, Genius Hour activities may appear chaotic as students collaborate and seek materials that invite them to delve into discovery. A teacher's role is to coach students as needed. Teachers may want to involve media center/library staff or connect students to approved experts in the community who can answer questions. For younger students, pairing them with older student "buddies" who share similar interests can help them in the data-gathering process. Students should also be given a platform—such as through a presentation in the classroom or on a web conferencing service—to share their findings along the way. This provides an assessment opportunity for teachers to determine whether students are focused on the challenge and the chance for students to hone speaking and listening skills.

3. **Answer the essential question through investigation and engineering design.** Students take what they've discovered and apply it to the creation of a model to test and determine if it answers their essential questions. As they create their models, they test, use math and computational thinking to analyze data sets, re-create, and test again. Through this engineering-design journey, students need to recognize that each failure brings them closer to success or understanding. They should be encouraged to document evidence gathered as they create their models to construct explanations and design solutions.

4. **The grand finale: present the projects.** Whether the work was done over several weeks, a semester, or the entire school year, the takeaway from Genius Hour should be a tangible product—such as a model, blog, report, or video—for students to present to classmates, the school, or the community. As part of the presentation, students should analyze the experience as they present their thinking, stating successes, roadblocks, what they learned, and what they'd still like to learn. In assessing students, teachers can take the final product into account but focus on students' skills in research, investigation, collaboration, perseverance, critical thinking, and solving problems

A nationwide poll found that teachers and parents rate critical thinking, problem-solving, and developing curiosity to learn independently as the most important learning outcomes among K–12 students. In the same poll, the majority of students who responded said they want to spend more time on self-directed activities with real-world applications (Gallup 2019, 10, 14).

By paving the way for students to act on their curious nature, teachers become facilitators of learning that excites students, guiding them to realize that they are able to make a difference in the world around them.

> "A 2019 Gallup poll found that 87% of teachers and 77% of parents agree that incorporating creativity in learning has 'a bigger payoff for students' and that there is widespread approval of self-directed, project-based learning among teachers, parents, and students."

REFERENCES

Gallup, Inc. 2019. *Creativity in Learning.* Accessed March 2020: https://www.gallup.com/education/267449/creativity-learning-transformative-technology-gallup-report-2019.aspx.

Pink, D. 2009. "The Genius Hour: How 60 Minutes a Week Can Electrify Your Job." Accessed January 2020: https://www.danpink.com/2011/07/the-genius-hour-how-60-minutes-a-week-can-electrify-your-job/

San Dieguito Union High School District, Encinitas, California. 2015. "What is Genius Hour?" Accessed January 2020: https://sites.google.com/a/sduhsd.net/genius-hour/what-is-genius-hour

Spencer, J. 2017. "The Genius of Design." *Educational Leadership.* March 2017. Volume 74, No. 6. Association for Supervision and Curriculum Development: accessed March 2020: http://www.ascd.org/publications/educational-leadership/mar17/vol74/num06/The-Genius-of-Design.aspx.

ABOUT CAROLINA

Carolina Biological Supply Company is a leading supplier of science teaching materials. Headquartered in Burlington, North Carolina, it serves customers worldwide, including teachers, professors, homeschool educators, and professionals in health- and science-related fields. Carolina is the exclusive developer, publisher, and distributor of the Building Blocks of Science™ 3D curriculum.

ABOUT BUILDING BLOCKS OF SCIENCE™ 3D

Building Blocks of Science™ 3D is a hands-on, phenomena-based curriculum developed to establish a solid foundation in elementary science while addressing the NGSS. It provides all students with multiple opportunities to engage in three-dimensional learning anchored in phenomena.

Learn how to integrate Building Blocks of Science™ 3D engineering design challenges into your Genius Hour.

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