



PLAYBOOK

for Game-based Global Goals Challenges



About Us

Edu-fy Pty Ltd ([Edu-fy](#)) is a for-purpose enterprise with the aim of making education equitable to all learners in line with SDG 4: Quality Education. Edu-fy's vision is to uplift and edify people of all creeds and from all walks of life, as well as their communities, through the power of quality education. Our mission is to provide equitable access to resources for all learners regardless of location or socio-economic situations,. We believe that quality education is a two-way process of learning. Guides (Teachers) and Explorers (Students) discover and make connections together in face-to-face, online or hybrid learning situations. Learning spaces are everywhere!

Through the Global Goals Challenge, we are implementing our objective to connect learners anywhere to quality teaching resources that teach 21st Century Skills and help them link everything they learn to face the global challenges that are ahead. We aim to develop creative, collaborative and culturally-aware 21st century thinkers through well-crafted game play and activities relating to the 17 United Nations Sustainable Development Goals (SDGs).

Edu-fy is a member of [Catalyst 2030](#), a global movement of 900+ social entrepreneurs and social innovators in 195 countries.





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- Current List of SDG Challenges for Schools
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Part 1

Introduction





WHO is this for:

This playbook is for teachers who are looking for new ways to engage their students while ensuring that curriculum aspects are addressed.



It will be particularly useful for teachers who already use project-based learning in their classrooms. The playbook addresses how such lessons can be delivered in online or hybrid formats.

For others, it will provide a guide to begin exploring project-based learning as a means to offer engaging challenges to their students in online or hybrid lessons.



The **NEED** for this Playbook

Many learners want:

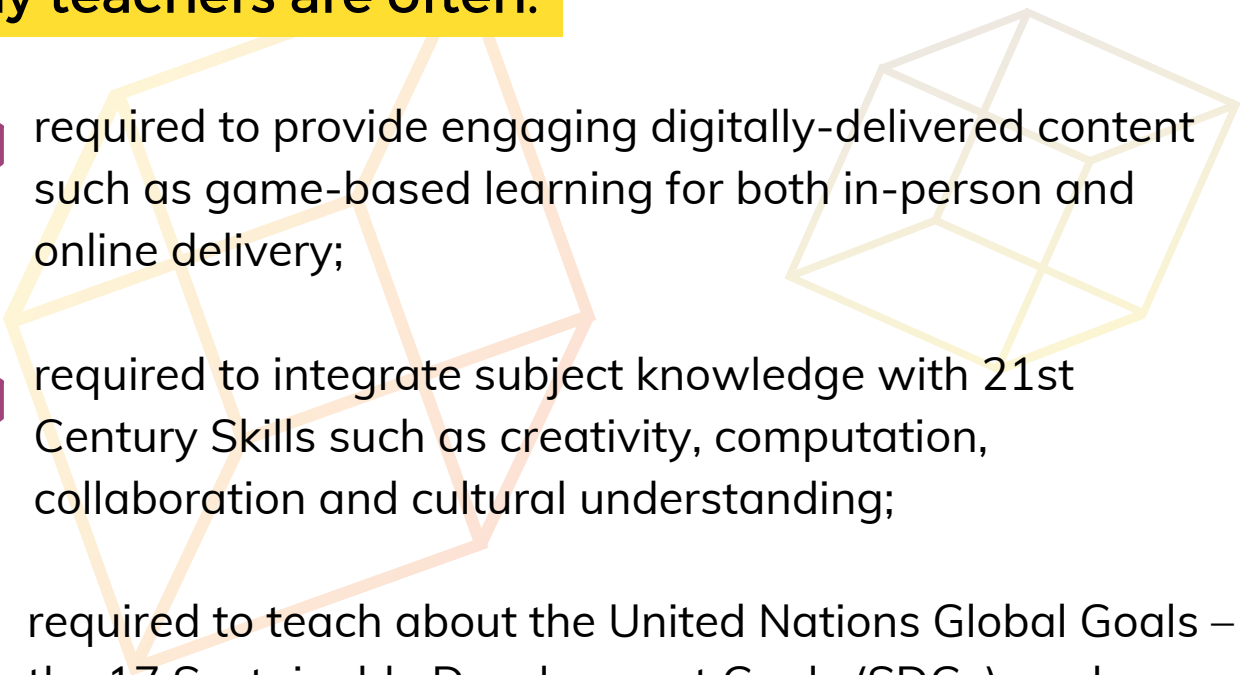




-  meaningful and engaging content; and
-  to find solutions to real-world issues like discrimination and climate change.

But they do not have the opportunity to do this.



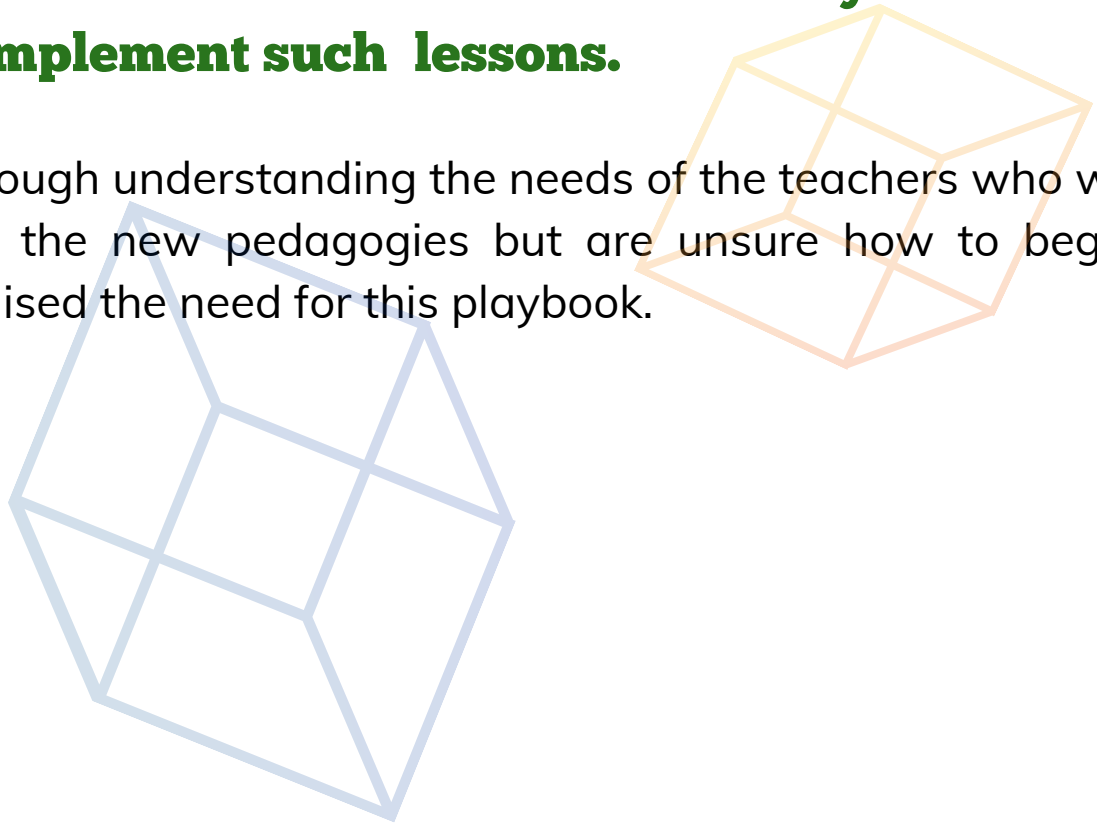


Many teachers are often:

- 
-  required to provide engaging digitally-delivered content such as game-based learning for both in-person and online delivery;
 -  required to integrate subject knowledge with 21st Century Skills such as creativity, computation, collaboration and cultural understanding;
 -  required to teach about the United Nations Global Goals – the 17 Sustainable Development Goals (SDGs); and
 -  expected to use frameworks such as design-thinking for project-based learning.

But they lack adequate training and expertise in the initiatives to effectively create and implement such lessons.

Through understanding the needs of the teachers who want to use the new pedagogies but are unsure how to begin, we realised the need for this playbook.





What it is **NOT**

This playbook is not designed to be a training manual for the various methods being discussed.

We recommend that it is used as a starting-point referral to informative sites and relevant challenges.

The sites we mention are by no means an exhaustive list of what is available.

What it **IS**

Children are the future change-makers, We need to equip them with the relevant knowledge and 21st Century Skills to address the world's most pressing issues now and in the future.

We believe that having classrooms adopt project-based and design-thinking principles and game-based learning principles when addressing tasks and issues makes the challenging task enjoyable and meaningful.

One of the best ways to integrate these is through project-based learning. In terms of real-world issues, what could be better than the issues related to the 17 UN Sustainable Development Goals (SDGs)? By relating projects to the SDGs, learners can apply their skills to finding innovative and effective solutions to the identified global problems.

Part 2

The Components of the Challenge





Design- thinking Skills

“

Design-thinking is a non-linear, iterative process that is very useful in tackling problems that are not well defined or unknown. It challenges assumptions and redefines problems to create innovative solutions.¹

”

The Design-thinking model we describe here is the one proposed at Stanford University's Hasso-Plattner Institute of Design, also known as d.school. It is the leading university when it comes to teaching Design-thinking. The five stages of Design-thinking, according to d.school, are briefly described below.



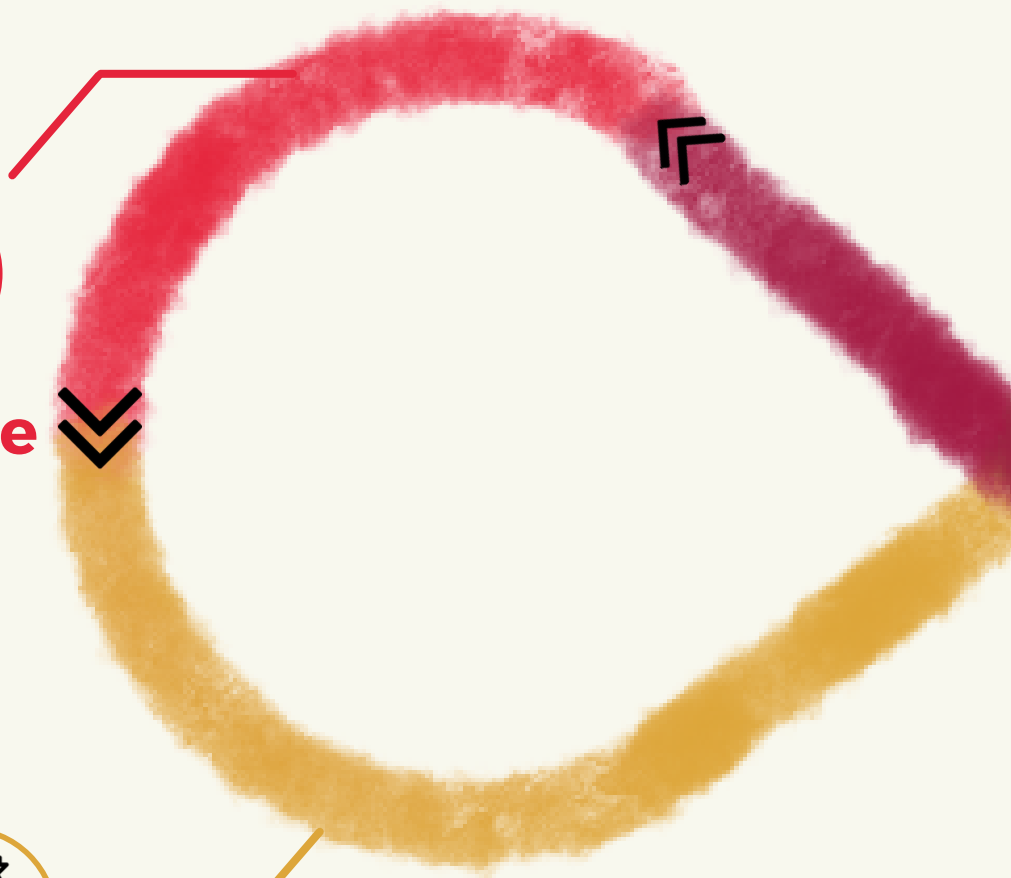
Empathy Phase

Is there a need for a solution?



Define Phase

Do the research. What is the exact nature of the problem? What has been done before in other contexts? What does the solution need to do in order to be successful?

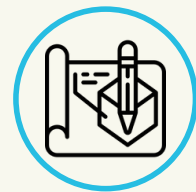


Ideate Phase



Think outside the box.

Think about how some of the solutions in other contexts will work in these conditions. What needs to be changed? What else can be done? Sketch the idea.



Prototype Phase

Build a model of the idea. What materials and tools will be needed? What skills and techniques will be needed to accomplish it?



Test Phase

Think about the test design. What will be needed to test the model that has been built? Evaluate the prototype and re-design or re-build if necessary.



Finally...

Celebrate what you have created.

Share your prototype with the community it is designed to serve.

Tell others how your prototype works.

Create community involvement in using the prototype.


How will you communicate with each other?



Extra Information

Some courses and tools that are designed specifically for educators:

1. <https://dschool.stanford.edu/resources/dschool-starter-kit> (A starter course (3 hours) for teachers who want to introduce design thinking in their classrooms).
2. <https://pages.splat3d.com/designplaybook> (This playbook, based on the NSW Department of Education Design Thinking Across the Curriculum [Framework](#), is packed with action statements on what can be done).
3. <https://www.designathonworks.com/> (Design-a-thon Works is an organisation that not only provides training for teachers but also runs global design challenge workshops and competitions for children ages 8-12).

A photograph of children sitting at a wooden table, engaged in painting. One child in the foreground is focused on painting a green circular shape on a white piece of paper. Other children are visible in the background, also working on their projects. The scene is brightly lit, suggesting an indoor classroom or art studio environment. A solid blue rectangle is overlaid on the left side of the image, containing the title text.

21st Century Skills

Overview

21st Century Skills are sometimes known as soft skills. However there is nothing 'soft' about these skills. They are immensely important for the jobs of today and will be increasingly needed in the future. Initially there were the 4Cs of the soft skills – critical thinking, collaboration, communication and creativity. These were expanded over the years to also include character and citizenship. These 6Cs were termed the [New Pedagogies for Deep Learning](#) by Michael Fullan.

Over time the 21st Century Skills were also associated with lifelong learning skills and became the 7Cs, with new terminologies. These are listed below.



Creativity



Collaboration



Critical thinking



Communication



Cross-cultural understanding



Computing



Career & lifelong learning

An eighth C might be added – caring!

Caring - for self, others and the planet - is an essential skill for the changemakers of the future.



Extra Information

For further reading:

1. <https://www.oecd.org/site/educeri21st/40756908.pdf>
2. [https://www.oecd.org/education/2030-project/contact/E2030_Position_Paper_\(05.04.2018\).pdf](https://www.oecd.org/education/2030-project/contact/E2030_Position_Paper_(05.04.2018).pdf)
3. <https://files.eric.ed.gov/fulltext/ED519462.pdf>
4. <https://www.edsurge.com/news/2018-02-25-the-5th-c-of-21st-century-skills-try-computational-thinking-not-coding>
5. <https://www.teacheracademy.eu/course/the-seven-cs/>
6. <https://www.acer.org/au/discover/article/teaching-and-assessing-21st-century-skills>




Game-based Learning

Overview

When we see images of a child absorbed in a video game, we tend to see this as a negative situation. That may or may not be so.

Listen to Professor Paul Howard-Jones talking about [Neuroscience, Games and Learning](#).

But what if we ask what it is within the game that is eliciting the child's full attention and focus? Professor James Paul Gee looked into this question and came up with a list of 16 key features.



Professor Gee is often considered the [godfather of Game-based Learning \(GBL\)](#) thanks to his significant academic research on effective learning methods via video games. He wrote a paper called [Good Video Games and Good Learning](#) more than a decade ago that outlines 16 components critical to strong GBL. The essay can be found in his seminal book of the same title, now in its second edition.

16 Principles Of Good Video Game Based Learning²

Here are the 16 principles of good video game based learning outlined in his text.

1. **Identity**: Players build a sense of identity throughout the video game, either through direct input or an on-screen character they inherit.
2. **Interaction**: Communication occurs between the player and the game.
3. **Production**: Gamers help produce the story through some form of interaction, such as solving a puzzle or completing a level.
4. **Risk Taking**: Failing in a game holds few consequences in comparison to real life, empowering players to take risks.
5. **Customized**: Games usually offer a level of customization so that users can play — and succeed — at their competency level.
6. **Agency**: Players have control over the gaming environment.

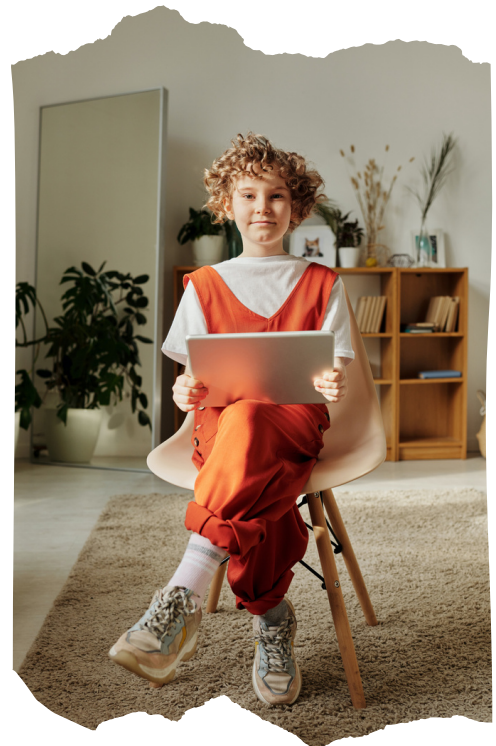
7. **Well-Ordered Problems:** The gaming environment contains problems that naturally lead into one another, allowing a player's mastery to grow and evolve.
8. **Challenge and Consideration:** Games offer a problem that challenges students' assumed expertise.
9. **Just in Time or On Demand:** Players receive information as they need it, not before, which teaches them patience and perseverance and improves critical-thinking abilities.
10. **Situated Meanings:** Students increase their vocabulary by encountering new words within game situations.
11. **Pleasantly Frustrating:** The game should frustrate the student enough to challenge them but be easy enough that they believe and can overcome the problem(s) faced.
12. **System Thinking:** Games make players consider the bigger picture and not just their individual actions which helps them see how the pieces fit or can be fitted together in the whole system.
13. **Explore, Think Laterally, Rethink Goals:** Games force players to expand their situational knowledge and consider courses of action other than linear ones.
14. **Smart Tools and Distributed Knowledge:** In-game tools help students understand the world. Through using them, they gain confidence to share their knowledge with others.

15. **Cross-Functional Teams:** In multiplayer environments, players have different skills, forcing them to rely on each other—a needed soft skill for students.
16. **Performance before Competence:** Competency occurs through taking action in the game, reversing the typical model in which students are required to learn before being allowed to act.

What do you think of James Paul Gee's 16 Principles of Good Video Games and Good Learning? How might you incorporate them into your teaching style and curriculum?

Why don't we use these principles in the classroom and help our students “absorb” the lessons we teach?

Neuroscience shows us that games with well-designed mechanics match the “needs” of the brain when it comes to acquiring and retaining skills and knowledge.



A Different Perspective of the Brain³



Please note: The colours used are for visual effect only and do not reflect the physical locations of the functions described below.

Visual Brain

Playing video games increases attention.

Motivated Brain

Victory in games stimulates the reward centre of the brain.

Creative Brain

Games contain elements that stimulate creativity. For example, games enable 'act as if', symbolic thinking, visualisation and curiosity.

Social Brain

Playing with or against a human opponent enhances the "reward" feeling. In-game co-operation and/or competition also evoke distinct reactions in the brain.

Emotional Brain

Emotions influence our thinking and memory. Games contain emotionally engaging features that help us remember the content better.

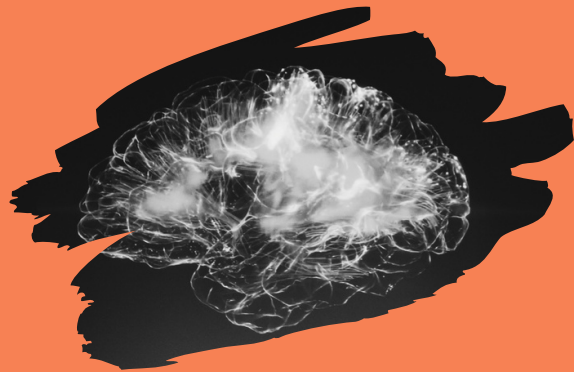
This shows that using game-based learning addresses social and emotional learning conditions as well.



Story to Tell

Neuroscientists in California are using novel ways to collect and display data on how the learning brain develops.

On a typical day at the [Synapse School](#) in Menlo Park, California, where our team of Stanford University neuroscientists works hand-in-hand with teachers, students might drop by [the Brainwave Learning Center](#), an on-site research lab where they can wear stretchy caps with more than a hundred small, spongy sensors on their heads. These sensors measure the naturally occurring brain waves that fluctuate as they play educational games or engage in guided meditation. The students can also watch live computer displays to witness how their own brain waves change as they concentrate on a task or engage in mindfulness. This interactive experience provides each child the chance to see and think about their own brain activity, how it changes with learning, and even how it changes with moment-to-moment shifts in mindset, which helps instill in students a sense of ownership of their learning process. Meanwhile, the brain activity evoked by the educational games provides important data to ongoing studies of brain and skill development.



[Read more](#)

Some educational games that are currently in use in schools do not align with how the brain learns. These are generally very good games that teach, but they do not necessarily lead to the content being “learnt”.

The games that fully align with brain function are the ones which include the game mechanics that lead to and maintain cognitive flow. Educational games that use [Minecraft](#), [Roblox](#), or [Lego](#) tick most or all of these boxes.

Read the Lego Foundation's Whitepaper on Learning through Play at School [here](#).



A top-down view of three students sitting around a white table with a grid pattern. They are working on laptops and a smartphone. One student is pointing at a laptop screen, another is looking at a smartphone, and a third is looking at a laptop. There are also some small yellow circular objects on the table.

Project-based Learning

Overview

Project-based Learning (PBL) is more than doing a project!

According to the organisation PBLWorks, PBL helps students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem or [challenge](#).

[PBLWorks](#) have created a guide to help teachers who want to implement PBL in their classrooms.



The effectiveness of PBL is demonstrated by [Open Way Learning](#).

Underlying the effectiveness of this methodology is the understanding that to be successful in projects, students need to be mentored by experts in the field, who guide them to become competent in the skills that are required to complete the project tasks.

A video with an overview on a competency-based education course is available [here](#).



[Here](#) are some case studies on schools that have adopted this approach.

PBL is an effective method for incorporating the 7Cs, 3Rs and 3Ms of 21st century learning into the [curriculum](#).

Part 3

The Lens for the Challenge



The Lens



Using the UN Sustainable Development Goals (SDGs) as the basis for projects empowers learners to become change-makers not only of the future but also in the present.

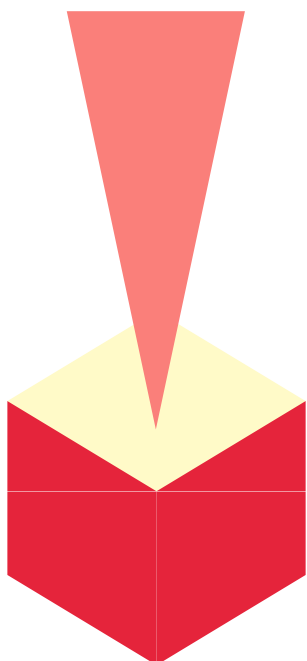


**SUSTAINABLE
DEVELOPMENT
GOALS**

The SDGs provide authentic real-world tasks that are needed for effective project-based learning.

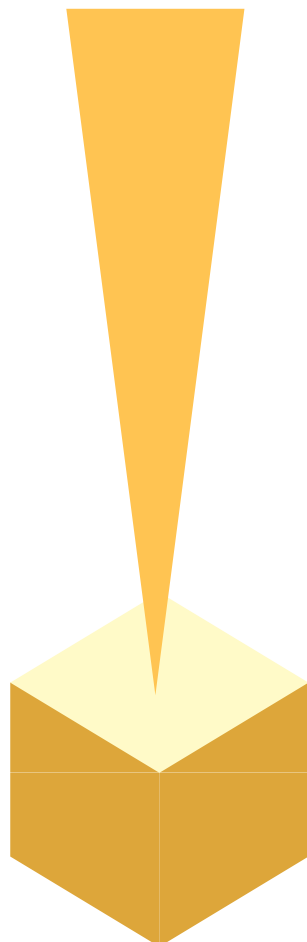
SDG1: No Poverty

Topics: definition of poverty, equal rights to resources, social welfare protection, disparity between rich and poor



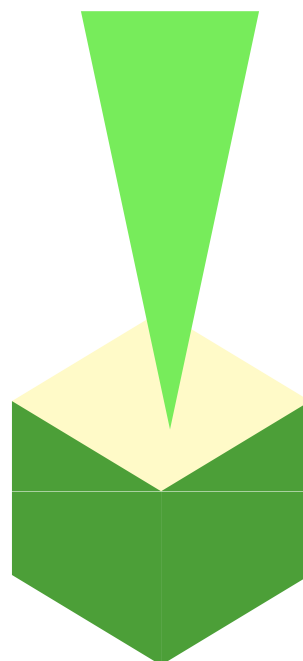
SDG2: Zero Hunger

Topics: definition of hunger, root causes of hunger and malnutrition, concepts of sustainable agriculture



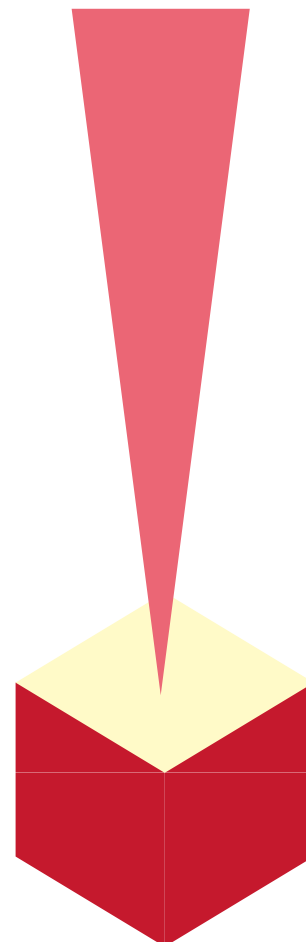
SDG3: Good Health and Wellbeing

Topics: strategies to promote health and wellbeing, health education, obesity, pollution



SDG4: Quality Education

Topics: access to inclusive and equitable quality education, basic skills needed in the 21st century, youth empowerment





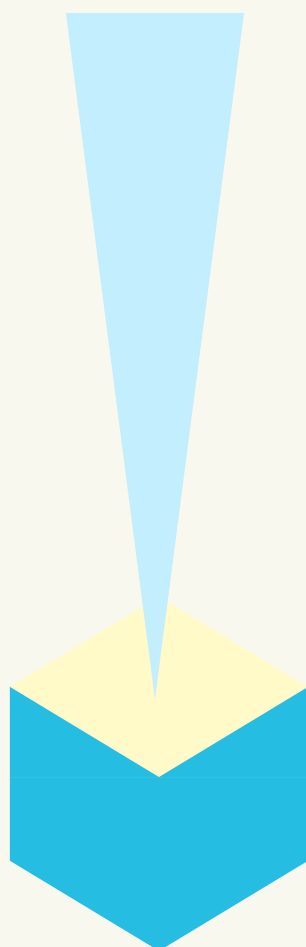
SDG5: Gender Equality

Topics: gender as a product of social construction, structural discrimination, gender and labour, gender and education rights, gender and poverty



SDG6: Clean Water and Sanitation

Topics: global water distribution, access to safe and affordable drinking water, water scarcity



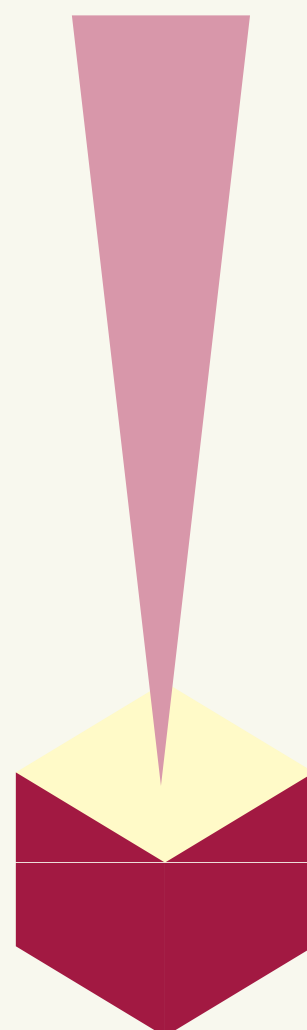
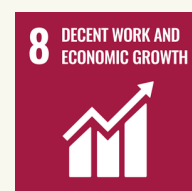
SDG7: Affordable and Clean Energy

Topics: energy efficiency and sufficiency, energy security, political, economic and social dimensions of energy, development of low carbon energy solutions



SDG8: Decent Work and Economic Growth

Topics: effects of unemployment, alternative economic indicators, inequalities in the labour market, sustainable economic development



SDG10: Reduced Inequalities

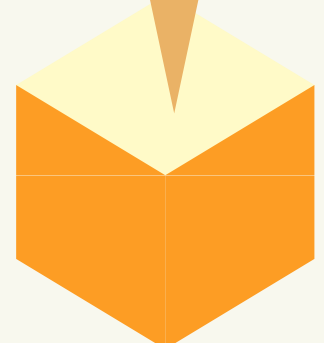
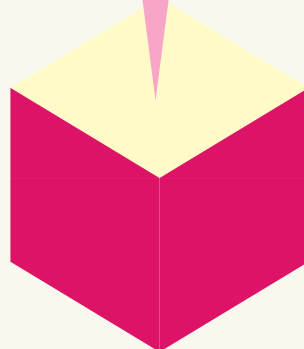
Topics: inequalities on national and global levels, social protection policies, representation of diverse groups, roots of current inequalities, migration of people

SDG9: Industry, Innovation and Infrastructure

Topics: need for basic infrastructure, sustainable innovation and industrialisation, sustainable supply chain, sustainability of the internet

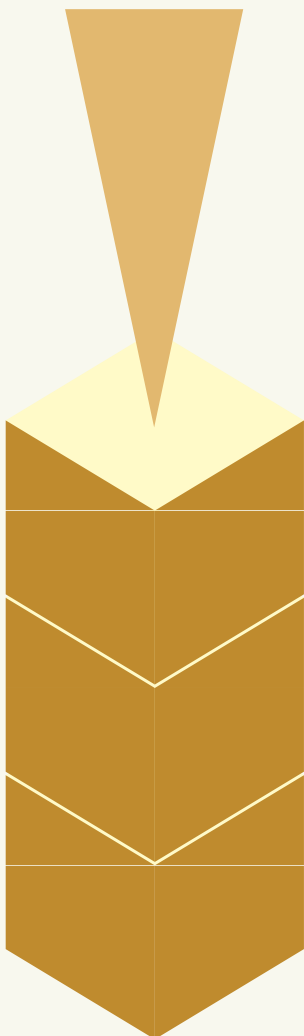
SDG11: Sustainable Cities and Communities

Topics: need for shelter, urban ecology, sustainable resilient buildings and spatial planning, resilience to weather problems



SDG12: Responsible Consumption and Production

Topics: management and use of natural resources, waste generation and management, sustainable lifestyles, green economy



SDG13: Climate Action

Topics: management of greenhouse gas emissions, strategies to protect the climate, climate change related hazard-prevention and adaptation



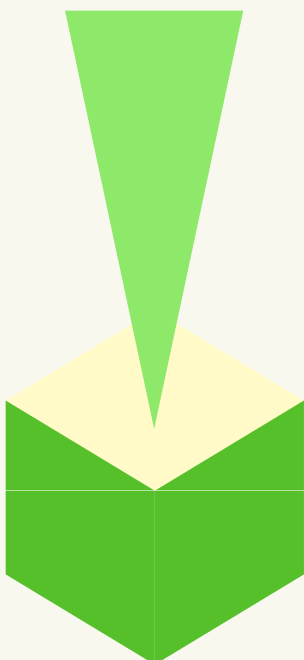
SDG14: Life below Water

Topics: management and use of marine resources, sustainable marine energy, ocean pollutants, risks of rising sea levels



SDG15: Life on Land

Topics: threats to biodiversity and risks of extinction, restoration of wildlife, strategies to combat desertification, deforestation



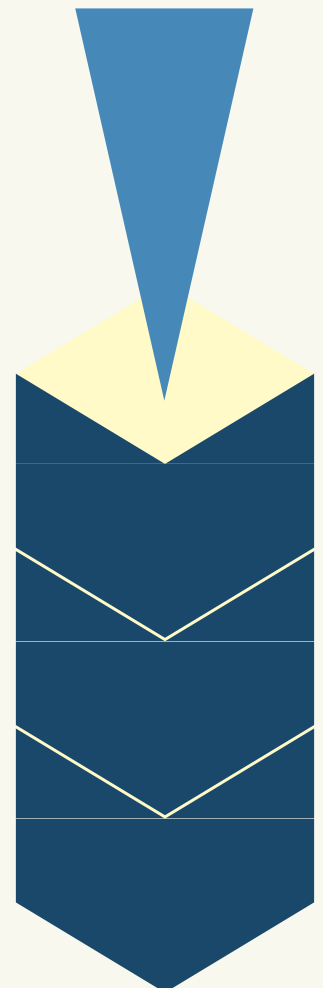
SDG16: Peace, Justice and Strong Institutions

Topics: strategies to promote peaceful and inclusive societies, agreements related to war, peace and refugees, child labour, drug abuse and drug-related issues



SDG17: Partnerships for the Goals

Topics: development and implementation of global policies on goals, citizens as change agents, global partnerships between governments, the private sector and civil society



To help teachers include SDG-related problems into classroom projects, the UN has created student [resources](#).

There is also an SDG course by The Dais called the [Ultimate Dialogue Adventure](#).

Many organisations have seen the usefulness of using the SDGs or SDG-related themes as a basis for competitive challenges. Below is a list of some of these challenges.



Extra Information

The United Nations Regional Information Centre in Western Europe (UNRIC) has created a [Minecraft Education Peace with Nature Challenge](#) relating to the SDGs.

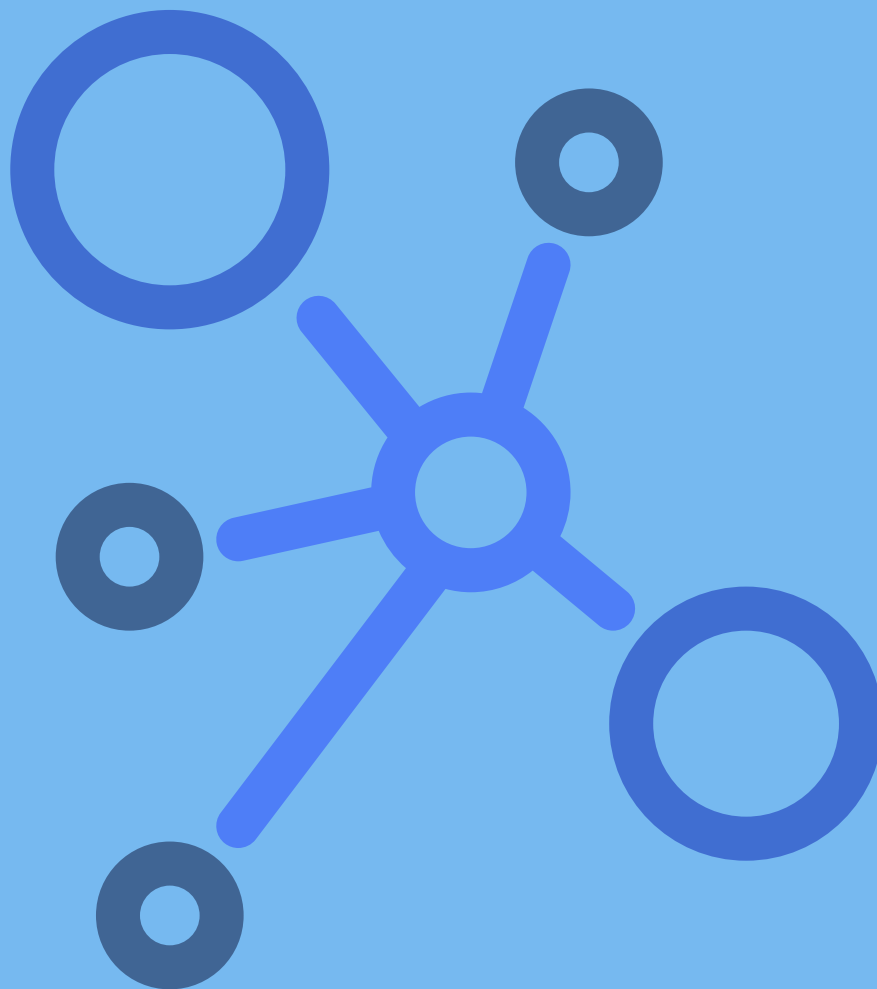
[Project Rangeet](#) has created a fun social and emotional learning app that also addresses some of the SDGs.

The Southern Cross University in Australia has a project called [Climate Action Adventure](#).

Benjamin Kelly, a Microsoft Innovative Educator Expert Fellow and Global Minecraft Mentor, created [The SDG Shuffle](#).

Part 4

Bringing it All Together





--- Bringing it All Together ---

The Edu-fy Global Goals Challenge integrates Design-thinking, Game-based learning, Social and Emotional Learning and Project-based Learning methodologies into one student-centred activity which develops 21st skills.

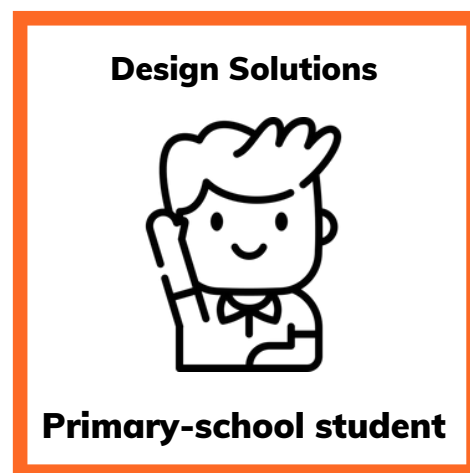
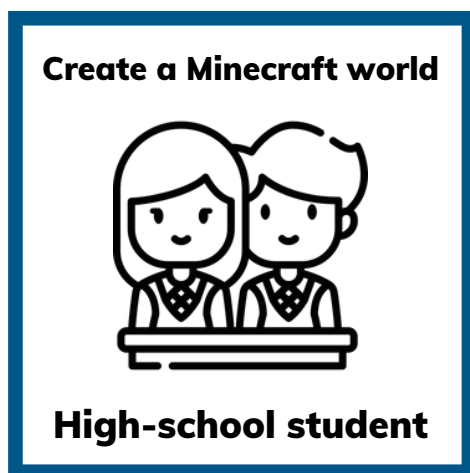


We recognise that there are many game platforms that can be utilised for the challenge. For the purposes of our first trial, we will utilise Minecraft Education Edition (MEE). (See [Why Minecraft](#))

The Challenge

For each of the 17 SDGs:

High-school students who are in grades 7-9, are challenged to create a Minecraft world depicting a current issue associated with the SDG they want to solve.



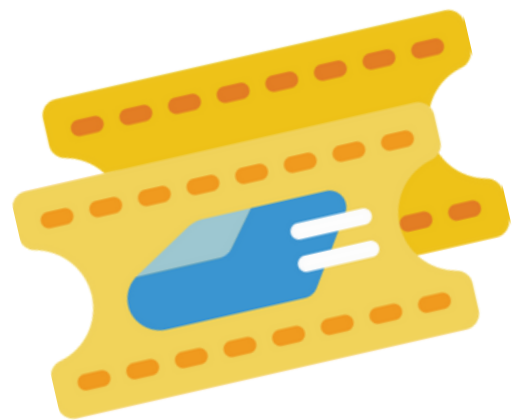
- **Primary-school students** who are in grades 4-6, are challenged to design solutions that will alleviate or solve these issues to achieve the SDG targets.

Approach / How we do it?

- We encourage teachers become Design-thinking facilitators and practise the skills with their students.
- We invite students to participate in a challenge using their Minecraft and Science, Technology, Engineering, Arts and Mathematics (STEAM) skills to create worlds that can be used in the SDG challenges.

Process

SEE NEXT PAGES!



**Problem-Solution
Challenge**

Best 3



Register Your School

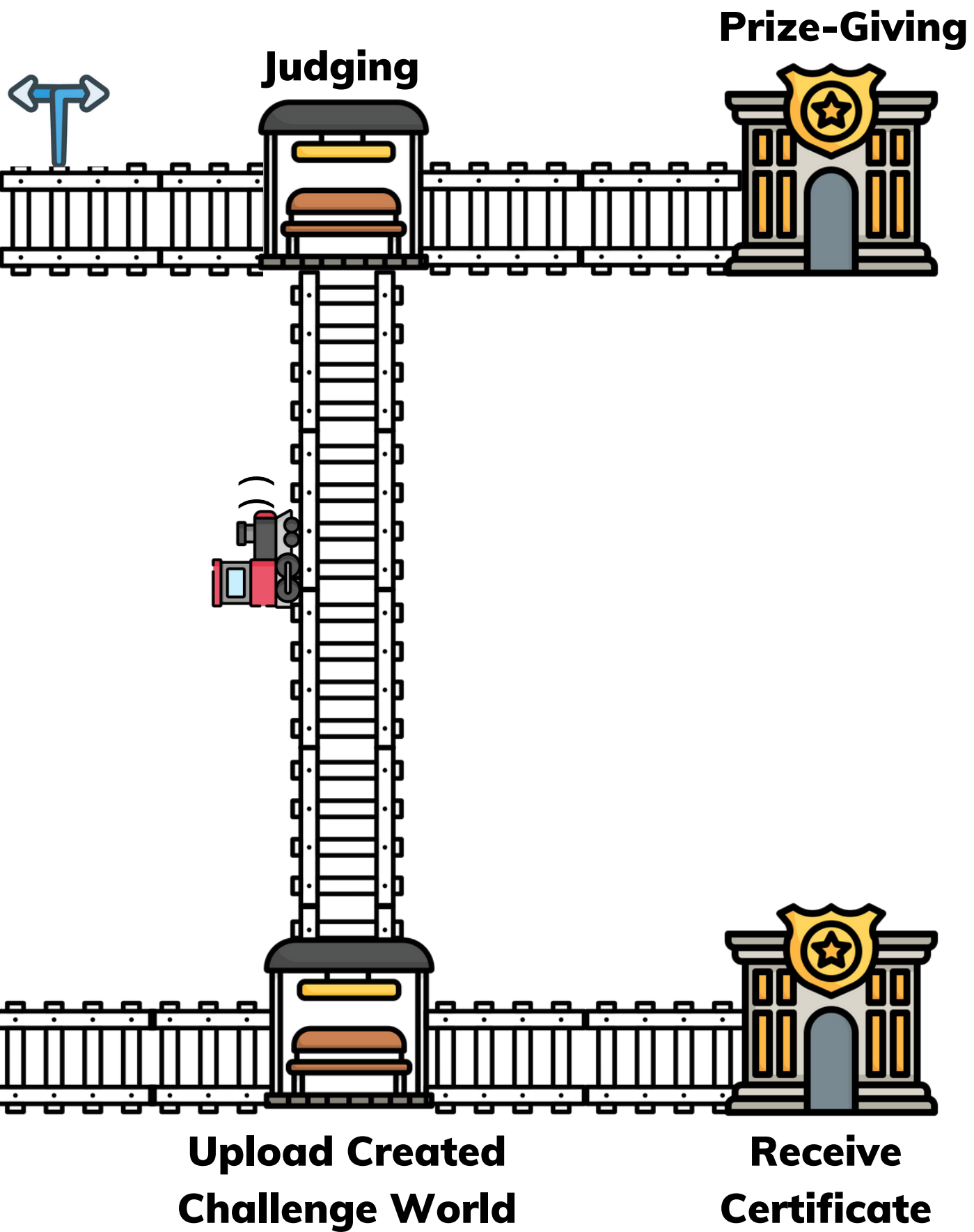


**Within
School**



**Problem-Creation
Challenge**





Support

Edu-fy will provide:

- guided support materials to be used within the challenges with links to stories of successes and failures from the past and to the latest research and innovations relating to solving the issues;
- modules relating to the SDGs where STEAM skills can be applied;
- support and resources for teachers to become facilitators in order to help their students in their Global Goals challenges; and
- a platform to create an online community of practitioners to offer and receive support to and from one another.



Why Minecraft?



Minecraft is increasingly being used as a tool in classrooms for innovative learning approaches.

<https://www.edsurge.com/news/2019-02-12-playing-games-can-build-21st-century-skills-research-explains-how>

<https://phys.org/news/2019-04-minecraft-problem-collaboration-learningyes-school.html>

<https://funtech.co.uk/latest/11-reasons-why-minecraft-is-educational-for-kids>



Minecraft can be used by teachers as a means to teach engaging lessons in person, remotely or in hybrid settings.

<https://education.minecraft.net/en-us/blog/victoria-celebrates-remote-learning>

<https://digital.com/best-web-hosting/minecraft/education/>



Part 5

Call to Action



Man is most nearly himself when he achieves the
seriousness of a child at play.

— *Heraclitus 500 BCE, philosopher*

Serious play is not an oxymoron; it is the essence of
innovation.

—*Michael Schrage, scholar*

Educators

- Sign-up for the Learning Planet Festival from Jan 22-29.
- Join the Q&A session during the Learning Planet Festival on Integrating Game-based Learning (GBL), Social and Emotional Learning (SEL) and Project-based Learning (PBL) to teach about the Global Goals.



- Register for our course on Game-based Learning (GBL), Social and Emotional Learning (SEL), Project-based Learning (PBL) and Design-thinking and how they can be used to teach the Sustainable Development Goals (SDGs).
- Join our international community of changemaker educators,



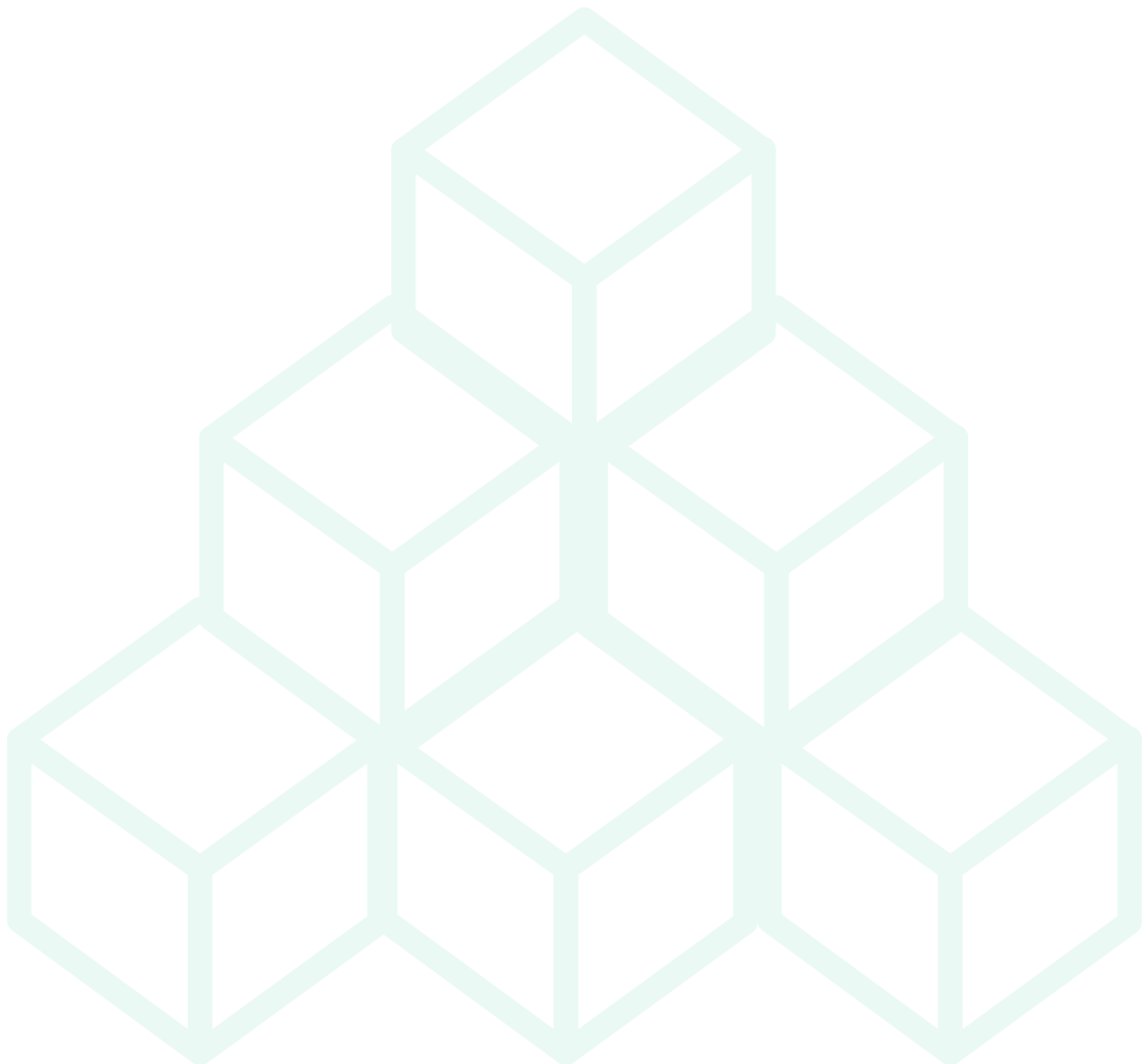
Schools/Clubs



-
- Register to become a Changemaker School/Club.
 - Register to join a pilot program on the Edu-fy Global Goals Challenge.
-

Endnotes

1. Quote from <https://www.interaction-design.org/literature/topics/design-thinkin>
2. James Paul Gee, "Good video games and good learning," https://academiccolab.org/resources/documents/Good_Learning.pdf
3. Eveline van Zeeland, "The neuroscience of game-based learning," Inchainge, on <https://inchainge.com/resources/blogs/the-neuroscience-of-game-based-learning/>



Credits

Graphics

Alina Grubnyak on Unsplash

Alvin Mahmudov on Unsplash

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Lego

Minecraft

Monstera from Pexels

Pixabay from Pexels

Polina Zimmerman from Pexels

Roblox

Sharon McCutcheon from Pexels

United Nations

Vlada Karpovich from Pexels

Information

UNESCO. Division for Inclusion, Peace and Sustainable Development, Education Sector. (2017). Education for sustainable development goals: Learning objectives.

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