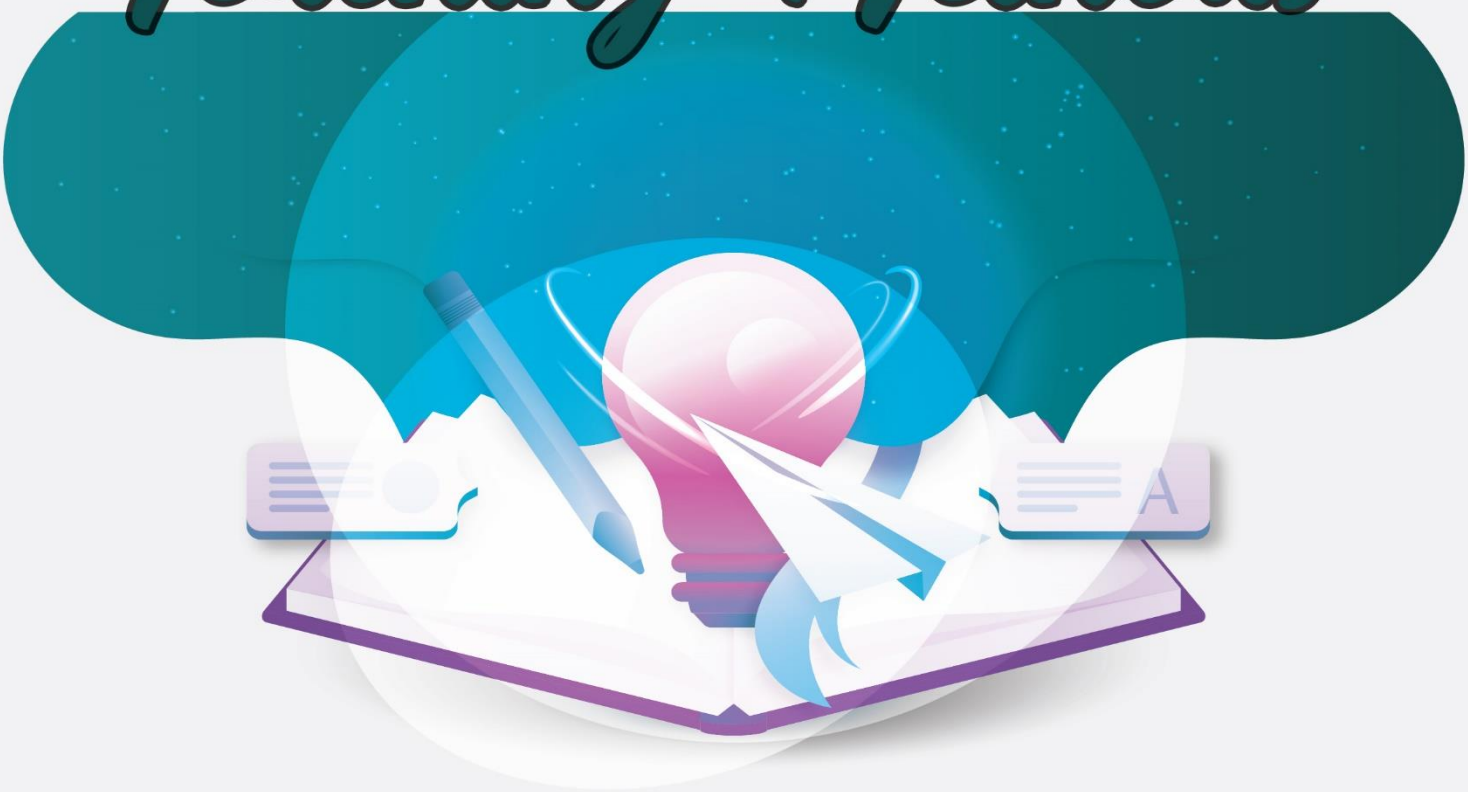
CC EDU

21st Century Teaching Methods



CC-EDU SIMPLIFY CLIMATE CHANGE EDUCATION FOR BETTER COMMUNICATION IN ELEMENTARY AND LOWER SECONDARY SCHOOL

PROJECT NO: 2019-1-FR01-KA201-063200

This project has been funded with the support from the European Union. This publication reflects the views only of the author, and the European Commission or L'agence Erasmus+France / Éducation Formation – National Agency of Erasmus+ in France cannot be held responsible for any use which may be made of the information contained herein."

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21st Century Teaching Methods

"The best teachers are those who show you where to look, but don't tell you what to see"
Alexandra K. Trenfor

The new century introduced significant changes in didactics and teaching methods. Pedagogy of the twentieth century differs from the pedagogy of **the twenty-first century**. Since the beginning of the twenty-first century, there have been many changes in the development of national and world education. In the twenty-first century, significant changes are occurring related to new scientific discoveries, informatization, globalization, the development of astronautics, robotics, and artificial intelligence. This century is called the *age of digital technologies and knowledge*.

New teaching methodologies are changing the educational environments around the world and driving better academic performance among students. ***The biggest challenge for any teacher is capturing each student's attention,*** and conveying ideas effectively enough to create a lasting impression. As a teacher, to tackle this challenge effectively, you should implement innovative ideas that make the classroom experience much more lovable for your students.

A number of different teaching techniques have emerged due to this change in education. Many of these **teaching techniques** are not actually new! The **use of technology in the classroom** has simply given education a new lease of life allowing us to approach old ideas in new ways.

One of the best qualities a teacher can have is a willingness to try new teaching strategies! Effective teaching holds your students' attention so powerfully they will beg you to stay longer in class!

In *Effective Teaching and Learning*, educational researcher **Naga Subramani**[1] argues that an effective teacher: "*Constantly renews himself [or herself] as a professional on his [or her] quest to provide students with the highest quality of education possible. This teacher* ***has no fear of learning new teaching strategies or incorporating new technologies into lessons.***" **Is that you?**

In the modern school, we observe serious changes related to informatics and the introduction of multimedia in the educational environment. Modern scientists—teachers, sociologists, futurists also reflecting—speak about a new generation of students, that is, schoolchildren of the twenty-first century. Let us consider the foreign studies of scientists who demonstrate modern changes and new approaches in the development of didactics.

Scientists **D. Tapscott, D. Oblinger, B. Brdička**[2] note serious changes in perception and learning process:

20th century generation	***New 21st century generation***
Books → reading	**Display – visual perception**
Current step, gradual movement	**Nonlinearity**
Single tasking	**Multitasking**
Linear approach	**Hyper media**
Perception through reading	**Iconic perception**
Independence	**Connection**
Ambiguity	**Cooperation**
Passive school, as requirement	**School as game**
Discussion	**Warning**
Reality	**Fantasies**
External Technology	**Internal technology**
Fact awareness	**Know how to find something necessary**

Hietajärvi[3] echoes it and so articulates changes in the new generation, called the "***social-digital generation***". Differences between the modern practice of teaching at school and the new "*social-digital generation*"

[1] *https://www.lulu.com/shop/drpc-naga-subramani/effective-teaching-and-learning/paperback/product-22827880.html*

[2] *Brdička B. New Information Technologies of Education [Internet]. 2012. Available from: http://www.slideshare.net/bobr/ [Accessed: 2012-06-30]*
New Pedagogical Challenges in the 21st Century: Contributions of Research in Education – Edited by Olga Bernad Cavero and Nuria Llevot - Calvet

[3] *Hietajärvi L, Tuominen-Soini H, Hakkarainen K, Salmela-Aro K, Lonka K. Is student motivation related to socio-digital participation? A person-oriented approach. Procedia-Social and Behavioral Sciences. 2015;171:1156-1112. DOI: 10.1016/j.sbspro.2015.01.226*

Socio-digital participation	School practices
Flexible use of digital media	Traditional media, e-mail
Multitasking	Linearity and sequence
Intellectual ICT tools	Pure mental performance
Internet searches	Limited textbook content
Socio-digital networking	Offline working, F_2F
Working on screen	Paper and pencil
Making and sharing in groups	Individual performance
Extended networks	Closed classroom community
Knowledge creation	Knowledge acquisition

Hietajärvi call the modern generation as a generation with "social and digital participation" and write that "*social and digital technologies are integrated systems of technology, social media and the Internet that provide a constant and intensive online interaction with information, people, and artifacts*"; Social and digital participation is "***a new concept of the practice of informal, socially-digital mediated participation***".

Teachers have diametrically opposed opinions on how to respond to changes: from conservative (*leaving everything as it is, schoolchildren need to be taught as in the last century*) until the need for a ***complete restructuring of the education system***. Our position is based on the principle of ambivalence, the continuity of "**tradition → innovation**," the need for active research of the *phenomenon of electronic and visual culture*, and the study of the influence of visual culture on the personality of a schoolboy. Digital technologies change our way of life, ways of communication, way of thinking, feelings, channels of influence on other people, social skills, and social behavior[4].

These issues put forward new requirements for the teacher and his/her professional activities. Teachers need to learn new information and digital technologies more actively. In addition, new research is needed in the field of the **psychology of perception and thinking with the active use of e-learning**. Practical training of teachers for the use of ***ICT and digital resources***, the formation of digital literacy, the inclusion of such courses in educational programs for teachers is necessary nowadays.

[4] *Mynbayeva A, Anarbek N. Informatization of education in Kazakhstan: New challenges and further development of scientific schools. International Review of Management and Marketing. 2016;6(S3):259-264*

Teaching Strategies and Methodologies

We go over some of the main innovative approaches that educators have forged over the last few years and that every **21st century teacher** should be acquainted with.[5]

Classroom teaching strategies

Classroom management	Flexible seating
Webb's depth of knowledge	Summative Assessment
Active learning	Formative assessment
Differentiated instruction	Personalized learning
Universal design for learning	Response to intervention
Classroom technology	

Math teaching strategies

Math games	Math websites
Mental math	Common core math
Solve math problems faster	How to teach multiplication
Multiplication games	Multiplying fractions
How to divide fractions	Math puzzle

Student-focused teaching strategies

Gamification	Convergent and divergent thinking
Project-based learning	Experiential learning
Peer teaching	Inquiry-based learning
Problem-based learning	Cooperative learning
Reciprocal teaching	Blended learning
Culturally responsive	Interdisciplinary teaching
Service learning	Media literacy
Growth mindset	

[5] *https://www.prodigygame.com/blog/teaching-strategies/#resources*

Classroom management strategies

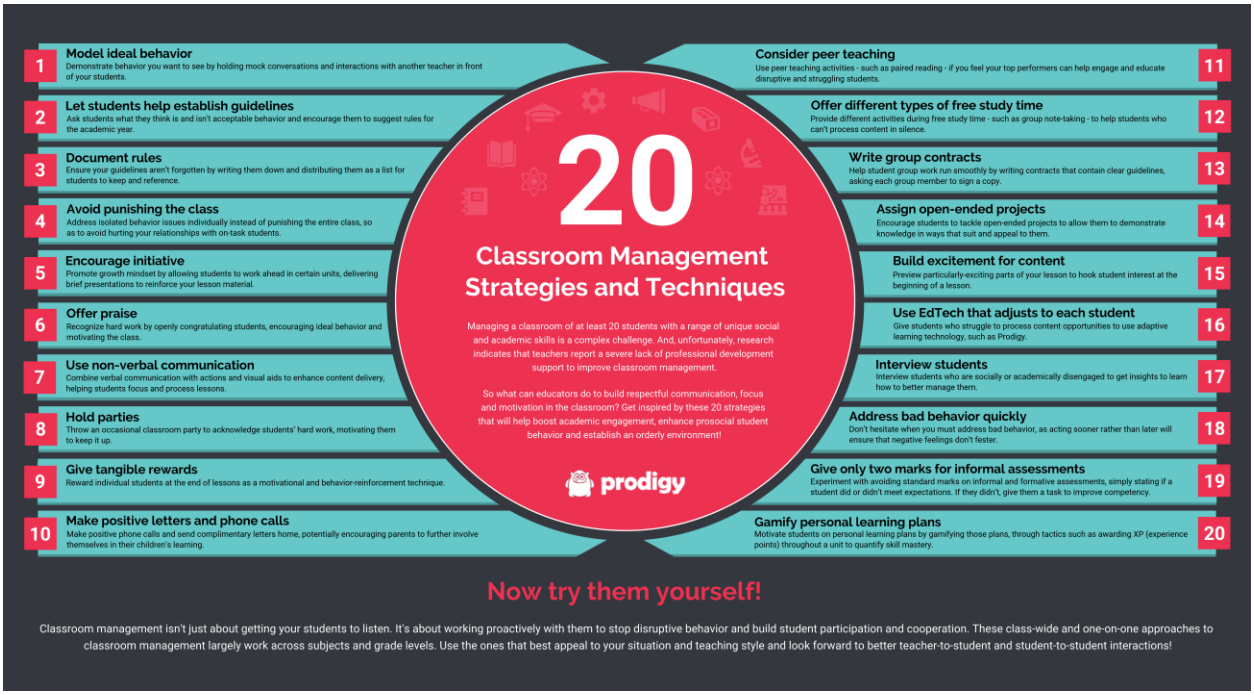
According to research from 2006, teachers overwhelmingly reported a lack of professional development support when it came to improving their own **classroom management strategies.** This can lead to confusion for students and frustration for teachers.

When students clearly understand what's expected of them, they're more likely to be focused and engaged with their lessons. Some tips for building a positive environment include:

- **Model ideal behavior:** Clearly explain proper behavior, and then follow it yourself.
- **Encourage initiative:** Allow students to actively participate in the learning process.
- **Avoid collective punishment:** While it can be difficult, make a point of calling out disruptive behaviors on an individual, not collective, basis.

In this picture bellow you can find the Infographic with ***20 Classroom Management Strategies and Techniques***.

What can educators do to build a respectful communication, focus and motivation in the classroom? **Get inspired by these 20 Strategies…**



For more actionable classroom management teaching strategies, read *20 Classroom Management Strategies and Techniques*[6]

[6] *https://www.prodigygame.com/blog/classroom-management-strategies/*

Common core Math

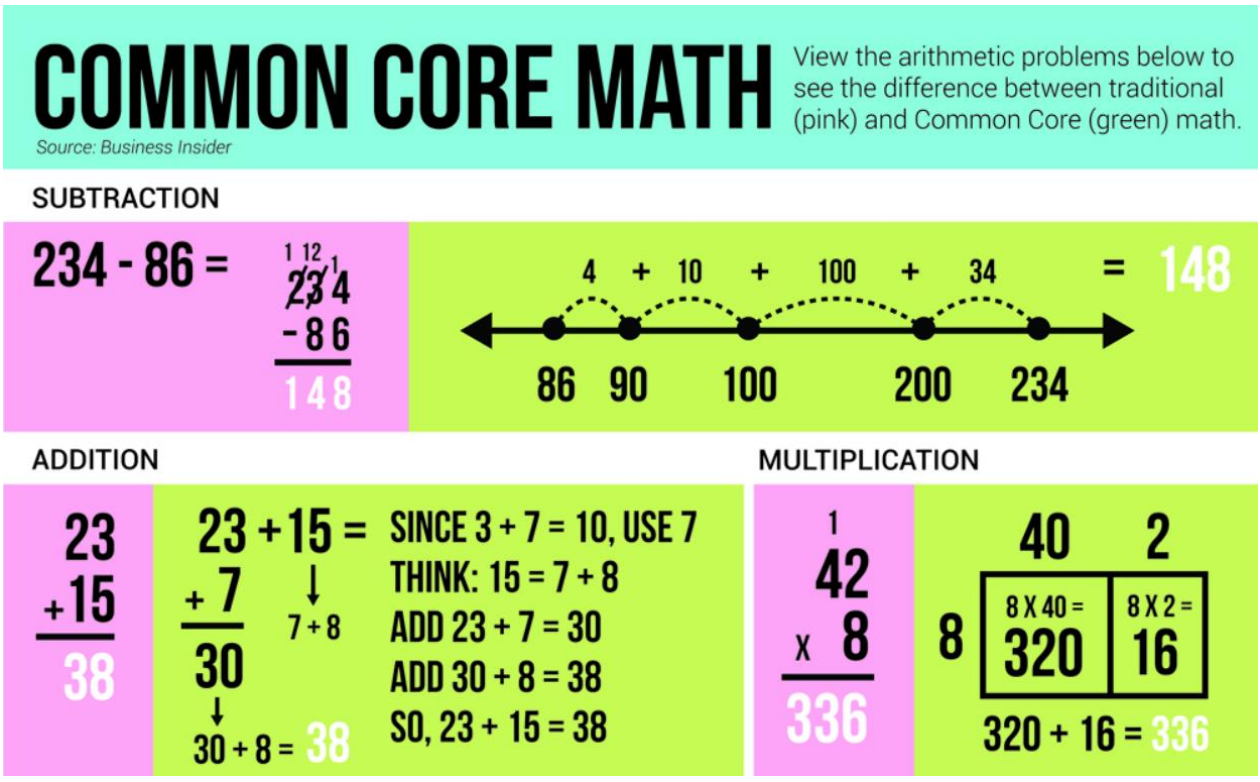
For some students, math is complicated enough. Even when it consisted of counting on fingers and grouping blocks in an effort to grasp the concept of multiplication, it sometimes still proved challenging.

Common Core math is a new framework that seeks to improve students' conceptual understanding of math by encouraging problem-solving, critical thinking, and discussion skills.

Since it's so new, instructors have struggled to prepare materials that align with the standards. If that's you, here are some techniques to get you started:

- **Use modular tools:** Younger students can model their problems using number blocks, and older student can use everyday objects to "act out" the concepts they're learning.
- **Encourage peer discussion:** Common Core standards place a large focus on critical thinking and problem solving — two things that students can learn by talking through problems with their peers.
- **Math journals:** Writing out the steps they took to solve a problem helps students to understand where they got stuck. Plus, it's a great tool for teachers looking to keep track of student comprehension.

For a detailed explanation of the eight standards and ways to teach them, read *8 Common Core Math Standards, Explained [+ Examples]*[7].



[7] *https://www.prodigygame.com/blog/common-core-math-standards/*

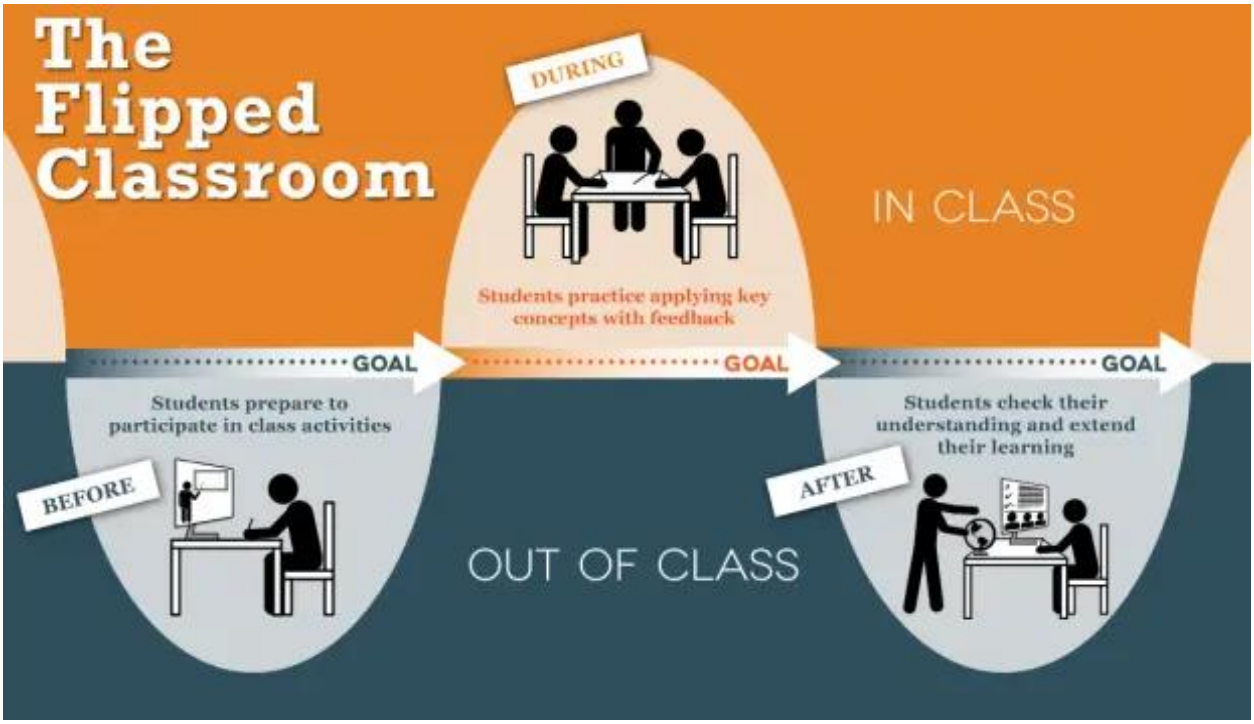
Modern teaching methodologies

Flipped Classroom

One of the modern methodologies that has gained more popularity in recent years, **Flipped Classroom** is a **pedagogical approach in which the traditional elements of the lesson taught by the teacher are reversed** – the primary educational materials are studied by the students at home and, then, worked on in the classroom.

The Flipped Classroom Model basically involves **encouraging students to prepare for the lesson before class**. Thus, the class becomes a dynamic environment in which students elaborate on what they have already studied. Students prepare a topic at home so that the class the next day can be devoted to answering any questions they have about the topic. This allows students to go beyond their normal boundaries and explore their natural curiosity[8].

The main objective of this methodology is to **optimize time in class** by dedicating it, for example, to meet the special needs of each individual student, develop cooperative projects or work on specific tasks.



Check more: https://youtu.be/iQWvc6qhTds *(YouTube link where it is better explained the Flipped Classroom Methodology)*

[8] *https://www.goconqr.com/en/learn/flipped-classroom/ - GoConqr's free online learning tools can be **integrated into the Flipped Classroom teaching model**. Using GoConqr, you can easily share resources with a group, in this case a class, allowing students to study these resources from home and prepare for the next class.*

Project-based Learning

With the arrival of new information and communication technologies to schools, both **new teaching methodologies** as well as **new versions of existing methodologies**, now revised and updated for the digital generation, have emerged. One of the most used in class at present is Project-Based Learning (PBL).

In its essence, PBL **allows students to acquire key knowledge and skills through the development of projects that respond to real-life problems.**

"The teaching based on projects or integrated tasks, is today the best didactic guarantee for an effective development of key skills while also acquiring the knowledge of the curriculum's content."

Starting from a **concrete problem, instead of the traditional theoretical and abstract model,** sees notable improvements in students' ability to retain knowledge as well as the **opportunity to develop complex competencies such as critical thinking, communication, collaboration or the problem solving.**

Check more: https://youtu.be/LMCZvGesRz8 (Project Based Learning: Explained.)

Cooperative Learning

"Stronger together". This concept in a simple way cooperative learning, a *methodology that teachers use to group students together*[9] and, thus, impact on learning in a positive way.

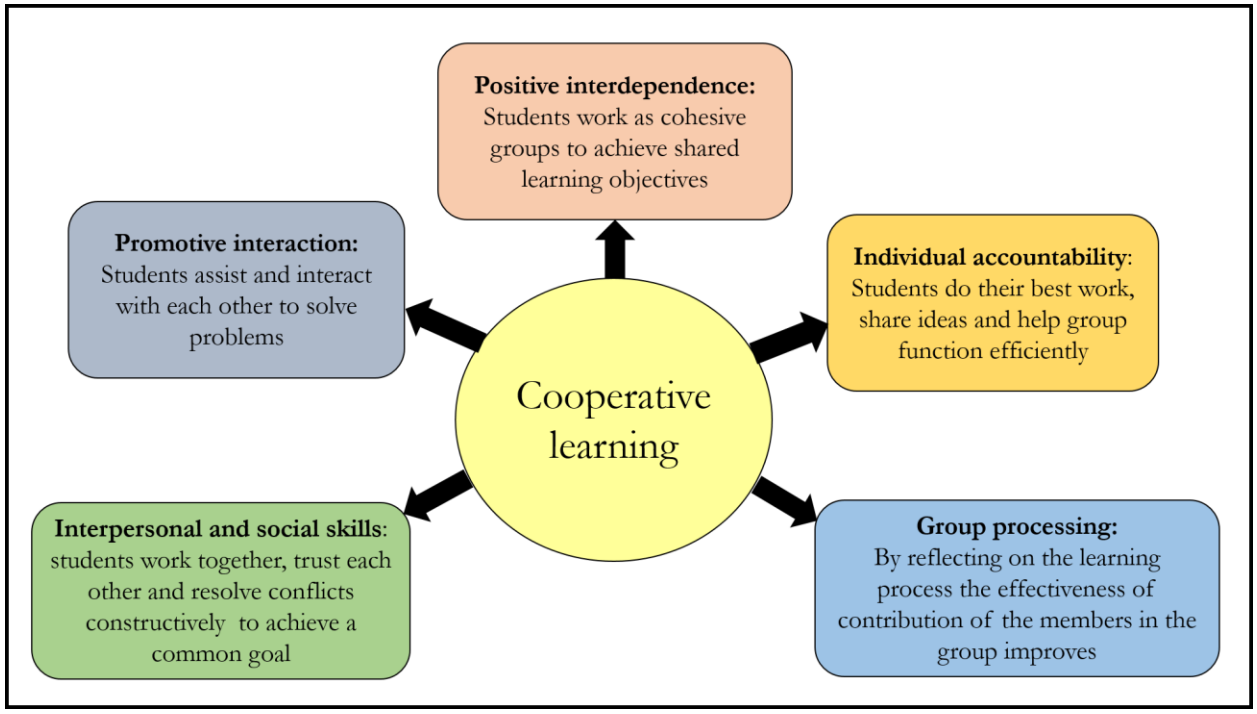
The proponents of this model theorize that **working in a group improves the attention, involvement and acquisition of knowledge** by students.

The final goal is always group-oriented and will be achieved if each of the members successfully perform their tasks.

The main characteristic is that it is structured based on the formation of groups of 3-6 people, where **each member has a specific role** and to reach the objectives it is necessary to interact and work in a coordinated manner.

In a cooperative learning context, **the final goal is always common and will be achieved if each of the members successfully performs their tasks.** On the other hand, individual learning has students focusing on achieving their objectives without having to depend on the rest of their classmates.

Check more: https://youtu.be/rWEwv_qobpU

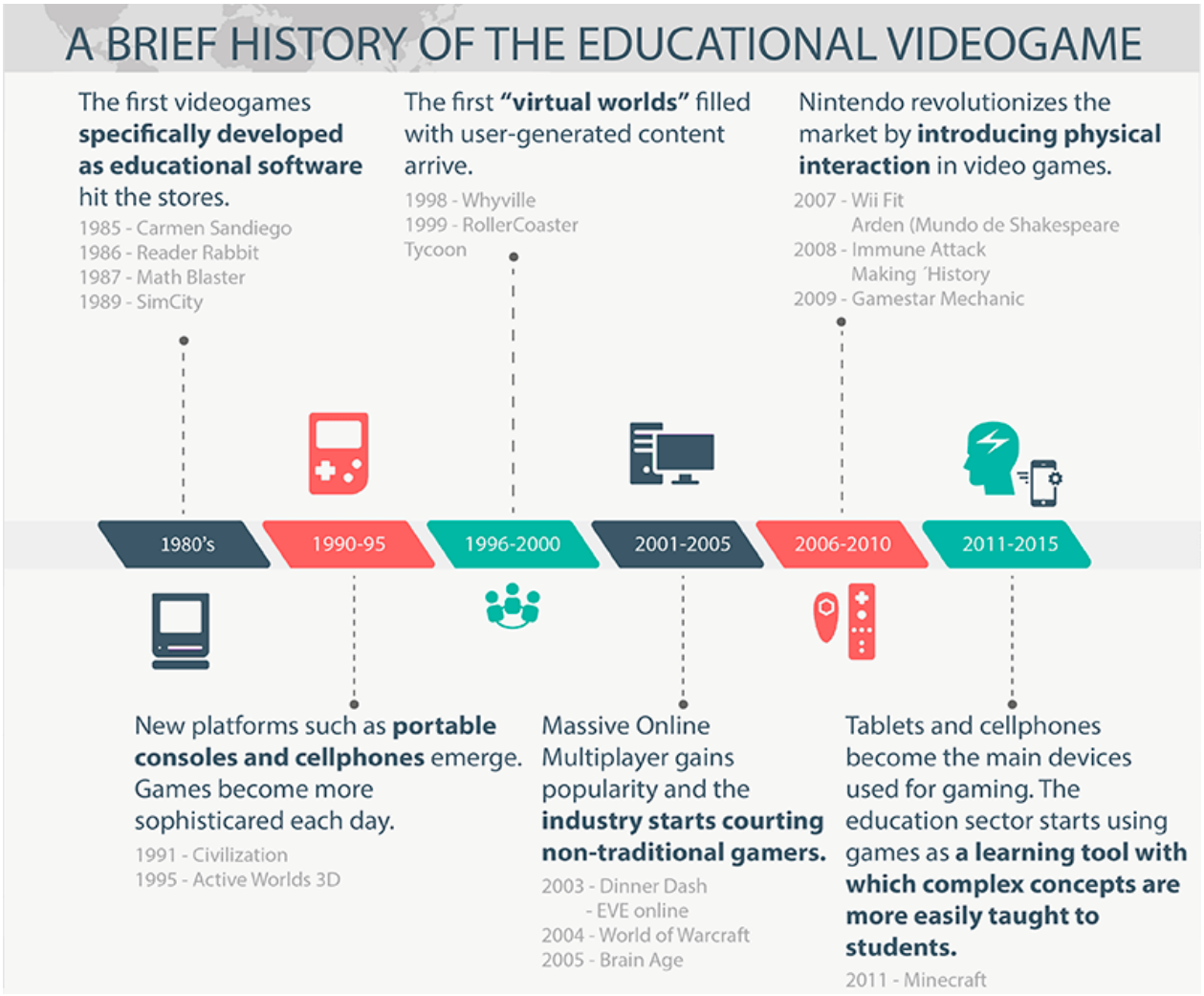


[9] *https://www.realinfluencers.es/en/2015/12/02/claves-del-aprendizaje-cooperativo-en-el-arenales-carabanchel/*

Gamification

The integration of game mechanics and dynamics in non-ludic environments, or gamification, has been practiced for a long time. Over the past few years, however, and particularly due to the evolution of videogames, the phenomenon has gathered unprecedented dimension, and is **one of the most talked about as a current and future trend[10] of the EdTech industry.**

Since, in the 80's, games with an international vocation such as the "Carmen Sandiego[11]" series or "Reader Rabbit[12]" (*see infographic below*) have gained worldwide popularity, the **development of educational titles has increased consistently.** Not only those aimed at the general public but, ever more often, those specifically designed for students and particular courses.



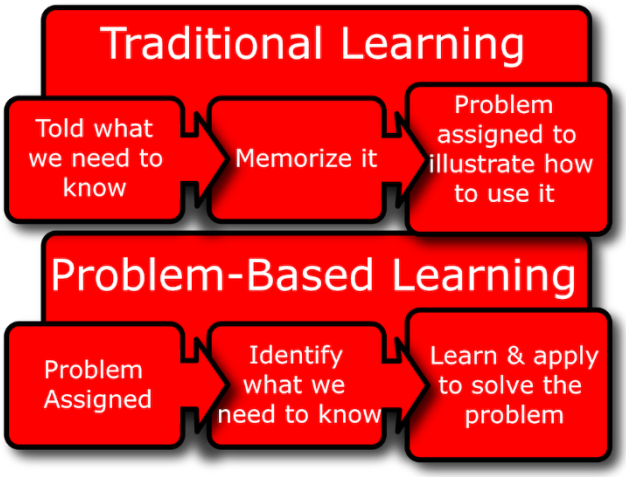
This trend was consolidated with the **increasing inclusion of gamification in school curricula** and it is estimated that this inclusion will continue to grow in the future. Check more: https://youtu.be/4qlYGX0H6Ec

[10] *https://www.realinfluencers.es/en/2016/01/19/main-edtech-trends-for-2016/*
[11] *https://en.wikipedia.org/wiki/Where_in_the_World_Is_Carmen_Sandiego%3F_(1985_video_game)*
[12] *https://www.youtube.com/watch?v=FKR6UKq7lV4*

Problem-Based Learning

Problem-Based Learning (PBL) is a **cyclic learning process** composed of many different stages, starting with asking questions and acquiring knowledge that, in turn, leads to more questions in a growing complexity cycle.

Putting this methodology into practice does not only mean the exercise of inquiry by students, but convert it into useful data and information. According to *several educators*[13], the four great advantages observed with the use of this methodology are:



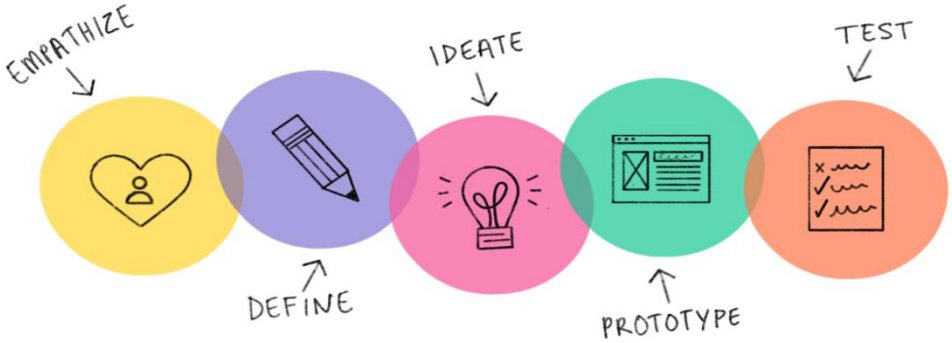
- The development of **critical thinking and creative skills**
- The improvement of **problem-solving abilities**
- Increased student **motivation**
- Better **knowledge sharing** in challenging situations

Check more:
https://youtu.be/RGoJIQYGpYk

Design Thinking

Education has always been a **prolific space for innovation.** Teachers all over the world are constantly coming up with **new ideas and methodologies** to introduce in the classroom making the best of the tools at their disposal.

Design Thinking (DT) applied stems from industrial designers and their unique method to solve problems and satisfy the needs of their clients. Applied to education, this model makes possible to **identify with greater accuracy the individual problems of each student** and generate in their educational experience the **creation and innovation towards the satisfaction of others,** which then becomes symbiotic. Check more: https://youtu.be/_r0VX-aU_T8



[13] https://www.afr.com/policy/health-and-education/the-evidence-is-in-for-the-future-of-education-20190412-p51dh9

Thinking-Based Learning

Beyond the *debate around the effectiveness of learning by memorizing*[14] facts and data when discussing education, one of the most talked about aspects is the need to show students how to work with the information they receive at school. Teach them to contextualize, analyze, relate, argue… In short, convert information into knowledge.

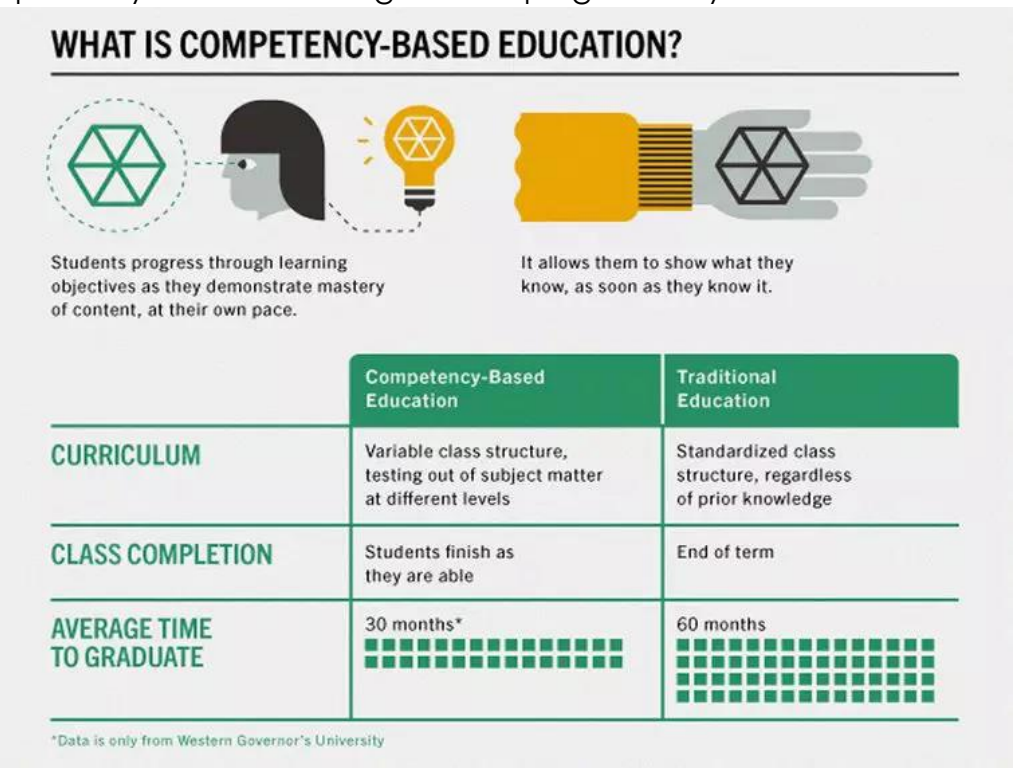
This is the goal of **Thinking-Based Learning (TBL),** developing **thinking skills beyond memorization** and, in doing so, developing effective thinking on part of the students. Check more: https://youtu.be/g8NZS-QZd98

Competency-Based Learning

By definition, **all learning methodologies have the acquisition of knowledge, the development of skills and the establishment of work habits as their main goals.** Competency-Based Learning (CBL) represents a set of strategies to achieve this.

Through assessment tools such as rubrics, teachers can go through the academic curriculum without significant deviations but focusing it in a different way, putting into practice real examples and, thus, transmitting to their students a more **tangible dimension of the lessons.**

Check more: https://youtu.be/VnXdj0yqpzI
(Competency-Based Learning: Developing Mastery of Skills and Content)



[14] *http://www.vfo.be/docs/VFOstudiedag2008-131-Ferla2.pdf (Learning Conceptions and their Impact on Higher Education Students' Study Strategies and Academic Achievement*

Challenge Based Learning

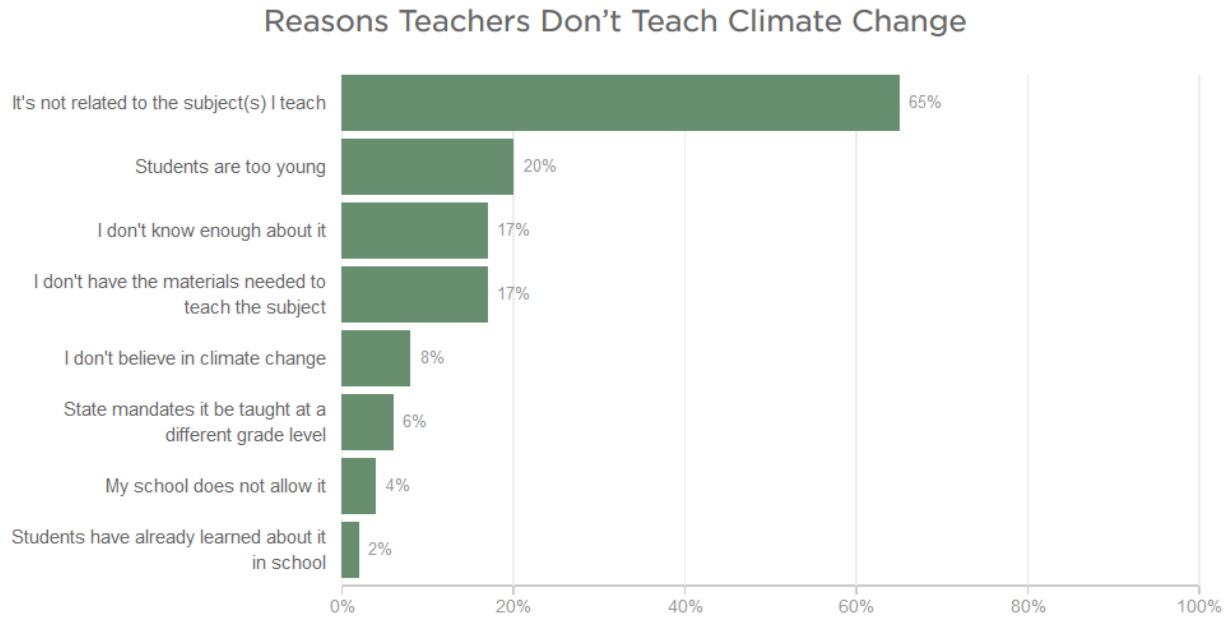
Challenge Based Learning (CBL) provides an efficient and effective framework for learning while solving real-world challenges. The framework fuels collaboration between students, teachers, families, and community members to identify big ideas, ask thoughtful questions, and identify, investigate and solve challenges. This approach helps students gain deep subject area knowledge and develop the skills necessary to thrive in an ever-changing world.

For more ideas and methods on how to use CBL visit the CBL site at challengebasedlearning.org

Teaching Climate Change

How To Teach Climate Change Without Panicking Your Students?

Climate change is one of the most important challenges faced by current and future generations. The top reason that teachers say for not covering climate change? **"It's not related to the subjects I teach,"!**



That raises the question: **Where does climate change belong in the curriculum, anyway?**

Joseph Henderson teaches in the environmental studies department at Paul Smith's College in upstate New York. He studies how climate change is taught in schools and believes it needs to be taught across many subjects.

"For so long this has been seen as an issue that is solely within the domain of science," he says. *"There needs to be a greater engagement across disciplines, particularly looking at the social dimensions,"* such as the displacement of populations by natural disasters.

It's a difficult topic to talk about, let alone teach. Climate change can make children feel **scared and powerless**, so it's important to approach any conversation with care.

However, teaching about climate change can prepare students for the future. Here's how to introduce this topic in your classroom and incorporate it into lessons across history, science, social studies and more.

Resources for teaching climate change

The best way to teach about a challenging topic is to find the right resources and examples for doing so. When it comes to climate change, there are a wealth of websites and lesson plans available to educate elementary students about this topic.

One example is **Climate Kids**[15] from **NASA**. This project spans topics on *water, energy, plants and animals, atmosphere and weather and climate.* Another reputable resource is the National Center for Science Education. **Minda Berbeco**[16], director of the San Francisco Bay Chapter Sierra Club, says teaching young children about climate change isn't a political issue. Rather, she explains that it's a science topic with societal implications. She also says that today's teachers have no choice but to educate students on these matters.

"The data is readily available; we know Earth is warming. If children understand why, they can begin working towards slowing down the effects. Their future quality of life depends on it."

Additional lesson plan resources are shared by Common Sense Education senior editor **Danny Wagner**[17]**.** He points out that *understanding climate change isn't just an ethical issue — it's now part of the Next Generation Science Standards*. This means that students will need to be able to explain how climate change occurs and what contributes to it. Wagner provides four digital tools and accompanying lesson plans that can be used in the classroom to advance climate change learning.

Teachers might also refer to the **National Ocean Service's Planet Stewards Education Project (PSEP)**[18]**.** Teachers who feel uncertain about teaching climate change topics will find this to be a useful resource for educating both themselves and their students. PSEP has also sponsored numerous environmental stewardship projects in elementary schools.

Younger students can also benefit from watching climate change videos that make scientific processes more digestible. A number of videos are collected by **Project Learning Tree**[19]**.** These videos feature animals and easy-to-understand visuals. They're used to explain things like the carbon cycle, climate science and **biology topics**[20] like how trees store and capture carbon.

[15] https://climatekids.nasa.gov/menu/teach/
[16] https://ncse.ngo/teaching-climate-science-its-elementary
[17] https://www.commonsense.org/education/articles/5-free-tools-for-teaching-about-climate-change
[18] https://oceanservice.noaa.gov/education/planet-stewards/#3
[19] https://www.plt.org/educator-tips/videos-climate-change-middle-school
[20] https://blog.planbook.com/teaching-biology/

Connect climate change to the Real World

Incorporating visuals and real-world information into climate change lessons can help students better grasp the extent of the problem. According to the **National Education Association**[21], a real-world connection is crucial for properly teaching climate change.

> *"One of the essential principles of teaching climate change to students is the message that it has consequences for the earth and human lives."*

A great place to start is asking students to consider how their daily actions might contribute to climate change. **Climate Change Connection**[22] is a Manitoba-based resource that helps educate the public about climate change. They also have specific resources to engage and inform teachers, students and schools in taking action on climate change. One of their free resources for students is a carbon footprint worksheet. This asks students questions about transportation, housing and eating habits to help them better understand how their daily activities affect the planet. They also have an ecological footprint, which is a positive spin on the carbon footprint activity. This lesson helps students conduct self-assessments to see what good is being done for the environment.

Teaching students these real-world connections can also be done through activities. For example, sixth grade teacher **Melissa Lau**[23] uses dice to teach her students how probability affects extreme weather. Some of these dice have extra sides, which symbolize additional carbon in the atmosphere.

> *"The students then sent the dice clattering again and again across tables to test the extent to which the extra carbon contributed over time to high tallies, which indicated extreme weather events."*

While this is in a middle school classroom, the same activity could be used by fourth or fifth grade students as well. Lau also collects data from her travels to provide them with real-world information on how climate change affects other areas. After a trip to Alaska, for example, she showed students measurements and photographs of the impacts of climate change. This shows students that climate change is a real and current problem, even if they can't see the influence in their hometown.

[21] http://www.nea.org/climatechange
[22] https://climatechangeconnection.org/
[23] https://hechingerreport.org/teaching-global-warming-in-a-charged-political-climate/

Inspire Change and Action

Learning about climate change can be stressful, especially if students feel that nothing can be done to help. That's why it's important for teachers to pair elementary climate change lessons with actionable, hands-on activities that **cultivate compassion**[24]. This will empower and inspire students to make a difference in their daily lives. For younger elementary students, start by spending time outside and teaching students about the local environment.

"Understanding that humans have impacts on the natural world and that wildlife is impacted by changing ecosystems is a must in grades K-2. Spending time exploring local wildlife/habitats and learning about any current risks will establish the ground-work for more abstract climate-related thinking later on," **says Lindsey Bailey**[25], teacher training manager at Population Education.

For every lesson that focuses on a problem or challenge related to climate change, consider adding a positive and actionable point. "An elementary school child can understand why it's better to walk to their friend's house instead of being driven, or why they can wear a sweater in the house instead of just cranking up the heat," says pediatrician **Samantha Ahdoot**[26], lead author of the American Academy of Pediatrics' Policy Statement on Climate Change and Children's Health, by way of example.

Consider encouraging small daily changes that can make students feel empowered about making a difference. *"My goal is to inspire students, not scare them to death! I stress that we can do something about this. It's very much empowering,"* says climate change education consultant **Kottie Christie-Blick**[27].

She facilitates a website called **Kids Against Climate Change**[28], which explains why the world's climate is changing and encourages and empowers students to get involved in things like recycling and reducing air pollution.

[24] https://blog.planbook.com/teaching-performing-arts/
[25] https://populationeducation.org/5-kid-friendly-ideas-for-teaching-climate-change-in-elementary-grades/
[26] https://www.pbs.org/newshour/science/how-to-talk-to-your-kids-about-climate-change
[27] http://neatoday.org/2017/03/14/teaching-about-climate-change/
[28] https://kidsagainstclimatechange.co/

We also heard from teachers who say that they are searching for more ideas and resources to take on the topic of climate change. Here are some thoughts about how to broach the subject with students, **no matter what subject you teach:**

1) **Do A Lab** - Lab activities can be one of the most effective ways to show children how global warming works on an accessible scale. Many teachers we talked with mentioned **NASA** as a resource for labs and activities. The ones in **this outline**[29] can be done with everyday materials such as ice, tinfoil, plastic bottles, rubber, light bulbs and a thermometer. On the **Earth Science Week**[30] **website**, there's a list of activities and lesson plans aligned with the Next Generation Science Standards. They range from simple to elaborate.
2) **Show A Movie** - Susan Fisher, a seventh-grade science teacher at South Woods Middle School in Syosset, N.Y., showed her students the 2016 documentary *Before the Flood*, featuring Leonardo DiCaprio journeying to five continents and the Arctic to see the effects of climate change. "It is our intention to make our students engaged citizens," Fisher says. ***Before the Flood***[31] has an action page and an associated curriculum. Common Sense Media has a list of **climate change-related movies**[32] for all ages. The 2006 film *An Inconvenient Truth* and **its 2017 sequel**[33], *An Inconvenient Sequel: Truth To Power*, have curricular materials created in partnership with the National Wildlife Federation.

[29] https://gpm.nasa.gov/education/weather-climate
[30] https://www.earthsciweek.org/classroom-activities/ngss
[31] https://www.beforetheflood.com/act/
[32] https://www.commonsensemedia.org/lists/movies-that-teach-kids-about-climate-change
[33] https://www.inconvenientsequeleducation.org/educators/

3) **Assign A Novel** - Rebecca Meyer is an eighth-grade English language arts teacher at Bronx Park Middle School in New York City. She assigned her students a 2013 novel by **Mindy McGinnis** called *Not a Drop to Drink*. "As we read the novel, kids made connections between what is happening today and the novel," Meyer says. "At the end of the unit, as a culminating project, students chose groups, researched current solutions for physical and economic water scarcity and created PSA videos using iMovie about the problem and how their solution could help to combat the issue."
4) **Do Citizen Science** - Terry Reed is the self-proclaimed "science guru" for seventh-graders at Prince David Kawananakoa Middle School in Honolulu. He has also spent a year sailing the Caribbean, and on his way, he collected water samples on behalf of a group called **Adventure Scientists**[34], to be tested for microplastics. (Spoiler: Even on remote, pristine beaches, all the samples had some.) He has assigned his students to collect water samples from beaches near their homes to submit for the same project. He also has them take pictures of cloud formations and measure temperatures, to see changes in weather patterns over time. "One thing I stress to them, that in the next few years, they become the voting public," he says. "They need to be aware of the science."
5) **Assign A Research Project, Multimedia Presentation Or Speech** - Gay Collins teaches public speaking at Waterford High School in Waterford, Conn. She is interested in "civil discourse" as a tool for problem-solving, so she encourages her students "*to shape their speeches around critical topics, like the use* ***of plastics, minimalism, and other environmental issues***."
6) **Talk About Your Personal Experience** - Pamela Tarango teaches third grade at the Downtown Elementary School in Bakersfield, Calif. She tells her students about how the weather has changed there in her lifetime, getting hotter and drier: "In our Central Valley California city of Bakersfield, there has been a change in the winter climate. I told them about how, when I was growing up in the 1970s, we often had several two-and-three-hour delays to school starting because of dense tule fog, which affected visibility. We really never have those delays in the metropolitan area. It is only the outlying areas, which still have two-and-three-hour dense fog delays, and they are rare even for the rural areas."
7) **Do A Service Project** - "I teach preschoolers and use the environment and our natural resources to highlight our everyday life," says Mercy Peña-Alevizos, who teaches at Holy Trinity Academy in Phoenix. "I stress the importance of appreciation and eliminating waste. My students understand and have fantastic ideas. We recycle and pick up around our neighborhood." Environmental service projects can be simple, elaborate or just for fun. Check out the **#Trashtag challenge** on social media, for example.

[34] https://www.adventurescientists.org/

8) **Start Or Work In A School Garden** - Mairs Ryan teaches science at St. Gregory the Great Catholic School in San Diego. "The sixth-graders oversee the school garden, as well as our vermin composting bin, christened the 'Worm Hotel'. The garden is their lab and the students 'live and learn' soil carbon sequestration and regenerative agriculture. Our school's compost bin is evidence that alternatives exist to methane-producing landfills. In looking for more solutions to reduce methane, students debate food reuse practices around the world."[35]

Here you can find some more resources on climate change:

Alliance for Climate Education ***has a multimedia resource called Our Climate Our Future, plus more resources for educators and several action programs for youth.***	**https://acespace.org/**
The American Association of Geographers *has free online professional development resources for teachers*	http://www.aag.org/cs/teachingclimatechange
Biointeractive, *created by the Howard Hughes Medical Institute, has hundreds of free online education resources, including many on education and the environment, and it offers professional development for teachers*	https://www.hhmi.org/biointeractive/earth-and-environment
Climate Generation *offers professional development for educators nationwide and a youth network in Minnesota*	https://www.climategen.org/our-core-programs/statewide-youth-network/
CLEAN *(Climate Literacy and Energy Awareness Network) has a collection of resources organized in part by the Next Generation Science Standard it is aligned with*	https://cleanet.org/clean/educational_resources/index.html
Global Oneness Project *offers lesson plans that come with films and videos of climate impacts around the world*	https://www.globalonenessproject.org/library/collections/climate-change
Google *offers free online environmental sustainability lesson plans for grades 5-8*	https://yourplanyourplanet.sustainability.google/
The Morningside Center for Teaching Social Responsibility *has a group of 19 lessons for K-12*	https://www.morningsidecenter.org/sites/default/files/2019-04/EarthDay2019TeachableMomentLessons.pdf
The National Science Teachers Association *has a comprehensive curriculum.*	https://www.nsta.org/climate/
Think Earth *offers 9 environmental education units from preschool through middle school.*	https://thinkearth.org/curriculum/

[35] *https://www.thepermaculturestudent.com/ - Check the site for resources on building school gardens with rainwater capture and compost systems to regenerate the soil. There are local and regional resources such as the Collective School Garden Network (http://www.csgn.org/why-school-gardens) in California and Growing Minds (https://growing-minds.org/school-gardens/) in North Carolina, which offer basic plans for a school garden as well as lesson plans that connect gardening to Common Core standards.*

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