D19: The Science Fiction in Education Toolkit

Prepared by UPIT & CARDET

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Project Title: Science Fiction in Education

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Introduction

The Science Fiction in Education Toolkit is the most important product of the SciFi-Ed project. It is a combination of seven deliverables from four different Work Packages.

It is addressed to *in-service* teachers and educators in the view of supporting them throughout their effort to design and implement SciFi teaching units. Special emphasis is placed on *in-service* teachers' training, but the needs of *pre-service* teachers are also addressed.

The goal of the Science Fiction in Education Toolkit is striving to convince, guide and support educators in introducing Science Fiction in education, gathering and developing experience and *know-how* in this field, organising it into solid and accessible bits of information and making it available to stakeholders.

The Science Fiction in Education Toolkit specific objectives are:
1. To introduce European educators of pupils aged between 9-15 to the genre of science fiction and its subgenres and convince them about its literary and pedagogical value.
2. To provide educators with analytical information regarding acclaimed international and European authors of Science Fiction for children and young adults, and Sci-Fi titles available in partner countries.
3. To describe general approaches and specific methods and techniques to teach through Science Fiction key competences and concepts in Science and other important areas of the curriculum.
4. To support educators in utilizing film, multimedia, and Web 2.0 technologies to introduce Science Fiction in education.
5. To provide educators sample Sci-Fi cross-curricular teaching units that may be used by them but also function as models for building new teaching units.
6. To assort and disseminate relevant resources to European educators.

The structure of this Toolkit contains the following distinct parts or sections:

INTRODUCTION
PART I: The SciFi-Ed Approach
PART II: Introduction to Science Fiction and its Subgenres
PART III: Review of significant SciFi Texts for Children and Young Adults in partner countries
PART IV: Guidelines and ideas for incorporating SciFi in various educational areas
PART V: Suggestions for utilizing film, computer games, and Web 2.0 technologies
PART VI: Sample Cross-Curricular SciFi Units
APPENDIX

This Toolkit gathers contributions from all project partners, namely:

P1. Centre for the Advancement of Research and Development in Educational Technology LTD (CARDET), CY (project coordinator)
P2. University of Piteşti, RO
P3. County Meath VEC, IR
P4. Public Library in Ursus District of the City of Warsaw, PL
P5. INNOVADE LI LTD, CY
P6. Agenzia per lo Sviluppo Empolese Valdelsa (ASEV), IT

Part I: SciFiEd Approach

Executive Summary of the Transnational Research Report and Summary of Suggested Approaches and Methods

The report presents the results of **desk research** – a bibliographic survey within each national literature – and a **field research** achieved through questionnaire and structured face-to-face interview, in all partner countries, namely in Cyprus, Ireland, Italy, Poland and Romania.

Based on results of both desk and field research performed in partner countries, we may draw the following conclusions:

- In some participating countries, like Poland and Romania, SF literature is well developed and popular among children and young people. In the rest of the participating countries science fiction for children and young adults is at a developing stage. In some countries, such as Cyprus, recent developments in the field show an emerging appreciation for and development of the SF genre. As far as translated SF is concerned, American science fiction seems to be popular in most participating countries.
- In all countries, while there is not much reference to teaching scientific facts, concepts or processes through SF. This is not found in teacher-training either and a vast number of educators are not familiar with SF and its pedagogical potential. Nevertheless, a limited number of practitioners do propose and employ interesting educational activities that utilize SF.
- In all participating countries, the inclusion of SF in curricula is marginal and limited, if it exists at all. Additionally, when referred to, it is only included under Literature and never in relation to Science. Interdisciplinary approaches to SF are rare and only generally described. The pedagogical and educational valences of SF literature are not fully exploited in education, most of this issue being left to teachers' choice.
- In all countries, there is the potential for SF to be introduced by teachers should they choose, and the majority of educators believe that SF could be of use in many areas.

Part II: Introduction to Science Fiction and its Subgenres

What is Science Fiction?

A defining characteristic of the SF mode is its fascination with science and technology. Literature and science, or science and literature, are often thought to belong to separate and incommunicative professional cultures. SF is one of the bridges that contribute to the narrowing down of this rift.

Extrapolation **is yet another defining characteristic of the SF mode.** *Extrapolation* is the projection of technological, political, or social developments outside the author's place and time. *Cognitive estrangement* **is the third most important characteristic of SF.** C*ognitive estrangement* is "the process through which certain works of literature, by imaginatively placing readers in an unaccustomed situation or environment, cause those readers to ponder th*e* differences between this environment and their own, thus potentially causing them to view their own world differently"

SF is distinctly different from fantasy. Both SF and fantasy are *speculative fiction*: imaginative fiction which constructs worlds that differ fundamentally from our own. The difference between the two is that SF is "always outlined by the barely possible"; the reader needs to be convinced that what the SF story describes *could*, under certain circumstances, actually take place.

Which are the major SF subgenres?

Utopian Fiction

A utopia is an imagined society, in which the social, economic, and political problems of our own world have been essentially solved, producing an optimum life for all of the citizens of the society.

Dystopian Fiction

If a utopia is an imaginary ideal society that dreams of a world in which the social, political, and economic problems of the real present have been solved, then a dystopia is an imagined world in which the dream has become a nightmare.

Alien Invasion

Alien invasion is a type of SF narrative in which the Earth is invaded by aliens, usually for purposes of conquest or colonization.

Apocalyptic Fiction

This type of science fiction narrative deals with the approach and arrival of a cataclysmic event that causes widespread destruction, leading to a dramatic change in the nature of human civilization on Earth.

Post-apocalyptic Fiction

This type of SF narrative deals with the aftermath of such a catastrophic event that destroys or radically alters human civilization, necessitating an attempt to rebuild civilization (perhaps along different lines) on the part of the survivors.

Cyberpunk

Cyberpunk focuses on the effects of near-future developments in technology, such as genetic engineering.

Post-cyberpunk Science Fiction

Sometimes referred to as "second-generation" cyberpunk, this type of SF grows out of the original cyberpunk movement and typically employs many of the same near-future science fictional technologies.

Ecological Science Fiction

This type of SF deals with the projected consequences of changes to the natural environment.

Planetary Romance

This type of SF involves the detailed imagination and elaboration of the culture and natural environment of a planet other than the Earth.

Space Opera

Space opera involves stories of adventure, exploration, and conflict in outer space.

Post-human Science Fiction

A type of SF dealing centrally with developments that either produce fundamental changes in the human species or produce new species that outstrip or replace the human.

Time-travel Narratives

Time-travel is the process of travelling through historical time, thus transporting the traveler either into the past or the future relative to his/her starting point.

Alternate History

In this type of SF narrative some major moment of the historical past is imagined as having occurred differently, leading to an extrapolation of the ramifications of that change in history from that point forward.

Steampunk

This form of SF usually has thematic and stylistic similarities to cyberpunk, but is set in a world where the level of technology is roughly equivalent to the steam-powered technology of the nineteenth century.
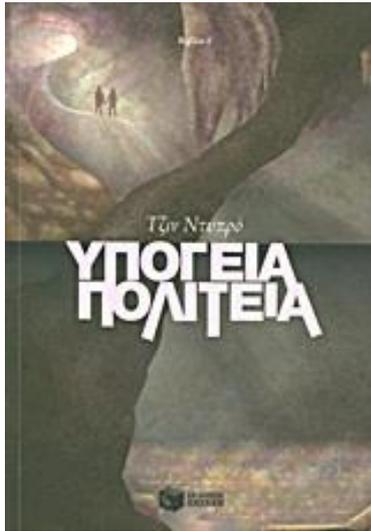
Part III: Review of significant SciFi Texts for Children and Young Adults

Introduction

All the project partners were asked to select 10-20 SciFi texts for children and young adults that have been published in their language.

Below is a sample text and the relevant accompanying information.

Cyprus

Ipogia Politia [The City of Ember] - DuPrau, J., Trans. Megaloude, F. (2011)
ISBN: 960-16-3759-1 | Pages: 280

This is an internationally acclaimed series of sci-fi books that has been translated in Greek and other languages.
Many hundreds of years ago, the city of Ember was created by the Builders to contain everything needed for human survival. It worked, but now the storerooms are almost out of food, crops are blighted, corruption is spreading through the city and worst of all - the lights are failing. Soon Ember could be engulfed by darkness.
But when two children, Lina and Doon, discover fragments of an ancient parchment, they begin to wonder if there could be a way out of Ember. Can they decipher the words from long ago and find a new future for everyone? Will the people of Ember listen to them?

Connections to curriculum

LITERATURE CURRICULUM FOR PRIMARY EDUCATION, GRADES 5 & 6*
SCIENCE CURRICULUM FOR PRIMARY EDUCATION**
5TH GRADE [The Environment – Matter]
6TH GRADE [Energy - Our Body & Health – Matter - Forces – Movement – Simple Machines – Tools – Constructions]

Ideas for educational activities

LITERATURE: Read and compare to other dystopian/ post-destruction stories and the future societies and worlds they imagine.
SCIENCE: Activities that prompt students to explore creatively possible futures of Earth and the human species (in relation to environmental issues).
The young protagonists are characteristically adept to the scientific way of thinking and problem-solving; these could be identified and students could be encouraged to employ similar processes to solve real or imaginary problems and explore learning situations.
Energy, in relation to the sun (and its absence from the underground city) and in relation to the use of hydroelectric power, is central in the plot. So, activities that relate to the importance of the sun for life on Earth, the manner in which hydroelectric power is produced, etc. are appropriate.
Underground morphology/matter and environment (creatures, water currents, etc.) could also be explored. Students could also discuss about the probability of humans being able to live underground for long periods (in relation to the human body, as well as to a possible nuclear disaster).
LIFE EDUCATION: Several issues that pertain to civic society, family, school, environmental education, etc. could be explored.

Romania
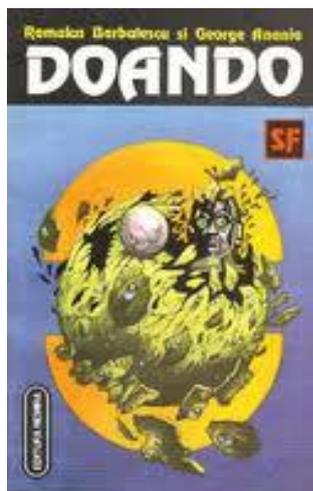
Doando [Doando] - Romulus Bărbulescu, R., Anania, G.(1992)
Bucharest: Nemira | ISBN : 973-569-552-9 | Pages : 304

The title presumably means (in the language of a humanoid civilization) lifeless life *(do- an- do).*
The action takes place in a future of the Earth civilization, in which the social, economic and moral problems that human kind has had for centuries were resolved and now the whole world can devote itself of the Cosmos knowledge and exploration. For the Earth civilization described in the novel, terraformationof the other planets has become a common way of pushing forward the exploration of the universe. The novel presents several favorite theme of science fiction, all subsumed under the main theme, the rescue of an alien civilization by two other much younger civilizations, the Earthlings, now in the next stage of multiple planets colonization, and the humanoids from Vuundo, which are only in the early interstellar exploration phase, looking for other planets, on which to move. The Vuunds (inhabitants of Vuundoplanet) live under the pressure that the Sun of their solar system will be destroyed (their Sun rapidly transforms from a yellow star in a red one, due to its hydrogen consumption). Thus Vuundo is constantly and irreversibly cooling, facing deep glaciations and because of that the Vuunds start their first inter-galactic travel aiming to find a new planet where to live.

Connection to curriculum

Subject: Chemistry, 7th grade
CHEMICAL REACTIONS. TYPES OF CHEMICAL REACTIONS:
Definition of chemical reactions;
Chemical equations;
Reactions of combination and decomposition;
Substitution reactions;
Slow reactions. Fast reactions;
Exothermic reactions. Endothermic reactions

Ideas for educational activities

Activity 1: Having the example of Sun, associations with many types of reactions can be made, reactions that are taking place in the Sun and are important for maintaining life.
Activity 2: Cooling and heating processes may be observed and described, based on endothermic and exothermic reactions
Activity 3: Cooling and heating processes may be analysed and explained, based on endothermic and exothermic reactions
Activity 4: Chemical equations of hydrogen-based chemical reactions.

Connection to curriculum

Subject: Biology, 6th grade: Morphofunctional general characteristics, behaviour, adaptation of living beings: relationships between environmental factors and the diversity of the living world; structure and functions of living organisms; relationships between types of behaviour and the living organisms adaptation to the environment.
Subject: Physics, 7th grade: Gravitational interaction
Subject: Physics, 8th grade: Radiations and radioprotection; Biological effects and radioprotection.

Ideas for educational activities

Activity 1: Overview of the subject of the book, emphasizing the phenomena that can be found here
Activity 2: Making PowerPoint presentations, drawings etc. about the subject;
Activity 3: Analyzing the possibility and implications of such phenomena like: terraformation, anabiosis, genetic correction, bio-electronic brain, antigravity field;
Activity 4: Highlighting possible applications

Ireland
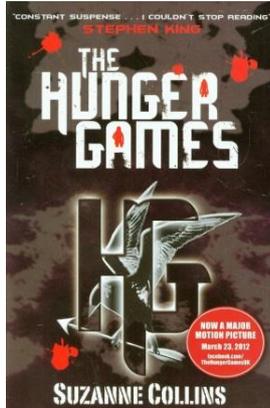
The Hunger Games - Collins, S (2008)
Publisher: Scholastic Press | ISBN: 1407109081 | Pages 374

In the first third of the book, we are introduced to our protagonist, Katniss Everdeen. Though she's only a teenager, she's a tough hunter who puts food on her family's table.

Every year the Capitol of Panem hosts an event called the Hunger Games where two "tributes" – a boy and a girl – are drafted from each of the twelve districts to be brought to an arena and fight to the death. Only one person can win. This is to remind the country not to rebel.

During the opening ceremonies, Cinna and Portia dress Katniss and Peeta in flames and they draw much attention to themselves. During training, Katniss reveals her archery skills to the Gamemakers and scores an amazing 11 out of 12. Peeta gets a lower score and asks to be coached separately. Peeta also announces in an interview that he has a mega crush on Katniss. Is this all just a strategy to gain audience support and sponsors? Katniss thinks so, but it works well for her too, so she plays along.

Connections to curriculum

History – Empire, history being written by the victor
Revolution and Resistance
Science – the evolution of humanity and the need to survive
Civics – Society and responsibility

Ideas for educational activities

One quick exercise I would use would be to simply ask kids to compare and contrast the maps and then discuss why they might look different, you might have kids create their own map and justify why their map looks the way it does. This could lead into a deeper look at countries/regions and how where we live affects who we are.

Create a Game Based on the Novel Encourage students to create a board game, card game, or learning game using the events and experiences from the novel. Combining Visions Students will create a mural of the novel.

Include these activities to encourage student creativity and analytical thinking while practicing reading skills, writing skills, using technology, and creating new and interesting products for the conclusion of the novel. With the variety of activities provided, they'll be sure to find something they'll enjoy completing and with as much enthusiasm as they possessed while reading the novel.

Poland
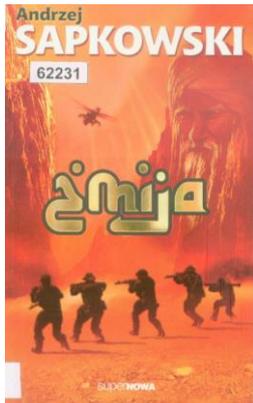
Żmija [The viper] - Sapkowski A. (2009)
Warszawa: SUPERNOWA | ISBN: 978-83-7578-0215| Pages: 237

The story takes place during the Soviet intervention in Afghanistan. The main protagonist is the officer of Soviet Army, who can predict the near future. During the bloody war in Afghanistan he is ablenot once to save a life of himself and his companions. One day serving at the outpost, he meets the golden snake, which makes him contact with the people from the past. He experiences scenes from the conquer of Afghanistan by invading armies - armies of Alexander the Great and the British during the Second Anglo-Afghan War, Lewart spends more and more time with the viper. In the epilogue there are the scenes from the intervention of NATO forces, with the participation of the Polish army patrol.

Connections to curriculum

Humanities curriculum for education in Gimnazjum, students aged 13-16
Grade 1, 2, 3:
Literature – war story
Language – communication skills

Grade 3:
History – the wars in Afghanistan
Science curriculum for education in Gimnazjum,   students aged 13

Grade 1:
Biology - reptiles.

*Ideas for educational activities*

Literature - comparing the story with other war stories

Language - activities that prompt students to discuss different types of communication among people and between people and animals or creatures

History - a group project on the history or wars in Afghanistan, comparing different fighting styles, weapons, military strategies.

Biology – the life of reptiles, specific features, their behaviour and adaptation skills, their environment.

Italy
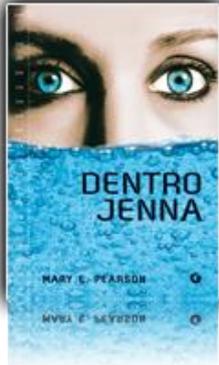
Dentro Jenna [Inside Jenna] - Mary E. Pearson (2011)
Italy: Giunti Y | ISBN: 9788809749634 | Pages: 384

The teenager Jenna Fox, after more than a year in a coma, wakes up in a body and a mind that she finds hard to recognise. Her parents say that she was the victim of a serious car accident, but there are many gaps about her identity and a lot of unanswered questions about her current life. Why would her family move suddenly to California, leaving everything in Boston? Why does her grandmother treat her with inexplicable grumpiness? Why do her parents forbid her to talk about the sudden move? And why can Jenna remember whole pages of Waldendi Thoreau, but she hardly brings to mind disordered excerpts of her past? Thirsting for truth and restless, the girl tries to regain her past life. Watching movies of her childhood, strange memories resurface in her confused mind, and slowly, Jenna realises that she's prisoner to a terrible secret.
(*Recommended age: 11 - 15*)

Connections to curriculum

Civic Education curriculum for middle school and high school:
- Human rights
- Ethics

Science curriculum for middle school:
- Human body

Technology curriculum for middle school:
- Hardware and software
- New technology

Ideas for educational activities

CIVIC EDUCATION
Activity: reading about human rights.
Which rights are violated in Jenna's story?
Class group is divided into 4 groups: each of them designs a new character based on the provision of abiding to human rights, designed for a world of robots-humans like Jenna.
After a collective discussion, characters are put together into a one Robot Right charter.

SCIENCE
Activity: realise a 2d human body section.
On an individual wooden board, each student paints the outline of a human figure.
Put some tacks: blue and red wool threads pass across tacks to simulate muscles and blood vessels. Braid them by looking at a human body picture.

On a second human figure, students create Jenna's body, weaving wire and plastic threads inspired by the image of a computer's interior.

TECHNOLOGY
Activity: Two class sub-groupsdo the same research in two different ways: using books and going to a library (classic way) and using new technology (internet).
Compare two manners: the old one and the new. Observe positive and negative aspects of both.

Part IV: Guidelines and ideas for incorporating SciFi in various educational areas

The SciFiEd project focuses on providing teachers with tools, training, and guidance that will assist them in enhancing their teaching, making science more attractive to students, connecting it with real-life issues such as the environment, and providing girls and other marginalised groups with access to science. The central project idea is to achieve this by incorporating Science Fiction in science teaching. Research tells us that the introduction of narrative in science education significantly increases students' memory, interest, and understanding. The consortium believes that SciFi narratives, in particular, can bring about impressive improvement in European science education. Even though SciFiEd focuses mostly on Sci-Fi literature for children and young adults (novels, short stories, comics, and graphic novels), it also aspires to make use of technologically mediated SciFi, such as film and computer games.

Benefits and Challenges of the use of narratives in education

Teachers and experts recognize multiple educational benefits stemming from narratives in education narratives enable students to develop research skills, critical and creative thinking, debating and decision-making skills, which are related to managing and utilizing scientific knowledge in everyday life as well as skills that are needed to deal with science-related social and environmental problems. Another important advantage offered by the use of narratives during the learning process is that these kind of stories support students in understanding basic concepts and subjects that stem from their own interests and experiences, and recognizing the nature of Science and its contribution to the development of human culture.

Interdisciplinary teaching and learning

Interdisciplinary teaching

Interdisciplinary teaching is a method that is used to teach a unit or subject to more than one academic discipline at the same time.

This method of teaching allows students to develop high-order thinking skills, by acquiring knowledge without only memorizing facts, but also applying what they have learned in their daily lives.

The use of SciFi narratives in education requires an interdisciplinary approach, in order to enable teachers and students to exploit to the maximum the advantages that interdisciplinarity can offer to the learning process. The need for the students to develop critical thinking is considered as necessary for the lessons that are based on SciFi narratives, and this need can be met through interdisciplinary teaching and learning.

The most important benefits of interdisciplinary teaching and learning are:
- Diversity in class.
- No need to replicate work.
- The cross curricular connections puts science at a historical level and makes understandable what usually it's difficult to be acquire by pupils
- More pupils involvement and connection with others subjects.
- The cross curricular setting allows the students to deal with the learning process as a single process, as a distinct personal growth.
- Interaction amongst pupils.
- Chance to get more than one vision in several subjects.
- Development of skills of how to figure out correlations between two or more things.
- Stimulates creativity in pupils.
- Pupils could get a wide and whole vision of daily basic themes.

General practical guidelines

Some practical guidelines on how to introduce and use SciFi narratives in education are provided below:
- Develop age-appropriate lists of SciFi stories.
- Keep the storytelling process interactive.
- Engage reluctant learners.
- Publish on-line, free accessible material that will be interesting and ready to be used by pupils.
- Develop activities that are of high quality and encourage exploration, investigation and discovery of new knowledge.
- Adopt material to certain age-levels.
- Match the SciFi-Ed material, stories, and activities to certain areas of specific curricula and produce material that correlates to other materials (e.g. textbooks) currently being used.
- Utilize technology, produce relevant visual aids, and encourage the use of multimedia (sound, movement, video, etc.)

Teaching and activity ideas for Science Education

A list of activities that the teacher could implement during a Science lesson which includes the use of a SciFi narrative.

- Students can be involved in many "think, pair, share" activities and can also be working in smaller groups during a debate (grades for the debate activity and prior research will be given on an individual level to hold students accountable for their own work, and each student must verbally participate at least once during the actual class debate).
- Create a game based on the narrative - students create a board game, card game, or learning game using the events and experiences from the novel.
- Role-play - students as different scientists interact with each other, discuss their thoughts and ideas that will come up after reading the narrative and discussing it with the teacher.
- Students make Powerpoint presentations of different inventors and their inventions.

Teaching and activity ideas for Technology Education

A list of activities that the teacher could implement during a Technology lesson which includes the use of a SciFi narrative.

- Students can be involved in many "think, pair, share" activities and can also be working in smaller groups during a debate (grades for the debate activity and prior research will be given on an individual level to hold students accountable for their own work, and each student must verbally participate at least once during the actual class debate).
- Create a game based on the narrative - students create a board game, card game, or learning game using the events and experiences from the novel.
- Role-play - students as different inventors interact with each other, show and discuss their inventions that will come up after reading the narrative and discussing it with the teacher.
- Critical thinking activities, brainstorming sessions, creative writing.
- Students make Powerpoint presentations of different inventors and their inventions.

Teaching and activity ideas for Environmental Education

A list of activities that the teacher could implement during a lesson that focuses on Environmental Education which includes the use of a SciFi narrative.

- Innovative ideas of using science and technology to control people and overexploit the environment could be the theme for an interdisciplinary unit. At the same time, children should be encouraged to explore all the ways in which wise use of science and technology can contribute to the improvement of our lives and the environment.
- Students can be involved in many "think, pair, share" activities and can also be working in smaller groups during a debate (grades for the debate activity and prior research will be given on an individual level to hold students accountable for their own work, and each student must verbally participate at least once during the actual class debate).
- Create a game based on the narrative - students to create a board game, card game, or learning game using the events and experiences from the novel.
- Critical thinking activities, brainstorming sessions, creative writing

Teaching and activity ideas for Language and Critical Literacy

A list of activities that the teacher could implement during a Language and Critical Literacy lesson which includes the use of a SciFi narrative.

- Classroom activities may include group projects, games, critical thinking activities, brainstorming sessions, writing poems, drawing or sketching, and more that will allow your students to interact with each other, be creative, and ultimately grasp key concepts from the text by "doing" rather than simply studying.
- Students can be involved in many "think, pair, share" activities and can also be working in smaller groups during a debate (grades for the debate activity and prior research will be given on an individual level to hold students accountable for their own work, and each student must verbally participate at least once during the actual class debate).
- Create a game based on the narrative - students create a board game, card game, or learning game using the events and experiences from the novel.

- Critical thinking activities, brainstorming sessions.
- Creative writing, writing their own memoirs, discussing the plots, describing people, places and events.

Teaching and activity ideas for Civic Education

A list of activities that the teacher could implement during a Civic Education lesson which includes the use of a SciFi narrative.

- Students can be involved in many "think, pair, share" activities and can also be working in smaller groups during a debate (grades for the debate activity and prior research will be given on an individual level to hold students accountable for their own work, and each student must verbally participate at least once during the actual class debate).
- Create a game based on the narrative - students create a board game, card game, or learning game using the events and experiences from the novel.
- Critical thinking activities, brainstorming sessions, creative writing.

Affordances of SciFi narratives and Practical tips/guidelines for teachers

Critical thinking-reflecting

Problem-based activity - Students read a SciFi narrative and reflect on the plot by connecting information from the story with real-life issues. Also, the teacher provides to the students a list with real or imaginary problems from real-life and asks them to find potential solutions, based on the story or on the actions and the method of thinking that the protagonist of the story has followed.

"*Think, pair, share*" *activity* - The story that is taught to the students provides them with "food for thought". Students need to read the narrative, think about the story, then find a classmate and share their ideas with each other. The exchange of views and ideas will encourage students to be part of this activity and think critically.

Views comparison - Ask from the students to summarize 5 major points made in the narrative. Then, ask them to identify a classmate that it is believed to disagree with these points and make a discussion with him/her. Students should then write his/her reactions and arguments and draw their conclusions.

Research skills

Problem-based activity - Use a story which presents a problematic situation. Then help the students to make a research and find useful information and data that they can use to write an essay with actions that they may undertake in order to solve the problem. Their assignment must be presented on power point to the entire classroom.

Concept analysis - Depending on the course and the narrative that has been taught, students may be asked to design a model with the concepts that are included in the story and then analyze those concepts based on what they have learned from the story and by conducting a simple research based on other resources.

Group project – Students must work in small groups and prepare an essay or a film on a subject related with the narrative. They should find more resources and compare data, discuss with the members of their team and present their final work to the entire classroom.

Creative thinking

Concept mapping – The teacher may prepare a concept mapping exercise and ask from the students to continue the story and write a possible ending. The classroom should be divided into smaller groups of students and each group should prepare a common ending for the story. Then ask from each team to distribute the roles of the story and, by using their cell phones, make a short film with the story that they prepared. Each film should be presented to the whole class at a certain lesson.

Board/Card game - Students may create a game based on the narrative - students create a board game, card game, or learning game using the events and experiences from the novel. Thereby, they will be able to test their knowledge and their understanding.

Creative thinking/writing - Classroom activities may include group projects, brainstorming sessions, writing poems, drawing or sketching, and more that will allow your students to interact with each other, be creative, and ultimately grasp key concepts from the text by "doing" rather than simply studying.

Debating skills and argumentation

Role playing debate - Teacher reads the narrative to the students and creates a scenario and a description for the role-playing debate, based on the characters of the narrative that he

taught. The description should state the issue and offer some helpful explanations. Students take on a particular role and make arguments-speeches based on their specific characters.

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Group project – Students must work in small groups and prepare an essay or a film on a subject related with the narrative. They should find more resources and compare data, discuss with the members of their team and present their final work to the entire classroom.

Decision-making skills

Problem solving - Use a story which presents a problematic situation. Then help the students to make a research and find useful information and data that they can use to write an essay with actions that they may undertake in order to solve the problem. Their assignment must be presented on power point to the entire classroom.

Part V: Suggestions for utilizing film, multimedia, and Web 2.0 technologies

The multimedia nature of contemporary tools allows for more senses to be engaged, targeting multiple learning styles. Their multi-modal nature, implies that information is stored in more than one mode. Visual, verbal, and auditory information can be incorporated in such systems. Representation of information in multiple modes can improve learning and retention, only when there is an overlap between the different modalities.

Another important affordance of contemporary tools is increased levels of interaction that facilitate collaboration and communication.

The use of video and film in education

Film and video can help develop the literacy skills of students and allow them to experience worlds they will not be able otherwise to do. Film and media are parts of culture and kids should learn to use them, critic them, deconstruct them and develop critical media literacy skills at school. Using film and video in the curriculum can help kids become more critical viewers and consumers and producers of media messages.
Some possible ways of using film in the classroom are:
- Encourage kids to develop film clubs in schools to view and discuss films
- Select films that match curricula objectives and use them as introduction to the lesson and themes to be discussed
- Design activities which will engage kids in producing films and videos for specific purposes.

Using technology to introduce Science Fiction in education

Among the educational advantages of multimedia one can identify:
- Flexibility
- Easiness in use/access
- Visual impact
- Connectivity
- Diversity of the possibilities/contexts of use for educational purposes
- Interactivity
- Learning by doing (instead of simply watching)

Using technology to support the introduction of Science Fiction in Education

Some practical suggestions on how to use technology to support the introduction of Science Fiction in education are provided below.

- Selecting some commercial movies, looking for ways to take educational advantage of them, and focusing on the audiovisual language to realize if this movie is able to communicate with the students.
- Focusing on the scientific content presented on scenes in the movie.
- Focusing on the way the scientific knowledge is presented, checking for possible mistakes and to think how the science can be contextualized in the science classroom.
- Select and editing short sequences more suitable for use in the teaching and learning of science.
- Using these episodes to organize classroom's activities based on selected episodes of the movie as a cultural tool to contextualize the scientific content and motivate students in science classes.

Movies proposed:

http://www.youtube.com/watch?v=ELwPSiBtqUQ&list=PL6dOrbWBmgRp-vV71rJoFhtAUMlsZfYHL
http://www.youtube.com/watch?v=K5dS8hu-_W4
http://www.youtube.com/watch?v=FfOqqEj_ip0
http://www.youtube.com/watch?v=9ZuhXwhoLKY
http://www.youtube.com/watch?v=XyXSCURYb8s&list=PL0B3F8A3DC72F152A
http://www.youtube.com/watch?v=CaVLaD4vfBc&list=PL039358C257A90097

Websites

http://www.teachwithmovies.org/index.html
http://www.ucalgary.ca/hic/issues/vol6/4
http://blogs.plos.org/scied/2013/10/07/science-education-through-science-fiction/
http://www.teachthought.com/literacy-2/30-storytelling-tips-for-teachers/
http://www.filmclub.org/

Part I/I: Sample Cross-Curricular SciFi Units

Each partner has designed cross-curricular SciFi teaching unit, describing a series of interconnected lessons that utilize one or more science fiction texts in order to achieve educational objectives in several areas of the curriculum.

The teaching units contain:
- Technical data about the unit (e.g. title, who developed the unit, country, pupils' age and grade, subject areas);
- Presentation of the SciFi stories used in the lessons (stories' references and summaries);
- General Objectives per Subject;
- Unit Panoramic View (with subjects and lessons);
- Detailed lesson plans for different subjects (with lesson title, objectives, activities, evaluation).

The sample cross-curricular SciFi units can be found at www.scifieducation.org