INFORMATION LITERACY CURRICULA

"THE NEW LITERACY SET" PROJECT

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1. THE “NEW LITERACY SET” PROJECT

1.1. ABOUT THE PROJECT

The communication skills are essential for success and happiness. People who are good communicators are more successful in their jobs and handle their personal relations much easier. Knowing how to search and evaluate information makes the difference between an active, responsible and aware citizen, and an easy-to-manipulate person. Each day one is faced with the consequence of financial literacy, as many people are on the edge of bankruptcy because they do not understand what they sign, or they chose the wrong financial strategy. So, communication, information and financial literacy are the new literacy set and are skills students need in later life and work.

The primary objectives of New Literacy Set project are enhancing digital integration and innovative teaching methods in learning and developing ICT, mathematics and language skills and students’ creativity, social and civic responsibility, initiative and entrepreneurship. Also, strengthening students’ position in labour market and encouraging their personal growth by developing their communication, information and financial skills.

Enhancing digital integration in learning and teaching is chosen as the most relevant priority because the development and testing of high-quality digital learning materials is the biggest part of the project. Three intellectual outputs are linked directly with this priority – open educational materials for communication, information and financial literacy.

The project is designed as a cornerstone of the new skills needed in everyday life, and that are best taught through everyday situations. Today this includes the use of technology, so all developed materials are placed on project web site (www.newliteracyset.eu). Access to these materials is free to all interested users of any age and any prior knowledge such as individuals, associations, other educational institutions, and especially schools.

1.2. NEED FOR NEW CONTENT

New technology is an indispensable part of the lives of today's students. Also, bustle lifestyle, hyperarousal with various visual, auditory and generally sensory effects makes today's young people highly susceptible to novelties and consumerist lifestyles. Such a mode of life spread to the education system, therefore, any form of inactive, frontal or inflexible lessons focused on the substance rather than the skills or attitudes is inadequate and maladjusted for today's student. Although there are numerous studies on the impact of such a lifestyle on the future of the individual and his/her happiness, neglect of these apparently deep changes in society is counterproductive. Therefore, in addition to adapting the technology of work, as well as the
introduction of modern methods in the teaching process, it was necessary to add also some specific outcomes and, so far unused techniques.

Furthermore, the project helped students with learning difficulties and lower results to be better motivated and connect the educational materials with situations from everyday life, binding specific needs with prepared curricula materials. Also, professional staff that worked on the project and used the curricula developed new knowledge in terms of learning outcomes, as well as innovative methods for teaching and learning, which they will be able to use in other aspects of their work. The use of ICT modernized teaching and encouraged the modernization of education in general.

Finally, the European character of this project and curricula enabled connectivity and developing of social relationships, and thus the communication skills among the participants, as well as teachers, and students, whether through student exchange, participation in professional meetings, communication via the Internet and others. Also, it increased awareness of the existence of such projects and Erasmus+ among students and professors who haven’t participated in such activities so far.

1.3. GOAL AND PURPOSE OF THE CURRICULA

The curriculas for communication, information and financial literacy are the fundamental documents of the project. They contain main ideas of the project, conducted research results and workshop specifications: expected learning outcomes, general content and used teaching methods.

However, the main goal of the curriculas stems from the desire and the need to give young students the opportunity to further develop their own personality, individuality and increase the chances for a successful and happy life, and that is possible only through the possession of certain knowledge, skills and attitudes.

1.4. POSSIBILITIES OF INTEGRATING CURRICULAS INTO CLASSROOMS

Should the curriculas be implemented in educational institution, there are several possibilities to integrate into existing subject curricula.

To begin with, the first option would be to integrate it into the teaching process as a separate, optional subject. Given the complexity of each curricula and time it takes to get through the workshop activities and develop new, it should extend through two semesters.

In addition to viewing it as a separate subject, the workshops can be held as a compact unit, for a selected time during the year, when there is time for it.
The next option is to integrate it into tutorial classes. This option excludes optionality, increases the number of participating students, but also takes time off existing class content. The solution lies in the ability to choose certain parts of workshops and special activities.

1.5. TEACHER COMPETENCES

Competences that teachers doing the workshops should have are the following:

- general professional knowledge and skills (teaching, psychological development, sociological, legislative-legal)
- knowledge and use of the learning and teaching processes (cross-curricular and subject-planning, programming, learning and teaching focused on learning and student achievement)
- knowledge and application of new methods of learning and teaching (ICT), knowledge and application of methods of evaluation and self-evaluation

2. INFORMATION LITERACY

The Times They Are A-changin is a wonderful song by singer-songwriter Bob Dylan, written and performed in 1964. It was an anthem of a coming change. At that time change was social, hippy movement which was gaining momentum and vast majority wasn’t prepared for it, thinking of it as doom of western civilization. In time hippies became yuppies\(^1\) that later ended defining and shaping late 20\(^{th}\) century. Times change.

Times change at a staggering pace, especially with advancement of technology. 30 years ago finding an information you’re looking for was only possible by using selected books, magazines, journals, newspapers, periodical index, library catalogue or encyclopaedias. During 90’s with Internet soon becoming the go to place for finding information search suddenly became easier. And at the same time more difficult.

During 90’s not every household had a computer let alone Internet access. Those selected few enjoyed browsing 56 kbit/s. Nowadays Internet is accessible from almost every home. In 2005. only 16\% of world population was using the Internet, in 2014. it was 40\%, almost half of world population of 7,2 billion people. We can only expect even more people using it in years to come. And with technology advancement Internet can now be accessed from your mobile phones or even watches like Apple Watch.

Plethora of information that can be accessed on the Internet is also a double edged sword. Not everything you find and read can be relevant or even true. It’s about evaluating information (online and offline sources): criticizing, judging, recommending, arguing and

\(^1\) short for "young urban professional" or "young upwardly-mobile professional"

Erasmus+
predicting. It’s also highly important to take in consideration copyright and intellectual property rights (licences, software copyright issues, open source, creative commons, plagiarism) and protecting data from viruses, hackers, Trojans, phishing, but also keep the data published on social media sites secured.

Information don’t only portray ability of finding the means of getting them. When thinking about information, it is also important to pay attention to information from commercials, TV programmes and other visual media – how they are made and why are so effective or make a compelling impression on viewers, how to detect fraudulent/malicious adds and so on.

As it is clearly seen, getting and properly using information today presents a challenge of a sorts and it’s a goal of this curricula to further improve or implement new methods of handling information.

3. RESEARCH

3.1. INTRODUCTION

Literacy is not just ability to read and write, today it includes skills like information literacy.

Information literacy is knowing when and why you need information, where to find it and how to evaluate, use and communicate it in an ethical manner. The skills that are required to be information literate call for an understanding of:

- A need for information
- The resources available
- How to find information
- The need to evaluate results
- How to work with or exploit results
- Ethics and responsibility of use
- How to communicate or share your findings
- How to manage your findings

First step in this research was assessment of skills students have in field of information literacy.

Before main exploration, preliminary research was made for teachers in schools participating in project, in form of brainstorm meetings. Findings of those sessions were used for selection of topics for main research.

Topics selected for main research for information literacy can be grouped as follows:

- Searching and evaluating information
- Creating and representing information
The New Literacy Set Project
2015-2017

- Ethical use of information

Next step in the process was construction and execution of survey on teachers and students in schools participating in research. Students were asked which information literacy skills they need and teachers/staff were asked what is the level of students’ skills in information literacy and what skills could be improved (based on their experience in classroom).

After collection and validation of data, data were processed and used for creation of topics for the information literacy curricula as well as topics for 15 workshops.

3.2. RESEARCH METHODOLOGY

Method selected for this exploration was survey in the form of closed questions. Students and teachers had to fill out survey using Google Forms.

Survey for students consisted of 24 closed questions about information literacy and 3 questions about their motivation during survey. Survey for teachers and staff consisted of 15 closed questions.

Students and teachers taking part in this study were selected in three partner schools in the project. These schools are:

- Privatna gimnazija i ekonomsko-informatička škola Futura s p. j. from Zagreb in Croatia,
- Institut Carles Vallbona from Granollers in Spain,
- Instituto Istruzione Scolastica Superiore “Carlo Alberto Dalla Chiesa” from Montefalcone in Italy.

In total of 366 students (HR = 98; IT = 166 and ES = 102, aged between 15 and 21) and 62 of teachers / staff (HR = 20; IT = 21 and ES = 21) took part in questionnaire.
3.3. RESULTS – STUDENTS

The first group of questions in questionnaire for students were related to the topic of searching information.

Results showed that 22 % of students would rate their ability to search Internet and library databases to find information as excellent, 70 % good, 7 % average and only 1 % poor. When asked about sources they use for their research, vast majority of students, 73 % of them, writes down the topic in Google search engine, 11 % is using Google Scholar, 13 % is using online databases and libraries and only 3 % are going to the library and reading books and articles.

In next question students were asked if they know how to broaden or narrow a search using Boolean operators (AND, NOT and OR) and truncation. Only 16 % of students have skills of using Boolean algebra, 55 % of students sometimes use Boolean algebra and truncation, 15 % never use it and even 14 % of students didn't even know what is Boolean algebra and truncation.

Results of responses to questions focused on student’s patience, while searching on web, show that 67 % of students claim to be patient and focused, 21 % of students are impatient and grab the first thing they get to finish the job while 12 % give up easily because there are too many search results given.

The students were then asked when using a search engine which results do they most likely use. 48 % of students used results from reliable sources (like expertise sites and authors with reliability/biography check). But 35 % of students used the results that first appeared (usually Wikipedia) and 13 % of students used results from web authors that are last published.

It is important to point out similarities between responses to last two questions, 35 % of students use first results that appear on Google and over 30 % of students admit their impatience or giving up easily.

When results of last two questions are compared, among students who claim to be impatient, 17 % of them will grab the first result shown to them (usually Wikipedia). Students who claim to be patient and focused, 27 % of them will again use first result shown to them (usually Wikipedia).

These results directly suggest a reduced level of knowledge on searching for information. These data will show even more significance when in next chapter teachers’ answers to similar questions are analysed.
The next group of questions was related to tracking the information, use of bibliographic information and checking accuracy.

When students were asked if they know how to keep track of the sources they find, when searching for information, 84% of students answered with positive answer and 11% with negative answer. 5% of students didn’t find it important. Students were also asked if they know how to search bibliographic information on the Internet. 73% of students answered with positive answer and 12% of students answered with negative answer. 15% of students don’t know what is bibliographic information at all.

But when students were asked if they are familiar with the correct way to reference a web source, book or article, only 37% of students admitted that they were familiar with all correct ways of referencing source, 45% of students know only some ways of correct referencing, 12% are not sure and 6% don’t know how to reference a source at all.

One of questions in research focused on knowing if information found on Internet or in books is accurate. 41% of students responded positively and 59% responded negatively. In next questions students were then asked if they check the resources accuracy by finding more about the author, publishing date, reviews, before they use it in their work. The results show that only 16% of students always check the resources accuracy, 17% if they think resource is not a reliable source, 13% never check accuracy and finally 54% of students sometimes check the accuracy. From the results it follows that students have knowledge of bibliographic information and ability to keep track of resources but they lack the knowledge of checking for accuracy of information and correctly referencing the sources.

The research also included the question about their ability to write a paper all by themselves. 7% of students write it all by themselves, 71% combine their ideas/knowledge with information found on web/books, 12% only copy/paste what they found online/in books without analysing the content, 8% take care to use the information they found in a way to avoid plagiarism and only 2% usually get lost/confused/lazy and use other students’ work.

In the question about their ability to read, understand, analyse, make a review of information found online and be able to compare it with other sources and distinguish important from unimportant, only 21% of students admitted such ability. 49% of students claim to have such ability most of the time, 28% sometimes and 2% admit that they don’t have such abilities.

It is important to compare answers of last question to a question about student’s ability to summarize and synthesize the information they found on web/in a book and if needed present the main idea and content. Only 23% of students have such abilities and 67% of students sometimes have such abilities, depending on the complexity of the topic. 7% students are able to do it with teacher’s help and 3% of students don’t have such skills at all.

Questionnaire had one question about student’s ability to learn by themselves from the sources they find online or in books and present the key idea from the data found. From the
answers, 87 % of students are able to learn and present the key ideas and only 13 % of students are not able to learn and present the key ideas.

Ability to organize and present ideas and knowledge by creating digital publications/presentations that can be published online is important part of information literacy. 43 % of students admit to have such ability, 47 % of students don't feel competent to decide and 10 % of students from answers, don't have such ability.

Results of this study show that students who are impatient, who lack knowledge of writing their papers by themselves, who don't have ability to read and analyse information found on Internet/in books, usually lack knowledge of learning, summarizing and presenting information.

For example, among students who claim to be impatient, only 1 % of them has ability to read with understanding and ability to summarise and synthesize the information. When compared to students who claim to be patient and focused during search for information, ability to read, summarise and synthesize the information is rising to 8 %.

Results from this study show that 46 % of students are aware of the copyright issues, 44 % are aware but they don't care and 10 % of students are now aware at all. When asked about Creative Commons, vast majority of students know what is it and what is purpose of such organization. Also 75 % of students are familiar with the term plagiarism and based on their answers, they take care of citations, references and plagiarism control in their assignments and schoolwork/homework. 25 % of students are not familiar with the term plagiarism. But when the students were asked is it ethical to use the ideas of another person in a research paper only 30 % of them knew that they have to give credit to authors.

Based on answers of tracking of the sources, use of bibliographic information and knowledge how to avoid plagiarism, it is evident that students lack knowledge how to properly write research papers.

It is also evident from results that students during their education don't improve their general information literacy skills. There is no significant improvement in student’s abilities for searching for information, reading with understanding or summarising and synthesizing the information (percentage of students’ abilities is varying from 5 – 20 % during their education, without any significant ascending trends).
3.4. RESULTS – TEACHERS/STAFF

In the second part of the study, teachers were asked similar questions about information literacy of students.

First question for teachers was how are information literacy guidelines/standards presented in their state standards. Results showed that 13% are standalone, 29% are included in library media or technology standards, 21% are embedded in content area standards and 16% answered that there are no state standards for information literacy. Results also show that 77% of institutions provide training in information literacy skills for students and 23% of institutions don’t provide training in information literacy skills for students.

The research also included question how teachers incorporate research/information literacy skills into their education courses. 23% of teachers provide the skills instruction, in 26% of cases teachers provide links to online tutorials or supporting materials, in 8% of cases the skills are taught in another course common to all teacher education students and finally 25% of teachers use a combination of two or more of the above.

As conclusion teachers have different standards in use and they use various methods of teaching literacy skills, without unification even in same school.

When teachers were asked how often their students are asked to work on a paper or project that required integrating ideas or information from various sources, 50% of students had to do it monthly, 15% weekly, 29% rarely and only 6% never.

Based on teacher’s answers about student’s patience, 74% of students are Impatient and grab the first thing they get to finish the job, 11% are patient, focused, and they carefully and critically review every source and 15% give up easily because there are too many search results given.

In a similar question about use of search engine, 76% of students most likely use the first result that appears (usually Wikipedia), 13% of students use results that seem to be from reliable sources (expertise sites and authors with reliability/biography check) and 10% ask the teacher/parent for their opinion.

The study had also question about student’s work on a paper or assignment. Teachers claim that only 3% write it all alone, 55% combine their ideas/knowledge with information found on web/books, 26% only copy/paste what they find online/in books without analysing the content, 8% take care to use the information they found in a way to avoid plagiarism and 8% usually get lost/confused/lazy and use other students work.

Results of this part of study for teachers show that 55% of students sometimes check the resources accuracy by finding more about the author, publishing date, reviews, before they
use it in their work, 31 % of students do it if the teacher says it is obligatory and 14 % never do it.

Based on this part of a study it is evident that one significant part of students is impatient, they don't check accuracy of information found on line or in books and almost half of them is not able to write a paper independently.

Next group of questions was about student’s ability to read information with understanding, analyse, make a critical review, compare with other sources and distinguish important from unimportant. Based on teacher’s answers only 82 % of students are sometimes able to do it, 10 % of students are able to do it most of the time and 6 % of students are never able to do it. Only 2 % of students have all necessary skills and do it all the time. Very similar answers were given by teachers about student's ability to summarize and synthesize the information they found on web/in a book and if needed present the main idea and content to their classmates/other people. 66 % of students sometimes have ability to do it, depending on the complexity of the topic and 31 % of students are able to do it with teachers help. Also, the results show that 68 % of students have skills to organize and present their ideas and knowledge by creating digital publications/presentations that can be published online depending on their age/class, 14 % of students don't have such skills, 13 % sometimes have such skills and only 5 % are able to do it alone, without help.

Results from last 3 questions show that teachers are even more critical about student’s skills of reading, analysing, summarising and presenting information then students own assessment.

Results from this study show that teachers believe that in 63 % of cases only some of students are familiar with the correct way to reference a web source, book or article and correctly make citations so they avoid plagiarism, 6 % believe that all of their students have such skills, 6 % of students don't have such skills and even 23 % of teachers are not sure about students’ skills.

Teachers were also asked about use of Boolean algebra. They believe in 53 % of cases that students sometime use Boolean operators, 10 % never use it and 34 % of teachers claim that students don’t even know that Boolean operators exist.

Last of the questions was about students having all the information literacy skills needed to be well prepared for lifelong learning. Based on teachers’ answers, 74 % students have just some of the skills, 16 % of the students have most of the skills, 8 % don't have any skills at all and just 2 % have all skills needed to be well prepared.
4. TOPICS AND LEARNING OUTCOMES OF THE CURRICULA

After completion of study and data analysis of results from student’s answers, results show that students are not even aware of skills they don’t have and how much room for improvement they have in field of information literacy. Results from students’ study were confirmed with a study for teachers, who based on their experience had to value students skills in information literacy.

Results of this study are used for new information literacy curricula and learning outcomes. In total, 15 workshops were defined for accomplishing those goals. Workshops will be divided in several groups.

First group of workshops will deal with searching for information and their understanding. Second group of workshops will deal with analysis of information found on Internet or in literature, their synthesis and use. Third group of workshops will deal with topic of copyright.

Fifteen subtopics were chosen and their choice was based upon results of conducted research:

1. Searching for information
2. Advanced searching
3. Organizing information
4. Reading comprehension
5. Using information
6. Analysing and creating charts and graphics
7. Analysing and creating maps
8. Evaluating information
9. Creating information
10. Creating online information
11. Usability
12. Copyright and intellectual property rights
13. Protecting information
14. Using social networks
15. Information from the senses

Workshops on these subtopics are planned in such way that students acquire new knowledge, learn new tools, develop all needed skills but also think of and create their own attitudes regarding their own information literacy. Best way of implementing them is by using teaching methods that require extremely proactive student participation, developed on a higher scale of outcome using Bloom’s taxonomy, while having in mind the use of unavoidable information technology. Researches show that using active information technology during class is a great way of active learning and increases the level of collaborative learning and teamwork. Taking those two aspects in consideration it is important to recognize active and passive information technologies because, if we’re observing student participation, watching video clips isn’t the
same as doing quizzes, tests and online research. In the end, since the best way of studying is teaching others, it is needed to implement that aspect into workshops which will also train and improve other soft skills, like those related to non-verbal communication between students, presentation skills, self-empowerment, empathy and other communication skills.

5. CURRICULA SUBTOPICS

5.1. SUBTOPIC 1 – SEARCHING FOR INFORMATION

Subtopic goals:

To learn how to manage and make the most of different sources of information, as well as facilitate locating it, searching for it and retrieving it.

Expected outcomes:

At the end of the workshop, the students will:

- Be able to analyse a text and find the information that I need;
- Be able to identify and interpret key words and ideas in a text;
- Be able to state the task in their words;
- Be able to identify possible sources (people, organisations, places, print, electronic materials,...);
- Be able to select the best of source for information to use and skim it;
- Be able to summarise information;
- Be able to write a text on a topic assigned by seeking the information independently.

Content:

The Big 6 is one of the most important process of searching information. The Big 6 allows people of all ages to solve a searching information problem. The process is a systematic approach to information problem - solving that relies upon critical thinking skills. Mike Eisenberg (Dean Emeritus and Professor - University of Washington Information School) and Bob Berkowitz (School Library Media Specialist with the Wayne Central School District, Ontario Center, NY) developed this process which guides students through information problem-solving and it provides a basic framework for teaching and promoting information literacy. The Big 6 consists of six stages:

1. Task Definition - In this step, the student determines exactly what the information problem is and the specific information related to the problem. For example, when assigning a project, a student needs to know which questions need to be answered, what kind of information is needed to answer questions, when it is due, etc.
2. Information Seeking Strategies - Once the problem is clearly expressed, attention turns to the range of possible information sources. Information Seeking Strategies involves making decisions and selecting sources appropriate to the defined task.

3. Location and Access - This is where the information seeking strategy really begins. Once students have decided on the appropriate strategy, the strategy is carried out.

4. Use of Information - Once students are able to locate and access a source, they must be able to read, view, listen or interact with the information and decide what is valuable for their particular situation. They must extract the information that they need using notes, copies, citations, etc.

5. Synthesis - The restructuring or repackaging of information into new or different formats to meet the requirements of the task is synthesis. Synthesis can be as simple as relaying a specific fact. Synthesis can be very complex involving several sources, a variety of media or presentation formats, and the effective communication of abstract ideas. This is where the real learning takes place as new information is brought in and links are made to pre-existing knowledge.

6. Evaluation - Evaluation determines how effectively and efficiently the information problem-solving process was conducted.

People go through the Big6 stages—consciously or not—when they seek or apply information to solve a problem or make a decision. It’s not necessary to complete these stages in order, however it has been found that in almost all successful problem-solving situations, all stages are addressed.

GENERAL TIPS: Generally, while searching for information it is necessary:

- **To avoid getting lost in the search**: Given there is a huge amount of information available, we need search, localisation, selection, storage and retrieval strategies and criteria. These days the Internet is the main source of information but it is necessary to know how to browse efficiently. It is advisable to identify strategies and criteria for the knowledge management processes based on the information provided by the Internet.

- **To know what is our starting point**: We need to keep the starting point in mind while analysing what our strategies for the information search are. Is it a random search or intentional? Do we establish criteria beforehand based on keywords or do we search as we go along? And so on. This is when strategies, criteria and good practices for browsing can be established.

- **To focus on what we are looking for**: We look for information for a reason, so we need to be clear on our aim. Nobody looks for information just to have that information; the aim is what will be done with that information. Having a clear focus and sticking to it is key, because it is very easy to lose sight of that. We need to be very clear about what our aim is before starting our search.
To realize a search plan: It is difficult to rely on a single strategy, because it depends on the specific information we are talking about. The following procedures could be useful:

1. Select keywords that represent what we are looking for.
2. Select some search tools. It is better to use different tools at the same time.
3. Use keywords in the search tools selected.

To select the most important information: Selecting the information is linked to looking for it, as there is a filter in the way the search process is carried out that helps selection. Because there is an enormous amount, even if we adopt a good search strategy we might still find we have a lot of information. Moreover, we tend not to be very good at synthesizing when it comes to selecting information that is really relevant. The following are some of the basic criteria for selecting information:

- Relevance: the information selected must respond to the search criteria with regard to the aims set.
- Audience: it is necessary to assess whether the information is suitable for the target audience and the purpose it is addressing.
- Rigour, credibility and reliability: the information must be able to guarantee its source (recognised author, access to the source), the content itself (the way in which it is organised and structured), updating the information found, etc.

To know how to store and retrieve information: The use of alphabetical and subject indices offer a good way of retrieving information. One option is to combine the two criteria but the best suggestion is to bear in mind its future retrieval when it is stored.

Proposed teaching method:

The activity will have to be done in an IT classroom, starting with a group activity to break the ice and help establish a community of learning based on mutual trust and knowledge. The participants’ previous knowledge and experience should be taken into account and the assimilation of new knowledge facilitated by expository teaching and demonstration/execution, by means of solving structured exercises.

The teacher will have presentations (Prezi, for example) as a learning tool, use of the Internet and can hand out support material to the participants. Structured exercises could be used, as doing these will help to achieve the goals set.

One activity that could prove useful would be an information hunt with clues, which could be done in the IT classroom or even in the municipal library. This way, the participants carry out a search for specific information using the means at their disposal, either in the classroom or the library.
References for preparing a lesson:

- Burnett, P. C. (2002.) *Teacher praise and feedback and students’ perceptions of the classroom environment*, Educational Psychology, 22(1), 1–16
5.2. SUBTOPIC 2 – ADVANCED SEARCHING

Subtopic goals:

To understand how search engines work, it is important to be able to refine searches on them.

Expected outcomes:

At the end of the workshop, the students will be able:

- To identify the basic parts of a web search engine search page;
- To understand what the different parts of search results suggest about the content of the pages they offer;
- To interpret these results in order to pick the best sources without reading every page;
- To be able to identify types of search results and media formats available in universal search results;
- To be able to use search techniques to locate web resources as part of an authentic learning experience;
- To be able to analyse the contents of a web page for clues to the credibility of the information;
- To understand how search engines work (SERP);
- To learn about online database, big data, cloud computing.

Content:

1. Web searchers
2. The importance of SERP
3. SEO:
   1. How Google works
   2. Understanding SEO
4. SEM – Google Adwords
5. Big data, online databases, cloud computing

1. Web searchers

First, it is important to bear in mind that there are other search engines besides Google and their usage depends on the country:

1. Google
2. Yahoo
3. Baidu (China)
4. Bing (Microsoft)
5. Yandex (Russia)
6. Mail.ru
A world map of dominating websites gives a general view of their usage:

Notice that Facebook is also used as a searcher.

Google is the Nº 1 search engine in Europe. The [http://www.worldwidewebsize.com/](http://www.worldwidewebsize.com/) website gives figures on how many indexed pages there are and how many searches per day are done by country. It is interesting to have a look and compare countries.

To illustrate how Google shows the results of any search (SERP: Search engine results page) it is necessary to differentiate between natural and paid (advertising) results. Google results are as follows:

- Advertising
- News
- Google Local (maps, places)
- Social networks (Twitter, Facebook)
- Images
- Videos
- Wikipedia

Google also gives information about how, how often, when, how many times, from where and which users search specific information, which is another source of information used by search engines ([https://www.google.com/trends/](https://www.google.com/trends/)). And Google Instant is personalised by every user.

To understand how search engines work it is important to be able to refine searches on them. Once students understand how Google works, they will be able to use advanced research techniques such as Boolean, truncation, operators, languages, etc. ([https://www.google.co.uk/advanced_search](https://www.google.co.uk/advanced_search))
**Operators:**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>How to use it</th>
</tr>
</thead>
</table>
| +      | Search for Google+ pages or blood types  
Examples: +Chrome or AB+ |
| @      | Find social tags  
Example: @agoogler |
| $      | Find prices  
Example: nikon $400 |
| #      | Find popular hashtags for trending topics  
Example: #throwbackthursday |
| -      | When you use a dash before a word or site, it excludes sites with that information from your results. This is useful for words with multiple meanings, like Jaguar the car brand and jaguar the animal.  
Examples: jaguar speed -car or pandas -site:wikipedia.org |
| " "   | When you put a word or phrase in quotes, the results will only include pages with the same words in the same order as the ones inside the quotes. Only use this if you’re looking for an exact word or phrase, otherwise you’ll exclude many helpful pages.
results by mistake.
Example: "imagine all the people"

* Add an asterisk as a placeholder for any unknown or wildcard terms.
Example: "a * saved is a * earned"

Separate numbers by two periods without spaces to see results that contain numbers in a range.
Example: camera $50..$100

- https://support.google.com/websearch/answer/2466433?hl=en
- https://sites.google.com/site/gwebsearcheducation/advanced-operators

The results can also be filtered by language, region, update date, site or licence. And not only web pages but also images, maps, files, books and documents, videos, etc.

2. The importance of SERP (Search engine results page)

After the search, let's analyse the results: students need to understand the importance of appearing in the first positions of what is called the golden triangle:
Users tend to see the regions painted in red and orange, so if your enterprise appears in 10\textsuperscript{th} position, it is not worth it.

This is key when the next statistic is shown, which tells how a user searches a web site throughout the shopping process for a car.
Google uses a secret algorithm to return the results of our queries. It's good, very good, and constantly tweaked to be as accurate as possible, so we receive the most relevant solutions and the ones most closely adapted to us. They are based on "hints" that make it possible to guess what we want. Eighteen years after Google's birth, the search engine algorithm is its great secret ingredient. Most web designers spend their time trying to guess how it works.

I'm feeling lucky. On their home page, under the search box, Google displays two options: "Google Search" and "I'm Feeling Lucky." What happens if you press the last button? Well, the California-based company sends you directly to the first search result. Just 1% of searches are conducted this way, in which the user is not exposed to advertising. The system jumps directly to the page, so there is no economic gain for Google from these searches. In fact, the company acknowledged in 2007 that it misses out on $110 million a year as a result. This option has now been deleted from the latest version of Chrome.
3. SEO (Search engine optimization)

It is important to understand that positioning a website in the first positions after a search is essential. Concepts such as organic search results, link-baiting, link-building, keywords, trends and ranking need to be explained at this point.

Recommendations are offered for selecting keywords, such as:

- Use some domain words and placing some of these words in the content of the site.
- While country extensions improve the positioning of the national market, they penalize the international one.
- Websites which are responsive (their size fits the mobile device size) are also shown in the first positions after a search, as well as those which are fast-loading.
- Google also likes it if the website content is periodically updated and other sites link to us.
- Use of multimedia elements (videos, images, etc.) is also a sign of quality.

*This section in italics could be skipped if students do not have an IT profile.*

*Google reads the metadata of a website first, so this must be correctly defined:*
More technically, the html tags in the metadata section (which are well known to IT students) should have:

- `<title>`: keywords which are also in the content of the website, preferably at the beginning
- `<description>` which describes the website shortly should also contain keywords
- `<keywords>` on the first page should contain general keywords and more specific ones should appear on secondary pages.

Some extra recommendations below:

- Include keywords in the first 100 words, as it provides relevancy.
- Include keywords repeatedly without abusing them.
- Do not exceed a 4% density of keywords in the content or the website will be penalized.
- The presence of keywords with singular and plural, masculine and feminine, as well as synonyms and linguistic variations, is a sign of quality content.
- Use the `<strong>` `<strong>` tag to highlight keywords but do not abuse it.
- The images should have the “name” and “alt” attributes.
- Inner links are rewarded by Google.
- Use breadcrumbs.

Google measures the popularity of a website by counting who and how many people talk about us. This is the PR or Page Rank, i.e. the number of other websites which links to us.

In order to improve a website ranking and thus its visibility, specific methods, techniques and tools can be used.

We can use social sites such as Linkedin, Twitter, Google+, YouTube, Facebook, Twitter, Instagram, Blogger and Pinterest to create links to our own website.
These websites calculate the page rank:

1. Woorank: https://www.woorank.com

4. **SEM (Search engine marketing)**

SEM is a way to promote our website or products on search engines (Google, Bing, Baidu, etc.). Our products appear in prominent places, where users look. In return we pay for each click the ad gets. Hence the name, Pay Per Click. The program that Google uses to manage such advertising is called Google Adwords.

Google AdWords Express: Online advertising made easy
https://www.youtube.com/watch?v=AJoUEBYIlM

Thanks to Google Adwords, we can find out the following:

- Metrics: How many people visit (impressions) and how interested they are (clicks)
- Conversions: Where the people who buy found us
- Profitability: How many people buy after seeing the ad
- Transactional search: We are present in the active search for a product

Moreover:

- Our product can appear prominently in Google from the beginning
- We only pay per visitor to our site
- Anyone can publish an ad

Google Adwords has grown in recent years, along with its billing.
Each solution is better suited to different enterprises, depending on their earnings, whether they are small or big businesses, eCommerce, webmasters, etc.

5. Big data, online databases

Finally, a glimpse of the future which is already the present: online databases, big data, distributed databases, etc. Big data, macro data or mass data is a concept that refers to the storage of large amounts of data and procedures used to find repetitive patterns within data. Such an amount of data exceeds the capacity of conventional software to be captured, managed and processed within a reasonable time, so software now uses new patterns or methods to search for information in an optimized way.

The current trend is one of exponential growth in data size: 90% of the data on the Internet has been created in the past 2 years. The following amount of data is created every minute:
This means that 2.2 million terabytes are created every day. The relationship between data sizes is as follows:

- 1 Bit = Binary Digit
- 8 Bits = 1 Byte
- 1000 Bytes = 1 Kilobyte
- 1000 Kilobytes = 1 Megabyte
- 1000 Megabytes = 1 Gigabyte
- 1000 Gigabytes = 1 Terabyte
- 1000 Terabytes = 1 Petabyte
- 1000 Petabytes = 1 Exabyte
- 1000 Exabytes = 1 Zettabyte
- 1000 Zettabytes = 1 Yottabyte
- 1000 Yottabytes = 1 Brontobyte
- 1000 Brontobytes = 1 Geopbyte
These dimensions, high-velocity and high-variety information assets, have left classic technologies obsolete and demand cost-effective and innovative forms of information processing for enhanced insight and decision-making. (Gartner, 2012)

Data has evolved from being structured (tables and databases) to unstructured (pictures, videos, etc.) and nowadays 90% of data is unstructured. Moreover, the speed of data generation is so high that a high-speed reaction and answer are required too. A good system should offer:

- Consistency: all “readers” with the same information at the same time.
- Availability: a guarantee that each Request will receive a Response.
- Partition or tolerance to error: the system continues operating even if there is a system crash or loss of messages.

But meeting these three requirements at the same time is quite a challenge.

**Proposed teaching method:**

*Web searchers and SERP:*

It is recommended you use the computer room for the activities linked to this topic, as this is mainly a practical class. Before starting it is recommended you use a Kahoot to evaluate the prior knowledge students have of some basic concepts or to correct misconceptions (the number of searches per day, the number of websites in the world, the existence of other web searchers, what Google Instant and Google Trends are, and so on). Some fun tricks can be found at:

- [https://www.youtube.com/watch?v=lYz9Ug6aR3g](https://www.youtube.com/watch?v=lYz9Ug6aR3g)
- [https://www.youtube.com/watch?v=Ch8P0XkgRFg](https://www.youtube.com/watch?v=Ch8P0XkgRFg)
- [https://www.youtube.com/watch?v=YXTwUaLUH7s](https://www.youtube.com/watch?v=YXTwUaLUH7s)

Also, type in:

1. “do a barrel roll” and see what happens! Does “askew” do the same?
2. [http://elgoog.im/guitar/](http://elgoog.im/guitar/) and play
3. “the answer to life, the universe and everything”. Why is 42 the answer?
4. Google Gravity
5. Zerg Rush
6. Atari Breakout

Or lose the Internet connection and you will see the dinosaur ;)
A game can be also played in Wikipedia, at http://thewikigame.com/, which consists of exploring and racing through Wikipedia articles, counting the number of clicks from one article to another.

Next, concepts related to the first two learning outcomes (1. To understand how search engines work (SERP) and 2. To define the SEO, SEM, keywords, trends and rank concepts) need to be explained by means of a presentation, for example. Some videos could be shown to break it up.

• How Search works: https://www.youtube.com/watch?v=BNHR6IQJGZs
• The evolution of Search: https://www.youtube.com/watch?v=mTBShTwCnD4&feature=youtu.be
• The cost of free: https://www.youtube.com/watch?v=MNAfnfcergc (specific parts)

Students try some examples and some easy searches online to analyse how the results are shown. As Google Instant is customised by every user, it is also interesting to compare the different suggestions for the same word. An activity based on google trends is also recommended.

Next, some exercises need to be done on the computers, preferably in pairs with an IT-profile student helping another one whenever possible. Advanced search exercises can be done as a contest or a quiz in teams (kahoot.it or https://quizlet.com/ for instance) to make it more fun. The tool to test is https://www.google.en/advanced_search.

**SEO & SEM**

A search on employment websites can also be useful to learn that professionals on SEO are wanted (https://www.linkedin.com, https://www.infojobs.net/).

An exercise on deciding the keywords for a product (generic, specific, secondary, long-tail) can be done in groups of 2 or 3 people. The teacher asks:

1. for a list of a possible keywords
2. which keywords do users use (Google Trends, Google Instant or ubersuggest.org)
3. what the competition is doing
4. for the final list of keywords chosen

If the students have an IT-profile, html files can be used to show how SEO works.

As regards PR, the teacher could give a few good and bad examples to show how it works. Students could also check some websites to find out their page rank and maybe improve it. For example:

• Bad example: http://www.lingscars.com/
• Good example: https://www.nasa.gov/
If any URL is entered in https://www.woorank.com/, the system will propose specific improvements. Some of them will be very technical, so only IT students will be able to follow at that point.

Besides all the above, and if the budget allows, a Google AdWords campaign could be run. For this the school would need to sign up to Google AdWords and provide bank account data. Working in groups, students draw up a list of keywords and later a contest could be run to find out which group gets the most clicks.

**Big data, online databases**

Looking to the future, the last subtopic on online databases and big data could be done as a flipped classroom. Students in groups of 2-3 prepare a small presentation on this and then hold a debate about the new knowledge they have learned. The material developed by the students should contain:

- Introduction
- Features
- Advantages and disadvantages
- Future.

The students could choose among the following subjects:

- Big data
- Cloud tools
- Internet of things
- Fancy subjects such as Google Glasses, Google Car or Google Play are also possible.

Before this, though, students could analyse the trend in data size: from 1 bit to 1 Geopbyte, what is the rate of data size? They can search for this information in Google.

1 Bit = Binary Digit  
8 Bits = 1 Byte  
1000 Bytes = 1 Kilobyte  
...  
1000 Brontobytes = 1 Geopbyte

Students could also be asked which social networks they use and to think about how much data they create every day (minute, hour, week, year) on Facebook, Instagram, etc. Or what
other data sources keep huge amounts of data: Amazon, the government, our DNA, VISA, Linkedin and so on.

Last, but not least, a visit to a supercomputing centre could be arranged, to Marenoster in Barcelona (http://www.bsc.es/) for example, where small chats are organised for students. These supercomputers can be booked online to process programs which handle huge amounts of data that even take days.

References for preparing a lesson:

- How Search Works: https://www.youtube.com/watch?v=BNHR6IQJGZs
- The Evolution of Search: https://www.youtube.com/watch?v=mTBShTlwCnD4&feature=youtu.be
- Documentary: The Cost of Free: https://www.youtube.com/watch?v=MNAfnfcerig
- Google Trends: https://www.google.com/trends/
- Advanced Search: https://www.google.co.uk/advanced_search
- The periodic table of SEO success factors: http://searchengineland.com/seotable#
- SEO Toolbar: https://moz.com/products/pro/seo-toolbar
- Woorank: https://www.woorank.com
- Google AdWords Express: Online advertising made easy https://www.youtube.com/watch?v=AJoUEBYIInI
- Barcelona Supercomputing Center: http://www.bsc.es/
5.3. SUBTOPIC 3 – ORGANIZING GIVEN INFORMATION

Subtopic goals:

To help students realise the importance of evaluating and organizing information as steps prior to understanding and explaining reality, two necessary elements for rebuilding and modelling information and developing ideas.

Expected outcomes:

At the end of the lesson the student will be able to:

- define mental maps, infographics and timelines
- recognise the best type of visual representation tool for a specific topic
- be able to read and produce a mind map, timeline and infographics
- understand the possible usage of visual representing tools in studying, lifelong learning and business

Content:

We all know the saying “A picture is worth a thousand words”. If we think of how we learn the fastest we remember that we are much more efficient when we replace a lot of text with notes, sketches, images, drawings and all kind of graphically represented and connected information. If you’re looking for creative ways to visualize and represent them in paper and online, check out the following tools. Most have a digital version of creation tools that are free, web based, and relatively easy to use. Today we will focus on mindmaps, timelines and infographics. We will do it for several reasons. Along with them we can enlighten the mystery on how to

- organize given information and our thoughts
- discover cause-effect relations
- be able to remember and process data instead of only memorize them
- transmit/communicate a message or information
- present large amounts of information in a easy to understand way

1. MIND MAPS

“Mind Maps are the meta-language of the human race.”

– Tony Buzan

A mind map is a diagram used to visually organize information. The technique of Mind Mapping was created by Tony Buzan and is one of the most widely used thinking tools around the world.
A Mind Map® is a visual thinking tool which maps out your thoughts and ideas in a brain-friendly way using the technique of radiant thinking. It combines colour, visual-spatial skills and imagination to trigger your brain to think more creatively, learn faster, remember more and communicate better.

Mind maps can be hand-drawn on paper or produced using mind mapping software applications.

You can benefit from Mind Maps to

- brainstorm ideas quickly and easily
- take fast and effective notes during classes or meetings
- make concise notes from printed material
- study better and remember more
- prepare and present information or ideas
- memorize facts more effectively and meaningfully

Mind Maps can be used for

- thinking (brainstorming, decision-making and project planning)
- learning (note-taking, note-making, studying)
- communication (presentations, meetings, speeches)

2. TIMELINES

A timeline is an actual picture of events that happened in history. The main function of a timeline is to visualize data over time. Whether you use them for educational purposes or business or to visualize historic events, time-related information can be presented as a list of data points with the distance between those points giving a visual hint on the time interval between events. Timelines actually are a way of displaying a list of events in chronological order. It is typically a graphic design showing a long bar labelled with dates alongside and (usually) events labelled on points where they would have happened. They are very often part of an infographic which we will discuss later.

Timelines can be linear or parallel (comparative). A linear timeline shows a picture of events as they occurred in a certain period of time. Use a linear timeline for one subject and time
frame. A linear timeline can be written horizontally, vertically or curved. A parallel (comparative) timeline shows two or more subject areas which occurred at the same time and compares them so we can see the main difference. A comparative timeline might compare historical events in two or more countries or compare two or more subjects like software development, car releases or people’s lives.

3. INFOGRAPHICS

Infographics are visual representations of information, data or knowledge. They are used where complex information needs to be explained simply, quickly and clearly. Human brain is able to consume visual content 60000 times faster than text! Photos are just not enough because they can't express statistical facts or numerical data or a concept. They use graphics such as in signs, maps, journals. Infographics are often used in ICT, mathematics, and statistics to ease the process of creating and communicating conceptual information.

An infographic is made of universal symbols, pictures, and data visualizations with short-form texts with a purpose to tell a story. They actually use visual elements such as signs, charts, maps, or diagrams to help us better understand a given text-based content. But if the main importance for understanding is based on the text besides graphics, we miss the key point.

The infographics can also be interactive meaning there is a possibility to click on some elements to gain additional information.

So what should be an infographics and how is it structured? It should tell the story and get the message, theme and point even if we take away the textual data. As a matter of fact, not all infographics rely the data to tell the story. The main point and purpose of an infographics is
to use symbols, illustrations and clean data visualisations to tell „a story“. Also, infographics are not made to be just good looking. They need to deliver a clear message of the data in a concise way.

What makes the bad infographics? First of all, too much data because it draws away the focus on what is important and the key point. Graphs are usually created wrong specially when they are combined. They are often too complex and that lack of simplicity makes them hard to read.

A good infographic uses pictures, graphics, symbols and icons without overloading it with text or details. They use simple and easy readable. It should focus on the main message. It should be quickly readable to meet the possible average attention ratio. They use clean design with enough space between data. Colour scheme is also important and it should be simple. Saturation should be reduced on less important data and increased on most important ones. Typography is also important, as much as the font size (it represents the importance). The design should be consistent and in the relation with the subject. If the infographics is interactive the additional article should not repeat the information already given but serve supplemental ones.

References for preparing the lesson:

- [https://blocs.xtec.cat/estudivallbona/](https://blocs.xtec.cat/estudivallbona/)
5.4. SUBTOPIC 4 – READING COMPREHENSION

Subtopic goals:
The goal is for students to develop a critical approach to the text, in order to understand it better and improve their self-awareness.

Expected outcomes:
At the end of the workshop, the students will know that:
- to understand a text, we have to understand words, sentences, concepts and relations between concepts
- the comprehension of a text is based on the relationship between the reader and all those items
- summarizing and rephrasing a text are parts of the comprehension of the text
- associating concepts and comparing them complete the comprehension process

Content:
Reading comprehension needs to be reinforced in all its dimensions, receptive (reading) and productive (writing), communication and creation, and it must be related to oral interactions, which will help to bring about ever more conscious and effective learning.

In contrast to spoken language, written language needs to be more explicit, because it has no contextual resources, such as gestures or sight, nor is there a situation of shared communication between the transmitter and the receiver. On the other hand, it can fix the message and maintain it over time.

Reading comprehension has the support of a text and the graphic representation of language. As in the case of spoken language, the comprehension of written texts implies the knowledge of lexis and morphosyntactic structures, as well as knowledge of the text structure, which organises the ideas and reflects different aims that are exclusive to the text.

The reading process involves various cognitive activities. Students must decipher the text and relate the letters with the phonemes of the language. But it also means they must be capable of extracting different ideas from the text, of interrelating them in order to arrive at a broader meaning and establish a hierarchical relationship. That does not mean understanding a text is the sum of understanding the separate elements in it. On the contrary, the comprehension process occurs in the word, the sentence and the text as a whole.
Types of reading comprehension

It is possible to distinguish between three types of comprehension: literal, interpretive or inferential, and reflective or evaluative. The latter two go beyond the information contained in the text and require prior knowledge on the part of the person reading the text.

Depending on what action the reader takes, it is possible to extract information directly out of the text, deduce it or adopt a more personal or critical point of view.

1. **Literal or obtaining information**: the information is taken directly from the text. This just involves selecting information that is relevant to the question posed or the information the reader is looking for. This is a very important type of comprehension in the work of the reader but it does not guarantee he or she is capable of transferring that knowledge to other situations. It is possible they might not understand what they are being asked and just repeat what they have read.

2. **Interpretive or inferential**: the reader deduces the information they are looking for from the information extracted from the text. Reformulation of the information received from the text (explaining what has been read in other words, summarising it or pointing out the main ideas) is also regarded as interpretive. To reach this level of understanding requires putting previously acquired knowledge in play. This knowledge and reading the text enables the reader to make the necessary deductions.

3. **Reflective or evaluative**: the reader not only uses his or her previous knowledge but also their criteria and opinions. They can make judgements, assess the usefulness and veracity of the information received, put themselves in the shoes of the main character, etc.

Often, we have students who do not possess adequate reading comprehension skills to do what is expected of them. Without comprehension, reading is simply following words on a page from left to right while sounding them out. The words on the page have no meaning. And while people read for many different reasons, the chief goal is to derive some understanding of what the writer is trying to convey and make use of that information – whether for fact gathering, learning a new skill, or for pleasure. That’s why reading comprehension skills are so important. Without them the reader cannot gather any information and use it to function efficiently.

Reading is a multifaceted process that develops only with practice. There are certain aspects of reading, such as fluency and word recognition, which can be learned in a few years. These basics must be mastered but at the same time reading comprehension should be emphasized in the process. Students can parrot words on a page all day long but if they don’t have the necessary comprehension skills they will not be able to make predictions about what will happen next, monitor their understanding of content, sequence or characters, clarify confusing parts of the text, or connect what they are reading to their own experience or prior knowledge. And that is what true comprehension is all about.
The ultimate goal of reading instruction is comprehension – gaining meaning from text. A number of factors contribute to students’ not being able to comprehend text. Comprehension can break down when students have problems with one or more of the following:

a) decoding words, including structural analysis;
b) reading text with adequate speed and accuracy (fluency);
c) understanding the meanings of words;
d) relating content to prior knowledge;
e) applying comprehension strategies;
f) monitoring understanding.

What does reading comprehension involve?

The reading comprehension process begins even before the process of decoding the text. Before we come to the specific content, the format and physical support already provide some information. This information has been acquired from previous experiences that enable the reader to recognise what kind of text it is and what to expect. That’s why it is important to give students real texts with formats that are real to them.

During the reading, the expert reader (teacher) engages in a dialogue with the text, and helps the beginner reader (student) in this dialogue. Students need to get to the point where they can interpret a text, with the help of what knowledge they have of the subject. It is also useful if they can assess their own comprehension and check whether it responds to the reasons why they started reading.

At the same time, the reader has to be capable of predicting what comes next, of confirming the hypotheses they have made in the course of reading and reformulating others as they make their way through the text.

The procedures of analysing and synthesizing the content carried out during reading make it possible to reformulate what has been read, say it in our own words, summarise it, comment on it and even criticise it. They also allow acquired knowledge to be applied in other fields, for example, to follow the steps for installing antivirus software by applying what has been read.

From all that has been said so far, it flows that reading comprehension, reading, involves a process whereby the person who reads, as well as decoding the text, carries out a whole series of strategic actions to make the content of the text their own.

For learning purposes, the various actions carried out more or less unconsciously and automatically by the expert reader must be carried out more explicitly to serve as a model, so the students can apply them, first with the whole group in a more or less guided fashion, before thinking about them with the help of an adult and finally carrying them out independently.
Proposed teaching method:

One way of organising the reading comprehension strategies and preparing the activities to be worked on is to take into account the temporal dimension of the process. We can distinguish between three moments for understanding a text, each of which requires different strategies: before, during and after reading.

Before reading

- Reading goals: any reading act has a goal, whether it’s pleasure, searching for information or learning. Reading goals provide the necessary motivation for proceeding to read. At the same time, they determine the way we read. For example, our reading will be more selective if we are looking for specific information and on a deeper level if our aim is to study a subject.
- Formulating hypotheses: the material, illustrations, presentation and textual clues (title, subtitles, letter type, etc.) all provide information that enables us to predict what type of text it is and what kind of content it has.
- Activating previously acquired knowledge: readers can form hypotheses about the text from the moment they have had previous experience of similar texts. Moreover, prior knowledge of the content enables comprehension; the further removed a text is from the reader’s knowledge and experience, the more difficult it will be to understand. It is important to bear in mind that this prior knowledge could come from inherent personal experience, the reader’s immediate environment (family, school, friends, etc.) or their sociocultural environment (standards, values, interculturality, multilingualism, etc.)

During reading

- Formulating hypotheses: while reading, the reader anticipates the content to come, based on what they have already interpreted. These hypotheses are revealed on different levels: words, sentences and the whole text. For example, the meaning of a word that does not read well in the text can be deduced, the narrative structure leads us to predict that the characters will do something to resolve the conflict just sketched out in the introduction to the story, etc.
- Confirming or rejecting hypotheses: the different hypotheses will gradually be confirmed or rejected as reading progresses. This process will lead to the formulation of new hypotheses that will be confirmed or rejected later.
- Recapitulation: in order to understand a text it needs to be retained in the short-term memory. The various pieces of information interrelate with each other in the same way as a link is established between previously acquired pieces of knowledge, and the new information obtained is what generates the interpretation made by the reader.
- Monitoring comprehension: at the same time as interpreting the text, the reader may also detect a possible lack of understanding and decide whether it is necessary to continue reading to obtain more information or better to re-read the text, whether they need to look a word up in the dictionary or use other strategies to avoid gaps in the information.
After reading

- Assessing comprehension: to carry out an assessment, it is possible to answer and learn to prepare pertinent questions for different levels of comprehension (literal, interpretative and reflective).
- Recapitulation: different aspects of the recollection of a text can be recalled by means of recapitulation, relating aspects of the text with other information.
- Communication: different activities can be combined to develop communicative skills (spoken language – reading – writing) and, in that way, grasp the main ideas, summarise the text, check comprehension, converse to share ideas and personal relationships stimulated by the text.
- Creativity: reading part of a story (beginning or end) and predicting how it continues or guessing how it started are ways of fostering creativity. So is summarising or a related application (representation in different graphic organisers, such as tables, charts, diagrams, conceptual maps, etc.).
- Assessment: if the text has met the expectations set, it could be assessed by reflecting on whether the students liked it, were surprised by it, would recommend it, etc.

The following should be borne in mind when planning activities for working on reading comprehension:

- How long and complex the text is, and what kind of text it is.
- The support it comes in.
- The knowledge the reader has of the subject.
- Their mastery of the decoding process.
- Their capacity for relating the different ideas contained in the text.
- The type of comprehension required by the reading goals.
- The responses and applications teachers could ask for after the reading.

A vital factor in putting forward an ever more independent approach to reading comprehension is learning the different strategies that this involves. Initially, the model of the teacher as an expert (an expert is someone who can explain orally the different strategies used in understanding a text) is a vital source of learning. Subsequently it is necessary to ask the students to consciously apply these strategies. One way of doing that is by commenting on them in a peer group designed to carry out a task, before going on to apply them more independently and automatically later.

In the course of the teaching process, wherever possible, reading comprehension activities should be set in real contexts that give rise to reading goals and motivation that helps students to learn and overcome the difficulties that might arise.

It is also necessary to take into account the diversity of texts in our immediate environment, as each type of text has a different internal structure. If communicative situations involving
different media, different types of text and different registers (formal and informal) are not used, it will be more difficult to interpret them.

Modelling is one of the most productive procedures in teaching and learning, much more than just verbal explanation and decontextualized advice or guidance, so it is necessary to teach the strategies this involves, for it to have an effect on comprehension. The role the teacher plays as an expert reader during learning is vital. All the actions teachers do more or less unconsciously and automatically must be done more explicitly: they need to explain everything they do and everything they think while they are reading.

Then it is necessary to think about applying these strategies, first with the whole group and in a more or less guided way. A good way of doing this is by commenting on them in a peer group set up to do a task, before going on to think about them with the help of an expert and, finally, reaching the stage of applying the different strategies independently.

Also, with a view to encouraging reflection, it is important to bear in mind the need to think about situations that require different levels of understanding.

Below we suggest different ways of encouraging self-assessment that are also designed to generate a process of pedagogical reflection among teachers with regard to the reading comprehension teaching process.

1. The teacher acts as a model, explaining the comprehension strategies that students will then have to apply independently.

2. Before starting to read a text, ask students to notice the formal characteristics and make some deductions.

3. Before reading a text, do some activities associated with activating previous knowledge.

4. Before reading, specify the purpose of the reading exercise, i.e. the reason for doing it: to look for information, contrast opinions, enjoyment, etc.

5. Ask them to predict the content during the reading and then corroborate or reject their prediction.

6. At a specific turning point in the reading, ask them to recapitulate what they have read.

7. Propose activities that require selecting information.

8. Do activities that require inferring information from the text.

9. Do activities that require interrelating information from different sources (different texts, images, etc.).

10. Do activities that require a critical understanding (with students assessing the information received, putting themselves in another’s shoes, giving an opinion, etc.).
11. Do activities where students have to resolve different kinds of situations to show they understand them: open questions, closed questions, multiple choice answers, graphic and motor activities, oral answers, written answers, etc.

12. Propose graded synthesizing activities for the reading, with more or less support, so they learn how to summarise texts, look for the subject and the main ideas.

13. Ask for pauses during the reading that enable them to think about following the message of the text, i.e. on their level of understanding.

14. Do graded reading comprehension activities, with more or less teacher support, so the students become better at measuring their possibilities.

15. Do readings designed to influence the formal aspects: intonation and decoding.

16. Once the activity is over, ask the students to reflect on what they have learned, where they were most successful, what they need to work on, etc.

17. Give them different types of written texts: descriptions, poems, stories, news items, explanatory, graphic and instructive texts, etc.

18. Ask them to read digital texts, with hypertext and multimedia. (Internet and IT applications. Onscreen reading).

19. Make them think about words they don’t know and the possibility of deducing the meaning from the context or their knowledge of other languages.

20. Do comparative analyses of similar texts as regards their content and different texts as regards their focus or register.

References for preparing a lesson:

- http://www.k12reader.com/subject/reading-skills/reading-comprehension/
5.5. SUBTOPIC 5 – USING INFORMATION

Subtopic goals:

Students should be able to analyse, interpret and process information, as well as organise and memorise it in the most suitable way for achieving their goal.

Expected outcomes:

Students should be able to:

1. Analyse information:
   1.1. Understand the information obtained
   - Scan the selected content
   - Read the information chosen carefully
   - Locate irrelevant information and discard it
   1.2. Identify ideas and data
   - Recognise the main concepts
   - Locate secondary ideas linked to the theme
   - Recognise the main measurements of a chart or a table
   1.3. Evaluate affirmations
   - Compare and contrast the information analysed
   - Establish whether there are any erroneous concepts or not

2. Interpret information:
   2.1. Make inferences and deductions
   - Relate ideas and concepts to the subject of the search
   - Identify causal relationships in the content
   - Establish links with their own knowledge
   2.2. Evaluate linguistic elements
   - Evaluate content coherence and cohesion
   - Discover the underlying features of the content (genre, style, etc.)
   2.3. Read with a critical eye
   - Recognise points of view and ideologies
   - Incorporate or reject diverse views
   - Handle ambiguity, opposite and/or negative ideas

3. Process information:
   3.1. Extract the relevant information
   - Break the selected information down into segments
   - Pick out the main ideas and concepts
   - Outline the main ideas and concepts
   3.2. Synthesize the information compiled
   - Summarise the important parts of the information they have chosen
   - Represent the information in conceptual maps
3.3. Structure the information
- Differentiate between the main and secondary ideas
- Establish hierarchical and associative ideas
- Organise the synthesized information according to an initial outline

4. Memorise information:

4.1. Improve memorisation
- Discover the capacity of their own memory
- Evaluate their visual, auditory and kinaesthetic memory
- Plan how to memorise some information
- Decide which aspects need memorising
- Use the most suitable mnemonic strategies for each kind of information

4.2. Self-assess what they forget
- Reflect on what they tend to forget most easily
- Discover resources for combating this by classifying and linking data, recovering data apparently forgotten

Content:

The processing and use of information is a learning strategy. According to Nisbet and Shuckersmith (1987) learning strategies are executive processes by means of which we choose, coordinate and apply skills. These strategies must be linked to meaningful learning and learning to learn. The most important thing with regard to learning style is that teachers understand the needs students may have, depending on their previous knowledge and level, as well as their aptitudes and/or shortcomings. As regards learning strategies, we can establish the following types:

**Dispositional and support strategies:** these start the process and help to maintain effort. But there are many types of strategies, so we are going to look at some of them:

a) Affective or emotive strategies: these include motivational processes, the right attitudes, self-concept and self-esteem, competence awareness, etc.

b) Context control strategies: these refer to creating the right environmental conditions – controlling space, time, materials, etc. – that make students feel comfortable.

c) Strategies for researching, gathering and selecting information: these include everything referring to locating, gathering and selecting information. In order to be a strategic learner, the subject must learn the different sources of information and know how to access them, the criteria for selecting information, etc.

**Strategies for processing and using the information acquired:**

a) Attention strategies: these are aimed at controlling attention.
b) Strategies for codifying, elaborating and organising information: these control the processes for restructuring and personalising information by means of tactics such as underlining, summarising, outlines and conceptual maps, which are called study techniques.

c) Repetition and storage strategies: these control the retention and short- and long-term memory processes by means of tactics such as copying, repetition, mnemonic resources and establishing meaningful connections.

d) Personalisation and creative strategies: these include critical thinking, reworking information, creative personal ideas, etc.

e) Information recovery strategies: these control the processes for remembering and recalling, through such tactics such as memory exercises, exercises for recalling information by following related concept routes, etc.

f) Strategies for communicating and using information acquired: these enable information acquired to be used effectively in academic tasks and everyday life by means of tactics such as drawing up reports, synthesizing what has been learned, doing mock exams, self-questions and tests, application and transfer exercises, etc.

g) Meta-cognitive, regulating and control strategies: these refer to knowledge, evaluation and control of the various cognitive strategies and processes, in line with the task goals and depending on the context.

Competence in processing information incorporates various skills, ranging from accessing it to transmitting it while using different supports, which includes using information and communication technologies (ICTs) as an essential part of getting information, learning and communicating.

It is therefore a mainstream competence that needs to feature in every subject in the curriculum. There is no information processing outside the specific content of these subjects, though development in one area can be transferred to others if teachers do explicit transfer activities. It should also be remembered that there are personal (learning styles), social and cultural factors that may determine how information is accessed and processed, so teachers must be sensitive to the various ways of doing this that they might come across.

Moreover, by communicating this diversity, they may give other boys and girls clues on how to proceed in developing this competence. Not only should this diversity be respected, it could be an effective learning tool.

This competence is developed while searching for, gathering, selecting, recording and processing information, by using various techniques and strategies depending on the source and support used (oral, printed, audiovisual, digital). It requires a mastery of certain basic languages (text, numeric, iconic, visual, graphic and sound) and the rules for deciphering and
transferring them, as well as applying in various situations and contexts knowledge of the different types of information, their sources, possibilities and localisation, and of the most frequent languages and supports this knowledge is usually expressed in.

Turning information into knowledge requires mastering the skills associated with the reasoning for organising it, relating it, analysing it, synthesizing it and making inferences and deductions of different levels of complexity. In short, understanding the information and integrating it into previous knowledge frameworks.

It means, therefore, communicating the information and knowledge acquired by the creative use of expressive resources that not only incorporate different languages and specific techniques but also the possibilities offered by information and communication technologies.

Thoughtful, competent use of these technologies is key in developing all skills but it has a special relevance in processing information, as it helps to achieve optimum performance based on the nature and way technological systems work. Digital competence means using ICTs as a tool in the use of process models – mathematical, physical, social, economic and artistic; properly processing and handling a wealth of complex information; solving real problems; taking decisions; working in collaborative environments and expanding communication environments to take part in formal and informal learning communities, and generating responsible and creative productions.

To sum up, processing information and digital competence imply the gradual development of working methods that help boys and girls become independent, effective, responsible, critical and thinking individuals when it comes to selecting, processing and using information and its sources in different supports and technologies. They also need to develop critical and thoughtful attitudes towards assessing the information available, comparing and contrasting it where necessary, and respecting socially accepted norms of behaviour governing its use.

**Learning styles:**

By learning style, we mean the set of habits, ways and styles each person has for acting and thinking in each situation. These are the characteristic ways by which an individual processes information and how they behave towards learning (Smith, 1988). When talking about learning, we must bear in mind that it depends on each person, and that it is possible to speak about a range of learning styles. It is also important to know that learning styles are not fixed, that they can change and we can strive to make them better and more effective. With the teacher's guidance, a student can learn to discover the traits of their own learning style and, at the same time, identify which traits they have to use in each learning situation to get the best results. So, if we know our students' learning styles and foster them, it will help us to guide the learning style of each one better. If we know how they learn, we can choose the most appropriate didactic strategies and teaching style. Thanks to neuroscience, we have made a lot of progress in understanding how we respond to external impulses and stimuli. It
tells us that we all have a dominant cerebral hemisphere and that each one has functions more closely associated with it. Katherine Benziger classifies the functions in the following way:

1. Left cortical: FACTS, analytical, mathematical, logical, technical, problem-solving.
2. Left limbic: FORM, sequential, controller, conservative, planner, organiser, administrative.
3. Right limbic: FEELING, interpersonal, emotional, musical, spiritual, talkative.
4. Right cortical: FUTURE, creative, imaginative, artistic, holistic, synthesizer, conceptualizer.

We all have a combination of the four styles, although one always dominates the others. NLP (Neuro-Linguistic Programming), which is the study of subjective human experience, how we organise what we perceive and how we revise and filter the outside world through our senses, tells us that people are visual, auditory and/or kinaesthetic. This might also help each person to learn better if we provide the stimuli most in line with their dominant style.

**Memorisation strategies:**

This is a set of cognitive operations and procedures which aim to improve memory function and the processes involved in the memorisation process.

**Internal:** these use the individual’s own skills to facilitate the memorisation process.

- Organisation strategies: the purpose of these is to turn the material a person wants to remember into a more meaningful structure for the person handling it (ordering concepts hierarchically and organising the material by categories, for example).
- Elaboration strategies: the purpose of these is to re-codify the information in more meaningful units, dealing with aspects of the meaning (includes mnemonic rules).
- Repetition strategies: these consist of a person reciting or repeating what he/she wants to remember in his/her head or out loud.
- Association strategies: these try to link or relate the information a person wants to remember with other information they already know, which helps the storing stage.
- Visualisation strategies: these consist of creating mental images, thus increasing the elaboration time and the distinctive nature of the memory.

**External:** these use external objects to aid the memorisation process. They help to store information, and may be reminding mechanisms that use the actual information (a diary note, alarm, etc.) or something that serves as a clue (putting your watch on the opposite wrist, for example).
Proposed teaching method:

In theory, any constructivist-based strategy where learning is focused on the students could suit an informational focus, but the best would be those that include the following characteristics:

- Start from a problem or objective that is realistic and tangible for the students.
- Set learning in relevant contexts.
- Activate previous knowledge as the basis for building new knowledge.
- Support the search and research.
- Can bring diverse areas or subjects together in a common objective.
- Require interaction as a way of building learning.
- Allow everything that has been learned in other situations to be applied.

So we should choose the didactic strategies we think are best-suited to teaching-learning processes where there is interaction with information:

1. Relevant contexts
2. Skill focus
3. Integrated, interdisciplinary focus
4. Different ways of working
5. Variety in the use of resources and interaction with information

The following strategies are very good for acquiring informational competence, in terms of processing information:

- Cooperative learning
- Work projects
- Problem-based learning (PBL)
- Treasure hunts or Web Quest
- Mental maps

Another possibility would be to introduce a didactic sequence based on study techniques for processing information, leading to the acquisition and integration of specific information. The steps involved could be the following:

Comprehensive reading:
This means finding the main ideas and key words. It is important to find the main ideas of a text because that enables us to remember the content and get an idea of what is most important.
“The New Literacy Set” Project  
2015-2017

How?
By underlining

How does that help?

1. It helps us to concentrate better.
2. It helps us to pick out the basic ideas.
3. It helps revision.

What kinds of underlining can we do?

Structural underlining: this consists of using notes in the margin to show the structure of the text, from which we can produce an OUTLINE.

Underlining key words: in this case words that evoke the written content are underlined and from these we can create a CONCEPTUAL MAP.

Linear underlining: this involves underlining the phrases or sentences that express the essential ideas of the text, from which we can produce a SUMMARY.

Enhanced underlining: this means using signs or words to insert our own opinion and is useful for a critical reading of a text.

Remembering information

Once we have done the comprehensive reading, the underlining and, therefore, the outline, the conceptual map, the summary, etc., we need to commit this information to memory. For that we could follow the following sequence:

- Divide the text up into small parts to be studied separately. That could be done by titles, paragraphs or questions.
- Repeated reciting. This consists of reading the first of the separate parts twice, silently or out loud, and trying to repeat the content without looking. We could also write what we know on a sheet of paper. Then we could check if we have said it correctly and, if so, move on to the next block.
- Review. We need to review what we have learned a few times the next day and the six days after that. That means seeing if we can repeat the content of the text without looking at it. If we have forgotten anything, we study it again as explained earlier.
- We could also invent some evaluation questions to see if we can answer them.

References for preparing a lesson:

- http://www.benziger.org/

http://tecnicasaprendizaje.blogspot.com.es/2013/10/el-tour-de-bases.html

https://sites.google.com/a/xtec.cat/cinfo-aula/model-2-fases/4-sequeenciacio#TOC-Capacitat-II.-Tractar-informaci-

http://lrrpublic.cli.det.nsw.edu.au/LrrSecure/Sites/LRRView/10457/10457_00.htm?Signature=%28a18b56ff-6418-44bd-b7e2-651fbe23f672%29


http://www.ascd.org/publications/books/107006/chapters/Memory,_Learning,_and_Test-Taking_Success.aspx

5.6. SUBTOPIC 6 – ANALYSING CHARTS AND GRAPHICS

Subtopic goals:

Show students the importance of the interpretation and construction of graphs and charts to understand given information on the media and facing critically the information society.

Expected outcomes:

At the end of the workshop students will be able to:

- define the usage and understand the use of the graphs and charts
- distinguish among different kinds of graphs and their uses
- analyse data using graphs
- identify the most appropriate graph or chart according to data to be presented
- design different kind of graphs: line graphs, bar graphs and circle graphs

Content:

What is the difference between a chart and a graph?

The difference between graphs and charts is mainly in the way the data is compiled and the way it is represented. Graphs are usually focused on raw data and showing the trends and changes in that data over time. Charts are best used when data can be categorized or averaged to create more simplistic and easily consumed figures.

Graphs are meant to be focused on the data in question and how it trends. Graphs have exact numerical figures shown on axes, usually organized on the left and bottom of the graph. Common graph types include dot-and-line and bar graphs. Graphs are most commonly used in analyses and situations that call for raw and exact data.

Charts are designed to show differences in things like surveys and figures in a more aesthetically pleasing way. Charts have numerical figures in line or popping out of the visual representations themselves. Pie charts are the most common type of chart. Charts are used primarily in presentations for businesses and debates.

Bar graphs

Are those employing rectangles (bars) that are placed in parallel. The height indicates the frequency of that data. Bar charts allow numerical information in a clear and orderly manner, to communicate it to others. With the information displayed on graphs you can quickly and visually interpret the information, facilitating further analysis.
A bar graph is useful for comparing facts. The bars provide a visual display for comparing quantities in different categories. Bar graphs help us to see relationships quickly. Another name for a bar graph is a bar chart. Each part of a bar graph has a purpose.

To construct a bar graph, you must draw a vertical and horizontal axes. In free space the bar is located. Numerical data are on the vertical axis (determining the height of the bars) and the categories in the horizontal axis.

**Line graphs**

It is a set of points connected by a line in a Cartesian system, showing a variable trends over a period of time. For this reason, a line graph is useful in displaying data or information that changes continuously over time. The points on a line graph are connected by a line. Another name for a line graph is a line chart.

**Circle graph/Pie chart**

It is a circle diagram that visually represents information into imaginary slices of cake. A circle graph, or a pie chart, is used to visualize information and data. A circle graph is usually used to easily show the results of an investigation in a proportional manner. The arcs of a circle graph are proportional to how many percent of population gave a certain answer.

Reading a pie chart is as easy as figuring out which slice of an actual pie is the biggest. Usually, you have several bits of data, and each is pictured on the pie chart as a pie slice. You will see that some data have larger slices than others. So you can easily decipher which data is more important to your audience than others.
OTHER TYPES OF VISUAL DATA REPRESENTATIONS:

<table>
<thead>
<tr>
<th>Illustration</th>
<th>Image</th>
<th>Purpose</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column graph</td>
<td><img src="image" alt="Column Graph" /></td>
<td>To reveal change in a subject at regular intervals of time</td>
<td>The number of registered voters in your city during the last five elections</td>
</tr>
<tr>
<td>Scatter diagram</td>
<td><img src="image" alt="Scatter Diagram" /></td>
<td>To graph pairs of numerical data to look for a relationship between them</td>
<td>The relation between temperature and number of sold airconditioners</td>
</tr>
<tr>
<td>Fishbone diagram</td>
<td><img src="image" alt="Fishbone Diagram" /></td>
<td>To identify possible causes for a problem</td>
<td>Trying to understand the source of periodic iron contamination during manufacture</td>
</tr>
<tr>
<td>Flowchart</td>
<td><img src="image" alt="Flowchart" /></td>
<td>To show the sequence of steps in a process or a procedure</td>
<td>The process of installing a computer application</td>
</tr>
<tr>
<td>Organizational chart</td>
<td><img src="image" alt="Organization Chart" /></td>
<td>To map the various divisions and levels of responsibility within an organization</td>
<td>The hierarchy of military officers</td>
</tr>
<tr>
<td>Diagram</td>
<td><img src="image" alt="Diagram" /></td>
<td>To identify the parts of a subject and their spatial relationship</td>
<td>The rooms of a building</td>
</tr>
<tr>
<td>Drawing</td>
<td><img src="image" alt="Drawing" /></td>
<td>To exhibit selected features of an object or process</td>
<td>The on/off button on a machine or the direction to turn lever</td>
</tr>
<tr>
<td>Photograph</td>
<td><img src="image" alt="Photograph" /></td>
<td>To show what a subject looks like in realistic detail</td>
<td>The scene of a crime</td>
</tr>
</tbody>
</table>
Proposed model of teaching:

- Show that there are different kinds of graphs (line, bar, frequency...)

- Each graph represents data in a particular way. Explain the different types of graphs and charts and how they are used.

- Divide the class into groups and make graphs with the information of students in the class.

- Interpret the information given through graphs, following a methodology:
  
  - Reading the title of the chart or table. We know what it is before we start to analyse it.
  - Read the data. There will be a literal reading of the graph or table.
  - Read among data. Interpretation and integration of data or graphics board.
  - Reading beyond the data. Can you make a prediction based on the data in the graph or table?

References for preparing a lesson:

- [http://www.mathgoodies.com](http://www.mathgoodies.com)
- [https://www.mathsisfun.com/data/pie-charts.html](https://www.mathsisfun.com/data/pie-charts.html)
5.7. SUBTOPIC 7 – ANALYSING AND CREATING MAPS

Subtopic goals:

Students will learn to:

- analyse the affinity between representation and reality
- understand how to read maps
- make different types of maps
- follow a route
- analyse the affinity between representation and artistic ability and creative, thanks to be aware of the symbolism implicit in all cases.

Expected outcomes:

Students should be able to:

- Distinguish the reality from its representation on a map.
- Understand the basic elements necessary to read a map.
- Understand the different types of maps: physical, political, economic, historical.
- Evaluate and measure the abstract space represented on a map.

Content:

1. Map versus reality
This section wants to raise the idea that maps are not real by definition. Most maps paint the world with the Pole North pointing up and Antarctica at the bottom. The reflection here is that there is not a right or wrong location, as the decision whether the North has to be painted on the top is arbitrary and responds to political and economical reasons.

Moreover old maps have gaps and mistakes but these was the data that Human kind had at that moment and so it was the most correct maps that Greeks could have. We all know that Galileo said that Earth was not flat until Medieval Ages. Still now some scientists claim that the planet is empty inside!

The example par excellence of how maps do not show reality are the projections. The most popular version is the Mercator projection, created by Flemish cartographer Gerardus Mercator in 1569. It's been widely used for centuries, including today in various forms by Google Maps and many other online services. This map preserves directional bearing, presenting rhumbs (imaginary lines that cut all meridians at the same angle) as straight lines, thus making it a useful tool for navigation.

Despite its benefits, the Mercator projection drastically distorts the size and shape of objects approaching the poles. This may be the reason people have no idea how big some places really are. For instance Russia is almost twice the size of the U.S.

In these two videos we will see how different Types of projection show the same reality in different ways:

https://www.youtube.com/watch?v=KUF_Ckv8HbE&feature=youtu.be
and why: https://www.youtube.com/watch?v=gsgYh7qrsys

Because the Earth is roughly spherical, every flat map distorts our planet one way or another. Through the website http://thetruesize.com/ the real size of the continents and countries can be checked.

It is also interesting to think about the diversity of representations and the criteria involved in the design of different maps mundi distortions: upside down or Europe centred. Do economical criteria effect these map designs? According to economical parameters the centre of the world would be now in Asia.

Besides an interesting reflection whether is it more real a map made of satellite photos or schemas.

Are imaginary maps more or less authentic than the maps that represent reality?

In all cases we should answer that all maps are not real. A photo is a representation of the reality as well and it could be also faked or unreal because things may have changed since it
was taken. Remember Pangea, when the continents were all assembled. And the Atlantis island? And Lemuria?

2. How to read a map

There are several types of maps and each show different information but most maps include a compass rose, which indicates which way is North, South, East and West. They also include a scale so distances can be estimated. The main item to understand a map, though, is the title or legend along with the key.

The maps may be incomprehensible objects without understanding these elements. We must therefore understand them before reading any map.

a. Elements of reference in the spatial location of objects:
   - Cardinal points: All maps always point to the North. However it is important to mention that the magnetic pole does not match the geographic pole. They are some Kilometres away one from the other:

![Magnetic North vs True North](https://www.youtube.com/watch?v=ieW7Hzrr8pw)

b. Axes geographic coordinates (latitude-longitude):

The grid system of latitude and longitude consists of a network of imaginary lines encircling the earth in two directions: north-south, and east-west.

The East-west lines of latitude run parallel to each other and are appropriately called **parallels of latitude**. The equator is a parallel of latitude.

North and South lines of longitude aren't parallel; instead they fan out from one pole and converge to the other. Lines of longitude are called **meridians of longitude**.

The location of any point on the earth's surface can be described using its latitude and longitude co-ordinates. In theory there are an infinite number of parallels and meridians. For
Convenience they are ordered into scales made up of degrees (°) and fractions of degrees.

b. Elements of reference and measurement of space:
   o Length measures: Kilometres or miles?

One of the most chaotic things reading maps is the units. Most of the world use the International System of Units: meters and Kilometres. But United Kingdom, the United States and other small countries with historical ties with UK or US use miles. The mile is an English unit of length of linear measure equal to 5,280 feet, or 1,760 yards.

   o Numerical and Graphical scales

Scale is the relationship that the depicted feature on map has to its actual size in the real world. Scale is the measurement of the amount of reduction a mapped feature has to its actual counterpart on the ground.
All maps will have an indicator of the scale of the map. A map that doesn’t conform to a specific scale will be indicated by the words “not to scale” (or NTS). The image below shows that the same scale can be shown as a numerical one: a) and b) or graphical: c)

a) (1 centimeter represents 250 meters)
b) 1: 25 000
c) 0 1000 2000 3000 4000 meters

C. Calculating distances:

When calculating long distances we should be aware that the Earth is spherical.
A Great Circle is the shortest distance between 2 points on the surface of a sphere. 

A Rhumb Line keeps a constant direction 
Meridians of longitude and parallels of latitude provide special cases of the rhumb line. On a North-South passage the rhumb line course coincides with a great circle, as it does on an East-West passage along the equator.

The video https://www.youtube.com/watch?v=NDlc9a4AjnE explains graphically the difference between the two distances.

d. Elements and icons for map placemarks

Maps have icons and marks to place items on them.

3. Types of maps

A political map does not show any topographic features. It instead focuses solely on the state and national boundaries of a place. They also include the locations of cities - both large and small, depending on the detail of the map.

- It is important to mention that even though there are a lot of political maps which can be found anywhere, some boundaries are claimed by both neighbouring countries: India and China, Egypt and North Sudan, Gaza and Israel... And depending on who has edited the map the borders will be different.

A physical map is one that shows the physical landscape features of a place. They generally show things like mountains, rivers and lakes and water is always shown with blue. Mountains and elevation changes are usually shown with different colours and shades to show relief. Normally on physical maps green shows lower elevations while browns show high elevations.

A topographic map is similar to a physical map in that it shows different physical landscape features. They are different however because they use contour lines instead of colours to show changes in the landscape. Contour lines on topographic maps are normally spaced at regular intervals to show elevation changes (e.g. each line
represents a 100 foot (30 m) elevation change) and when lines are close together the terrain is steep.

An economic or resource map shows the specific type of economic activity or natural resources present in an area through the use of different symbols or colours depending on what is being shown on the map.

A road map is one of the most widely used map types. These maps show major and minor highways and roads (depending on detail) as well as things like airports, city locations and points of interest like parks, campgrounds and monuments. Major highways on a road map are generally red and larger than other roads, while minor roads are a lighter colour and a narrower line.

The rest of the maps are thematic and its design will depend on the subject:
• Time zone
• Temperature
• Population density
• Mobile phone signal
• Landscape
• Tectonic plates
• Weather forecast
• 3D motion maps: https://www.youtube.com/watch?v=SHzRBMBVv-4
• 3D interactive maps: http://radio.garden/live/toulouse/radiopresence/
• DNA. An interesting video can be watched: https://www.youtube.com/watch?v=Fw7FhU-G1_Q
• Others that students can think of.

4. Routes

This video explains how researchers investigated the relationships between International Trade routes and endangered species.
In conclusion consumption in developed countries promotes deforestation and pollution to the so-called "hot spots" or biodiversity hotspots on the planet.

Related to routes, it is worthwhile mentioning that there is a mathematical theorem yet not solved. This problem is known as "The rectilinear crossing number of $K_n$," and it was proposed by a mathematician in 1973. There is no solution for 28 cities. It will be explained throughout a game:

**Activity:**

a) We start with a certain number of cities and a paper. The first task is to place the cities as dots on the paper.
b) The goal is to connect the cities with straight lines, like on a road map.
c) We will start with 2 cities. The drawing should be:

![Diagram of 2 cities](image1)

d) We add a third city and connect all of them so that all cities get connected to the others by road.

![Diagram of 3 cities](image2)

e) With 4 cities things get a bit more complicated. There could be more than one solution:

![Diagram of 4 cities with solutions](image3)

But we will choose the second solution as we will try to avoid crossings as in the left option.

f) For 5 cities we have 3 different solutions, all with crossings:
And we will choose the one with less crossings, the triangle with only one.

g) Now is your turn to find the best solution for 6 cities. *Hint: the best solution is with 3 crossings.*

Another historically notable problem in mathematics is the "Seven Bridges of Königsberg". Thanks to the attempt of mathematician Euler in 1736 graph theory and topology was born.

The city of Königsberg in Prussia (now Kaliningrad, Russia) was set on both sides of the Pregel River, and included two large islands which were connected to each other, or to the two mainland portions of the city, by seven bridges. The problem was to devise a walk through the city that would cross each of those bridges once and only once (Wikipedia).

On the other hand, checking on the Internet we will find plenty of websites and apps that help us to find our way through cities, countries or mountains.

- Google Earth: https://www.google.com/earth/
- Wikiloc (https://www.wikiloc.com/) where the user can upload and download thousands of trails for hiking, walking, running...
- Geocaching (https://www.geocaching.com/play) where users can also upload and download secret objects hidden for others to find.
- ViaMichelin and googleMaps to find your way via car, public transport or walking.
- GPS devices such as Tom-Tom or Garmin

And also several websites to create your own maps and routes:

- http://www.instamaps.cat/
- http://www.eduloc.net/
- https://storymap.knightlab.com/
- The very googleMaps allows to create your own map and route.
Proposed teaching method:

First, as an introductory activity, the Kahoot website could be used to check students' knowledge about maps and their awareness of spatial orientation. That can be followed by a short discussion on why some people do not have a good spatial awareness nor the ability to orientate themselves in a space and find their way through a specific environment.

Next, a presentation could follow showing world maps upside down and not European centred to make students reflect about the relativity of maps: do economical criteria effect these map designs?

Through the website http://thetruesize.com/ students can play with the real size of the continents and countries.

For the following section, how to read a map, it is recommended to give the students a real map and make them point the North, calculate distances with the scale, even with different units (km, miles...).

For the types of maps section different activities could be organised, such as searching on google maps where borders are not defined, think about a political map placed in a distant future, guess what some maps tell and use google trends to play with the maps of interests.

Last section of routes could be the funnier as a real treasure hunt could be run in the school or in the city. It is recommended to develop a well documented instructions with specific tasks (take photos, ask citizens about legends) and specific roles if the students work in groups. If there is time students could show to the rest of the class their researches and even there could be a winner.

Also some mathematical games could be explained, such as "The rectilinear crossing number of Kn" or the "Seven Bridges of Königsberg".

Making the students to work with digital tools such as https://storymap.knightlab.com/ and Google maps creating their own routes is also very interesting.

Last, as a final activity students could create their own map, whether real or imaginary.

These websites explain the recommended steps to follow to create a map:

- https://docs.qgis.org/2.8/en/docs/gentle_gis_introduction/map_production.html
- a real one: http://www.wikihow.com/Make-a-Map
- a virtual one on Google: http://www.wikihow.com/Make-a-Google-Map
- an imaginary one: http://www.wikihow.com/Draw-a-Map-of-an-Imaginary-Place
References for preparing a lesson:

- http://volaya.github.io/libro-sig/chapters/Mapas.html
- http://www.upside-down-maps.com/about.html
- http://thetruesize.com/
- http://www.craftionary.net/creative-diy-map-tutorials/

**Guidance on Knowledge Space:**
https://documat.unirioja.es/descarga/articulo/3629765.pdf

**Cartographic concepts:**
www.ign.es/ign/resources/.../conceptos_cartograficos_def.pdf

- Map distortions: https://www.youtube.com/watch?v=KUF_Ckv8HbE&feature=youtu.be
- Map distortions: https://www.youtube.com/watch?v=gsgYh7qrsy
- Map distortions: http://thetruesize.com/
- Magnetic versus geographical pole: https://www.youtube.com/watch?v=ieW7Hzrr8pw
- Rhumb line versus great circle: https://www.youtube.com/watch?v=NDlc9a4AjnE
- https://www.scribblemaps.com/tools/distance-calculator
- Level curves: https://www.youtube.com/watch?v=AsQoY48i6z0
- Understanding maps: http://geography.about.com/od/understandmaps/a/map-types.htm
5.8. SUBTOPIC 8 – EVALUATING INFORMATION

Subtopic goals:

At the end of the workshop the students will be able to evaluate information, according to the following indicators: credibility, main recipient, purpose, accuracy, updating. In this way they will develop a critical approach to information.

Expected outcomes:

At the end of the workshop, the students will:

- have tools to evaluate the quality of information and of its sources
- recognize that a piece of information can seem true and be not true (what seems true may be not so)
- know the complexity of reality and of its description
- know different language structures
- be able to build up clear and credible information
- have developed their personal critical thought

Content:

When you do a search, you are faced with a large amount of information from books, articles and websites in which to find what you need for your tasks and projects. How can you choose the best and most appropriate sources for your assignment?

What should you focus on?

a. Scope

- Does the source provide a general overview of the topic?
- Does the source focus on only one aspect of the topic?
- Does the source cover the right time period for the topic?

b. Audience

You need to know the purpose of the page (educational, commercial, entertainment, etc.) so you can properly evaluate its content.

It is also necessary to identify who the potential users of the information are: the general public; secondary education students, university students or students of other levels of education; teachers, scientists or researchers, etc.
Who is the source written for? University scholars, the general public, secondary school students?

Is the material too technical or too clinical for your purposes?

c. Currency

When was the source published?
If the source is a website, when was it last updated?
Do you need the most up-to-date information on your subject, or are older publications acceptable?

d. Authority

Who is the author?
What are his or her academic credentials?
What else has this author written?
Sometimes information about the author is listed somewhere in the article. If not, try searching the author's name in a general web search engine like Google.

e. Documentation

Does the source include a bibliography and/or footnotes?
Does the author pull from sources that represent multiple viewpoints?
If the source is a website, do the footnotes/references link out to supporting documents?

f. Objectivity

What point of view does the author represent?
Is the website sponsored by a company or organization that advocates a certain philosophy?
Is the article published in a magazine that has a particular editorial position?

g. Browsability

You need to evaluate the “effectiveness” of the way a web page works. It is very important that it has an orderly browsing system that enables information to be retrieved easily.

h. Relevance

The relevance of the information for your interest and convenience.
Critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analysing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.

It entails the examination of those structures or elements of thought implicit in all reasoning: purpose, problem, or question-at-issue; assumptions; concepts; empirical grounding; reasoning leading to conclusions; implications and consequences; objections from alternative viewpoints; and frame of reference. Critical thinking — in being responsive to variable subject matter, issues, and purposes — is incorporated in a family of interwoven modes of thinking, among them: scientific thinking, mathematical thinking, historical thinking, anthropological thinking, economic thinking, moral thinking, and philosophical thinking.

Critical thinking can be seen as having two components: 1) a set of information and beliefs generating and processing skills, and 2) the habit, based on intellectual commitment, of using those skills to guide behaviour.

**Characteristics of a ‘critical thinker’**

- Inquisitiveness about a wide range of issues;
- Desire to become and remain well-informed;
- Alertness to opportunities to use critical thinking;
- Trust in the processes of reasoned inquiry;
- Self-confidence in own abilities to reason;
- Open-mindedness towards divergent world views;
- Flexibility in considering alternatives and opinions;
- Understanding of the opinions of other people;
- Fair-mindedness in appraising reasoning;
- Honesty in facing own biases, prejudices, stereotypes, etc;
- Discretion in suspending, making or altering judgments; and
- Willingness to reconsider and revise views where necessary.

**Proposed teaching method:**

The best way of working on this topic would be to propose activities that involve reflection and critical thinking. The most suitable approach would be to use modelling: the teacher begins by demonstrating an example that involves analysing some information using questions shaped according to the parameters that need to be kept in mind. You could create a template with all the things to be analysed for each kind of information.
Some suggestions for giving students practice in evaluating ideas and written text are given below.

Why not:
Create some critical thinking writing activities that:
• give students raw data and ask them to write an argument or analysis based on the data;
• have students explore and write about unfamiliar points-of-view or ‘what if’ situations;
• think of a controversy in your field, and have the students write a dialogue between characters with different points-of-view. Select important articles in your field and ask the students to write summaries or abstracts of them. Alternately, you could ask students to write an abstract of your lecture; and
• develop a scenario that places students in realistic situations relevant to your discipline, where they must reach a decision to resolve a conflict.

Why not:
Explore what textual analysis involves. Ask your students to:
• Identify what is being said;
• Distinguish what is relevant from what is not;
• Find connections between different strands of thought;
• Recognise vagueness and ambiguity, then clarify the terms;
• Identify members of a class in terms of likenesses;
• Identify counterinstances as different in some respect; and
• Identify analogies.

“Evaluation involves:
• Giving reasons for beliefs and decisions and choosing how to act;
• Criticising ideas constructively; and
• Modifying ideas in response to criticism.”

Encourage students to ask the following questions each time they read printed or web-based source material for their assignments:

<table>
<thead>
<tr>
<th>Checklist to develop critical evaluation skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>How relevant is this text to my research needs?</td>
</tr>
<tr>
<td>What is the author’s stance in relation to the topic? Are they for it or against it, or neutral towards it? Is there evidence of the author’s personal, political or cultural bias in the text?</td>
</tr>
<tr>
<td>Do I accept or challenge their stance?</td>
</tr>
<tr>
<td>How do I know whether the author has academic credibility?</td>
</tr>
</tbody>
</table>
Where does the article/text ‘fit’ in the context of the broad issue? Is it dated or current? Does it present a new perspective or possible solutions?

What is the author really saying? Can I write it down in one thesis statement? Is it argued consistently throughout the article?

What are the main issues and sub-issues dealt with? Can I use a concept map to show how they all fit together?

Is this article/text convincing or persuasive?

What are its strengths and weaknesses?

What else will I need to know before I can make a judgement about this text?

The following is another model that could serve as an example for the table of items for evaluating the information:

<table>
<thead>
<tr>
<th>EVALUATION CRITERIA</th>
<th>QUESTIONS TO ASK</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO: author</td>
<td>Who created the web page? Who published the document? Is the name of the website’s author (person/institution) visible? Does the author provide their credentials (profession, years of experience, field of research, education, training, etc.)? Is he or she an authority/expert on the subject? Does the author have any qualifications? Has he or she published anything else? What kind of institution does the author belong to? Is it an educational, research or scientific institution, an accredited body in any field? Is there a link to the page of the institution the author belongs to? If the author is an institution, what kind is it? Is it possible to contact the website’s author (person/institution)? Can you send comments, complaints or suggestions? If there is nothing else, does the URL or domain name provide any information on the author or authors of the page?</td>
</tr>
<tr>
<td>WHAT: content</td>
<td>Is the information complete and precise? Is it consistent? Does it cover every aspect? Does it cover the subject in depth? Does it offer more than one perspective? Is there any evidence that the information/facts have been checked? Does it provide information of added value? Does the information consist of facts, opinions or advertising? Is the author’s point of view objective and impartial? Is the language used appropriate? Is the author a member of any institution or organisation? If so, does that affect the objectivity of the information published? Does the content of the page have the official backing of an institution, organisation or company?</td>
</tr>
<tr>
<td><strong>WHEN:</strong> updating information</td>
<td>Is it clear who is ultimately responsible for the rigour of the information included on the website? Has it been compiled, analysed and commented on by any independent person or institution? Does it show the sources of its information and data? Does it include references to justify/expand the information? Does it cite a bibliography on the subject? Is the information correctly cited? Are there any spelling, grammatical or typographical errors?</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>WHERE:</strong> publication</td>
<td>When was it created? How often is it updated? Are the links to other pages and resources updated? Are there any links that don’t work? Does the page show when it was last updated? What kind of publication is it? Is the site in a personal, institutional or commercial server? Is it a free site or does it require some sort of subscription or payment? Why can you trust the information included on the site? Does it appear to be valid and the product of appropriate research? Can you identify the sources used? Which body or institution is behind the information provided (university, research centre, government, private company, etc.)? Is the institution well known? Can you find out more about it (via links such as “About”, etc.)? Does the page contain advertising? Could this take anything away from the result of a search, depending on the commercial interest?</td>
</tr>
<tr>
<td><strong>WHAT FOR:</strong> who does it target</td>
<td>What is the goal, the purpose of the page? To inform, teach, explain, illustrate, persuade, sell, do business, promote, project, entertain or something else? What is it trying to achieve? Foster communication between the users/readers? Does the author express an opinion? Is the information partial? Objectivity/subjectivity, etc. Does it recommend or sell a product? Who is it targeting? The general public, students, experts on the subject?</td>
</tr>
<tr>
<td><strong>HOW:</strong> browsability</td>
<td>Is it easy to locate the information and move around the site? Is there structural browsing? Is there a site map? Does it let you display the contents in an organised, hierarchical way? Does it include the option of an information search system? Does it include subject indexes of the contents? Is there a Help section for users? Does it have a list of FAQs? How is the information organised? What is highlighted? Is there any advertising? Is the title of the site included in the browser address bar? Is the content of the website explained in the first few paragraphs? Are meta tags included? Are the links offered related to the subject it deals with? Are they useful for the purpose of the website? Do the links work? Are any of them broken? What kind of resource do they take you to? Are the links evaluated or commented on in any way? Do the images supplement the information provided or slow it down?</td>
</tr>
<tr>
<td>Does the site have a uniform design, format, colours, etc? Can you print from it? Does it require other, specific software to read, listen to or print the information? Is special software needed to display the information? Is it available free on the Internet? Does it suggest a browser to display the content better? Is there an html option?</td>
<td></td>
</tr>
</tbody>
</table>

### References for preparing a lesson:

- [http://library.ucmerced.edu/research/students/improve/critical-evaluation-resources](http://library.ucmerced.edu/research/students/improve/critical-evaluation-resources)
- [https://www.griffith.edu.au/__data/assets/pdf_file/0004/290659/Critical-evaluation-skills.pdf](https://www.griffith.edu.au/__data/assets/pdf_file/0004/290659/Critical-evaluation-skills.pdf)
5.9. SUBTOPIC 9 – CREATING STRUCTURED INFORMATION

Subtopic goals:

To learn how to evaluate and organise information, to learn to understand and to explain reality and to be able to reconstruct and model the information.

Expected outcomes:

At the end of the workshop, the students will:

- Learn about the different types of written texts (article, essay, report, ..) and the writing methods of each;
- Be able to choose a topic and draw up a list of ideas which deal with that topic;
- Know how to ask the key questions on the subject to be treated;
- Know how to write a text in a logical, linear, and attractive format;
- Be able to identify the type of text to be written based on the request.

Content:

The term “communication” is derived from the Latin word communis, meaning common. In general, communication refers to the reciprocal exchange of information, ideas, facts, opinions, beliefs, feelings and attitudes through verbal or non-verbal means between two people or within a group of people. Communication is a process by which information is exchanged between individuals through a common system of symbol and signs of behaviour. Robert Andersian said that communication is interchange of thoughts, opinions or information by speech, writing or signs.

The communication process is simple and is divided into three basic components: a sender, a channel, and a receiver. The sender will initiate the communication process by developing an idea into a message. This is also known as encoding. The sender will transmit the message through a channel, or a method of delivery; think of things like e-mail, phone conversations, instant messages, face-to-face discussion, or even a text message. The message then moves through the channel to the receiver, who completes the communication process by interpreting and assigning meaning to the message, which is also known as decoding.

Now, since most communication exchanges involve a continued dialogue between senders and receivers, a feedback loop was added to the communication process. The feedback loop is a critical component in the communication process because it ensures a message was properly received and interpreted by the other party. In the workplace, feedback is especially significant so that a manager can be certain the messages that he or she sends are, in fact, received and interpreted correctly, eliciting the appropriate action from subordinates.
FICTION
Everything we read is either fiction or non-fiction. Fiction comes from the imagination. Non-fiction is based on fact.

Fiction does the following:
- It aims to **entertain** the reader.
- It often tells a **story**, even if it is a partially true one like a historical novel.
- It uses **descriptive words**, including adverbs and adjectives.
- It uses **images** or 'word pictures' that help us to imagine what is being described.

Fiction texts can be divided into three main types:
- prose
- poetry
- drama

Fiction texts are written mainly to entertain the reader - they usually tell a story, but they can often be thought-provoking. Some may help you to make sense of, or understand, life better; some are a way for the writer to give their views and opinions of the world.

PROSE
“It seemed like just another cold, wet, winter night in downtown Pelleville. He hiked up his collar, stepped nearer the kerb and hailed a cab. "Where to, mister?" asked the driver. "The Vegas", was all he replied before the cab sped away. In the dry warmth, Spickler slipped his hand inside his coat and felt for the pistol. He knew it was there. He knew he’d be okay.”

You can probably tell that this extract is from a story. Here are the clues to look for:
- There is a **character**.
- The story is usually told in the **first** or **third person**.
- **Descriptive** and **figurative** language is used.
- **Sentences are varied** to keep it interesting.
POETRY
“If I could have just one more chance
For us to sing, for us to dance.
I’d like to make you feel the same
Instead of thinking it’s a game.”

Here are some clues, which will help you recognise poetry:

- It can be about characters, places, events, emotions, or beliefs.
- Descriptive and figurative language is often used.
- Many layers of meaning can be packed into just a few words.
- Rhyme and rhythm can be used.

PLAY
Detective Johnson: And you’re telling us that nobody can vouch for you being at home on that evening...
Wilkins: I told you, I wasn’t feeling too clever and I just wanted to get some kip. Do you let people know when you’re getting some kip, hey? Be serious...
Constable Talbot enters.
Const. Talbot: Sorry, sir. There’s something you should know... outside.
Det. Johnson: (standing) Interview paused at 8.17pm. Right, let’s get this sorted.

Here’s how to recognise that you are reading a play:

- It will be written as a script to be performed by actors.
- Characters’ names are listed next to the lines they should speak.
- It will include stage directions to tell the actors what to do and how to speak.
- The language can be natural and realistic and sometimes poetic.
- Sections are usually divided into acts, which may be divided into scenes.

NON-FICTION
Non-fiction texts can be divided into six main types:

1. information texts
2. recount texts
3. instruction texts
4. explanation texts
5. persuasion texts
6. argument texts
1. INFORMATION TEXTS
Information texts do just what their name suggests - they inform you. Here's an extract from an information text:

The best of both worlds
The Bellaritz Hotel is situated on a beautiful, peaceful country estate, just ten minutes drive from the busy social and shopping opportunities of Belltown.

This is how to recognise an information text:
- It provides clear information about a subject.
- It is usually written in the present tense.
- It is normally written in the third person.
- It organises and links information clearly, often using subheadings, short paragraphs, diagrams, photographs, maps, etc.

2. RECOUNT TEXTS
Recount texts are about things that have happened. To recount something means to tell the story of it. So, a biography is a recount text because it tells the story of someone's life. Here's an extract from a recount text:

My favourite shop was Mrs Deakin's, the newsagent and sweet shop. I'd skip there every Saturday morning with the threepenny bit that dad gave me.

Here are some ways to recognise a recount text:
- It is written about something that happened.
- It may use a descriptive, story-like style although it is factual.
- It is written in the past tense.

3. INSTRUCTION TEXTS
Instruction texts are all around us and are extremely useful. They include recipes, directions, manuals and plans. This is an extract from an instruction text:

Sponge cake
Ingredients
- 100g/4oz butter
- 100g/4oz sugar
- 100g/4oz self-raising flour
- 2 eggs
- a little water

First, place the sugar and butter in a mixing bowl. Use a wooden spoon or electric mixer to beat them together until the mixture is smooth and light. Add the eggs and carefully beat them into the sugar and butter mixture...

Here are some clues to help you recognise an instruction text:
- It instructs the reader, giving clear guidance about how to do something.
It will be ordered.
It can use bullet points, pictures and diagrams, to make the information clear.
It will use imperative verbs (bossy verbs), which tell you what to do - for example "make" "add" and "stick!".

4. EXPLANATION TEXTS
Explanation texts have a lot in common with information texts. They explain things in more detail. Many textbooks and reference books are explanation texts. Here is an example of explanation text:

Choose which option you want and press the corresponding button. You will then be presented with a further list of options. These will enable you to configure your computer's memory in the most efficient way.

You can usually recognise an explanation text because:
- It explains a subject and helps you to understand it more.
- It uses the present tense.
- It's impersonal.
- It may use diagrams, pictures, maps and photographs.

5. PERSUASION TEXTS
Persuasive texts try to persuade you to do something - like buy something or give money to charity. Magazine articles and newspaper reports may try to persuade you to agree with them.
Here's an example of persuasive text:

Dear friend,
Are you tired of the daily grind? Sick of working all hours of the day for little reward? Tired of never having enough money to really enjoy yourself?
Well, now there's a way out...

Here's how to spot this type of text:
- It tries to convince you to do or agree with something.
- It contains a mix of fact and opinion.
- It may use repetition, "soundbites" and persuasive or emotive language.
- It often seems to speak directly to the reader.
ARGUMENT TEXTS

Argument texts should be balanced and fair, and give all sides of an argument before coming to a conclusion. Here's an extract from an argument text:

Foxhunting is a subject that provokes very strong feelings. Many people believe that it is cruel to hunt a fox with dogs, and totally agree with its ban. Many farmers, and even conservationists, however, have always argued that the fox is a pest, which attacks livestock and must be controlled.

Here are some clues to help you identify an argument text:

- It discusses an issue, considering all points of view.
- It often uses a formal and impersonal style to seem balanced.
- It uses connectives to connect points, for example "however", "but", "similarly"

Proposed teaching method:

Teachers will need printed copies of the kinds of documents they are going to work on and there should be computers available for the various groups of students to write the required documents.

The unit has an important theoretical part, so teachers must use practical and collaborative resources as far as possible, with a good number of examples, allowing students to spend time on creating and handling files, so they really grasp the ideas. The speed of the learning process therefore depends on the teacher’s ability to explain, their skill in introducing examples and the extent to which the students are engaged in the activity.

The teacher could start with a short brainstorming session of the previous topics (deciding on and creating information). Teacher could also use a Kahoot tool to check how much the group knows about text types, their use, contents and target readers.

In short, the workshop involves a theoretical part, which should be brief (15’), to explain the text types. The rest should be eminently practical, hands-on and creative. Students must be capable of differentiating between different types of text and writing or designing an example of each one.

References for preparing a lesson:

- Dintel,Felipe; Cómo escribir textos técnicos o profesionales [How to Write Technical and Professional Texts]; Ed. Alba; Barcelona, 2005
5.10. SUBTOPIC 10 – CREATING ONLINE INFORMATION (WEB 2.0 AND 3.0)

Subtopic goals:

To encourage students to learn how to organise information, so they can communicate and collaborate with each other by creating Web 2.0 and 3.0 applications.

Expected outcomes.

Students should be able to:
- Record the information on the website.
- Report the right information on the website.
- Use different extensions in the website.
- Contrast and categorise the information before publishing it on the website.
- Check the information before publishing it on the website.

Content:

First of all, it’s important to conceptualize the evolution of web technologies from a user perspective:

- **In Web 1.0,** the main feature is the reception of information (you could only read information, not interact with it).
- **In Web 2.0,** users of Internet became producers of content, as social networks and blogs, among other tech tools overruled the web.
  - In all cases one-way communication always lacks efficiency. Due to many disadvantages of web 1.0, web 2.0 came into existence.
  - The term web 2.0 is usually associated with web applications that help in two-way communication (widgets, interactive, collaborative, information/knowledge sharing, etc.)
- **In Web 3.0,** with so many information to manage, what really matter is to use tools to filter information which is valuable to someone.
- **Web 4.0** main features are the intelligent Web, in which people and devices will communicate in real time (Mobile web)
Web 5.0 will be the next web and it will be about open, linked and intelligent web, that’s is emotional web.

Typical examples of Web 1.0 were simple homepages or directory services, such as Altavista, Yahoo, or Netscape, as well as basic supportive tools such as Web development tools (e.g., HTML editors) and basic search engines, such as AliWeb.

Today, it is more than just sharing knowledge and information. Web 2.0 gives the freedom to each and every individual to post their thoughts, views, philosophies, likes and dislikes. It is about interaction, sharing and networking.

The applications 2.0 can be divided into two basic types as follows:
- Those where participants can share information (i.e. Blogs)
- Those where participants go to search information (i.e. Wikis)

Now let’s discuss few of the pros and cons of web 2.0:

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>News media Marketing and Search Engine Optimization</td>
<td>Information overload. Too much information is daily posted by many people with different thought. This creates confusion for the readers and the quality of the content is not reliable.</td>
</tr>
<tr>
<td>Equal change to all to post their views and comments</td>
<td>Freedom to post views and comments provides good opportunities for competitors and rivals to post negative comments and rivals to post negative comments about other companies.</td>
</tr>
<tr>
<td>Increase the circle of friends and contacts through social networking</td>
<td>Too many fake ID’s and spammers</td>
</tr>
<tr>
<td>Latest update and content can be received if you are a RSS reader</td>
<td>Forgeries and hackers commit crimes</td>
</tr>
<tr>
<td>Online promotion of businesses, products and services</td>
<td>People are highly dependent of Internet to network</td>
</tr>
<tr>
<td>Engaging the customers. Customers can write their views about the products and services.</td>
<td>Wastage of time (People do not realize the amount of time they are spending in FB, LinkedIn, etc)</td>
</tr>
</tbody>
</table>

The concept of web 3.0 it’s not easy to understand, so it is important that participants understand the previous concept of web 2.0. Most experts call it “semantic web” (introduced by Tim Berners-Lee in 2001) and other call it “the Internet of things”.

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By extending Tim Berners-Lee’s explanations\(^2\), the Web 3.0 would be a “read-write-execute” web:

- **Semantic mark-up** refers to the communications gap between human web users and computerized applications.
- A **web service** is a software system designed to support computer-to-computer interaction over the Internet.

The potential benefits and drawbacks of Web 3.0 can be illustrated by showing the advantages and disadvantages in the following:

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information categorized and presented in a visually improved manner that enhances interaction, analysis intuition and search functions.</td>
<td>Search engine optimization practices may undergo wholesale adjustments as the different information and architectural standards of Web 3.0 fight for supremacy.</td>
</tr>
<tr>
<td>Taxonomies – standardized and self-describing classifications</td>
<td>As with any new technology or Internet-related development, personal privacy issues will be at the forefront of consumers’ consciousness.</td>
</tr>
<tr>
<td>No software programs to install</td>
<td>Still a long way from reality because of the number of technologies that is involved</td>
</tr>
<tr>
<td>Web 3.0 browsers learn (artificial intelligence) likes and dislikes and would function as trusted advisor, mentor and personal assistant and less like a search engine</td>
<td>New technologies that not all companies are embracing yet</td>
</tr>
<tr>
<td>Browsers will position themselves as true lifestyle canvases, taking into account cutting-edge concepts like social bookmarking and in-group searching to produce a much more customized and targeted Web surfing experience.</td>
<td></td>
</tr>
</tbody>
</table>

---

\(^2\) Sir Timothy John Berners-Lee is an English computer scientist, best known as the inventor of the World Wide Web (WWW)
Suggested teaching method:

This technological change produces a change of attitude among students because they have to create new content with new tools, interact with each other and learn together. They therefore develop new skills and competences.

Create 2.0 web applications:
- Search glossary for Web 2.0.
- Sign up in Blogger in order to write an article about the glossary created.
- After that create a link to RSS, Twitter.
- Sign up in Twitter to share this information with the rest of the class.

Students have to find three Web 3.0 search engines in order to create a Web 3.0 glossary
- Then put this glossary in Blogger and share it via Twitter.

It would be useful for the students if the teacher introduced a supplementary activity: creating their own social network with WordPress on the Windows 10 operating system (WordPress could be replaced by Joomla because these two CMS applications are the best currently available, but the latter is more difficult to implement).

References for preparing a lesson:
- O’Reilly, T. (2005.): What is Web 2.0
- Web 3.0 on Vimeo by Kate Ray (May 2010)
- Internet source: http://www.slideshare.net/valerie_sinti/web-20-and-web-30
- Internet source: https://flatworldbusiness.wordpress.com/flat-education/previously/web-1-0-vs-web-2-0-vs-web-3-0-a-bird-eye-on-the-definition/
- How to install WordPress and Xampp on a PC (on the Windows operating system): https://premium.wpmudev.org/blog/setting-up-xampp/
- How to install Joomla and Xampp on a PC (on the Windows operating system): https://www.youtube.com/watch?v=XNHf7vrJBRE
5.11. SUBTOPIC 11 – USABILITY

Subtopic goals:

To understand and evaluate how tools, objects and websites hold more information than we think.

Expected outcomes:

The students should be able to:

- Understand how information can also be found in icons, tools and websites.
- Define usability, learnability, clarity, efficiency and safety.
- Evaluate websites and objects according to their usability.
- Understand how information is digitally interconnected.

Content:

List of topics:

- Defining usability
- Evaluating usability
- Internet of things

1. Defining usability

All of us understand most of the icons that can be found. This is general knowledge. However, this knowledge depends on our culture and background. So students will learn that there is much more hidden information around than we think. A simple object such as a door handle gives us information about whether the door will open to the right or to the left and by pulling or pushing it. The better designed an object is, the more information it holds about itself, the less additional information users need. So, a label saying “Push” means that a door is not perfectly designed. The world is full of good and bad designs for tools, icons and websites. This is the idea behind usability, which is linked to learnability, clarity, efficiency and safety.

According to Wikipedia:

“Usability is the ease of use and learnability of a human-made object. The object of use can be a software application, website, book, tool, machine, process, or anything a human interacts with (...)”

“In human-computer interaction and computer science, usability studies the elegance and clarity with which the interaction with a computer program or a web site (web
usability) is designed. Usability differs from user satisfaction and user experience because usability also considers usefulness. (...)”.

As regards learnability, some authors might define it as “easy first-time use” while others might say that:

(...) “learnability is usability over time. Basically, task performance improves after repeated ‘trials’. More practice results in less time needed to complete tasks.”

But all experts consider it as an aspect of usability. Think of a TV remote control: generally a manual is not necessary as even young children learn how to use it on their own.

• **Clarity** is related to the amount and consistency of the information that an object has. How clear, for instance, is the control panel of a washing-machine? Are the important elements highlighted? Is there a help menu on a web form? Can you track the information throughout the process of buying an airline ticket?

• **Efficiency** is achieved when the tool offers short-cuts or set values by default (in a microwave for instance). It can also be helpful if the designer has used elements which are easy to learn and kept in the user’s short-term memory (green for okay, red for cancel).

• **Safety** is related to the concept of error prevention and, specifically on websites and electronic gadgets, it is also about the ability to recover from an error or undo an action. For this, **feedback** is important in order to avoid the feeling of **helplessness**: when the user feels that he/she does not have control.

• **Satisfaction** is the overall user experience. Although this is subjective, it can also be measured with questionnaires.

2. Evaluating usability

Answering the questions who, what, when, how and why is a good way to talk about usability evaluation:

Who?

The user determines whether an object is usable or not. However, there are experts who can evaluate its usability according to certain metrics.

What?

These metrics depend on prior concepts that need to be defined:

• Number of users who complete the task.
• Time used by users to complete the tasks.
• How many times users asked for help.
• How long users hesitate and stay looking at the interface, trying to understand it.
Subjective satisfaction of the whole experience.

The number and profile of users also needs to be determined: age, sex, expertise, etc.

Other measurable items for websites include:

Design:

- Consistency: colours, font (size, style), mixing languages
- Brightness
- Image resolution
- Resizing form
- Shortcuts such as pause, exit.
- Music: stop button
- Back button

Feedback:

- Confirmation of exit
- Successful messages
- Error messages
- Loading symbol of loading while the system is loading data

Clarity:

- Help menu: goal of the game, game keys and credits
- Amount of information
- Hierarchy of the information in the menus
- Distribution of the information in the forms
- Important elements highlighted
- Highlighting the option where the user is.
- Title forms?
- The user knows the score, level, life, energy, etc.

Efficiency:

- Time rendering images
- Time loading the game
- Time accessing database

Safety:

- Error prevention
- Recovery
- Rollback
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When?

The later we become aware of a design error, the more expensive it is to correct. So usability is a cross-cutting concept that needs to feature in every stage of product design. Moreover, all members of the team need to bear this idea in mind.

- Before designing the new product, the old one and the competitors’ are tested.
- Before producing the product, a prototype is evaluated.
- After producing the product, there is a trial stage.

How?

- Eye-tracking analysis.
- Navigation stress test.
- Alfa and Beta tests.

Why?

- To reduce the time, it takes users to understand, learn and ask for help.
- To increase the conversion rate (sales).
- To increase customer loyalty.
- To improve brand image and prestige.
- To improve user experience.

3. Internet of things

There is no need to imagine the future to talk about the Internet of things (IoT) as it is already far bigger than anyone realises. Objects such as mobile devices, smart watches, Google glasses, smart clothes and self-driving cars can all keep and retrieve data, as well as analyse and exchange it. Thanks to the Internet our physical world is integrated into computer-based systems, resulting in a more efficient, accurate world and more economic benefits.

With all this data, machines can take decisions as they become independent of human minds. This idea is called Artificial Intelligence which has changed and will change our world dramatically: machines perceive, know, learn, reason, plan, decide and act. This raises ethical and philosophical issues, because machines and technology can help humankind in many fields (blindness, deafness, industry, game systems, etc.) but they also pose dangers: what motivates smart cities, big data, big brother Google, the Artificial Intelligence Association and so on?

Proposed teaching method:

The computer room is recommended for the activities related to this topic, as it is mostly practical, involving the use of some web tools and visiting some websites.
The teacher switches between explaining the content and giving examples and allowing the students to interact. Ideally, it would be better to start with the students explaining their own ideas about the content. You could begin by showing a fun video of kids reacting to an old computer: https://www.youtube.com/watch?v=PF7EpEqlgk. That could be followed by a short discussion on why old computers are not understood today. The students can think of more examples.

A contest or a team quiz (kahoot.it, for instance), guessing the meaning of some icons to make it more fun, could follow. Some icons may be “universal” such as “i” for tourist information, but others may not be so well-known.

Showing some badly designed objects found on http://www.baddesigns.com could be useful next. There is also the well-known http://www.lingscars.com website. Students could be challenged to guess the purpose of this site, which is renting cars, and then try to hire one. On a shared wall (padlet.com) students could be invited to explain why they think lingscars.com is a badly designed website. That way they can come to a definition of usability themselves which they explain later, together with the concepts of learnability, clarity, efficiency, safety. Then, they could use another Padlet (padlet.com) to upload examples of badly designed objects or websites, allowing them to internalise what usability is.

They could also search for good examples, for example, https://www.nasa.gov/, and try to remember or think of easily usable websites or objects.

Finally, in groups of three, they could create a mind map (https://bubbl.us/) of everything they have learned so far and then share it with the class.

They can be given a template to evaluate tools and websites or, if there is more time, it would be a good idea to get them to design one. However, this activity requires higher cognitive skills and students of a certain age would be unable to do it without specific guidance from the teacher. There could also be a discussion for students to reach an agreement on the template.

In the case of students with an IT profile, a group could evaluate a website project designed by another group, while trying to keep their evaluation neutral. A good alternative would be to get them to evaluate a game (on a mobile device or a website). The http://www.meristation.com/analisis/448267 website might be useful for this.

The last subtopic of the Internet of things can be done as a flipped classroom, with students preparing a small presentation on it and then discussing the new knowledge they have acquired, e.g. debating the dangers of allowing our data to be on the Internet and governments having free to access it. Another good idea would be to get them to brainstorm useful tools for the future, e.g. tweets to switch on the heater, smart clothes, the Google self-driving car project and other ideas the students might come up with. To round it off, a video imitating the “Kids reaction to...” series could be recorded as if our great-great-grandchildren were using an old object from our century.
References to prepare a lesson:

- Krug, Steve; *Don't make me thing, Revisited*; Ed. New Riders, 2000.
- Kids reaction to an old computer: https://www.youtube.com/watch?v=PF7EpEnglg
- Definition of usability: https://en.wikipedia.org/wiki/Usability
- Usability theory: http://w144.bcn.cat/cibernarium/cat/centre-de-recursos/pdf/P/pagina32975/principis-d-usabilitat-i-experiencia-d-usuari-en-entorns-mobils.do
- Bad usability example: http://www.lingscars.com/
- Bad designs: http://www.baddesigns.com/
- Usability test: http://www.nosolousabilidad.com/articulos/heuristica.htm
- Videogame analysis: http://www.meristation.com/analisis/448267
- Internet of things: https://en.wikipedia.org/wiki/Internet_of_things
- Artificial intelligence: https://en.wikipedia.org/wiki/Artificial_intelligence
- Article about AI: http://centrodeperiodicos.blogspot.com.es/2016/10/peligro-los-cinco-gigantes-tecnologicos.html?m=1
5.12. SUBTOPIC 12 – INTELLECTUAL PROPERTY RIGHTS

Subtopic goals:

To help students understand different types of intellectual property and software licensing by making students aware of their importance and how they work to foster an environment in which creativity and innovation can flourish.

Expected outcomes:

Students will be able to:

- define intellectual property
- list, distinguish and define types of intellectual properties
- judge basic features of each intellectual property and point out differences
- define software in the frame of intellectual property
- identify and analyse types of software licencing and open source software licenses

Content:

Intellectual property (IP) refers to creations of the mind, such as

- inventions;
- literary and artistic works;
- designs; and
- symbols, names and images used in commerce.

IP is protected in law by, for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit from what they invent or create. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and innovation can flourish.

Types of intellectual property

1. Copyright

Copyright is a legal term used to describe the rights that creators have over their literary and artistic works. Works covered by copyright range from books, music, paintings, sculpture and films, to computer programs, databases, advertisements, maps and technical drawings.

2. Patents

A patent is an exclusive right granted for an invention. Generally speaking, a patent provides the patent owner with the right to decide how - or whether - the invention can be used by others. In exchange for this right, the patent owner makes technical information about the invention publicly available in the published patent document.
3. Trademarks

A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. Trademarks date back to ancient times when craftsmen used to put their signature or "mark" on their products.

4. Industrial designs

An industrial design constitutes the ornamental or aesthetic aspect of an article. A design may consist of three-dimensional features, such as the shape or surface of an article, or of two-dimensional features, such as patterns, lines or color.

5. Geographical indications

Geographical indications and appellations of origin are signs used on goods that have a specific geographical origin and possess qualities, a reputation or characteristics that are essentially attributable to that place of origin. Most commonly, a geographical indication includes the name of the place of origin of the goods.

Copyright law has existed for centuries, and as such, it wasn’t designed with software in mind. Nonetheless, copyright law does apply to software, and licenses that software authors apply to their software interact with copyright law to create the specific rights that you have—and don’t have—to use, modify, and redistribute software. Teachers should therefore describe these basic principles, as well as the differences between proprietary and open source license terms.

There are some general concepts that must be introduced to understand all the content:

- **Copyright**: A copyright is, as the name implies, a legally recognized right to create a copy of something.
- **License**: Although software is subject to copyright law, most software is released with a license, which is a document written in legalese that claims to modify the rights granted by copyright law.
- **Fair use**: Because most copyright laws were written long before computers came into being, they frequently don’t mesh well with the needs of computers. Fair use is an exception to the otherwise exclusive right to copy a work given to copyright holders.
- **Intellectual property (IP)**: IP rights refers to a range of intangible rights of ownership in an asset such as a software program.

**Property software licenses:**

*Software* is a type of intellectual property (IP), which is governed by copyright laws and, in some countries, patent laws. As a general rule, this makes it illegal to copy software unless you’re the software’s author.

Proprietary software is another name for non-free software (Its use, redistribution or modification is prohibited, or requires you to ask for permission, or is restricted so much that
you effectively can't do it freely). In the past we subdivided non-free software into “semi-free software”, which could be modified and redistributed non-commercially, and “proprietary software”, which could not. But nowadays that distinction has disappeared and “proprietary software” is used as a synonym for non-free software.

**Open source software licenses:**

Before introducing the content about open source software, the teacher should introduce the following concepts:

- **Freeware:** Freeware is software that is available for use at no monetary cost. In other words, while freeware may be used without payment it is most often proprietary software, as usually modification, re-distribution or reverse-engineering without the author’s permission is prohibited.

- **Shareware:** Shareware is a type of proprietary software which is initially provided free of charge to users, who are allowed and encouraged to make and share copies of the program, but no source code is made available.

- **GNU:** The GNU Project is a free-software, mass-collaboration project, first announced on September 27, 1983 by Richard Stallman at MIT. Its aim is to give computer users freedom and control in their use of their computers and computing devices, by collaboratively developing and providing software that is based on the following freedom rights: users are free to run the software, share it (copy, distribute), study it and modify it.

Open source software relies on licenses, which are documents that alter the terms under which the software is released. Open source licenses grant additional rights to software users. Open source software in general owes a great deal to three organizations:

- **Free Software Foundation (FSF)**
  - The Free Software Foundation (FSF) is a critical force in the open source world. Founded in 1985 by Richard Stallman, the FSF is the driving force behind the GNU’s Not Unix (GNU). The FSF has a certain philosophy that manifests itself in the GPL, which is the FSF’s favoured software license.
  - FSF Philosophy
    - Freedom to use the software for any purpose
    - Freedom to examine the source code and modify it as you see fit
    - Freedom to redistribute the software
    - Freedom to redistribute your modified software

- **Open Source Initiative (OSI)**
  - The OSI was founded in 1998 by Bruce Perens and Eric S. Raymond as an umbrella organization for open source software generally. Its philosophy is similar to previous FSF but differs in some important details. As a general rule, more software qualifies as open source than qualifies as free (in the way the FSF means), but precisely what qualifies depends on the open source definition and, in a strict sense, on what the OSI has approved in terms of its licenses.
Copyleft

- The Copyleft license is very similar to the Creative Commons license. This is because the Copyleft license is the “mother” of Creative Commons. It is represented by an inverted C inside a circle and could be considered the opposite of copyright. The works, initially, have no limit. Therefore, they can be modified to an improved version, they can be shared with other users and you can copy the content.

Creative Commons.

- This license is the “daughter” of Copyleft and it was founded by Lawrence Lessig. Its goal is to combat what its creators and supporters view as a creative culture that is increasingly tied to permissions granted (or not granted) by those who hold copyrights on earlier works. It is represented by two c-s within a circle.

Each organization has a distinct philosophy and role to play in the open source world. There are also numerous specific open source licenses, along with ways that businesses can use them.

The FSF and the OSI are dedicated to promoting software freedoms. The Creative Commons’ goals are broader, though; their licenses are aimed at audio recording, video recordings, textual works, and so on, not just computer programs. Nonetheless, the Creative Commons as an organization helps promote the types of freedoms that also concern the FSF and the OSI.

Plagiarism:

Plagiarism involves the use of another person’s work without full and clear referencing and acknowledgement. In open-source software there is plagiarism when someone deletes the author of something.

Suggested teaching methods:

It’s important not to ask participants to learn all this content through lectures. Instead, the teacher could motivate them to learn through investigation and information-gathering exercises. So, the best way to introduce good and bad practices in the use of copyright and licenses is to ask participants to:

- Work in groups of three
- Each group look for examples of good and bad practices
- The result of each investigation is shown to the rest of the group

In this kind of work, it’s interesting that teacher begins a discussion with the rest of participants about the examples exposed.

References to prepare a lesson:

- Roderick W. Smith, Wiley (2012.): LINUX ESSENTIALS
5.13. SUBTOPIC 13 – PROTECTING YOUR INFORMATION

Subtopic goals:

To help students keep their online personal information secure. To help students to realise the importance of the ability to use information technologies effectively to find and manage information, and the ability to critically evaluate and ethically apply that information to solve a problem, to realise importance of protecting their own information.

Expected outcomes:

Students should be able to:
- Define and understand dangerousness of viruses, hackers, Trojans, phishing
- Identify the mechanisms of system protection against viruses and malware
- Determine the need to control access to any personal information stored
- Protect personal data and personal web sources
- Recognize dangerousness of online shopping
- Create safe Facebook profile and identify unsafe profile

Content:

These days it is really important to protect our personal information because it’s very valuable: if this kind of information is lost or altered in any way, it could have a serious impact on our ability to carry on with our personal lives as usual.

Unfortunately, our computers and even applications such as a LinkedIn, are not 100% secure, so there is a security gap that cybercriminals take advantage of. But, by learning about the different tools and security options available in the application accounts, we will be able to avoid putting our personal information at risk. This not only reduces the risk of privacy breaches, it also reduces the time and resources involved in dealing with any breaches that do occur. Anyone who handles personal information should consider how they will protect that information during each stage of its lifecycle.

Malicious software apps (“malware”), viruses, and phishing scams are growing in number and sophistication. Data breaches and identity thefts are becoming commonplace. Even among “reputable” sites, there are ever-multiplying ways that personal data is being tracked, collected, and stored. The use of one’s personal data, and the manner in which it is saved and secured can create real risks to their privacy and even finances. Being able to maintain level of privacy
on the Internet is becoming harder, but it’s never been more important.

Personal information security throughout the lifecycle involves:

1. Considering whether it is actually necessary to collect and hold personal information.
2. Planning how personal information will be handled by embedding privacy protections.
3. Assessing the risks associated with collecting personal information.
4. Taking appropriate steps and putting strategies into place to protect any personal information that is held.
5. Destroying personal information when it is no longer needed.

To protect personal information effectively throughout its lifecycle, you need to be aware of when and how you are collecting it, and when and how you hold it. As noted above, personal information holdings can be dynamic and change without any necessarily conscious or deliberate action.

Additionally, the lifecycle may include the passing of personal information to a third party for storage, processing or destruction.

1. **Consider what personal information is important**

The first step in managing the security of personal information is to ask whether it is really necessary to collect, upload and show it. Personal information that is not collected, stored or uploaded cannot be mishandled. Personal information includes personal data:

a. Identification data
b. Contact data
c. Physical characteristics data
d. Ideology data
2. Privacy by design

Students will be better placed to meet their personal information obligations if they embed them early, which include choosing the appropriate technology and incorporating various measures.

So, the concept of malware should be introduced in this part, explaining what kind of malware is the most dangerous, which the best anti-malware software available is, and how to install and configure it.

Malware
Malware (short for “malicious software”) is considered an annoying or harmful type of software intended to secretly access a device without the user's knowledge. Types of malware include spyware, adware, phishing, viruses, Trojan horses, worms, rootkits, ransomware and browser hijackers.

Where malware comes from
Malware most commonly gets access to your device through the Internet and via email, though it can also get access through hacked websites, game demos, music files, toolbars, software, free subscriptions, or anything else you download from the web onto a device which is not protected with anti-malware software.

How to recognize malware
A slow computer is often a sign that your device may be infected with malware, as are pop-ups, spam, and frequent crashes. You can use a malware scanner (which is included in all anti-malware software) to check if your device is infected.

How to remove malware
The best way to get rid of malware is to use a reliable malware removal tool, as found in any good anti-malware software such as Hitman Pro, Esmisoft, MSRT, NPE, Zemana and Malwarebytes.

How to prevent malware
- Use powerful antivirus and anti-malware software.
- Don't open email attachments from unknown or unexpected sources.

3. If In Doubt, Throw It Out

Since malware and phishing scams are getting more sophisticated, try not to open emails that look suspicious or unusual, especially if they relate to your email, social media, financial services, or utility accounts. Delete these messages.

This goes double for links and attachments in emails related to these kinds of accounts or services — don’t click them unless you are absolutely sure of the source. If you get an email about an issue or past due balance or a refund, rather than click on a link, go to the provider’s website directly and log in to your account there, or call the provider.
Online shopping statistics

- 40% of global Internet users, or more than 1 billion people, have bought products or goods online.
- The U.S. e-commerce economy is worth $349 billion while China’s e-commerce economy is worth $562.66 billion.
- Online retail sales in the U.K. reached an estimated £52.25 billion in 2015, with the average shopper spending £1,174.
- 8 out of 10 consumers will shop online if offered free shipping.
- 40% of shoppers consult 3 or more channels, often in the process of shopping, before making a purchase; it goes to show the increasing importance of having an online presence in as many places as possible.

Ecommerce customers in Spain

Credit cards amount for more than half of all online transactions, followed by cash (32%), electronic bank transfer (20%) and eWallet (14%). The most important payment option in Spain seems to be 4B (means of payment system whose shareholders are Spanish banks), which has 20 million cards circulating amongst the Spanish population. The credit and debit cards of Euro6000 are also widely used.

Based on data from from Instituto Nacional de Estadistica, about 22% of the Spanish population bought something in the last three months prior to a survey in 2012. About 10.7 million Spanish people (31% of the population aged 16 to 74 years old) ordered something online in the last year.
Top 10 Online Shopping Sites in the World:
- Amazon
- eBay
- ASOS
- Wal-Mart
- Etsy
- Mr Porter
- Alibaba.com
- Nasty Gal
- Zappos
- Mod Cloth

Online payment methods:
- Visa and MasterCard cards
- Maestro cards
- PayPal
- American Express cards
- Bank transfer
- JCB cards.
- (China) Union Pay
- Direct debits

Phishing
Phishing email messages, websites, and phone calls are designed to steal money. Cybercriminals can do this by installing malicious software on the computer or stealing personal information off of the computer. Cybercriminals also use social engineering to convince you to install malicious software or hand over your personal information under false pretences. They might send emails, call on the phone, or convince users to download something off of a website.

What does a phishing email message look like?
Here is an example of what a phishing scam in an email message might look like.
• **Spelling and bad grammar.** Cybercriminals are not known for their grammar and spelling. Professional companies or organizations usually have a staff of copy editors that will not allow a mass email like this to go out to its users. If you notice mistakes in an email, it might be a scam.

• **Beware of links in email.** If you see a link in a suspicious email message, don’t click on it. Rest your mouse (but don’t click) on the link to see if the address matches the link that was typed in the message.

• **Threats.** Have you ever received a threat that your account would be closed if you didn’t respond to an email message? The email message shown above is an example of the same trick. Cybercriminals often use threats that your security has been compromised.

• **Spoofing popular websites or companies.** Scam artists use graphics in email that appear to be connected to legitimate websites but actually take you to phony scam sites or legitimate-looking pop-up windows.

4. **Stay Updated**

Keep your computer’s operating system, browser, and security software up to date. Turn on automatic updates for these wherever possible.

When our computers start slowing down or behaving in an unusual way, we are often quick to suspect that we have a virus. It might not be a virus, but it is likely that you have some sort of malware. Some are malicious, and others are just annoying. The worst culprits are the
hijackers—malware programs that take over your browser or worse yet, your computer. Here are some tips on how to prevent malware from infecting your computer, keeping your hardware safe:

- **Install Anti-Virus/Malware Software.** This tip may go without saying but this protection is a must-have first step in keeping your computer is virus free.

- **Keep Your Anti-Virus Software Up to Date.** Having protection software is the first step; maintaining it is the second. Free anti-virus software is better than nothing, but keep in mind that it’s not the best solution.

- **Run Regularly Scheduled Scans with Your Anti-Virus Software.** Set up your software of choice to run at regular intervals. Once a week is preferred, but do not wait much longer between scans. It’s difficult to work on your computer while your anti-virus software is running. One solution is to run the software at night when you aren’t using your computer. However, we often turn off our computers at night, and so the scan never runs. Set your anti-virus software to run on a specific night, and always leave your computer running on that day. Make sure it doesn’t shut off automatically or go into hibernation mode.

- **Keep Your Operating System Current.** Whether you are running Windows, Mac OS X, Linux, or any other OS, keep it up to date. OS developers are always issuing security patches that fix and plug security leaks. These patches will help to keep your system secure. Similarly, keep your anti-virus software up to date. Viruses and malware are created all the time. Your scanning software is only as good as its database. It too must be as up to date as possible.

- **Secure Your Network.** Many of our computers connect to our files, printers, or the Internet via a Wi-Fi connection. Make sure it requires a password to access it and that the password is strong. Never broadcast an open Wi-Fi connection. Use WPA or WPA2 encryption. WEP is no longer strong enough as it can be bypassed in minutes by experts. It’s also a great idea to not broadcast your SSID (the name of your Wi-Fi network). You can still access it with your device, you will just have to manually type in the SSID and the password. If you frequently have guests who use your Internet, provide a guest SSID that uses a different password, just in case your friends are evil hackers.

- **Think Before You Click.** Avoid websites that provide pirated material. Do not open an email attachment from somebody or a company that you do not know. Do not click on a link in an unsolicited email. Always hover over a link before you click to see where the link is really taking you. If you have to download a file from the Internet, an email, an FTP site, a file-sharing service, etc., scan it before you run it. A good anti-virus software will do that automatically, but make sure it is being done.

- **Keep Your Personal Information Safe.** This is likely the most difficult thing to do on the Internet. Many hackers will access your files not by brute force, but through social engineering. They will get enough of your information to gain access to your online accounts and will glean more of your personal data. They will continue from account to account until they have enough of your info that they can access your banking data or just steal your identity altogether. Be cautious on message boards and social media. Lock down all of your privacy settings, and avoid using your real name or identity on discussion boards.
• **Don’t Use Open Wi-Fi.** When you are at the local coffee shop, library, and especially the airport, don’t use the “free” open (non-password, non-encrypted) Wi-Fi. Think about it. If you can access it with no issues, what can a trained malicious individual do?

• **Back Up Your Files.** The best thing you can do is back up your files—all of them. Ideally you will have your files (your data) in at least three places: the place where you work on them, on a separate storage device, and off-site. Keep your files on your computer, back them up to an external hard drive, then back them up in a different location. You can use a backup service or simply get two external hard drives and keep one at work, at a friend’s house, at a family member’s house, or in a safe deposit box.

• **Use Multiple Strong Passwords.** Never use the same password, especially on your bank account. Typically, we use the same email address or username for all of our accounts. Those are easy to see and steal. If you use the same password for everything, or on many things, and it is discovered, then it takes only seconds to hack your account. Use a strong password. Use lower case, upper case, numbers, and symbols in your password. Keep it easy to remember but difficult to guess. Do not use dates or pet names.

5. **Assessing the risk**

Assessing the security risk to personal information is also an important element of ‘privacy by design’. These days we are used to sharing a lot of personal information and this may have impact upon our family, friends and life in general if it is not shared correctly.

That’s why we need to be clear about the concept of “metadata” and why it so important. The term metadata literally means ‘data about data’. Metadata provides additional information about a particular file, such as its author, creation date, possible copyright restrictions or the application used to create it. The aim of metadata is to know more about a file or photograph, but as long as “bad” people can use this information, it can hurt someone. For example, many people don’t realise that if they take a picture at the beach, then cut it and send it to a friend, the original picture can be recovered through metadata. So, it’s important to know how to control the metadata on digital information.

6. **Taking appropriate steps and putting strategies into place to protect personal information**

Once your data has been collected and stored, you need to consider what appropriate security measures are required to protect that information. Here is where anti-malware software comes into play which we discussed earlier.

Another important thing is to think about creating a strong password. Google advises the following:

- Use a unique password for each of your important accounts
- Use a mix of letters, numbers, and symbols in your password
- Don’t use personal information or common words as a password
- Make sure your backup password options are up-to-date and secure in case you need to reset or forget your password
7. Destroying personal information

Destroying personal information that is no longer needed is an important risk mitigation strategy. It is important to know how to destroy personal information for good:

1. **Wipe the drive completely.**
   a. Formatting makes a data thief's job tougher, but not impossible. On larger hard drives, there are still big empty spaces where the old data is just sitting around. There is software that wipes that information, such as Darik's Boot and Nuke, and which is used by the CIA and the military.

2. **Delete only your sensitive files.**
3. **Destroy the hard drive.**

One kind of data it is important to destroy regularly is cookies. That's because the main purpose of a cookie is to identify users and possibly prepare customised web pages to save site login information for you. When you enter a website, cookies save all or part of your information and preferences. It's important to delete these cookies to prevent anyone from reading their content and stealing your personal information, such as logins and passwords.

**Suggested teaching methods:**

All the points explained above should be explained through practice:

- First of all, it would be a good idea to introduce the new concepts (cybersecurity, hackers, white hacker, black hacker, virus, phishing, etc.) to students and, even better, create a glossary.

- After that, put the students in pairs and get them to configure the security in some of their accounts, such as Facebook. This is good practice because it is real-life practice and the changes are applied immediately. If most students use another social network, they could do the exercise with that one.

- It would also be good practice to invite students to search for other students in this social network to view all the personal information that is not protected and is therefore visible to the entire world.

- This part could be done on social networks or an e-mail service such as Gmail: introduce the guide of how to protect our personal information that Google offers then invite students to log into their Gmail accounts and change their configuration if necessary.

Another necessary measure, in order to clean the computer and prevent anyone stealing our
information, is to install a PC cleaner software such as CCleaner.

**References for preparing a lesson:**

- Internet source: https://www.consumer.ftc.gov/articles/0272-how-keep-your-personal-information-secure
- Internet source: https://www.google.com/safetycenter/everyone/start/
5.14. SUBTOPIC 14 – USE OF SOCIAL NETWORKS

Subtopic goals:

The workshop participants will understand what is marketing and advertising through social networks, realize their potential and influence and ways of implementation in the business.

Expected outcomes:

Students will be able to:

- understand the difference between traditional marketing and social media marketing
- define the functionality of LinkedIn, Facebook, and Twitter
- recognise the best social media platform(s) for their business
- distinguished characteristics of communication on social networks compared to communicating face to face
- understand the concepts of marketing communication on digital platforms focusing on social networks

Content:

A social network is a website that allows you to connect with friends and family, share photos, videos, music and other personal information with either a select group of friends or a wider group of people, depending on the settings you select. Social networks like Facebook, Twitter and LinkedIn are great ways of keeping in touch with friends and family around the world as well as making new connections with people based on similar interests or professions. There are tons of different social networks that you can join – all for free.

Top 10 reasons for using social networks:

- To stay in touch with what friends are doing
- To stay up-to-date with news and current events
- To fill up spare time
- To find funny or entertaining content
- To share opinions
- To share photos or videos with others
- Because friends are already on them
- General networking with other people
- To meet new people
- To share details of our everyday life

Social media networks are fantastic resources for businesses of all sizes looking to promote their brands online. The platforms themselves are free to use, and they also have paid advertising options specifically for brands that want to reach even more new audiences. But just because your business should be on social media, that doesn't mean your business should
be on every network. It’s important that you choose and nurture the social platforms that work best for your business so that you don’t spread yourself too thin. If you want to create a successful social strategy, you need to familiarize yourself with how each network runs, the kinds of audiences you can reach and how your business can best use each platform.

Some of the popular social networks are Facebook, YouTube, Twitter, LinkedIn, Instagram, MySpace, Google Plus, Snapchat and Pinterest.

**Facebook**

In February 2004 Mark Zuckerberg launched "The facebook", as it was originally known. Within 24 hours, 1,200 Harvard students had signed up, and after one month, over half of the undergraduate population had a profile. It became Facebook.com in August 2005. As of September 2006, the network was extended beyond educational institutions to anyone with a registered email address.

**Amazing Facebook Facts:**

- Al Pacino was the first “face” on Facebook
- Facebook’s 'Like' button used to be the 'Awesome' button
- Facebook stores approximately 300 petabytes of user data on its servers (there are 1 million gigabytes in a petabyte)
- There are now more than 2 million active advertisers on Facebook
- Videos are the most-shared content type on Facebook
- Facebook runs on 61 million lines of code

Facebook’s casual, friendly environment requires an active social media marketing strategy that begins with creating a Facebook Business Fan Page. Social media marketing for business pages revolves around furthering your conversation with audiences by posting industry-related articles, images, videos, etc.

**YouTube**


Today, YouTube is the largest online video destination in the world and the third most visited Website overall. The site exceeds two billion views a day. The platform comprises the largest video-sharing community in the world and includes users, advertisers and over 10,000 partners. Every minute 24 hours of video uploaded to the site. Hundreds of millions of users spanning the globe come to YouTube to discover and shape the world through video.
Twitter

Twitter began as an idea that Twitter co-founder Jack Dorsey had in 2006. Dorsey had originally imagined Twitter as an SMS-based communications platform. Jack sent the first message on Twitter on March 21, 2006, 9:50pm. It read, "just setting up my twttr". Twitter is the social media marketing tool that lets you broadcast your updates across the web. Follow tweeters in your industry or related fields, and you should gain a steady stream of followers in return.

At one point, you may have questioned why you can only Tweet 140 characters. The reason for such a specific limitation is Twitter was originally designed as an SMS mobile phone-based platform. 140 characters were the limit that mobile carriers imposed with SMS protocol standard. Twitter eventually grew into a web platform and the 140-character limit remained. Think of it as a creative constraint.

LinkedIn

LinkedIn is a social networking site designed specifically for the business community. The goal of the site is to allow registered members to establish and document networks of people they know and trust professionally. LinkedIn was co-founded by Reid Hoffman, a former Executive Vice President in charge of business and corporate development for PayPal. You must be at least 13 year old to use LinkedIn.

What is LinkedIn and how can it help me?

- LinkedIn is the leading professional network on the web
- Connect with classmates, faculty, and family professionally
- Find new opportunities for internships and full time positions
- Manage what potential employers learn about you from the Internet
- Find key contacts at companies that interest you

Why join LinkedIn?

- Build your professional brand/market yourself in your field
- Find and pursue your career passion by browsing profiles and connecting with professionals in your field
- Build and maintain professional relationships
- Turn professional relationships into opportunities
- Research staff at companies as you prepare for interviews and other opportunities

Instagram

Instagram is a popular photo-sharing app for smart phones. Compared with other social networks, Instagram is relatively simple - it's focused exclusively on sharing photos with your friends. One reason for Instagram's popularity is its simplicity. Rather than focusing on a lot of
different features, Instagram has only one core feature, which makes it especially easy to share photos and see photos from your friends.

Filters are another reason people like using Instagram. Whenever you take a photo in Instagram, you can quickly apply a filter to give the photo a unique look. Filters can help transform an ordinary photo into something worth sharing without much effort.

Like most other social networking sites, you must be at least 13 years old to create an account on Instagram. While you may occasionally encounter some inappropriate content on Instagram, it does have strict rules banning nudity and other types of offensive posts.

Social media marketing, or SMM, is a form of Internet marketing that implements various social media networks in order to achieve marketing communication and branding goals. Social media marketing primarily covers activities involving social sharing of content, videos, and images for marketing purposes, as well as paid social media advertising.

**What are social networks used for in business?**

Small businesses are using social networks exceedingly. There are so many ways to use social networking in a business environment, and so many benefits of doing so.

- **Inexpensive Marketing**: One of the best reasons for using social networks as a small business owner is the increased attention and marketing it provides to the business with little to no cost. By using social networking online, there are very few overhead or advertising costs, outside of the cost of a website.

- **Banner and Text Ad Advertising**: Some businesses are using social networks for low cost banner ads because social networks are highly effective websites that attract millions of visitors daily, providing the business with excellent exposure.

- **Customer Relation Management Tool**: Social networking websites and related tools allow management to speak with, ask questions, answer questions and overall interact with their customers as never before. Now, a small business online can personally connect with their customers.

- **Global Exposure**: A television ad or similar marketing method on an international scale would costs millions of dollars, but the same can be accomplished online for next to nothing. Also, because these tools allow businesses to interact with people worldwide, they are highly effective at achieving global response.

- **Online Meeting Places**: Social networks work well as online meeting places for industry experts to meet and discuss various aspects of their business. It also allows for various industries and niches to explore other professionals that could aid them in growing their business. For example, a remodelling business can network with a window wholesaler.
What they do well

When considering, "what are social networks used for," keep in mind that they can be in use for many things, good and bad. Many of the aforementioned ways that they can be used are beneficial to companies. They can also do much more.

- They can improve the customer images of the business.
- They can help a business to get feedback on new products and services.
- They can help connect friends, family and long lost college friends.
- Social networks allow for idea sharing and the creating dialog.
- Social networking allows people to network with others in order to find jobs.

Online social networks are beneficial in many ways. They remove many of the complexities of the offline world. In addition, they are often a very fun pastime.

Before you begin creating social media marketing campaigns, consider your business’s goals. Starting a social media marketing campaign without a social strategy in mind is like wandering through a forest without a map—you’ll only end up lost.

Create a social media marketing plan and brainstorm about your goals: what are you hoping to achieve through social media marketing? Who is your target audience? Where would your target audience hang out and how would they use social media? What message do you want to send to your audience with social media marketing?

Proposed teaching model:
Examples of activities that can be adapted to suit our purpose:

Dynamic of advantages:
Author: Antonio Omatos Soria
Divide the students into groups by whatever method you decide on and hand out a sheet of paper to each member of all the groups.

Explain the topic they are going to work on. With regard to the advantages, you could adopt different focuses, ranging from the most general to specific advantages. Depending on what you chose, they must write what advantages they see on the sheet in the set time. Once that time is up, they pass the sheet to the classmate to their right and do the same. Repeat this three or four times.

Each group will have four sheets summarising the advantages of the Internet. Start a discussion in each one with the aim of creating a joint document of all the advantages as they see it. This can be put on paper or (better) in Google Docs.
After the discussion, a representative of each group explains what advantages they have found for the others to consider. After this final discussion, a class document can be created with all the advantages they have come up with.

Variations:

- The same dynamic could be used for specific advantages, risks, recommendations for using social networking sites, networking strategies, etc.
- A blog entry could be created with the overall summary and students could add a comment on their own, more personal view and those aspects which are vital in their life.
- You could create a questionnaire in Google Docs with the advantages raised and try to do a survey on their importance.

References for preparing the lesson:

- [https://sites.google.com/site/lesarxessocialsaeducacio/3-usos-i-interes-de-les-xarxes-socials-en-els-joves](https://sites.google.com/site/lesarxessocialsaeducacio/3-usos-i-interes-de-les-xarxes-socials-en-els-joves)
- [https://sites.google.com/site/tallerid11/actividades-de-aula/dinamicas-de-aula](https://sites.google.com/site/tallerid11/actividades-de-aula/dinamicas-de-aula)
5.15. SUBTOPIC 15 – INFORMATION OF THE SENSES

Subtopic goals:

To understand and evaluate how sensory information works in our brain.

Expected outcomes:

Students will be able to:

- Understand how information comes from the senses.
- Evaluate how a sensory experience can change your own mood.
- Create sensory experiences for other people which may bring back memories.

Content:

1. Introduction to our brain
2. Senses
   1. Smell
   2. Touch
   3. Taste
   4. Sound
   5. Sight

Introduction to our brain:

Our brain weighs about a kilo and a half but keeps all the secrets of our evolution because it is the result of the evolution of millions of years from the brain structure of reptiles. Throughout evolution new structures have been superimposed on the old ones. In the human brain the most archaic brain structures coexist with modern ones. The most primitive part of our brain, the brain stem or reptilian brain, is the innermost part and is connected to the top of the spinal cord.

- The reptilian brain does not think or learn, but is responsible for basic functions such as breathing and metabolism, along with reactions and automatic movements.

- The cortex and limbic development system were developed with the arrival of the first mammals. This new brain structure wrapped round the reptilian brain. Two very important new capabilities for survival appeared: learning and memory. Thus a past experience could be remembered, so it could be repeated or avoided. Thanks to the limbic system emotions such as fear, pleasure, etc., could be felt.
Higher mammals, added a new structure to the brain, the **neocortex**, in which higher cognitive abilities are developed: language, analysis, abstraction, problem solving, planning, etc.

Our brain structure changes physically when we learn something new, such as a new colour or odour, someone's name, etc. This new information is retained thanks to synapses or connections, between neurons or brain cells. The experience strengthens the connections between various pieces of information, such as the smell, colour, taste and warm feeling of a cup of hot chocolate with *churros*, for example. This means that when you smell chocolate again, previous connections produced by the first experience are activated, so the smell is immediately associated with other sensory feelings of a cup of chocolate with *churros*.

Above all, the great secret of memory is that the relationships between things are encoded in it rather than the detail of each one. It is like remembering the melody of a song without...
remembering the exact notes which compose the melody. This is essential for understanding how sensory information is processed by our brain.

There is a language of the senses or a sensory language which is often forgotten. This sensory score is used in our everyday lives but we are not aware of it. As explained before, our body also carries its own memories of scents, textures, sounds, flavours and, of course, images. And these memories work as tokens which open other memory networks as well. For instance, if you smell your grandmother’s perfume again, for sure some images of her, even some particular moments, will come to mind.

![Brain diagram](image)

**Smell**

According to scientific studies, smell is the most evocative sense and it can alter or influence our moods and behaviour unexpectedly because it is the most powerful of our senses, up to 10,000 thousands more sensitive. Our brain detects smells unconsciously and immediately, this information travelling straight to our limbic system, bypassing it and connecting directly to the forebrain, affecting our emotions, memories and will. This is the only place where our central nervous system is exposed to the environment (von Have, Serene Aromatherapy). Information coming from touch and taste need to travel through neurons and our spine before reaching our brain.

The human female olfactory sense is stronger than that of males and can even distinguish potential sex partners based on the detection of HLA genes, which are important for the immune system. In general, all humans can identify their blood relatives, as well as distinguish more than one billion different odours, although we can only identify a few hundred. By contrast, we can only distinguish five basic tastes. Moreover, different people smell different odours and most of these differences are caused by genetic differences.
The latest theories show that there is a neural convergence between smell and sound in a new perception named *smound*, which is used by therapists working with blind people. Aromatherapy practice is also used for a variety of applications, including pain relief, mood enhancement and increased cognitive function.

**Touch**

The sense of touch is the least known sense of all. However, it is the most extensive of our bodies, as the touch system is based on many receivers spread all over our skin. The latest scientific research tells us that the same areas of the brain are activated when looking at an object or touching it. That's why we are able to recognise an object when only touching it. Furthermore, there are some people who have a nice, comfortable and relaxed experience in their brains when they watch people touching certain objects such as a soft weave. They recall it as if their brain was ticklish. This phenomenon is called the autonomous sensory meridian response ([https://en.wikipedia.org/wiki/Autonomous_sensory_meridian_response](https://en.wikipedia.org/wiki/Autonomous_sensory_meridian_response))

But not only does information about objects come from the tactile sense, tactile stimuli also have their own language. Thanks to the touch we can express our feelings in a precise way. For instance, more or less pressure, the duration or lack of gentleness in shaking hands could communicate anger, nervousness, shyness, etc. In fact, several pieces of research show that touch has a big effect on social relations: anyone who has a massage will surely will feel more generous and willing to help in return. That's why massage is used for people with special needs, because it provides therapeutic benefits. To sum up, as some poets say, your soul is on your skin.

**Taste**

Humans need a sense of taste to be aware of rotten or spoiled foods. There are five different basic tastes, namely bitter, sour, salty, sweet and a new one from Japan, *umami*, which means savoury. People in Asia believe there is a sixth linked to the spiciness or hotness of well-spiced food like curry. Sourness and saltiness can be pleasant in small quantities but not in larger ones, while we generally regard a bitter taste as unpleasant. We like a sweet taste because it indicates the presence of high calorie count, which is something our body seeks.

The tongue or taste map is a common misconception suggesting that different sections of the tongue are exclusively responsible for different basic tastes. This is illustrated by means of a schematic map, with certain parts of the tongue labelled for each taste. Although widely believed, this was scientifically disproved by later research. All taste sensations come from all regions of the tongue, although different parts are more sensitive to certain tastes. Together with taste, smell also contributes to flavour.
Sound

Like touch, sound produces a type of mechanical sensation because both senses require sensitivity to the movement of molecules in the world outside our body. Mechanical waves, known as vibrations, are detected by the ear and translated into nerve impulses that are perceived by our brain.

It is worthwhile mentioning that hearing range of humans is quite limited compared to that of animals. The human range is from 20 to 20,000 Hz, with considerable variation between individuals, especially at high frequencies. Several animal species are able to hear frequencies well beyond that. Some dolphins and bats, for example, can hear frequencies up to 100 kHz and elephants can hear sounds at 14–16 Hz, while some whales can hear subsonic sounds as low as 7 Hz (in water). (https://en.wikipedia.org/wiki/Hearing_range)

Everybody likes music and one reason for this could be it affects many different areas of our brain, as it shown in the following image:

We can usually work out if a piece of music is particularly happy or sad, but this is not just a subjective idea that comes from how it makes us feel. In fact, our brains actually respond differently to happy and sad music. Even short pieces of happy or sad music can affect us. One study showed that after hearing a short piece of music, participants were more likely to interpret a neutral expression as happy or sad, to match the tone of the music they heard. This also happened with other facial expressions, but was most noticeable in the case of those that were close to neutral.
Something else that is really interesting about how our emotions are affected by music is that there are two kinds of emotions related to music: perceived emotions and felt emotions. This means that sometimes we can understand the emotions of a piece of music without actually feeling them, which explains why some of us find listening to sad music enjoyable, rather than depressing (http://www.spring.org.uk/2013/07/why-do-we-enjoy-listening-to-sad-music.php). Unlike in real life situations, we do not feel any real threat or danger when listening to music, so we can perceive the related emotions without truly feeling them.

**Sight**

Despite being one of our five main senses, vision seems to take precedence over the others. Hear a piece of information, and three days later you will remember 10% of it. Add a picture and you will remember 65%. Pictures beat text as well, in part because reading is so inefficient for us. Our brain sees words as lots of tiny pictures, and we have to identify certain features in the letters to be able to read them and that takes time. If we have a look at the learning pyramid we will see that what we hear and see is better remembered than only hearing or only seeing:

![Learning Pyramid Diagram](image)

Despite this being common sense there are theories which tell us that, in general, every one of us uses a sense or two more than another to interact with our environment and to get information from it. According to this pseudo-science, there are 3 different types of people:

1. **Visual people.** It is very common for people with more visual dominance to need silence to be able to concentrate. When they need to memorise things, it is easier to remember images which is why they need notes for a little bit of help.
2. **Auditory people.** They verbalise things, talk to themselves and read aloud. It is also common if you have an auditory personality that you like to listen to other people as well. This is how you memorise things better, for example, by listening to them speaking and barely writing things down.

3. **Kinaesthetic people.** They have a special liking for emotions and particularly anything to do with physical and manual things. It is difficult for them to sit for hours listening to someone else, or even watch a presentation with lots of images.

http://steptohealth.com/visual-kinesthetic-auditory-person/

However, no matter whether someone is visual or not, it is important to bear in mind that even our eyes can be fooled, visually speaking. From optical illusions to misleading tricks:

- Test your awareness: [https://youtu.be/ubNF9QNEQLA](https://youtu.be/ubNF9QNEQLA)
- Other optical illusions: [https://google's/search?q=optical+illusions&safe=strict&espv=2&tbm=isch&tbo=u&sourc=univ&sa=X&ved=0ahUKEwittYr1_LnPAhWBtxoKHG91CuQQsAQIJg&biw=1366&bih=613](https://google's/search?q=optical+illusions&safe=strict&espv=2&tbm=isch&tbo=u&sourc=univ&sa=X&ved=0ahUKEwittYr1_LnPAhWBtxoKHG91CuQQsAQIJg&biw=1366&bih=613)

**Time lapse**

Some scientists believe that how our brains perceive time is also a sense. Essentially, our brains take a whole lot of information from our senses and organise it in a way that makes sense to us, before we ever perceive it. So what we think is our sense of time is actually just a whole lot of information presented to us in a particular way, as determined by our brains. What happens is that new information is a bit slower to get reorganised and makes time feel elongated. That is why when we are young we may sometimes wish for time to pass quickly, so school will be over and we can enjoy our time off. When we are old, we may wish time passed more slowly as we have fewer remaining years with which to enjoy our lives. The problem is not our age, however, but the processing of familiar information. It is not just one area of the brain that controls our perception of time, it is several.

**Proposed teaching method:**

First, as an introductory activity, the Kahoot website could be used to break down some misconceptions about our senses. Questions such as how many odours/tastes/colours can we distinguish? (There is a game to show how difficult is to distinguish colours:
http://game.ioxapp.com/eye-test/game.html). Which is the most highly visible colour? (Yellow). Can we identify our blood relatives by smell? The perception of colours can be demonstrated by “The dress”, which went viral (https://en.wikipedia.org/wiki/The_dress).

Optical illusions are always useful to show that we all perceive things in a different way. You could test whether there is a student with ASMR (https://en.wikipedia.org/wiki/Autonomous_sensory_meridian_response) by showing a video (https://www.youtube.com/watch?v=n33G6HP5tw). You could also ask students whether they consider themselves to be “visual”, “auditory” or “kinesthetic” (http://steptohealth.com/visual-kinesthetic-auditory-person/). This video shows how our attention is focused on something totally different to what is really happening as well: https://youtu.be/ubNF9QNEQLA

Follow that with a presentation (Prezi, PowerPoint) on the theory of the brain and its senses but, as the topic is about senses, the goal is to experience them through the following activities. Most of the time students will be blindfolded, to enhance the perception of the other senses by restricting their sight.

It is highly recommended you prepare the following activities with a maximum of 15 students and two teachers. Due to the nature of the activities, it is necessary to break down the spatial barrier which separates teachers from students. Some experiences can be experienced in a personal way, as they may bring back long-forgotten memories. A central element in achieving this goal is the game. According to Johan Huizinga (1938):

“The game is a voluntary activity that takes place within specific spatial and temporal limits, with freely agreed rules. It is an action in itself, accompanied by a feeling of tension and joy and of the feeling of awareness of being otherwise than in everyday life”.

Silence is also important to establish a dialogue with the senses and your own memories. As mentioned above, most of the activities are performed blindfold, in order to keep the focus on senses other than sight.

To work on the senses of **smell and touch**, the students are blindfolded and presented with some smells. Things like colour pencils, perfume, coffee, naphthalene (used to keep clothes), old books, chamomile, etc., always bring back memories. The activity is carried out in silence and the students are given enough time to smell all the objects. They are sat in a circle, with the objects passed round. It is important to bear in mind that time goes faster in the dark and people need time to absorb and internalise all the sensations and feelings that emerge.

Another activity related to **touch** involves separating the students into two groups. One group is told to take the other group, who are blindfolded, for a walk. The latter are asked to touch different textures (walls, plants, fabrics, objects, etc.). Once they have finished, the blindfolded students say how they felt, not just about the textures but also other relevant aspects:
The mood of the person who was with him.

The change between light and dark.

The change of temperature if they changed room or approached a window.

Sounds (in the dark, sounds seem louder)

It is worth pointing out that all this information (light, temperature, sounds) could also be felt by the students who were not blindfolded but they were not aware of it. In that sense we all live with our eyes open, so to speak; we are blind to the information coming from the other senses. As most information comes from our sight, we ignore the other information coming from our skin and ears.

In the next proposed activity, you work with sound. Five students are blindfolded and the rest of the group approach them muttering excerpts from conversations, such as when you cross a street at a pedestrian crossing and a crowd approaches you. If the activity is repeated without a word, the analysis will show that we even sense people walking around us in silence.

For taste and touch: blindfolded students, sitting down, are presented with some food (cheese, nuts, grapes, etc.). The food can be on plates and not all there at the beginning, with other students bringing it in at different times. After a while some music is heard. Later we analyse if everybody felt the same and if everybody tried all the different types of food or got stuck on the same one, without investigating what else was on the plates.

You could also prepare a soundscape, or sound landscape. For instance, you can simulate a village with the sound of bells. If you add a cock crowing you are in the morning. With keys, steps, a watch ticking, laughs, etc., you can even imagine a story. In groups of three students could be asked to create a little story with simple sounds and check whether the others understood their script.

Another perception, distance, can be perceived in the dark. Place an object some metres away, walk blindfold towards it and try to stop when you think you have reached it. This is quite difficult and some people even go left or right because they have lost the perception of going straight ahead.

For sound and touch: work in groups of eight students. One volunteer from each group goes out of the room while the others prepare a corridor to simulate a washing tunnel. When the volunteer comes back, blindfolded, the first two in the corridor can be the water and the next two the soap, massaging the volunteer, followed by the dryer and the mop.

The above experience can be repeated with the sounds of the forest, the jungle, underwater, clouds, etc.

Lastly, in teams of three, students have to think of a sensory experience. They have some minutes to do that and they can ask the teacher if he or she thinks the experience will work.
They are allowed to bring objects, smells and sounds the following day to perform their experience with their peers.

One conclusion can be reached after all that has been learned: experiences can also be forgotten. How? By building up new experiences related to the thing we want to forget. Thus, new neuronal connections will replace or be mixed with earlier ones.

References for prepare a lesson:

- Ascarin, Nicolás; *El cerebro del Rey* [The King’s Brain]; Ed. RBA Divulgación, 2010.
- Punset, Eduard; *El alma está en el cerebro. Radiografía de la máquina de pensar* [The soul is in the brain. An X-ray of the thinking machine]; Ed. Destino, 2012.
- Estupinyà, Pere; *El ladrón de cerebros* [The Brain Thief]; Ed. Debate, 2016.
- http://www.pereestupinya.com/  
- Teatro de los sentidos: Several workshops (http://teatrodelossentidos.com/)
- Brain enigmas: http://www.elorigendelhombre.com/enigma%20del%20cerebro.html
- ASMR: https://www.youtube.com/watch?v=f8rlKAsBOKA
- ASMR: https://www.youtube.com/watch?v=-n33G6HP5tw
- Tongue map: https://en.wikipedia.org/wiki/Tongue_map
- Basic tastes: https://en.wikipedia.org/wiki/Taste#Basic_tastes
- Type of person: http://steptohealth.com/visual-kinesthetic-auditory-person/
- How our brain works: https://blog.bufferapp.com/10-surprising-facts-about-how-our-brain-works
- Optical images: https://www.google.es/search?q=optical+illusions&safe=strict&espv=2&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwittYr1_LnPAhWBtxoKHa91CuQQsAQIJoMAD&biw=1366&bih=613
- Test your awareness: https://youtu.be/ubNF9QNEQLA
- Time perception: https://en.wikipedia.org/wiki/Time_perception#Short-term