Information Literacy Game-based model

From the Strategy to the model

By ERASMUS+ Project NAVIGATE – Information Literacy: A Game-based Learning Approach for Avoiding Fake Content

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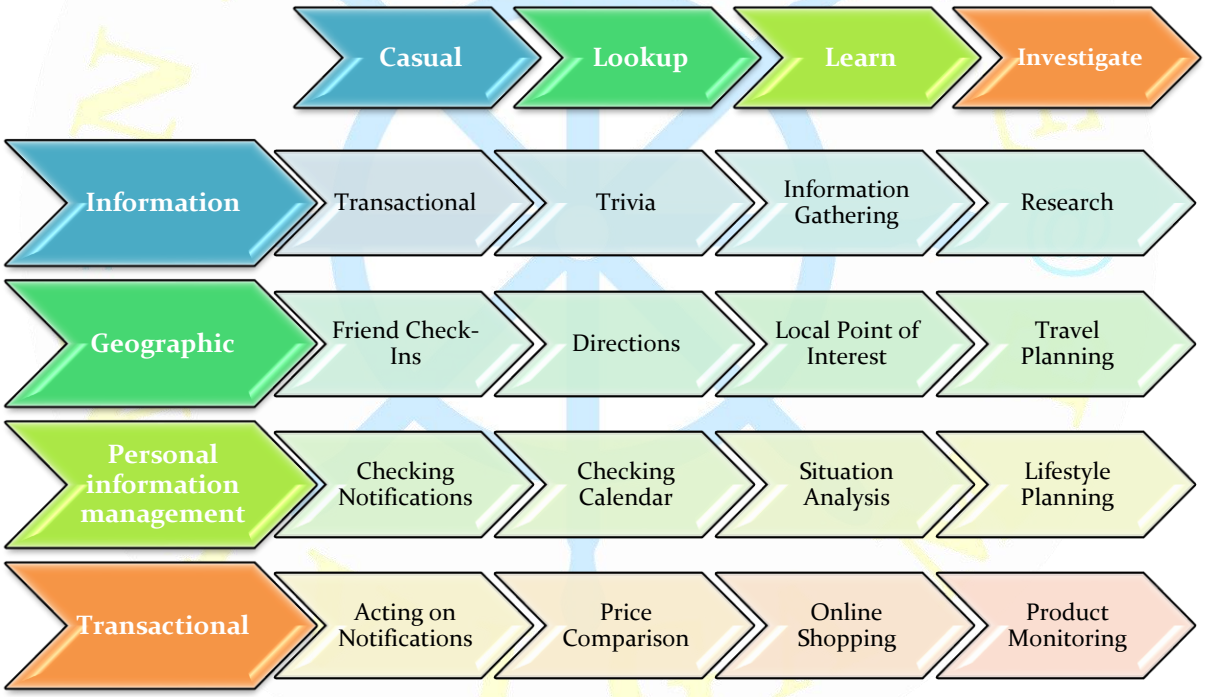
Table of content

Game based model on Information Literacy: definition

Professors, teachers, librarians could be interested in exploring Information Literacy (IL) competencies with their students, but they don't know how to approach the topic in a fruitful and friendly way.
The NAVIGATE Game Based Model aims at sustaining the improvement of IL competencies in their classes using games and/or gamified approaches.
....

In the matrix and model presented below, *the challenges for the project are towards – moving from "Trivia" – see the old simple academic produced games in the O2, into the spaces of information gathering (learning to structure and organize knowledge) and research (investigate, produce knowledge)* as shown below – if the games also work in a non-formal educational setting/situation, is it important that the students are able to use mobile devices.



In the context of the main goal of the project, we can talk about a model of game-based training that will adequately support traditional learning by not only diversifying it, but also providing the opportunity for this diversification but above all for complex coverage of defined problems for students' areas of competence.
We need to learn what the impact processes look like and why we allow ourselves to be manipulated. Digital development is now very fast and the framework that information literacy now comprise is sometimes somewhat outdated. The question is what we can add extra in the project that is not

found in today's framework for digital competence or information competence.

Purposes and goals

The NAVIGATE project aims are to give the teachers/trainers the powerful support for using games in the IL courses. Examples of adaptation of the NAVIGATE Strategy - learning situations:

Models of use of the NAVIGATE Framework (Teacher Embedded Games)	Types of use of the game, regarding the specific skills (student)
• The teacher uses the games based on the NAVIGATE Competency Framework for a hierarchy of the sources of the course (subject, discipline) • Recommended (guided, directed) use of the games for avoiding Plagiarism and understanding IPR and Creative Commons in the NAVIGATE Framework • Instruction by teacher and librarian to use dictionaries based on quality criteria and avoiding fake content • Instruction via teacher in workshop as practice exercise - for practice game and informing students of avoiding creating fake info • Integrated learning modules for written or group assignment regarding avoiding creating fake information - complementary and additional course material • Teacher brings the value of the context with games on the line time to the subject information • Integrated learning modules for specific designed assignment regarding avoiding fake information - as instructed and additional course material • Assessments with integrated learning modules for specific designed assignment regarding information literacy of avoiding fake information - as instructed course material - using specific Rubric (assessment criteria)	• Free game use via university e-learning system and library web sites • Recommended use of the games on Plagiarism via open educational resources as course content in the learning management system (in LMS as a OER-module) • Recommended use of the Dictionary games in formal or informal settings • Instructed use of games as training and adapted learning to create academic (not fake) content • Motivated use of the games for course assignment, embedding game-based learning for avoiding fake content in creating documents • Recommended specific game modules on the line time for training the use or making conscious decisions regarding critical and crucial skills in the context • Complementary and recommended use of the specific games relevant and connected to the specific area of skills for avoiding fake content regarding the assignment/task • Complementary and recommended use of the specific games for avoiding fake content relevant and connected to the specific area of skills in the rubric - calculated as additional ECTS in the study guide or assignment as assessment

Based on the curriculum applied in ULSIT, which currently includes three general semesters for all humanitarian specialists who should have a level of competency above the average to be successful in the chosen professional

field, this means implementing the training model through games in the most problematic areas/courses that students are taught, such as:

1. *Information sources*, the training gives students the necessary skills not only to recognize the different types of traditional and electronic information sources, but also to know the specifics of structuring their content, purpose and use. Specific skills:

1.1. Competency tree skills

- ✓ Relevance
- ✓ Awareness of the scientific information sources
- ✓ Double check of the facts
- ✓ Identifying a search topic

Sconul skills: IDENTIFY

1.2 Acquired skills:

- ✓ Being aware of types of traditional and e-information sources
- ✓ Peculiarities of structuring and content of information resources
- ✓ Being aware of ways of their layout, purpose and usage

2. *Academic writing*, opportunities to apply the concept of critical thinking and evaluation of textual information, including the creation of own information content. Specific skills:

2.1. Competency tree skills:

- ✓ Relevance
- ✓ Awareness of the scientific information sources
- ✓ Double check of the facts
- ✓ Identifying a search topic

Sconul skills: IDENTIFY

2.2. Acquired skills:

- ✓ Being aware of types of traditional and e-information sources
- ✓ Peculiarities of structuring and content of information resources
- ✓ Being aware of ways of their layout, purpose and usage

3. *Information systems and a market* within which students acquire knowledge and skills on how to store, process and provide information, as well as skills for designing a strategic work plan and segmentation of information products. Specific skills:

3.1. Competency tree skills:

- ✓ Search techniques and specialist search tools
- ✓ Vocabularies and taxonomies
- ✓ Define a search strategy and search tool
- ✓ Search question

Sconul skills: PLAN

3.2. Acquired skills:

- ✓ Being aware of types of information systems

- ✓ Ways of gathering, saving, processing and providing information
- ✓ Being aware of the diversity of systems for providing information different in topics and in types of documentation
- ✓ Being aware of the information products market
- ✓ Nature of the "information broker" job
- ✓ Being aware of activities and services
- ✓ Skills for developing a strategic plan for working with users and segmenting information products and services

4. *Information services*, the training of which implies good development of skills and enrichment of the knowledge to apply basic methods and models of work with information within the process of "information services". Specific skills:

4.1. Competency tree skills:

- ✓ Awareness of the scientific information sources
- ✓ Using library guides
- ✓ Apply the principles of effective searching
- ✓ Background information
- ✓ Identify a search topic
- ✓ Awareness of what is really available
- ✓ Search techniques and specialist search tools
- ✓ Vocabularies and taxonomies
- ✓ Defining a search strategy and search tool
- ✓ Search question
- ✓ Cite and refer sources
- ✓ Copy right and creative commons

Sconul skills: IDENTIFY, PLAN, MANAGE, GATHER

4.2. Acquired skills:

- ✓ Being aware of the nature of information services in cultural institutions
- ✓ Knowledge and skills for applying basic methods of information service

5. *E-resources*, where learners learn to use a complex set of criteria to evaluate the different information systems and sources in the context of information provision of science, education and business. Specific skills:

5.1. Competency tree skills:

- ✓ Awareness of the scientific information sources
- ✓ Applying the principle of effective searching
- ✓ Background information
- ✓ Identifying a search topic

Sconul skills: IDENTIFY, GATHER

5.2. Acquired skills:

- ✓ Skills for integrated use and evaluation of various information systems for the needs of information provision of science, business and education

6. *Fundamentals of science*, where knowledge and skills are needed to apply approaches, methods and tools to use new scientific knowledge in various fields of science, education and culture. Specific skills:

6.1. Competency tree skills:

- ✓ Awareness of the scientific information sources
- ✓ How to spread and share information

Sconul skills: IDENTIFY, PRESENT

6.2. Acquired skills:

- ✓ Being aware of the science of knowledge including as a social phenomenon
- ✓ Being aware of and applying approaches, methods and means of using new scientific knowledge in different spheres of science, education and culture

7. *Methodology of the research*, after which the students should have an in-depth knowledge of the ways in which they can conduct research related to the achievement of pre-determined goals, applying in practice all the acquired knowledge and skills – extraction, analysis, evaluation of the information and the inclusion of new one in its own knowledge complex. Specific skills:

7.1. Competency tree skills:

- ✓ Identifying the personal information needs
- ✓ Finding relevant information
- ✓ Organizing and sharing information professionally and ethically

Sconul skills: GATHER, PRESENT

7.2. Acquired skills:

- ✓ Being able to work with phenomenologically cognitive tools of science
- ✓ Being able to classify information objects by their natural belonging to historical and cultural scientific paradigms
- ✓ Being able to treat “their own” and “others’” method of being in the information and communication act as a reference to the object of research (seeking information)
- ✓ Being able to create a text (research, course, diploma paper, review, author’s review) operating generally with the tools of scientific methods and the system and structural inter-disciplinary information modelling

At Sofia University "St. Kliment Ohridski", students in specialty "Library Studies, Scientific Information and Cultural Policy", analogous to the one at ULSIT, have no common semesters and do not train together with other specialties. This has advantages as well as disadvantages. One advantage is the fact that totally specialized courses are taught in the desired specialty. At the same time, constructing training together with other specialties requires considering a number of other factors and mostly deciding what specific skills can be taught in a way that they comprise information competences applicable to the spectrum of humanitarian sciences.
As the specialties are similar and students graduate with the same profession, we will look at those courses that are different in the curriculum. They make it possible to highlight the application of the competency tree and training by means of a game-based approach.

1. *Introduction to Informing Science*:

1.1. Competency tree skills:

- ✓ Relevance
- ✓ Do you know the scientific information sources
- ✓ Double check the facts
- ✓ Identify a search topic

Sconul skills: IDENTIFY

1.2. Acquired skills:

- ✓ Browsing, searching and selecting data, information, and digital content
- ✓ Evaluating data, information and digital content
- ✓ Data management skills, information, and digital content
- ✓ Knowledge of the types of traditional and electronic information sources
- ✓ Features of structure and content
- ✓ Knowing how to modify, direct and use

2. *Handwriting Traditions in the Book History and Reading*

2.1. Competency tree skills:

- ✓ Be sceptical about simple solutions
- ✓ Relevance
- ✓ Who is benefiting
- ✓ Consider the underlying purpose
- ✓ Find out the sender
- ✓ Examine yourself
- ✓ Copyright and creative commons
- ✓ Cite and refer sources

Sconul skills: EVALUATE, MANAGE

2.2. Acquired skills:

- ✓ Knowing the early book history and the readers' practices
- ✓ Working with digital content - handwritten collections of national and world libraries Understanding the basic corpus of book concepts
- ✓ Analyzing and interpreting the acquired terminology
- ✓ Using critical thinking
- ✓ Using source criticism (information evaluation)
- ✓ Being able to organize information professionally and ethically

3. *Processing Information Resources*

3.1. Competency tree skills:

- ✓ Relevance
- ✓ Be skeptical
- ✓ Double check the facts
- ✓ Cite and refer sources
- ✓ Reference management software
- ✓ Copyright and creative commons

Sconul skills: IDENTIFY, GATHER, MANAGE

3.2. Acquired skills:

- ✓ Being able to create digital content
- ✓ Getting acquainted with the variety of documents and analytical techniques for processing documentary information
- ✓ Developing practical skills for using information resources in a network environment, maintaining and developing information services and managing information flows

4. *Introduction to Digitization*

4.1. Competency tree skills:

- ✓ Relevance
- ✓ Find out the sender
- ✓ Consider the underlying purpose
- ✓ Examine yourself

Sconul skills: IDENTIFY, GATHER, PLAN

4.2. Acquired skills:

- ✓ Being able to create digital content
- ✓ Being able to view, search and select data, information and digital content
- ✓ Evaluating data, information and digital content
- ✓ Data management skills, information and digital content

5. *Print Book and Reading, 15th-20th Century*

5.1. Competency tree skills:

- ✓ Be sceptical about simple solutions
- ✓ Relevance
- ✓ Who is benefiting
- ✓ Consider the underlying purpose
- ✓ Find out the sender
- ✓ Examine yourself

Sconul skills: EVALUATE, MANAGE

5.2. Acquired skills:

- ✓ Understanding the printed book and reading in a historical perspective
- ✓ Exploring different reading practices
- ✓ Understanding Book Theory theses
- ✓ Analysis, interpretation of learned theories according to the book field of issue
- ✓ Using critical thinking
- ✓ Using source criticism (information evaluation)
- ✓ Being able to organize information professionally and ethically

6. *Communicative Techniques*

6.1. Competency tree skills:

- ✓ Relevance
- ✓ Be sceptical
- ✓ Double check the facts

Sconul skills: IDENTIFY, PLAN, GATHER, PRESENT

6.2. Acquired skills:

- ✓ Acquiring skills for efficient use of the existing information infrastructure in the communicative socio-cultural situation
- ✓ Being able to communicate through digital technologies
- ✓ Being able to manage digital identity
- ✓ Being able to apply a variety of strategies for communicative competence in their library practice

7. *E-Government and the Role of Libraries*

7.1. Competency tree skills:

- ✓ Do you know the scientific information sources
- ✓ Construct strategies for locating information and data
- ✓ Copyright and creative commons

Sconul skills: IDENTIFY, PLAN, MANAGE

7.2. Acquired skills:

- ✓ Knowing the development, concepts and applications of e-government

- ✓ Knowing the legal framework, European initiatives and programs in the field of egovernment and the role of libraries in its development
- ✓ Identifying and managing electronic information resources
- ✓ Being able to apply electronic administrative services to libraries

LEARNING OUTCOMES, IL DOMAINS (SKILLS FROM THE COMPETENCY TREE) & TYPES OF KNOWLEDGE MATRIX					
IL Topics / domains/ Skills from the competency tree	**LEARNING OUTCOMES**				
	Plan - Find Relevant Information	**Identify and Scope - Search Information**	**Manage and Communicate Information**	**Digital Competence Regarding Fake Content**	**Identify, evaluate and avoid fake information**
Declarative Knowledge - an association between two or more objects – facts, jargon, and acronyms. Content must be memorized.		*The learner will be able to search for the background information on a specific topic and to analyze the already available sources *The learner will be able to recognize information sources and identify the different text formats		*The learner will be able to apply information integrity criteria to analyze information and disclose fake content	*The learner will know how to check the facts and to find the sender of the information *The learner will know how to analyze the purpose of the information and who is benefiting from it *The learner will be able to use critical thinking in order to detect fake news
Conceptual Knowledge - grouping of similar or related ideas, events, or objects that have a common attribute or a set of common attributes.	*The learner will get knowledge of different search techniques and tools *The learner will know how to define search strategy and choose a suitable search tool *The learner will be able to formulate a search question	*The learner will be able to recognize information sources and identify the different text formats *The learner will know how to use Library Guides *The learner will know how to identify a search topic *The learner will be able to apply the principles of effective searching	*The learner will demonstrate awareness of issues related to copyright and creative commons		
Rules-based Knowledge - a statement that expresses the relationships between concepts. Rules provide parameters	*The learner will be able to identify a personal need for information *The learner will demonstrate knowledge	*The learner will be able to use/follow library guides and recommendations *The learner will demonstrate knowledge			

dictating a preferred behavior with predictable results.	about strategies for effective searching and search techniques *The learner will be able to identify the information gaps	about using keywords and search words			
Procedural Knowledge - a series of steps that must be followed in a particular order to reach a specific outcome.			*Learners will be able to cite and refer sources *Learners will be able to apply information integrity criteria to analyze information *Learners will be able to choose true and unbiased information *Learners will be able to distinguish between real and fake content, especially in the news and social media channels *Learners will be able to investigate the anatomy of the fake news environment	*Learners will be able to apply the search skills related to the scientific information source *Learners will be able to verify the genuineness of the scientific information sources	
Soft Skills - non-sequential guidelines for dealing with social interactions					*Learners will be able to verify which are the potential reasons behind the publication of fake news *Learners will be able to understand which are the potential advantages behind the public misconception *Learners will be able to understand the complexity lying behind a fake news and all steps done to arrive to people as a plausible, credible story

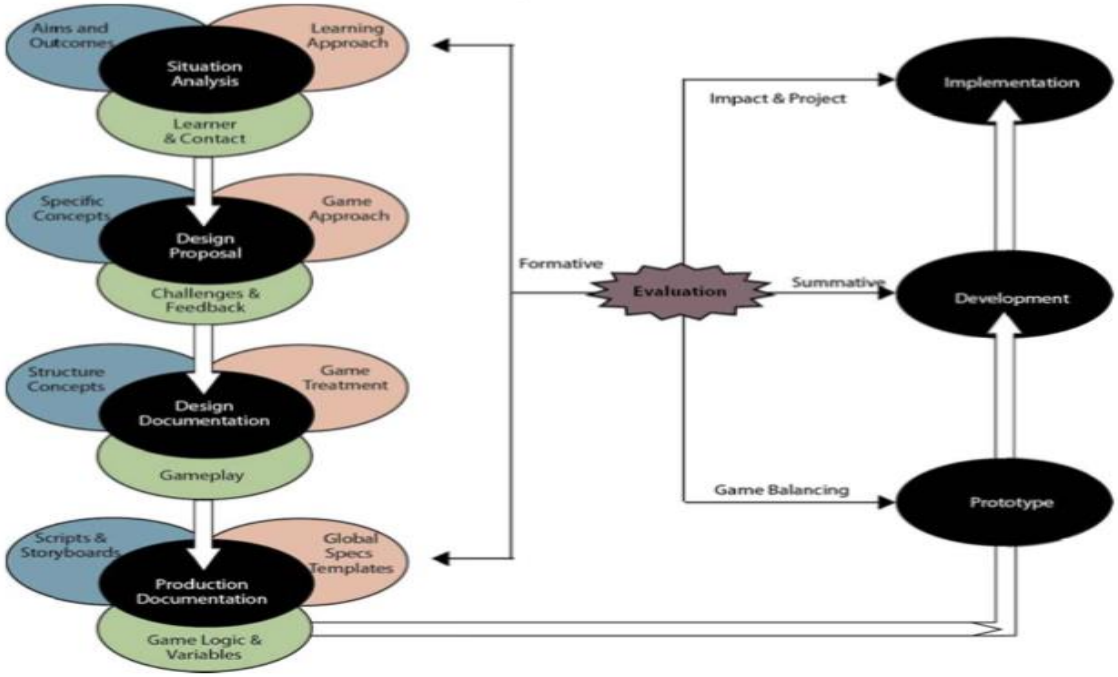


Figure 4.1: DODDEL Model (McMahon, 2009b:98), adapted by the researcher

Figure reported in De Kock (2014)

Situation analysis: The NAVIGATE addresses the needs of the humanities students, faculty and librarians. The different stages of the situational analysis, namely the aims and outcomes, the learner approach and the learner contact, are part of this stage.
Aims and outcomes: The aim of NAVIGATE is to use games to improve student success and achieve better performance of faculty teaching.
The outcome relates to the learning process (Syllabus and scenarios) and expected learning outcomes at the level of Syllabus and Units (Modules).
Learning approach: The goal and outcomes of the NAVIGATE must be clear to the end user. Starting from the Competency tree and analysis done in O1 and O2 the learning outcomes of the Syllabus are:

1. the students' ability to recognize and avoid fake content
2. the students' ability to argue using analysis and synthesis capabilities of the collected resources

The Competency tree was the basis on which the needs of the students were highlighted and on which the existing games were classified. This made it possible to highlight that students do not have certain skills and that existing games do not include all the skills. The results of the O1 and O2 phases made it possible to highlight that the weakest skills for students are also the skills that existing games neglect. So, NAVIGATE will have to try to fill the gaps in skills with tasks that complement existing ones.

Learner and contact: The learning needs and learning styles of the target group are important. Students have different learning needs that might fit in with their age group and their preferred learning style. In terms of using information for learning, the previous student experience from three universities provides the scaffolding that allows them to increase their existing knowledge.

Design proposal: The needs identified in the O1 (situation analysis) are important at this stage. O3 should focus on solutions for the specific needs evidenced by students.

The first need is that students participating in the survey consider the digital competences necessary and many of the respondents consider themselves sufficiently equipped to find information online, just by knowing the device. The second aspect is that they tend to neglect research strategies and underestimate the management of information: in other words, students cannot select academic sources and are not able to justify and give evidence for the information gathered.

One of the most effective ways to ensure that students become skilled in handling good information is to include information skills in the curriculum, centered on the library, as well as included in practice in the training courses and combined with the different subjects. While studying for exams is notional and based on the textbook, doing exercises at home or preparing the thesis requires more information resources.

Consequently a first scenario - integrated in the curriculum and library centered - could represent the evaluation and management of information from quality academic resources (dictionaries, websites, corpora), a second scenario - embedded in the curriculum - could be constituted by the creation of new information as a critical analysis and synthesis of the information collected.

Design documentation: The O3 design of the documentation will be crucial for the quality of the game. The structure of the game will be designed during O3.

Structure concepts: Mapping should be used to outline the structure of the concept. A detailed organizational chart will support the linear process of the game design.

Game treatment: The game world will be chosen during this O3 stage. Action planning is necessary for this stage. Menus, head-up displays and characters will be developed to underline the narrative aspects of the game.

Integrating structure, game play and game treatment:

All three elements of the design will be integrated during this O3 stage. These three stages consist of learning outcomes, visual media, auditory

media and interaction. All these elements can improve the simulation of the game.

Target groups

Direct target groups

The NAVIGATE game based learning model has been designed with teachers, professors and librarians in mind. All these groups have the possibility to strengthen the Information Literacy competencies of their students and hosts.

The main target group of NAVIGATE project is represented by professors and librarians at a Higher Education level, in humanities. However, the project team considers that the resources, both those selected and those created ex-novo, can be of some help to improve the IL competences at different levels, based on a general and spread limit of competences.

DIRECT:

1. Professors/assistants;
2. Librarians;
3. HE students (bachelor's degree, BA)
4. Information literacy trainers/educators in HE.

Indirect target groups

Pilot tests have been planned to verify how the model works with HE students in humanities, both if professors or librarians are involved. Nevertheless, as suggested above, other target groups as students from high school, or the generic adult audience could benefit from a learning path based on this module.

INDIRECT:

1. Library & Information Science [LIS] professionals or scholars;
2. Teachers in high schools;
3. Students in high schools;
4. Information literacy trainers in informal education;
5. Trainees in informal education;
6. Gamers.

The essentials

1. Trainer perspective regarding applying and utilizing the competency tree framework[1]
2. Free usage, modifying, sharing and adapted usage of information and knowledge in the Competency tree framework.
3. Adapted use of self-assessment during the whole course or educational program as a service for the university library.

[1] https://drive.google.com/drive/folders/1OCU7qtv8GpaMSTBr_2Zk-8KTHKaW4B3i (04/07/2019)

4. Recommended use of the information and knowledge in the Competency tree framework.
5. Instruction via trainer in workshop as practice exercise - informing students about DL and avoiding fake content.
6. When writing an essay or thesis - instructing and recommending the Competency tree framework to show that specific, particular skills are more important than others regarding the topic or research method used in the students' work.

Information Literacy

What is Information Literacy? If you search the web, you will discover many definitions. They are all quite complex or at least extended, because Information Literacy is not a simple competence, but a mix of many of them.

As a reference point, we could use the DIGCOMP2.1 from the European Commission[2] with its levels of information and data literacy from the basic level to identify information needs to the most advanced level in creating solutions to solve problems with many interacting factors that are related to: 1) browsing, searching and filtering data, information and digital content; 2) evaluating data, information and digital content; 3) managing data, information and digital content.

IL Stratification in four levels as follows:

1. **basic** level - **identify** information need; **find** data, info, content through simple search; **find** access navigation between them; **identify** simple search strategy;
2. **intermediate** level - **explain** info needs; **perform** well-motivated searches; **explain** well-defined personal search strategies; **illustrate** info needs; **organize** the data searches and **describe** how to access this info and content; **organize** personal search strategies;
3. **advanced** level - **respond** to info needs; **apply** searches to obtain data and content; **show** access navigation between them; **propose** personal search strategies; **access** info needs - **adapt** searching strategy to find relevant data, info and content - **explain** the way of access - **vary** personal search strategies;
4. highly **specialized** level - **create** solutions to complex problems related to browsing, searching and filtering of data, info and digital content; **integrate** knowledge to contribute to professional practices and **guide** others in browsing, searching and filtering data, info and digital content; **propose** new ideas.

[2] http://publications.jrc.ec.europa.eu/repository/bitstream/JRC106281/web-digcomp2.1pdf_(online).pdf (04/07/2019)

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Games

*"**A game is** a structured form of play, usually undertaken for enjoyment and sometimes used as an educational tool. [...] Games are sometimes played purely for entertainment, sometimes for achievement or reward as well. They can be played alone, in teams, or online; by amateurs or by professionals. [...] **Key components** of games are goals, rules, challenge, and often both. Many games help develop practical skills, serve as a form of exercise, or otherwise perform an educational, simulational, or psychological role"*[3].

Starting from the generic definition of the game on Wikipedia, we immediately find a reference to the educational dimension potentially implied in the playful activity. Nowadays "Serious game" is a rather common term, and its definition can be extremely wide. Often we can also hear the terms "learning games" and "applied games". Again on Wikipedia: "*A **serious game** or **applied game** is a game designed for a primary purpose other than pure entertainment*[4]*"*.

But why should a game be serious? The 'seriousness' of a game may depend more on the use of it rather than how it is designed. This means that in the framework of Game Based Learning, we can find examples of mainstream games (or 'usual' commercial games whose main goal is entertainment) that have been used to enhance specific skills or teach specific subjects.

The NAVIGATE model focuses on games that can initiate a transformation in the user, moving him/her from a state to another. So this may apply to the aim of increasing the level of awareness on a specific subject (e.g. the importance of quoting a source) that a game can actually enhance in the gamer/user. In this sense, games are often considered a powerful tool to improve or develop competences by a *learning by doing* or *simulating* approaches.

Please note that, even though we refer in this context to video (digital) games, also board games (e.g. cards) can have impressive educational potential, so serious games can be digital or not.

There are obviously many examples, but we can in this context mention "This War of Mine", as it's a very popular synthesis of what we're describing: it's available both as a board and video-game, and it's perfectly placed among the boundaries of entertainment, education, physical and digital.[5]

How to use games in education

First, we need to know what different kind of games we can use.

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[3] https://en.wikipedia.org/wiki/Game (22/05/2019)

[4] https://en.wikipedia.org/wiki/Serious_game (22/05/2019)

[5] "In This War of Mine for the first time **you do not play as an elite soldier, but a group of civilians** trying to survive in a besieged city; struggling with lack of necessities and constant danger." It is described as "a longform exercise in empathy" - This War of Mine: http://www.thiswarofmine.com/ [May 2019].

Many classifications of games with a potential educational impact are already available, and addressing them all here would bring us beyond the scope of the actual work.
Implementing the example approach, we can mention the "Serious Games Classifications"[6], where they are classified according to their gameplay, their purposes, their markets and target audience, alongside with user-contributed keywords.
An impressive work has been done in that sense by the "The Serious Games Typology Project", whose aim is to "build a global catalogue of serious games while facilitating the study of the evolution of game based learning and other areas that are still to be explored."[7]
On the other hand, when dealing with a specific subject, as for instance health, other categorizations can be found, as this one by Rubén Jesús García Hernandez, on "Serious Games for e-Health Care".[8]
In general, many researchers tend to refuse close categorization:
"*How "traditional" and entertainment video games may be able to have a potential educational and training function? [...] Anything that could be able to improve knowledge, skills and competences in the user, has to be linked to the intrinsic characteristics of the videogame medium such as immersion, proactivity and interaction. These are peculiarities also typical of serious games in their classic definition but declined in different ways. The focus is not mainly what (the type of video game, serious game or not), but how (how to interact with this).*"[9]
For the very specific purposes of this model, the following macro-categories should be the most effective:

1. *Games designed for entertainment, with an (almost) evident learning impact:* Many commercial games address topics laterally and subjects that are often useful when teaching specific themes. A famous example is Civilization, which can be used to teach history.
2. *Games designed for entertainment but for educational purposes as well:* Adapting commercial games to learning needs is a tendency that is taking place more and more nowadays. "Anything that's vastly popular among students should be addressed in the classroom one way or another" says the American teacher and researcher Abran Maldonado on his website. A classic situation is to use a Mainstream

[6] See http://serious.gameclassification.com/
[7] See https://seriousgames.online/
[8] "Serious Games for e-Health Care", by Voravika Wattanasoontorn, Rubén Jesús García Hernandez and Mateu Sbert, 2012, ResearchGate - researchgate.net/publication/259199150_Serious_Games_for_e-Health_Care
[9] "La pratica video-ludica. Arte e tecnica, gioco e apprendimento", by C. Coccimiglio, M.M. Riolo - INDIRE, ("The video-ludic practice. Art, technique, game and learning" - Rivista Bricks, December 2019.

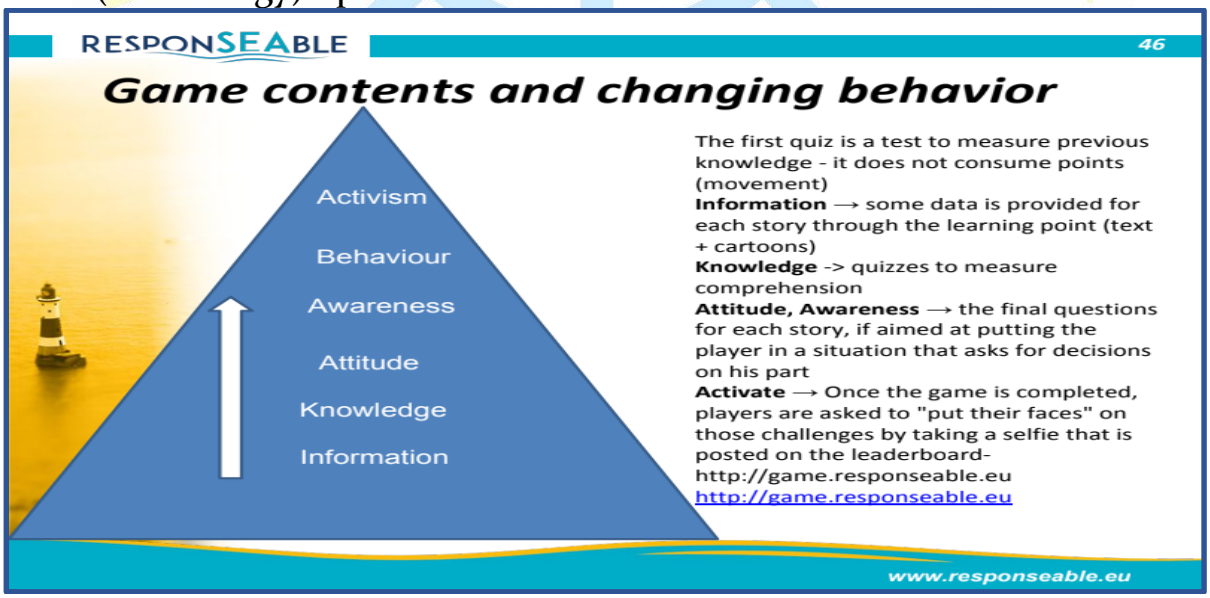
game to enhance debates in class (eg. games that have moral dilemmas, such as Walking Dead) (cfr. Aleksander Husøy & Tobias Staaby, Norway)

3. *Serious Games, designed for educational purposes*: This is the 'classic' category of games: Use of games specifically designed to teach particular subjects of competences. The ones selected in the mentioned NAVIGATE Search Tool belong to this set. For a further example set of this kind of games, we suggest taking a look of these slides from Maja Pivec, developed in 2014.

Why games to teach Information Literacy

As mentioned, games can be used to teach or train in several fields. It is a widespread belief that the main potential of games is related to the engagement they can enkindle in the users, often higher if compared to other educational media (books, videos, etc.), as the user is both the main protagonist of the game and a follower of the learning path.

Games are therefore often used in context where the main educational need goes beyond the mere acquisition of knowledge. Applied games can be designed to focus on competence development or even on behavioral changes. A good example of the exploitation of this kind of resources is the application to ethical subjects, like the issue of the environment and pollution promoted by the Erasmus+ project ResponSeable. In this chart from Eleonora Pantò, involved in the mentioned project, you can notice the interrelationship between "Game contents and changing behavior".[10] It shows how the game users are driven from a basic 'information' level on the issue (sea ecology) up to sheer 'activism'.



[10] "A learning game for Blue literacy", Parma, 28th February 2019, by Eleonora Pantò, CSP Piemonte - Responseable.eu - February 2019,

When it comes to Information Literacy, as stated in previous outputs[11] of the NAVIGATE project, we need to teach specific competences: therefore, using games is for sure a very useful option, as the games can drive the transformation of behavior of the users (in our case mostly HE students, as they are the main target of the NAVIGATE project) in a more conscious and effective way, for instance finding relevant sources, recognizing fake content, searching, finding, evaluating, managing and communicating information.

In that sense, games can provide simulation of an actual situation ("can you recognize this fake news"), de-contextualize a didactical situation into a metaphorical environment (e.g. an adventure with quests whose solution is linked to specific IL based questions) or go further in asking the player to build up or manage information.

Games on Information Literacy: the NAVIGATE search tool

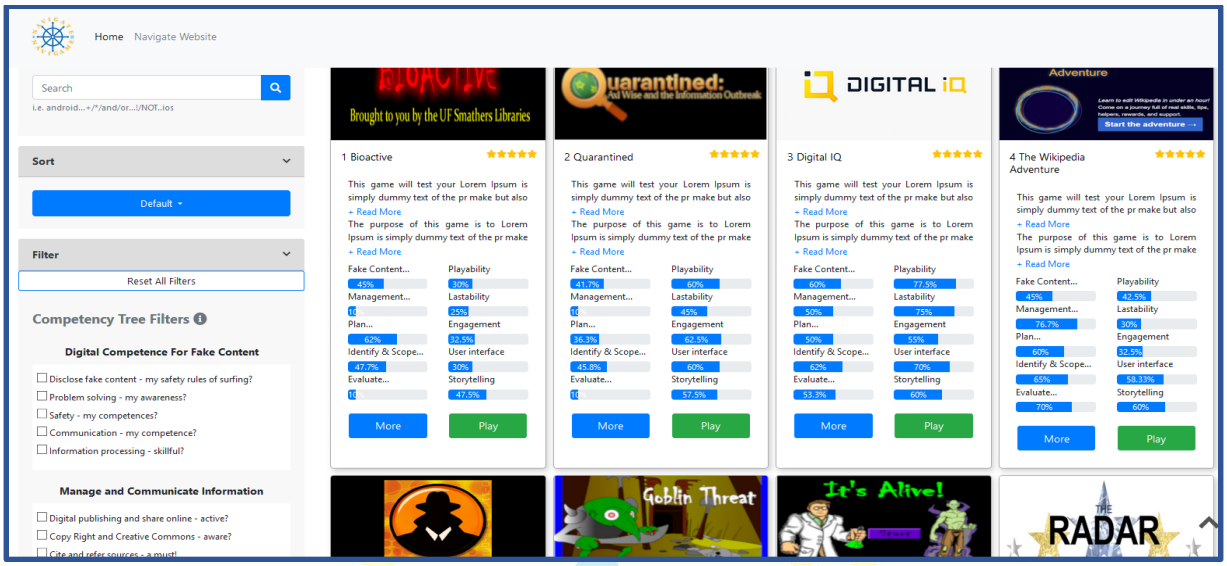
NAVIGATE mapped about 70 serious games from all around the world that offer a reasoned set of existing games that can be useful particularly in the context of Information Literacy.

The NaviGameSearcher has been designed to offer teachers, librarians and educators peer information about the uses and the features. It is based on a peer review expert form on different subjects, so as to determine an inclusive set of supporting advice.

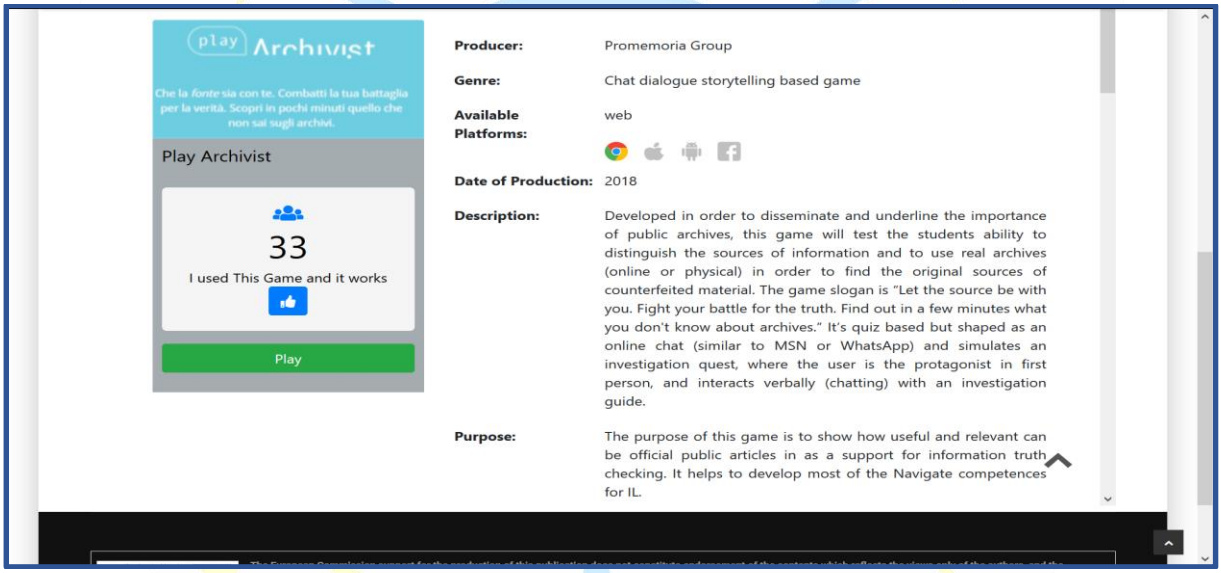
Games are presented through summary cards that show at a first view which the potential purposes of each of them are thanks to the use of bars.

Filters on the left side of the page are particularly important, as they help to select games based both on educational purposes and technical features.

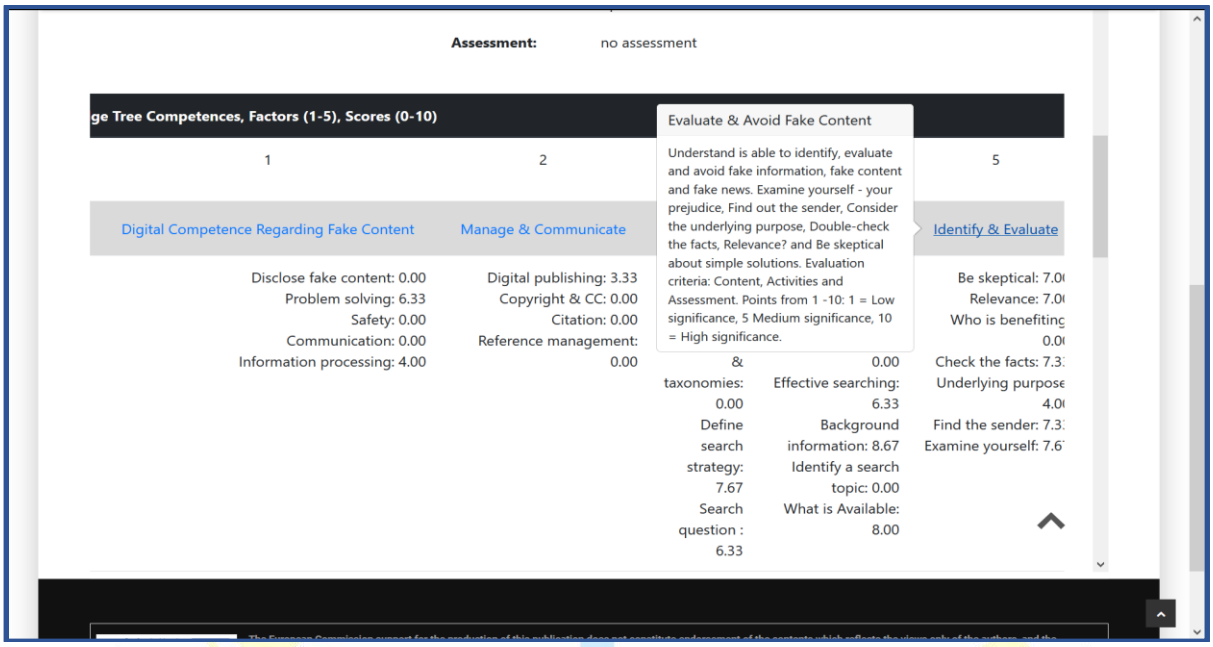
[11] Please see the Output "Tracking the Evolution of the Information Literacy Training Needs in Faculties of Humanities in European Universities: Elaboration of a Competency Tree" and the following chapters - https://www.NAVIGATEproject.eu/o1/.



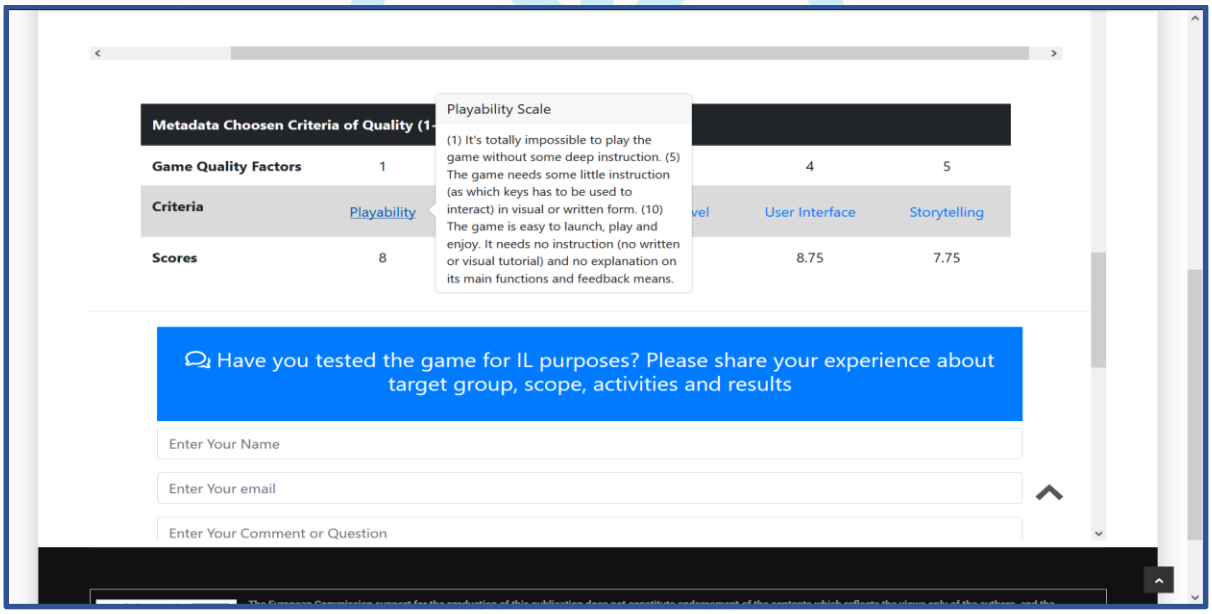
When you find the game that you are interested in, for more info you can click on “more” and access the full information page.



Scrolling down, you find the results of the peer review. First comes the evaluation based on the NAVIGATE Competences tree: you have access to the general score for each of the 5 factors identified as most relevant and also to the specific competences for each of them. In this way, it will be easy for you to choose the best game for your learning goals.



Then you find the results of the peer review focus on the technical side. This data could help you to have a better understanding of some features of the game. For example, how long does it take to play this game? Is it coherent with the learning goal?



Please note that the peer review doesn't stop here. Should you choose one of these games, it will be great if you come back to the NaviGameSearcher to tell your story. It could be very useful for new teachers that will join.

Game based learning as a practice: developing your own scenario to teach IL through games

As stated by Coccimiglio and Riolo (2018), "*It is precisely the experience of playing video games in a reasoned and educational way, one could say a*

meaningful play, to make video game enjoyment an activity with a formative value, if guided, reworked and shared."

That's why, in the context of NAVIGATE, we also suggest teachers make an attempt to design new scenarios: they could be based on the games selected in the NaviGameSearcher or anyway selected among the existing ones (also among the mainstream ones), but it's possible also to develop your own gamified scenarios, according to the specific learning goals on Information Literacy (possibly not mentioned in the NAVIGATE IL Competency Tree).

An example can be related to the cultural and geographical aspects, or even political, of Information Literacy, especially when it comes to quotes (those have different rules and specification between - for instance - the Anglo-Saxon system and the Latin one) or fake news. Some of the games collected in the NAVIGATE Game Search Tool have been developed in the USA, so they reflect the issues and context of North America. But, as an example, if we want to ask a student to distinguish between fake news and a real one, and we're in Bulgaria or Sweden, it would make more sense if we collected examples from those countries.

That's why we suggest teachers develop their own game strategy, drawing inspiration by the collected examples, and adapt them to their needs and contexts, according to the IL Outcomes they wish to achieve with the students.

This is obviously not an easy task to do, as it puts the teacher in the difficult position of becoming a trainer and facilitator of learning than being a mere lecturer. But this is a world-wide tendency that is now more and more recognized at several levels when it comes to soft skills/competences training at HE level.[12]

When to adopt it

Training needs and learning outcomes

The need for training and the results of the learners correspond to the conducted comparative research among students of three universities in Bulgaria, Italy and Sweden. The results show that training should be to a large extent focused on the strategies for conducting information search in a broader sense. Most students have only basic levels of knowledge of information, which is not enough today even for the purposes of vocational training. It is also useful to have information literacy training, whether part of the curriculum or outside of it, in close cooperation with lecturers, teachers, librarians, etc., and preferably in the territory of libraries (in this

[12] See the "eLene4Life - Learning and Interacting to Foster Employability" report "Transnational Analysis of the Transferability to Higher Education of Innovative Corporate Training on Soft Skills" - http://elene4life.eu/ - May 2019.

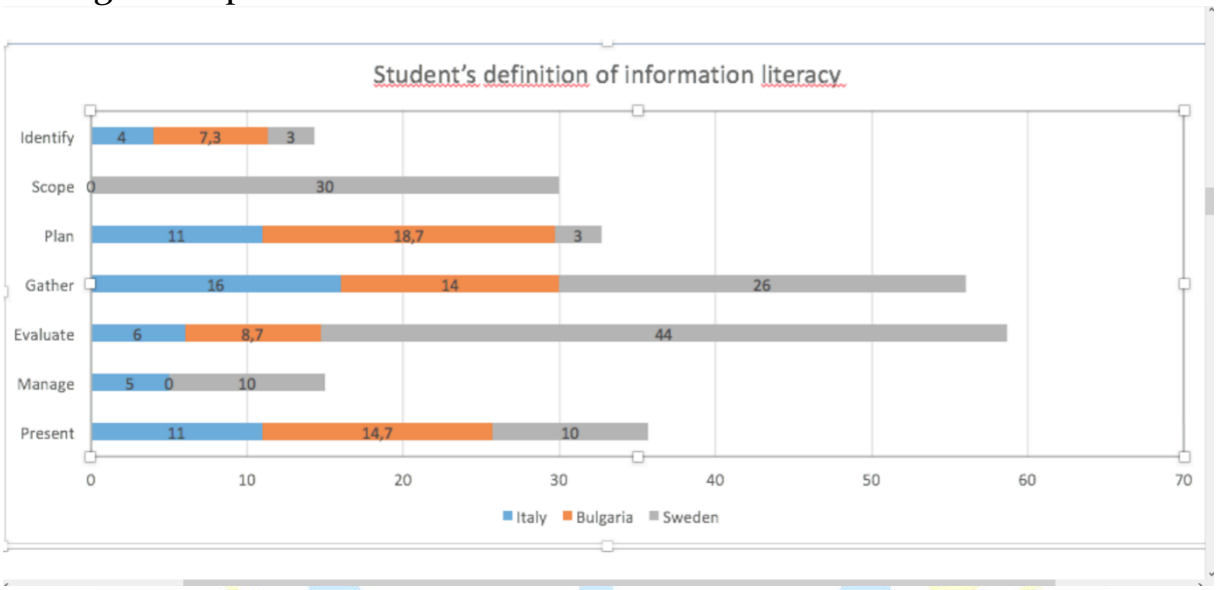
case university ones) as these institutions are an appropriate place for learning and self-education by integrating through their organization and activities the whole range of knowledge and skills needed to successfully complete the training course. Negative results are also due to students' lack of a sufficiently good library and bibliographic culture, which is part of the information culture and which is also associated with a low level of information search skills. The research data showed that libraries are not currently the preferred and sought-after places for information and research. More attention needs to be paid to knowledge related to virtual space security.

Students' information competence is at different levels affected by cultural and economic differences, which impacts their abilities to manage information. From the differences in curricula and the ways and forms for integrating information literacy training, it is necessary that this training should be linked to the development of a comprehensive strategy for conducting information search, including the integration and creation of new knowledge. Insufficient in itself is having good digital competencies. These should be linked to other complementing cognitive skills including creative thinking, case-solving and cooperation skills.

Competency tree

At present the three partner universities have different methodologies and approaches to teaching Information Literacy (IL) competencies. While in Bulgaria the IL concepts are integrated in different courses within the curriculum, in Italy and Sweden the library offers not mandatory courses related to online resources and information retrieval. Students however arrive at the university with previous experience and knowledge and therefore should not be considered as totally ignorant. The survey asked the learners to define the concept of IL in order to understand if they are actually literate when they enter the university. Information literacy The analysis - via classification of the students written statements for this open question how do they understand IL as definition/concept – was done with the Framework SCONUL Seven Pillars of Information Literacy (2011). Most of students (16% in Italy, 14% in Bulgaria and 26% in Sweden) define information literacy as the ability to gather information online and to know how to evaluate it (6% in Italy, 9% in Bulgaria and 44% in Sweden). Few students are aware of the importance of knowing how to present and create content (11% in Italy, 15% in Bulgaria and 10% Sweden). Only students in Sweden recognize the importance of starting from the scope (30%). All the students of the three universities are unaware of the preliminary

identification and planning phases and of the important information management phase.



The Competency Tree Framework has been done with a generic Framework web tool - ready for all to use and modify with an open OER license model. The Competency Tree Framework has possibilities to be used both as a basis for game development as well as for direct teaching about the necessary information skills and digital skills for humanities students, here also taking into account integrating learning modules from Competency Tree Framework within the Librarian's progression plans for the curriculum in a course or an education program.

Lesson learned is that it allows students to have clear arguments for their perception around what is false data, false content or fake news here is the tool around Limited vs Complex ways of experiencing evidence & arguments. This is important to take care of in the learning modules in the learning design of the game.

Questions from the article ”SIX Frames for Information literacy Education: a conceptual framework for interpreting the relationship between theory and practice” are relevant and can be used as critical questions in the work with the learning design for game production and using the Competency Tree Framework with the students.

Expected results

In order to integrate the gaming element into the educational process, it is above all necessary to identify the results demanded by the training, which also correspond to the complex of types of knowledge that are necessary for the implementation of both daily routine operations and non-specific activities to:

- ✓ Have a set of skills to identify different types of information sources, identify them and work with different text formats;
- ✓ Apply a set of criteria for analyzing and evaluating information (including that from social networks), including critical analysis to avoid false content;
- ✓ Have and apply critical thinking in the educational process;
- ✓ Be able to build effective information search strategies, using different approaches and techniques;
- ✓ Know the term “plagiarism" and techniques for its prevention;
- ✓ Be able to create own content and present it;
- ✓ Integrate new knowledge into the scope of already accumulated knowledge.

Competences - Matrix
(regarding the content, activities and assessment areas)

Digital competence - regarding fake content	Manage and communicate information	Plan - find relevant information	Identify and scope - search/find information	Identify, evaluate and avoid fake information

Learner needs and priorities for the NAVIGATE game/s to develop – to give high priority to

“Disclose fake content - my safety rules of surfing?”, “Problem solving - my awareness?”, “Safety - my competences?” and “Communication - my competences?”	“Reference management software - you use it?”, “Cite and refer sources - a must!” and “Copyright and Creative Commons - aware?”	“Search techniques and specialist search tools - do you have a clue?”, “Vocabularies and taxonomies - your knowledge?” and “Define a search strategy and search tool”	“Do you know the scientific sources?”, Use Library guides - research and topic guides, Apply the principles of effective searching?” and “Identify a search topic - using keywords and search words?”	Almost none (Note: Newer custom games are available on the market)

Potential issues

The SWOT-analysis and preferred conclusion is the following, regarding games on the market and competencies referring to our Competency Tree Framework:

- ✓ *Digital competence - regarding fake content* - mostly very old or very new games
- ✓ *Manage and communicate information* - mostly very old and the games not working well
- ✓ *Plan - find relevant information* - many old games now, not very well working today.
- ✓ *Identify and scope - search/find information* - many old games, now very well working today
- ✓ *Identify, evaluate and avoid fake information* - several new games and working well today

How to adopt it

Use of Mobiles

Mobile literacy - scope of the notion (according to survey among students)[13]:

1. ML is related to mobile skills (IDENTIFY).
2. ML lies in different approach of finding and social spreading information (PRESENT).
3. ML is related to computer and Internet skills (GATHER).
4. ML is referred to the devices themselves and the technical equipment (MANAGE).
5. ML is the capability to use devices and Internet (GATHER).

Mobile literacy - scope of the notion (in general):

1. ML provides a comprehensive introduction to literacy pedagogy within today's new media environment;
2. ML focuses on different modes of communication - oral, visual, audio, gestural and spatial literacies.
3. IL skills has been broadening in the mobile environment - it occurred in response to exponential increase in both the number of information channels that can be accessed and the amount of information flowing through them.
4. MLearning according to Advanced Distributed Learning (ADL) is the use of handheld computing devices to provide access to learning content and information resources.

The results of the comparative analysis in O1 clearly show that the preferences of humanities students in the three countries, regardless of their economic difference, prefer in every case to use their mobile phones

[13] https://drive.google.com/drive/folders/1pNTeZwzu6qczlYJs__lhhQMh8FHj2WUv (04/07/2019).

and more specifically smartphones. Most of all, however, they see them as a source of entertainment (excluding their main purpose, which is naturally a priority), rather than as a means of training and / or upgrading competences. This is valid for all types of mobile devices that students own, and most importantly, it confirms the direction of the project: fun, interactive learning. It also answers the question what kind of access the developed games within the project should use – either through an application for the two major types of operating systems on modern phones and / or accessible through a browser. Consideration should also be given to access through social networks, as students spend a considerable part of their time on them. Therefore, games should be well planned for both single player and multi-player options, with the added benefit of being able to promote competitiveness between players and their competitive nature. The information gathered during O1 also shows that if games are fun, dynamic and contemporary, they will be of interest to students and would be part of their learning approaches.

Real users scenarios

The dynamics of the everyday processes in the 21st century differs drastically from those that were witnessed at its beginning. The rapid development of technologies and their even faster advent in all spheres of life have totally changed the routine activities and the different professional spheres. Certifying knowledge as part of the school and university systems (formal education) is far from enough. The very dynamics of the development of the labor market influenced by the constant influx of innovation necessitates the demand for another educational environment in order to acquire new skills and knowledge i.e. participation of different age groups in informal training. In many cases, participation in lifelong learning processes, whether in formal and/or non-formal education, is based on one of the basic concepts underlying the concept of "information literacy", namely: individual awareness of the need of additional knowledge. In this context, the main partner of Navigate is the libraries, which in the practice of the EU countries are real partners of universities in education, as well as various other organizations, such as centers for continuing education and / or qualification, NGOs, etc.

Libraries today are a territory for innovations, including the latest ones. For example, at OODI Public Library in Helsinki (Finland), a robot works with (the Illusion of) a Personality[14]. In this sense, and given one of the main guidelines for the development of libraries as a "social hub" (third place), they are no longer just a place to keep books. Within their traditional

[14] URL: https://www.futurice.com/blog/the-little-robot-that-lived-at-the-library

functions and activities, libraries are also institutions where children find support for their personal development, but also students, professionals and all who wish to upgrade their knowledge and skills.
Intelligent products developed under Navigate (with modifications according to purpose and age category) will be able to be successfully used in the work of library institutions, as libraries are recognized by the EU as an important and reliable partner in the process of acquiring information competences. Along with the traditional activities they carry out, much of the work of libraries and librarians is related to the formation of habits for users to search for traditional and electronic information, recognition and application of criteria for relevant search, verification of information resources, ways and forms for the correct use of information resources, etc. These tasks directly correspond to the Navigate aims and the developed within O1 Competency Tree – a foundation for the learning games planned within the project.
Application of the Competency Tree in the Work of Libraries: (real situations):
Identify and scope – search/find information – libraries, in their role as "providers" of information services and information, daily find themselves in a situation where they give the guidance necessary for each person to find the information they need and successfully use the resources as an institution, such as the library catalog, through which information sources are accessed. Each library has developed its own concepts for orientation within the institution and effective ways to obtain the information it needs: through verbal explanations on site (both by library professionals and by volunteers of different ages, including the principle of "older to younger" commonly used in the practice of Bulgarian libraries when working with children and students), through a text guide published on the library's website, through an interactive guide, etc.
Identify, evaluate and avoid fake information. However, the work of libraries today is not just about providing guidance on resource use and how to reach content. An important element of content is its quality, and libraries are a guarantee for users to reach it. In a world where hundreds of fake news stories are published daily through various news channels, combating levels of international integration and developing special policies, it is important for libraries to assist in the process of evaluating information and to help form habits for critical thinking and content analysis for its users (across all ages and professional fields). In their activities, libraries find themselves in a situation where they need to validate not only the relevance of information, but also its authenticity. More and more libraries, especially

when it comes to serving professional categories of users and scholars, for students and pupils, provide access to specialized databases. However, the training of young people on the formation of a criteria basis for avoiding false content remains an essential point being one of the priorities in the work of libraries.

Manage and communicate information – a great part of the information management process is the skills that are encouraged for the development of learners corresponding to the application of established standards for the use of various information resources in the correct way concerning their authors. This process actively contributes to the organization of learners' own knowledge and influences the final result that students need to achieve (poster, thesis, presentation, etc.). The role of librarians and library experts is to assist different categories of learners in developing skills for correctly citing and presenting bibliographic resources (also known as library knowledge / culture), but in the process today different tools, techniques and applications can be used making the process significantly more reliable and easy to use by technology generations. Often, professionals are also advisors to help make the right choice and way of sharing the end information product, which is also part of the learning process whereby learners are able to understand and make sense of the selection criteria used and integrate them into their own system of values.

Plan – find relevant information – who can better than a library specialist build an effective search strategy? A specialist who has lived and worked in the time of traditional library information-search systems, working today with technology-based search systems. It is the library institution where the universities (theoretical knowledge) meet with the real environment (practice), where the practitioners apply the practical knowledge in formal education. On the way to building an effective plan for searching for reliable and qualitative information, library professionals take the role of navigators in the process of refining information questions, formulating search words and phrases, using various search techniques, including the use of new technologies.

Digital competence – regarding fake content – The role of modern libraries and professionals is also essential in the formation of digital literacy, especially with regard to false content. This is not only related to the formation of a criterion scale for the evaluation of information resources, but also to the formation of at least a basic understanding of relationships and communication in the web space, the nature of copyright, etc. as well as computer skills related to consumer safety on the Internet (especially important for users under 16 and those in the 60+ category).

Examples are given of the activities of libraries, training centers, NGOs, etc. in Bulgaria, because the partner countries of the project (Italy and Sweden), are placed in the most disadvantageous position in terms of economic and cultural status. Our argument for this is that if there are practices promoting the development of information competences in a country where libraries are not in a strong position like Bulgaria, then this is probably a mandatory element of the work of foreign similar institutions.
Good examples of Bulgarian library practice demonstrating the possible application of Navigate educational games in a broader context are the activities of Sofia City Library, New Bulgarian University Library (NBU), Varna Regional Library, organizations in informal education, etc. These examples are not exhaustive of all the problems and possible training topics of the Competency Tree, since they are not organized by the Bulgarian institutions. This gives Navigate the opportunity to fit in just where there is a gap.

- ✓ At NBU periodically for first-year students, PhD students and teachers there is a training related to the basics of information search, where students learn the basic library rules, work with library catalogs, electronic services system, etc. Specialized training courses are also organized in relation to the work with specialized databases, in which it is necessary to build a more complete concept of information search and to define dimensions in advance. Also, librarians carry out trainings on the basic principles of correct use of information resources (citation), which are often open to outside visitors.
- ✓ The same goals are set by the trainers of Regional Library Pencho Slaveykov-Varna. Initial computer literacy courses for people aged 60+ in lifelong learning and digital competency can also successfully utilize the already developed intellectual products from the Navigate team, as well as successfully put into practice educational games for formation of information skills. They can also be used in the training of librarians for the purpose of educational games, understanding their logic of building and adapting to the model of work in a particular library institution and real practical application in the process of library services.
- ✓ Within the framework of vocational non-formal education for library professionals, the products we develop can also be used by The Center for Continuing Education of Librarians with the Bulgarian Library and Information Association. Those wishing to enroll in training courses can choose between “Information Search Strategies and Techniques”,

"Economic and Business Information - How to Find It, How to Use It?", "Local Information Electronic Resources", "Training on Information Literacy Teachers", etc.

- ✓ In the Vocational Training Center with ULSIT there are training courses for the occupation of Librarians. Generally, the educational process, as well as in the field of school and university education, is related to the formation of skills concerning the information competence of students, including the ability to use library instructions, to work with a library catalog at a basic level, searching in the information systems, etc.
- ✓ In 2018, in Sofia City Library, within the framework of the Student Practices project of the Ministry of Education and Science, students were acquainted with the norms for working in the institution in a specially prepared practical work plan, existing instructions, basic work with an electronic library catalog, i.e. basic information skills that form the basic level of information competence. Such training, with the necessary adaptations, can be carried out with students of different age categories.