

Game-Based Learning: a Cognitive Pedagogical Approach for Improving Students' Information Literacy

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Abstract:

In the world of digital information, university students need more critical thinking to have the ability to evaluate and use information resources. The paper presents the preliminary findings of the Project NAVIGATE (09/2017-08/2020) focused on Higher Education (HE) students in Humanities as major target. It aims to enhance student learning with the creation of a set of games based didactical resources (methodologies, competency tree, digital serious games) that can hopefully support the Information Literacy competencies.

Keywords: Fake content, Information literacy, Games based learning.

Introduction: Games based learning definition

In terms of Human Computer Interaction (HCI) research, gamification is the use of game design elements in non-game context(s) in order to influence user behaviour (Deterding et al., 2011). According to Wouters et al. (2013), computer games are interactive environments (Prensky, 2001; Vogel et al., 2006) that are based on a set of agreed rules and constraints (Garris, Ahlers, & Driskell, 2002) and that challenge the player(s) towards a clear goal (Malone, 1981). In addition, computer games constantly provide feedback, either as a score or as changes in the game world, to enable players to monitor their progress toward the goal (Prensky, 2001).

This distinction of games elements in serious games is mirrored in McGonigal's coinage of the term gameful as a complement to playful. All games for games experts, share four defining traits: a goal, rules, a feedback system, and voluntary participation (McGonigal, 2011). Whereas serious games describe the use of complete games for non-entertainment purposes, gamified applications use “elements” of games that do not give rise to entire games. James Paul Gee, a professor of Education at Arizona State University and prominent scholar of game-based learning, notes that “good video games incorporate good learning principles, principles supported by current research in cognitive science” (2005, 34).

From these definitions, it is evident that three academic perspectives of 1) computer science, 2) education, plus 3) a professional game development perspective are combined in the world of gaming. The common objectives linking these three academic studies is whether games can improve learning processes, in terms of participants’ motivation and engagement and/or learning outcomes. Are games really improving learning?

Clark et al.’s (2016) extensive meta-analysis suggests that evidence in favour of a positive learning potential of games is now more solid, and it also shows that there are several variables increasing the effect, such as game mechanics, visual and narrative features, and additional instructor support. The analysis of the core papers for this perspective revealed that research has mostly concentrated on game based learning in the different disciplines, in the various types of games and on the type of learning impact. However, the ways authors approach this objective differ greatly, mostly due to the different viewpoints they take. This very varied landscape, together with the relatively narrow scope of empirical evidence, makes it difficult to draw general conclusions. It is perhaps for this reason that authors tend to agree upon the fact that research should focus more on the connection between games features and learners and content characteristics.

The originality of the NAVIGATE Project is that it attempts to bring together the three academic perspectives to improve the learning of students in the humanities faculties for information literacy.

Games based learning for Information literacy

How information literate are the Google generations, and what information literacy skills do they bring to university? This was the initial question of the NAVIGAYE Project.

In terms of using information to learn, students’ prior experience provides the scaffolding that enables them to augment their existing knowledge. At Trobe a questionnaire has been submitted to students to understand their previous knowledge (Salisbury 2012). The Stanford study related to social media and website using student assignment, has added fuel to the discussion, suggesting university students have very weak evaluation skills.

The traditional approach to information literacy education is the “one-shot” method, in which a faculty member invites a librarian to a classroom to discuss discipline-relevant resources and library services. This passive learning experience creates a latency between the time of instruction and the actual usage of a library resource and requires repeated contacts with students to be successful.

For IFLA UNESCO MIL (Media and Information Literacy) consists of the knowledge, the attitudes, and the sum of the skills needed to know when and what information is needed; where and how to obtain that information; how to evaluate it critically and organise it once it is found; and how to use it in an ethical way. The concept extends beyond communication and information technologies to encompass learning, critical thinking, and interpretative skills across and beyond professional and educational boundaries. Media and Information Literacy includes all types of information resources: oral, print, and digital (IFLA UNESCO 2011).

For European Commission, the definitions used in the official documents¹ for digital or Media literacy emphasize tool-related skills as well as critical attitude and understanding of safe usage. Media literacy is the ability to access the media, to understand and to critically evaluate different aspects of the media and media contents and to create communications in a variety of contexts (Ala-Mutka, K. (2011) European Commission).

The difference between the two definitions is that MIL of IFLA UNESCO starts from the integration of different media and technologies in present situation: this combines digital literacy and information literacy. In fact, different types of sources are used (even at the University we cannot limit ourselves to texts, but we must also consider social media) and we use different tools and devices, along with traditional paper or oral ones.

The European Commission which, in the last two years has adopted digital literacy as a key concept, leaves the definition vague, speaking in terms of “the ability to use ICT and the Internet” (European Commission, 2003, p. 3) or “the ability to effectively use ICT” (ibid., p. 14).

As to information literacy and games based learning, Sourmelis et al. (2017) find that these are addressed in only a limited number of studies. These mostly regard the way players search through online sources of information of various kinds to solve problems associated to the game. Most of the research concerning the learning effects of applied games for information literacy focus on investigating knowledge acquisition or skills development, as well as engagement. Connelly et al. (2012) found that many such games were simulations or puzzle games and suggest that this may be because these learning environments have already proved satisfactory.

Aims and objectives

The NAVIGATE Project is learner centred and aims to improve students’ learning. Learners must become "media and information literate" and with the capacity to understand, assess, evaluate, and apply information to solve problems or answer questions about fake content.

NAVIGATE aims at enhancing students’ competencies in recognising fake content. The definition adopted by the team is as follows: Fake content (print, digital, oral) is considered disinformation, inaccurate and uncertified information. To filter fake content, the measurable characteristics of quality information include: authority, purpose, format (accuracy), relevance, documentation and timeliness.

The project objectives are:

- To develop a game-based model for information literacy training consisting of a syllabus based on the competency tree;
- To elaborate learning material such as games included in the syllabus, working modules with specific game tasks, game-based learning activities.

From the pedagogical perspective, NAVIGATE is combining cognitive psychology and constructivist learning theory. The project’s cognitive pedagogical perspective sees learning as a result of knowledge, experiences, and understanding—learning through gaming (Gee 2003, 2004).

¹ ftp://jrc.es/pub/EURdoc/JRC67075_TN.pdf

Methodology

In the first phase of the Project (Output 1 - O1), a comparative study of the information literacy competences of the students was carried out in the three partner universities in Sofia, Parma and Gävle. On the basis of the students' gap results, a Competency tree was elaborated including the competences necessary for the students to avoid fake content. The Italian Team conducted a workshop to better understand what competencies the faculty would like the students to learn. The outcome of the workshop provides examples of learning situations and strategies that can assist in the development of games. Recent literature on developing IL of students suggests that curricula should not only involve generic skills, but also knowledge about discipline specific content and research practices (Grafstein, 2002; Farrell, R. and Badke, W. 2015; Secker and Coonan, 2013). Additionally, information literacy teaching in a discipline specific context is considered beneficial to students, as discipline specific contexts create motivation for learning.

In the second phase (Output 2 - O2), around 67 games used for learning information literacy in academic libraries were identified and evaluated. The top 20 games for information literacy have been ranked according to three aspects: 1) technological interface, 2) content, 3) pedagogical aspects (outcomes, activities and assessment). An interactive database was developed in order to visualize the list and categories.

The NAVIGATE team noted a lack of games directed to the last-year university students and also the fact that the existing games are mostly tutorials; thus, they do not reflect current changes in technology, information use and academic content/expectations. The alignment of game aims, mechanics and strategies, and content to be learnt is also an important principle; another is that immersive gaming features should be used with care, in order to avoid unnecessary cognitive load. Finally, the pivotal role of educators in contextualising the gaming experience is underlined by several authors.

Based on similar considerations, several authors (Abdul Jabbar & Felicia, 2015; Clark et al., 2016; Wilson et al., 2009) have sought to advance the state of knowledge about games and gamification for learning by analysing the relationship between game design, game attributes or game elements, and learning outcomes.

First findings

The analysis of students' answers in the educational institutions involved in the survey on information literacy competences clearly shows where and in which areas learners have serious shortcomings and the need to gain additional competencies related to the formation of at least an average level of information skills. According to SCONUL's concept for 7 pillars of information literacy, this means that some of the most serious problems related to the understanding of information skills are:

- As for identifying the need for information, students often have difficulties in recognizing the lack of sufficient knowledge on specific topics and issues, including achieving well-defined educational and other goals. This can be seen as an explanation for their inability to plan a successful search for information (Identify);
- Also, understanding the notion of "information literacy", which is predominantly based on its technological aspects, prevents students from identifying their own gaps in their knowledge, as well as correctly identifying the appropriate information sources (Scope);
- Serious gaps have been identified regarding their skills to build an information search/search strategy (Plan).
- Generally, as far as the critical assessment and comparison of information sources is concerned, there are also unsatisfactory higher education skills (Evaluate).

- Considering all of the above, students encounter difficulties in presenting the information regarding its inclusion in its own knowledge complex (Present).

As a conclusion of Phase 1, doing an analysis of the students' answers on their concept of information literacy, mobile literacy and fake news, we can say that there is an overlap between Mobile and Information literacy and Digital competences. The activities of the preparatory phases of the research process are underestimated. The skills of knowing how to manage and present information are underestimated too. We can state that all students have an electronic device and are connected, but do not use the technology for learning. The learning style is still traditional even if the book is close to the PC. Many like to study at home, few prefer the library, but the Library is used as a place not for its services, including databases and digital resources. It is important to note the apparent contradiction between the answers because they can highlight two different styles of learning and teaching: active learning (and teaching) makes the difference. While studying for exams is notional and based on the textbook, doing exercises at home requires more information resources. Therefore, it is necessary the active learning of students to be stimulated in order they to become more information literate.

In mobile literacy there is a greater importance of digital competences. This has two aspects. The first 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 knowing the device. The second aspect is that they tend to neglect research strategies, which even before in the concept of information literacy were highlighted and to underestimate the management of information. It is interesting to note that students in the survey evidence that the preparatory activities of the research process disappear: how to identify needs, plan and understand what is already known. The planned activities are reduced to: gather, evaluation and presentation.

In terms of using information for learning, the previous student experience provides the scaffolding that allows them to increase their existing knowledge. One of the most effective ways to ensure that students become skilled in handling good information is to include information skills in the curriculum, centred on the library, but also put into practice in the classes and combined with the different subjects. While studying for exams is based on traditional sources, doing exercises during the semester requires more online information resources. Therefore, to stimulate better information literacy the involvement of teachers is essential. If libraries want to have a role for learning using mobile services, they should also start offering services on mobile devices.

Games based model Strategy

The cognitive pedagogical conceptual approach of the NAVIGATE project is described by two documents, based on the results of the first two phases: a Game based model Strategy and a Games based Syllabus.

The Game-based model Strategy and the connected Competency tree with Information Literacy pillars include various learning scenarios and characters related to the learner, librarian and teacher. The learning pathways are dependent on learning outcomes the NAVIGATE team choose and prioritize from Competency Tree Framework (what's missing from the 20 best analyzed games).

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. The important learning outcomes for NAVIGATE project are the students 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 from different sources (e.g. social networks), including critical analysis to avoid fake 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.

Using the Game-based model Strategy, the team has developed the NAVIGATE games syllabus based on activities, both embedded or independent from the student curriculum. If independent, further discussion about assessment models and competencies will be essential. Assessment is including self-assessment, peer assessment and teacher assessment. It is an activity in which the cognitive approach of information literacy is better combined with the pedagogical aspect of learning theory.

The project is focusing on an innovative approach: the research behaviours that students have with mobile devices. This means that students are more oriented to solve immediate problems, rather than those of deep knowledge related to tasks and exams. A mobile literate user has to be print and multimedia literate, as well as information literacy and network literate. Mobile literacy, then, is a macro-literacy, which requires student to be able to master all the afore-mentioned literacies.

NAVIGATE is the first to correlate mobile learning and gaming, how do we make this combination? Mobile learning has an impact on the library. If we want the library to return to the centre, it is not enough to remind the library resources and therefore the need to go to the library. Conversely, the library goes where the student is, through mobile devices. On this the libraries are still behind, the project can try a first service of mobile literacies on which we must reflect. This service should be “situated” instead of simply verbal (text based).

In the NAVIGATE Project the focus is on learning and the capability of interpreting the meaning (not on resources, not on the process of retrieving information). We should think of focus groups with the teachers we have involved in the questionnaire. In our universities we must create synergies that are not there now. The libraries in Sofia, Parma and Gävle make courses but do not collaborate enough with the teachers. NAVIGATE should experiment with a collaborative model. This all is very important if we want to put libraries at the centre of literacy and integrated into the learning system.

Conclusions

Gee argues that gaming provides opportunities for gaining situated rather than merely verbal or literal meanings for concepts, processes and functions. Situated rather than literal meanings are, precisely, the kinds of meanings that underpin deep understanding and competence, whether in work practices or academic disciplines. Gee marks the difference between merely being able to parrot back content (which may be good enough for passing school tests, but not for performing with distinction in real world tasks) and attaining sound theoretical understandings and being able to think critically.

In conclusions, the real difference that NAVIGATE aims to make is not to define literacy as a cognitive process, but to focus on learning. Rather than focusing on identifying Fake content in the project, it makes more sense to teach students to become critical thinkers and learn how to find, recognize and create good quality information.

Games based learning is not only for participating and stimulating motivation, but can be a new approach to situated learning. The challenge of the NAVIGATE Project is now however to develop

games for situated rather than literal meanings. Situated learning is the kinds of meanings that underpin now the deep understanding and critical thinking competence, whether in work practices or academic disciplines.

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