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Digital Competence Assessment: A Proposal for Operationalizing the Critical Dimension

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Abstract
The European Commission considers the development of digital competences a strategic action to spread and to develop a more active digital participation of citizens. The objective is to increase the level of digital competence in the European citizens up to 2015 and to reduce the number of those who don't use new technologies and don't surf the net. At the base of an active citizenship there are creativity skills, the ability to support one's own point of view, the ability to quest, to have a critical reflection, communicative, collaborative, problem solving and listening abilities. This paper offers a theoretical definition of the critical competencies starting from the European framework and providing an operational definition from semiotic and linguistic patterns in the scholarly literature, concluding with the compilation of an evaluation rubric. By focusing on the critical dimension of digital competence, it may be possible to create evaluation tools applicable to different contexts and target audiences.

Keywords: *digital competence, critical dimension, evaluation rubric*

Digital competencies are one of the eight key competencies for lifelong learning, recognized by the European Parliament and the European Council in 2006. The innovative perspective of these recommendations is the extension of the definition of digital competences in two main orientations: basic skills (connected with knowledge), and soft skills (connected with attitudes and skills). In regard to this, digital competence favors and assists with the process of social integration (Andò and Cortoni 2013).

The European Commission considers the development of digital competence a strategic action to spread the more active digital participation of citizens. Hence, "the enhancing digital literacy, skills and inclusion" is one of the seven pillars of the Digital Agenda for Europe (DAE) in the Europe 2020 Strategy. The objective is to increase the level of digital competence in the European citizens up to 2015, and to reduce the number of those who don't use new technologies and don't surf the net. For this reason, every year the Eurostat Community conducts surveys about the usages of the ICT skills connected to the computers and the web, in order to analyze the trends of the digital skills by age, gender, and variables of education in 27 European countries.

However, this research has focused so far on the operational skills linked to the technological and cognitive access to the digital sphere. By the way, they just represent the most basic skills. According to UNESCO (2013), the new digital divide goes beyond the physical, material and technical accessibility—it recognizes a new increasing gap between people who are able to find, to manage, to create, and to spread

information and knowledge through technological tools in an innovative and effective manner, and people who can't (EKOS, 2004). It is important that citizens understand how to access to information and media content, where the content originated from, how they are created, funded, protected, evaluated, and shared. All citizens need to know the functions, roles, rights, and obligations of information and media institutions.

The expression *active citizenship* has been used in the European Union in order to highlight one of the fundamental components for democracy: the citizen participation. At the base of an active citizenship there are creativity skills, the ability to support one's own point of view, the ability to quest (including the collection and the selection of information), to engage in critical reflection, and advance communicative, collaborative, problem solving and listening abilities, being able to participate in the decisional processes autonomously with awareness and intercultural competence. These kind of skills are also acknowledged as digital competencies, so recently scholars have started to create shared definitions, to find and to create reference indicators, and to improve digital literacy policies (Livingstone 2008; Buckingham 2013; Hobbs 2011; Tornero 2010). From these studies it came out that the digital competency is a complex system in which skills, knowledge, and social behaviors go beyond simple literacy—it includes more cross-sectional dimensions of such competence, such as the creative production of content, social involvement, and the development of critical thinking. For this reason, despite the variety of models proposed, critical analysis is seen as a fundamental dimension of digital skill.

This paper wants to focus on the critical dimension of the digital competence—trying to simplifying it through more specific analysis levels, and through cognitive tools and methodological data that can be useful to educators and researchers to create evaluation tools applicable to different contests and targets. It is divided in the following phases: a theoretical definition of the critical competence starting from the European framework; an operational definition of the critical competence starting from semiotic and linguistic patterns in literature; and finally, a compilation of an evaluation rubric.

Critical Competence: A Theoretical Definition

International scholars give different definitions of the critical competence but they have all similar meanings. For example, in Tornero's opinion, "critics" is the synthetic meaning (2008) while Calvani uses the expression "cognitive dimension" (2010), while Jenkins (2006) talks about "control of media." The Educational Testing Service (ETS, 2007) within its project iSkills, uses the term "integrate" to acknowledge the critical dimension of digital competence, that is to say "interpreting and representing information. It involves summarizing, comparing and contrasting." It refers to the application of digital competence within specific professional contexts. Its main interpretation is that critical thinking is at the base of active citizenship and it is considered a soft competence, because it contributes to develop the critical thinking, which means "reading, understanding and interpreting information and media sources, seeking alternatives to media discourse, and using discourse to solve the problem. The emphasis here is on the receiving and reading process" (Tornero 2008, p. 9). In media literacy education, "critical thinking"—such as "media appropriation" and "intervention and participation in the public sphere"—is one of the three main concepts that are at the base of a responsible citizenship in the digital era.

According to John Pungente (2010), critical thinking is a media education objective, because it is concerned with "helping students to develop an informed and critical understanding of the nature of mass media, the techniques they use and their impact. More specifically, it is an education that aims to increase students' learning and understanding of how the media work, how they are organized and how they create reality" (p. 1). Specifically, "critical reading" is the set of skills that enable students to perceive, read, analyze, understand, and to give meaning to media messages. It includes different levels: (a) the acquisition of languages, codes and symbolic conventions of the media and the acquisition of information and communication technologies; (b) the ability to grasp and describe the structure, the forms and the organization of the messages and their main mechanisms for the production of meaning; (c) the ability to frame the meaning of media

discourses in their communication context and in the student's context; and (d) the autonomy in evaluating information and media messages (Tornero 2008).

Not by chance, in the 2013 DIGCOM project by the European Commission the critical competence corresponds to the Information dimension of the digital competence. Its components are: (a) browsing, searching, and filtering information: to access and to search for online information, to select reliable resources, to navigate between online sources, to create personal information strategies; (b) evaluating Information: to collect, process, understand and critically evaluate information; (c) storing and retrieving information by manipulating and organizing information and contents for easier retrieval.

According to UNESCO (2013), students who achieve critical and reflective autonomy are able to express their own judgments and to reflect on the way they use or produce information, media contents and products, as well as knowing how media and information providers work in our society. Thus, the concept of critical competence is related to the development of capacities of knowing, comprehending, and critically assessing the complex world of media. It is related to critical analysis, that is, to understand or critically evaluate different aspects of the media and media content. It is the second necessary ability for media literacy, the access to media content and the participation in the production process (Millwood Hargrave and Livingstone, 2006).

Hence, critical competence is the capacity to analyze and reason autonomously about the logic, nature and content of messages, as well as interpreting the symbols, codes and cultural conventions used by the media. This critical approach assumes the possession of access competencies and a basic technological literacy. With regard to this, we can combine the critical competence with the analysis and evaluation levels that UNESCO included in the "Knowledge Deepening" area within the ICT competency framework for teachers in 2008. It refers to: a) the ability to decode a message with relation to a specific code and a particular communicative situation, to link a meaning to a specific personal context, and to understand the process of classification and categorization of the contents of a message; b) the capacity to learn and understand of the conditions and possibilities of the media as tools.

Toward the Operational Definition of Critical Competence

To give a more specific and operative definition to the critical dimension of the digital competence, we need to systematize the different definitions—given in the previous paragraphs—through an interpretation or an analysis able to justify a conceptual elaboration. Hence, our definition of the critical competence combines two semiotic models of the textual analysis: Greimas' (1967) generative semiotics and Umberto Eco's (2000) semiotic enunciative model. The first one focuses on the generative path of sense inside the text and aims to reconstruct the development level of meaning through the identification of narrative structures. Specifically, it describes the transition from the textual surface to a deeper level.

They are hypothetical levels of complexity/abstraction in which interpretative process moves. According to Greimas, the interpretative levels of this model are as follows: First, the most superficial is the thematic-figurative one, that refers to the lexical and visual elements inside a text that allow the audience to hypothesize a certain cognitive frame. In other words, this level supplies those elements that give a global idea of the text. Second, the discursive level locates not only the global elements, but also the actors-agents factors and spaces and times that structure the text as a narration—the rhythm of the narration is defined, the actors act in a certain time in a certain place. Finally, the semio-narrative level doesn't include the characters but the abstract instances of actions—narrative or abstract roles—uniquely characterized by the actions they perform.

Umberto Eco's model, on the other hand, focuses on signification processes triggered by enunciators during the encoding or decoding process of the text. However, he does not dwell on the interaction between the empirical author and the reader, but rather on their simulacra, which refer to their interpretative competence. Table 1 depicts the key elements.

Table 1
Umberto Eco's Semiotic Enunciative Model

Development Level of Meaning	**Linguistic Element Evaluated**	**Elements in the Interpretative Process**
Thematic and figurative	Lexical and discursive meaning	Contextual and denotative meanings, connotations
Discourse level (or enunciation)	Tenses, adverbs, pronouns and demonstrative adjectives	Simulacra of producers and receptors of the text
Semio narrative	Action verbs and roles	Manipulation and agency forms

Eco defines these simulacra as *model reader* and *model author*. The first one derives from the ensemble of conjectures necessary to understand how the text works and how it can be interpreted; the other one is seen as an *image* of the author itself. Eco uses the model author as *textual strategy* to tell the story and to transmit a meaning system that the reader has to recognize and interpret. The "model reader," instead, is just the ideal target or audience to which the narrative text is addressed. In Eco's opinion, each text requires, in fact—to those who want to interpret it—some encyclopedic knowledge, and from this derives the centrality of the interpretation processes of the reader.

Multilevel Critical Analysis System

Starting from the two models above, we propose a multilevel critical analysis system that starts from a simple textual analysis—using Greimas' levels—up to Eco's contextual analysis, where digital and communicative competences meld with other cultural and social competences, customizing and semantically enriching the narration. This analysis system (we can call it "mixed") can be divided into seven complexity levels: the lowest ones focus exclusively on the characteristics of the digital text—applying and verifying media knowledge and skills (intra-textual approach); the highest ones, instead, involve also vaster cultural, social and relational competences (extra-textual approach).

Thus, the first level of critical analysis I am proposing in this essay is *expressive or linguistic*. It is a matter of an exploratory analysis of the digital text, where the subject locates and recognizes all the digital elements—visual, voiced, written—and their connections. It is a perceptive and sensorial analysis, determined by the subject's attention level, from which derives the cognitive selection and the selective memorization of the objects.

We can call the second analysis level *thematic figurative*—it refers to the capability to classify the media text inside a contextual and expressive category. The media genre identification activates a process of hypothetical identification of the correspondence level between the text and the syntactic characteristics of the target genre. This level necessarily includes the denotative analysis of the narrative content—the identification of the story the textual elements refer to.

The third level is connected to *discourse*. It is a matter of narrative originality detected through the identification of a specific narrative style, of the space and time of the narration, of the narrative rhythm, through the application of technologies (visual effects etc.) and in sequence development of images.

The fourth level is *semio-narrative*, which consists of a connotative analysis of the meaning of the text—it analyzes the hidden meanings that can be found through the identification of visual and voiced symbols or their combination inside the narration. In this case the deeper meanings within the narrative text are identified by symbolic textual connections that overlap the meanings inside the linguistic repertoire or that derive from the literary or narrative genre; such connections are related to the interpretation mechanisms of the specificity of the empirical text beyond the linguistic codes or narrative conventions already attested.

The fifth analysis level is *social and cultural oriented*, and it is about the subject's skill to catch the semantic connections between the text narrated and the historical, social, geographic, and economic context. In this case we talk about the contextual knowledge as subject's previous cultural competence (defined "encyclopedic" by Umberto Eco in 1979) needed to recognize the communicative role of narrative mechanisms—and overall textual organization—in the definition of communication recipient's knowledge.

The sixth level concerns the author's *ideology*, that is to say identifying textual and communicative strategies that are at the base of the text organization. This level includes both the “model reader” analysis—the set of comprehension and analysis skills the potential recipient must have to activate cognitive interpretations—and the author's communicative design analysis, focused on the definition strategies of the interpretative paths used in the narrative process.

The last analysis level, at last, concerns the *commuicative context* that verifies coherence and/or correspondence between contents, presumed interpretation and communication registers used (Principles of descriptive, narrative, expository, and argumentative speech organization and location the other's point of view), and the specific communicative situation in which the message has been constructed (editorial system, TV network, position in the show schedule, recipient type).

Critical analysis can be applied only if you have technological access competences. The access degree obviously influences the subject's expected or actual analysis level. For example, those who know only the media language can only make an expressive analysis—exploratory and impressionistic, namely led by intuition and emotionality rather than interpretive categories or cognitive tools.

On the other hand, those who have syntactic knowledge, grammatical rules within a media text structure, as known as *algorithmic procedural knowledge*, are able to recognize inside the text recurring narrative structures and linguistic rules that allow you to co-locate the text within an interpretive category—e.g. within the media genre. This kind of analysis goes beyond the simple exploration of the text and it can develop in two different kind of analysis of different complexity: if it is able to prefigure genre narration types, it is called thematic-figurative; if it is able to recognize and identify specific narrative styles within the same genre, it is called discourse level.

However, if the completeness and complexity of the analysis depends on the subject's difficulty in cognitive operations, it is important to consider not only digital knowledge but also the type and the amount of cultural knowledge the subject uses to make the analysis. So, the semio-narrative analysis level—mainly focused on identifying principles and values implied in the text—presupposes the activation of interpretation processes that derive from the projection of extra-textual sociocultural knowledge, which fall outside of the medial text, but whose symbols and signs are recognized and interpreted by the subject within the text taken in exam (heuristic procedural knowledge). Going on with this reasoning, knowing the mechanisms of production and receiving of the media message (contextual knowledge) is a fundamental prerequisite both to analyze text simulacra—producer's and recipient's intentions toward the digital text—and to recognize the empirical social context the text refers to.

Finally, the knowledge of the communicative context of a media product insertion—probabilistic contextual knowledge—allows you to make a critical analysis on the correspondence between the media text content and form and the communicative criteria, expectations and demands of the referential communication system.

A Specific Methodology to Evaluate Digital Competences: The Rubric

In 2005, the scholar Jane Davidson made a methodological consideration on the need to fine-tune and to spread "Specific Methodologies for Evaluation" in an empirical social research area of interest. According to

Table 2
Operationalizing the Assessment of Critical Analysis—STEP I and II

Criteria	**Analysis levels**	**Indicators**	**Questions/Variables (for example in a TV series)**
Identification of visual, voiced, lexical etc codes present in the text	Expressive	Identification of communicative codes inside the text: verbal, sign, film language...	Indicate the main elements of the examined TV series
Media genre identification and analysis	2.Thematic/ figurative	Identification of genre syntactic rules. Identification of genre semantic fields. Connection of textual elements to the genre type: **Balance** (balanced distribution of optical weights) **Proportion** (adapting the picture to the background) **Progressiveness** (composing objects in a continuous way, without optical breeches **Unity** (coherence between the chosen objects) **Emphasis** (spectacular spelling of the object)	How do you define the TV series you have watched? Sitcom Dramatic series Thriller …. Why …… is defined a TV series? Which are the linguistic characteristics you recognize in this cultural product?
Identification and analysis of the author's narrative style and of the space-time construction of a text	3. Discourse level	Identification of the mechanisms that create the author's discourse Identification of the editing technique Filming style Special effects	According to you, which are the novelty elements of the TV series in narrative and technical terms? (You can also make a comparison with other TV series)
	4.Semio-narrative	Identification of: symbols, ideas, moods, values, cultures, behaviors and routines, wishes, dreams, life expectations hidden inside the story	According to you, what is the morale of the story? What deep meaning does the narration hide?

	5.Cultural context		Where and when does the story take place? What does make you recognize the location? What social, economical and political elements do you deduce from the text? How?
	6. Ideological		Which is the author's position related to the subject matter? How does he/she tell the event? What point of view does he/she use? According to you, who is the recipient of this TV series? Why? Which is the users target the author addresses?
	7. Communicative context	Equivalence degree between the textual product and the transmission container	Do you think the broadcasting time is appropriate? Why? Is there a correspondence between the TV channel that transmits the TV series and such TV series? Why?

her, to evaluate digital competence, specifically to get to formulate evaluative conclusions on competence, it is necessary to integrate the empiric evidence collection with quality and value definitions. This is possible through Specific Methodologies for Evaluation (SME) — methodologies that aim for rating digital competence. About them, Davidson elaborates the evaluating rubrics method, starting from M. Scriven's (1995) consideration on the limits of traditional social research methodologies, generally used to evaluate performance and quality and often applied in the evaluation of competencies.

Rubrics are proper tools because they are able to give an evaluative description of how a performance or a quality appears to each levels of each digital competence dimension. Rubrics are a tool to convert a quantitative and qualitative data ensemble in a judgment of qualities or values of such performance level (Davidson, 2005). They are useful in evaluating digital competencies because they allow you to determine the quality or absolute value of the examined person (grading), or the relative value compared to the other examined people (ranking). Therefore, rubrics are appropriate for determining the absolute value within a standard scale—such as excellent, very good, good, sufficient etc.—and are generally divided in two columns: the grade one, and the one that describes how the situation must be to get such grade attributed. In the specific case of the operative definition of the critical analysis dimension, it has been created by the use of an analytic rubric that allowed for the division of such dimension in criteria subsets - each one accompanied by a descriptive scale that indicates the scores that can be assigned to the subjects' performances. In the first step of the rubric construction, have been specified criteria according to which the subjects' performance will be evaluated compared to the critical analysis capacity of a medial text. It is possible to associate to each criterion a set of performance detection indicators. Table 2 shows a list of measurement variables in the form of questions for a critical analysis test.

Table 3 has some performances people may perform, and the evaluation scores for such performances—from a minimum of 0 (absent) to a maximum of 3 (excellent) points for each critical analysis level. The critical analysis rubric is formed by two columns: the one of the absolute value in a standard scale—3 for excellent, 2 for good, 1 for sufficient, 0 for absent; and the one that describes the elements necessary to give such scores to the performance. So, the rubric contains, for each point, a detailed description of the subject's performances that correspond to all the categories detected through levels previously explained. This will lead to fine-tuning different kind of tools for evaluating and measuring performances on competence of digital analysis of digital texts.

The passage from measuring to evaluating is clear in Table 3, which presents the evaluative rubric. It is a rubric (useful to the construction of valid evaluative tools) that clarifies evaluation criteria, quality levels of the performance to evaluate and performance scoring for each critical analysis level.

The Next Steps to Fieldwork

The theoretical and methodological structure illustrated in the previous paragraphs can be a useful analysis model for researchers and educators—to describe and evaluate the critical dimension of the digital competence in a multilevel analysis system. The rubric tool is a fundamental step in planning and testing quantitative, qualitative, and mixed methods for the empirical survey and the evaluation of critical analysis of people in different investigation contexts. In fact, rubric can be used in different media (for example, movies, social networks, music, TV programs…) and in more research contexts focused on different objectives (for example, young generation life style, job perspectives etc.). In conclusion, this essay has as starting point in field-testing the efficacy of the operationalization process, and specifically of the rubric for a multilevel analysis of digital competences. All we can do now is "take the field and get pants dirty."

Table 3
Rubric for the evaluation of the critical analysis – STEP II and III

Score	*Expressive*	*Thematic figurative*	*Discourse*	*Semio-narrative*	*Cultural contextual*	*Ideological*	*Communicative contextual Action*
3	Student is able to fully explore the digital text, identifying all the codes (visual, voiced, lexical...) inside a text and all their connections, explaining their presence in the text. This analysis will be accurate and complete.	Student is able to recognize the reference media genre of the cultural product taken in exam and/or to analyze the text relevance degree to the genre, explaining his/her reasons	Student is able to analyze specifically the author's style (narrative, shooting script etc.) within the genre, recognizing all the elements (visual effects, type of editing etc.) and understanding how they participate in creating a text in a temporal order.	Student is able to detect/bring out the hidden message of the text and to explain it in detail, giving deep meanings to all the linguistic and visual elements in the narration	Student is able to recreate and analyze the overall empirical context of the text on the base of the identification and interpretation of all the symbols (historical, geographic, social, economical, political) in the text	Student is able to recognize and analyze the author's general point of view implied in the text and the psycho cognitive and cultural characteristics of the target	Student is able to analyze and evaluate the relevance of the text to the communicative context (radio, TV channel…), on the strength of the recognition of all communication registers used in the text.
2	Student is able to explore the digital text, detecting most (between 50% and 80%) codes (visual, voiced, lexical...) inside a text and all their connections, not necessarily explaining their presence in the text. This analysis won't be complete but rich.	Student is able to recognize the medial genre on the base of most linguistic rules and forms in the text and to analyze relevance degree of a text to the genre. Motivations are relevant but not complete	Student is able to analyze specifically the author's style (narrative, shooting script etc.) in the genre, recognizing most style elements (visual effects, type of editing etc.) and understanding and understanding how they participate in creating a text in a temporal order	Student is able to detect/bring out the hidden message of most text and to explain it in detail, giving deep meanings to all the linguistic and visual elements in the narration	Student is able to recreate and analyze the overall empirical context of the text on the base of the identification and interpretation of most symbols (historical, geographic, social, economical, political) in the text	Student is able to recognize and analyze the author's general point of view implied in most text and the psycho-cognitive and cultural characteristics of the target	Student is able to analyze and evaluate the relevance of the text to the communicative context (radio, TV channel…), on the strength of the recognition of most communication registers used in the text

Table 3 (con't)
Rubric for the evaluation of the critical analysis – STEP II and III

Score	Expressive	Thematic figurative	Discourse	Semio-narrative	Cultural contextual	Ideological	Communicative contextual
1	Student is able to explore only a part of the text, identifying minimally (less than 50%) the codes (visual, voiced, lexical...) inside a text and all their connections. This description is general and superficial.	Student is able to recognize the medial genre but he/she is not able to explain it.	Student is able to analyze the author's style (narrative, shooting script etc) within the genre, recognizing minimally the elements (visual effects, type of editing etc.)	Student is able to detect/bring out the hidden message of only a minimum part of the text but he/she is not able to explain it in detail	Student is able to recreate and analyze the overall empirical context of the text on the base of the identification and interpretation of a minimum part of symbols (historical, geographic, social, economical, political) in the text	Student is able to recognize and analyze the author's general point of view but not to explain it. Furthermore, he/she is able to recognize minimally the psycho cognitive and cultural characteristics of the target	Student is able to analyze and evaluate the relevance of the text to the communicative context (radio, TV channel…), minimally recognizing communication registers used in the text.
0	Student is not able to analyze the digital text, not identifying the codes inside a text	Student is not able to recognize the genre	Student is not able to analyze the author's style, not recognizing the elements defining the style	Student is not able to detect/bring out the hidden message of the text	Student is not able neither to recreate nor to analyze the overall empirical context of the text, not recognizing all the symbols (historical, geographic, social, economical, political) in the text	Student is not able neither to recognize nor to analyze the author's point of view and the psycho cognitive and cultural characteristic of the target	Student is not able to neither analyze nor evaluate the relevance of the text to the communicative context (radio, TV channel…)

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