

Monograph “Information and Digital Competencies in Higher Education”

ARTICLE

Multiliteracy and Social Networks in Higher Education

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Abstract

Higher education as an institution should respond to the philosophy underlying the predominance of all things digital and of the Social Web in society, both today and tomorrow. In doing so, it should take an integral approach, because every higher education unit and service has the potential to be enhanced by a well-founded application of 2.0 (and above) methodologies. In particular, the areas on which this is likely to have a greater impact are the teaching/learning process and the production, validation and dissemination of knowledge. Consequently, students, lecturers and staff included within the concept of multiliteracy (especially reading and writing literacy, ICT literacy and information literacy) will inevitably require an appropriate level of literacy and competency training and refresher training.

Keywords

Social Web, multiliteracy, reading and writing literacy, ICT literacy, information literacy, multimodality, design, discourses

Multialfabetización y redes sociales en la universidad

Resumen

La universidad como institución debe responder a la filosofía que subyace al predominio de lo digital y la web social en la sociedad actual y la del futuro con planteamientos integrales, puesto que todas sus unidades y servicios son susceptibles de mejora gracias a la aplicación bien fundamentada de las metodologías 2.0 y posteriores. En concreto, las esferas donde mayor impacto se puede esperar son la del proceso de enseñanza/aprendizaje y la de la producción, validación y difusión de conocimientos, para los que una formación y actualización al nivel adecuado de las alfabetizaciones o competencias de alumnos, profesores y personal que se engloban dentro del concepto de multialfabetización (sobre todo alfabetización en lectoescritura, en TIC e informacional) resulta insoslayable.

Palabras clave

web social, multialfabetización, alfabetización en lectoescritura, alfabetización en TIC, alfabetización informacional, multimodalidad, diseño, discursos

1. Web 2.0 and Higher Education

Cope & Kalantzis (2008) describe the current era of higher education as a period of change. This not only applies to traditional higher education based on the predominance of printed documents as a means of learning and academic communication, but also to higher education in which all things digital are increasingly becoming the main means of access to knowledge for academics and the predominant medium for offering educational content to students. For these authors, the new situation – in which the predominance of all things digital is ever greater – has the following distinguishing traits that directly impact on the type of institutional response that higher education needs to give:

- The ability to publish and provide access to a huge amount of content allows for the emergence of new areas of knowledge, new cultural perspectives, and better focused and located applications of knowledge.
- The intrinsic multimodality of new modes and means of communication will end up having an impact on many disciplines as a consequence of new forms of textual representation.
- The Social Web, equivalent to Web 2.0, fosters a change in balance between the designer-producer and the recipient of texts as a consequence of the multiple options for collective production, annotation, shared tagging, remixing and collaborative development of all kinds of texts. This blurs the boundaries between creator and reader, and is a reflection of the new social order in which a consumer becomes a creator and vice versa. In this context of the predominance of all things digital and of the Social Web, higher education needs to reconsider its role and status in these new ways of creating and disseminating knowledge beyond its traditional boundaries, since the dialogical and distributed nature of the Social Web may allow for faster, more participatory processes of exchanging knowledge between experts, professional groups and interested parties. In turn, this gives rise to new ways of validating and distributing knowledge, which may act as an alternative to peer review, for example.
- Anyone can learn anywhere, anytime. How does a teaching/learning process – for which higher education still has to be ultimately responsible – sit

with learners who are more capable of constructing their own knowledge on the basis of a combination of sources, resources, prior experience, interaction with their peers, collaborative work, etc.?

As can be seen, these traits affect many of the most fundamental aspects of university life, and that is the reason why there is now talk of University 2.0, Science 2.0, etc. Indeed, there are very few aspects of life to which the “2.0” adjective is not applied. The recent *Higher Education in a Web 2.0 World* report (Committee of Inquiry, 2009) for the JISC (Joint Information Systems Committee) in the United Kingdom adds further traits to those listed above. The report analyses the key problems and offers recommendations for the institutional approach that higher education should take with regard to the participatory philosophy underlying the Social Web:¹

- Learner skills: it is essential for higher education to be aware of the levels and prior experience of their students on admission (which will never be uniform) in order to act on basic shortcomings; attempts should be made to provide equality of access to technological resources and to training for effective use; information literacy programmes are essential, as is fostering participation in Social Web-based activities.
- Staff skills: it is crucial to foster ongoing research into teaching practices; to extend and facilitate lecturers’ use of technology; to raise awareness and encourage the spread of the concept and of information literacy applications for lecturers; to foster research into 2.0 (and above) applications; to promote the incorporation of the 2.0 (and above) mindset and applications into curricula and specific subjects in a planned way.
- Infrastructure and organisation: it is essential to extend the 2.0 mindset to as many higher education services and units as possible, since the Social Web has obvious applications in higher education management in the widest of senses, including accounting to society and social impact.
- Inter-sectoral relationships: the expansion and consolidation of the 2.0 mindset requires a coordinated effort between higher education and other sectors and educational areas.

1. For an analysis of the differences between 1.0 and 2.0 mindsets, see Lankshear & Knobel (2008b, pp. 43-72). For an exhaustive list of 2.0 elements applicable to educational environments in the categories in the cognitive domain of Bloom’s Taxonomy, see Churches (2008).

- The digital divide: this is – and will continue to be – real in a variety of social segments, even in the most technologically advanced societies. Narrowing it, or getting rid of it altogether, requires a clear policy approach in higher education: access and skills levels will continue to be very uneven between different social groups. It is also essential to deal with the digital divide between students and tutors through intelligent policies, taking advantage of the levels of technological mastery that different groups of students have.
- An information literacy approach for the whole institution and not just for students.

It appears to be clear, therefore, that the pervasive presence of all things digital and the Social Web requires higher education to have a more critical understanding of, and engagement in, the ultimate philosophy underlying these developments, over and beyond the specific mechanisms and tools available at any given moment in time. Therefore, they need general institutional frameworks to serve as a guide for the various academic and management units – and for all aspects of university life – in terms of adopting any valid 2.0 (and above) methodologies that gradually emerge.

The above-mentioned documents particularly underscore the importance of 2.0 and the Social Web for teaching/learning processes on the one hand, and for new multimodal ways of producing educational and academic texts on the other. Both aspects lead to the core topic of this article and of this monograph: the concept of multiliteracy, and higher education policies on literacy and competency training for students, lecturers and staff included within that concept, to which the Social Web appears to be inextricably linked.

2. Multiliteracy and the Social Web as an Integral Part

For several years now, the absolute priority of establishing a framework and map of all literacies has been underscored in library and educational environments. It does not matter whether these literacies are old or new. What does matter is that they are considered indispensable to our functioning as citizens in today's society. In the higher education environment, a framework and map clearly established by means of consensus between all education stakeholders would serve as a coordination and co-responsibility tool

for all the agencies and professionals involved in the task of training and helping to train university students in such literacies, thus enabling them to carry on learning throughout their lives. From the point of view of the effective use, accountability and inalienable social benefit associated with resources allocated to training in key competencies, which enable people to cope with complexities of today's society, it is shocking to find – and all the more so in times of crisis like the present one – that inefficiency and ineffectiveness as a consequence of discoordinated resource use still predominate.

Public, school, university or specialised libraries owe their very existence to the mission and objectives of their mother institutions. For many years now, a great deal of emphasis has been placed on ultimately justifying their existence. Therefore, the reason why they should be held accountable for an effective use of resources placed at their disposal is to compare and demonstrate the contribution they make to all levels of education (in the widest of senses) of the population they serve. For university libraries, this refers to students' academic results. However, managing to attain these levels of education and academic results is, needless to say, not the sole responsibility of libraries. Therefore, it is necessary to mark out the playing field very clearly and to define intra-institutional, inter-institutional and inter-professional responsibilities in this respect, not only to be able to plan training activities in libraries properly, but also to incorporate and integrate such activities in the most appropriate educational way into curricula and into applied practice through various subjects and programmes. As learning support resource units, university libraries become a space and an environment full of multi-purpose resources that offer students the chance to become the active subjects of their own literacy acts and practices in order to meet the demands of the curriculum. This contribution must be subject to the same principle of educational effectiveness as other learning facilitation processes in the higher education setting.

In our search for potential theoretical and practical bases for this framework and map of literacies necessary for the 21st century (Pasadas Ureña, 2008), and after realising that terminological chaos was a predominant feature, we reached the conclusion that the theory of communication and, to be precise, the theory of multimodality, was a crucial premise and starting point. Furthermore, it provides the best practical structure in which to set all of the literacies cited in the academic, technical-professional and political-administrative literature available. Indeed, the theory of multimodality

in communication postulates that the creation/design/production of meaning/texts/representations and their distribution in any society and era are carried out thanks to the very diverse modes/languages of communication available, which Cope & Kalantzis (2009b) systematise as follows:

- **Written:** writing (representing meaning to another) and reading (representing meaning to oneself); handwriting, the printed page, the screen.
- **Oral:** live or recorded speech (representing meaning to another) and listening (representing meaning to oneself).
- **Visual:** still or moving image, sculpture, craft (representing meaning to another); view, vista, scene, perspective (representing meaning to oneself).
- **Audio:** music, ambient sounds, noises, alerts (representing meaning to another); hearing, listening (representing meaning to oneself).
- **Tactile:** touch, smell and taste (representing bodily feelings and sensations to oneself, or to another when there is physical contact). These include kinaesthesia, physical contact, skin sensations (hot/cold, texture, pressure), grasp, manipulable objects, artefacts, cooking and eating, aromas.
- **Gestural:** movements of the hands and arms, expressions of the face, eye movements and gaze, demeanours of the body, gait, clothing and fashion, hair style, dance, action sequences, timing, frequency, ceremony and ritual. Gestural representation is understood in a broad and metaphoric sense as the physical act of making signs, and not in more restrictive literal sense of moving the hands and arms.
- **Representation for oneself** may take the form of feelings and sensations, or the rehearsal of action sequences in one's mind.
- **Spatial:** proximity, spacing, layout, interpersonal distance, territoriality, architecture/building, streetscape, cityscape, landscape.

For the theory of communication, all meanings/representations produced by any of these modes constitute information that is inevitably produced, consolidated, preserved and distributed through very diverse media, channels and supports that technological development at a given time in history permits. It is this technological development, which now gives priority to images over the written word. Quite paradoxically, it has ended up attaching value and preference to the traditional modes

of orality and gestuality over the centuries-old prevalence of the written word on the printed page. Consequently, training citizens to understand and manage all of these modes of creation/design of meaning/text, and to use the most appropriate media, channels and supports for the type of meaning/text that they distribute, requires a well-articulated approach to multiliteracy across all of these educational levels throughout their lives. Here, it should be noted that training refers to the level of proficiency that citizens attain in each of the literacies particular to each mode and medium. Furthermore, multiliteracy is understood to be the acquisition and mastery of skills centred on a personal, social and cultural use of multiple tools and languages of representation as a social practice, and not only the instrumental skills to use different technologies (Area, Gros & Marzal, 2008, p. 74).

Area (2010, p. 3) defines a multiliterate person as someone who:

- has skills to access information and to use any technological resource, whether printed, audiovisual or digital.
- possesses cognitive capacities to transform information into knowledge.
- is capable of using languages and forms of expression to relate to others, to distribute information via any medium and to communicate with others.
- has interiorised criteria and values for an ethical and democratic use of information and knowledge.

However, from the perspective of the need for a framework and a map, as postulated earlier, it does not appear that enough progress has been made to overcome the conceptual and terminological chaos that continues to predominate. This is still the case, despite the fact that the theory and practice of multiliteracy (as it has been developed and completed by the members of the New London Group (Cope & Kalantzis, 2009b)) has consolidated its position as being one of the most interesting contributions to the field in terms of the changes required in the approaches taken to multiliteracy training in every educational area and environment, and in daily life. An example of that can be seen in the concept of digital literacy, or digital competency as it appears in the title of this monograph. This appears to be the most widespread concept, probably because of the importance of all things digital in certain geographical areas and segments of today's society. Authors who share the idea that digital literacy is an inclusive part of most other literacies are still unable to find a consistent articulation

between all literacies for all societies and their constituent groups. However, this is precisely what would need to be demanded of a paradigmatic, integral formula.

Along these lines, Bawden (2008, p. 19) asserts that Gilster's digital literacy has nothing to do with any specific technology, or even with technology itself, which is rather paradoxical when taking the term into account. It has more to do with mindsets, in which skills and competencies operate, and with information and information resources in any format. The term itself is wholly reasonable in this context, given that information nowadays is digital, has been digital and could be digital.

Further on, Bawden (*ibid.*, p. 29) recognises that an important part of digital literacy involves when to use a non-digital source. When he sets out the four components of digital literacy, which he claims are generally agreed, he accepts the idea that digital literacy is a framework for integrating some literacies and groups of skills, though not necessarily all of them. Here are the basic components (*ibid.*, pp. 29-30):

- a) Underpinnings: literacy per se; Computer / ICT literacy.
- b) Background knowledge: the world of information; nature of information resources.
- c) Central competencies: reading and understanding digital and non-digital formats; creating and communicating digital information; evaluation of information; knowledge assembly; information literacy; media literacy.
- d) Attitudes and perspectives: independent learning; moral / social literacy.

Faced with Bawden's chaotic heterogeneity, and in the same collective work, Martin (2008) – aware of this integral framework's articulation difficulties – puts an interesting slant on the discourse of talking about digital literacies (computer / ICT literacy, technology literacy, information literacy, media literacy, visual literacy, communication literacy). Indeed, he concludes by postulating that digital literacy is “the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesise digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process” (p. 167).

Although this definition of digital literacy seems rather more adapted to the nature of all things digital as being

a technological support and no more, three well-founded objections can always be made: in reality, it is a matter of convergence between information literacy (that is to say, access to and use, understanding and production of content/texts on digital supports only) and ICT literacy (the mastery of the digitalised production of multimodal texts). For that reason, it cannot become a valid universal framework for all literacies stemming from the modes/languages of communications systematised by Cope & Kalantzis above. Finally, Martin's digital literacy would only be applicable in highly developed technological environments, which would once again go against the condition of universality. Otherwise, placing such an acute emphasis on the importance of all things digital to the detriment of all things printed means falling into the exact same trap of technological determinism that, for so many centuries, favoured all things printed to the detriment of other modes/means of communication.

Therefore, we firmly maintain that it is the theory of communication and multimodality that can offer us a framework in which all literacies necessary for today's society can be set. Together with the constellation of skills concept, it would allow us to determine – for each situation or specific problem anywhere in the world, or for any social segment and at any level of complexity – what constellations of literacies are the most essential and effective in order to deal with that situation or problem.

The term “multiliteracy” is thus understood as having become a necessary term to encompass various literacies. At the same time, emphasis is placed on an application in constellations and on a need for an integral approach when it comes to training citizens in such literacies. Its usefulness for educational practice and library service planning, for example, is unquestionable. Thus, to conclude this section, Area, Gros & Marzal (2008, pp. 73-75) offer us a concept of multiliteracy consisting of printed-page culture and reading and writing literacy, audiovisual culture and language literacy, digital culture and technology literacy, and information literacy. All of these literacies need to be developed across all levels of the education system, for children, teenagers and adults alike, and this should be done simultaneously in the instrumental, cognitive, attitudinal and axiological dimensions.

The reference above allows us to state that multiliteracy approaches have started to become more visible in our environment thanks to works like the one by Area, Gros & Marzal (2008) and the one by Coll & Monereo (2008), where Coll himself and Rodríguez Illera (2008) offer us a fairly balanced overview of the problem of literacy, new literacies and digital literacy, or the various

contributions made by Daniel Cassany (2009),² to give but a few of the most noteworthy examples. That said, these reflections do not seem to be fully incorporated into the approaches to higher education competencies in our environment, as demonstrated in works like those by Villa Sánchez & Poblete Ruiz (2008), Rué (2009) and Pozo & Pérez Echevarría (2009). For these authors, literacies/competencies appear not to have a significant presence in higher education, or if they do, they are very blurred. It is almost as if no-one either knows how to integrate training in such competencies into the curricula or into curricular development, or which planning mechanisms to implement for overall qualification objectives/results that cannot be attained through a straightforward, unconnected accumulation of practices for various subjects across the curriculum without an indispensable collaborative/coordinated approach.

To conclude this section, it should be underscored that the Social Web can clearly be taken as a constituent part of the concept of multiliteracy, irrespective of the differences in the way it may be defined or of its components, etc., as seen above. Indeed, the incorporation of 2.0 into the paradigm of information literacy takes place in the phase of reading and understanding texts created in any mode of communication, distributed via any medium and retrieved thanks to relevant search strategies. However, it particularly takes place in the phase of designing and producing new meanings/texts in accordance with the mode and medium chosen, depending on the context and goals pursued in that design. Likewise, the incorporation of 2.0 into the paradigm of digital literacy, according to Martin, takes place in the phase of reading/understanding digital texts, and in the phase of designing/creating meaning on a digital support. Therefore, when talking about multiliteracy, we are talking about the 2.0 philosophy as an indivisible part of it, because, at one and the same time, we are talking about the three literacies that present themselves in constellation: reading and writing literacy, information literacy and digital or ICT literacy, in this instance, at their various entry, intermediate and exit stages in higher education; and 2.0 implies, at the very least, a certain level of ICT mastery.

3. Multiliteracy in Higher Education

Area (2010, p.5) postulates that the concept of multiliteracy may represent an authentic revolution for the school environment, since it implies a whole new approach to at least the following aspects of educational practice:

- Simultaneous literacy, not only in reading and writing, but also in audiovisual, digital and information competencies, in order to use and contribute to the range of information and knowledge resources available in the educational environment and elsewhere, in an intelligent, critical and ethical way.
- Systematic and critical questioning of all sources of data, information and knowledge, irrespective of the technological medium used in their production, consolidation, preservation and distribution.
- A teaching methodology that fosters constructivist learning processes through project-based methods, in which pupils themselves put together study plans and take the necessary technological actions to construct and obtain satisfactory responses to relevant, meaningful problems.
- Educational activities that require pupils to express themselves and communicate with each other through technological resources and a variety of hypertext, multimedia and audiovisual formats.
- Using 2.0 (and above) tools and technology to generate processes of collaborative learning.
- The teacher as an organiser and supervisor of learning activities that pupils undertake using technologies, rather than the conveyor of ready-made information.
- Literacy is multimodal; in other words, the literacy process should develop skills in many language and media competencies, and should be based on cultural experiences that pupils bring from earlier educational phases and extramural settings.
- Literacy activities are integrated, cross-disciplinary tasks across the curriculum, and do not constitute separate actions that stand outside content and curricular objectives.

Area's reflections are automatically transferrable to the higher education environment. Discourse on

2. Cassany translates the concept of literacy/ies into Spanish using the neologism *literacidad/es* and appears to ignore the concept of multiliteracy/ies, despite the fact that his considerations mostly coincide with the theory and practice of new literacies and multiliteracy developed by the New London Group since the early 1990s (Cope & Kalantzis, 2009b).

the educational implications of the European Higher Education Area (EHEA) shares that view practically in its entirety. Therefore, it can be asserted that multiliteracy training at any educational stage would present the same or similar challenges. Let's take a look at some of the most important ones in the higher education environment.

At this moment in time, the first one involves academic authorities and teaching staff being aware of and understanding that multiliteracy is nothing more than a key constellation of competencies for today and tomorrow, whose structured training at the respective levels throughout students' degrees should be considered as an overall qualification result and, therefore, something requiring inevitable planning by the bodies responsible for the effectiveness of curriculum implementation, over and beyond the unconnected and accidental approaches taken to each individual subject of the curriculum and the vagaries of what each lecturer/tutor individually considers appropriate.

Indeed, it is assumed that university degree holders will have to demonstrate, in one way or another (for example, by producing final projects that are compulsory in the EHEA, or by qualifications in, or the certification of a personal portfolio of, all the training/activity/experience gained throughout their degrees in this respect), a certain level of reading/understanding and writing/production of multimodal texts adapted to the complexity of the disciplinary and professional discourses of their degrees, as well as critical approaches to information in today's society. Determining the exit levels necessarily demands that entry and intermediate levels be set, which undoubtedly requires proper, effective educational planning of content, pathways, stages, remedial actions, etc. across the curriculum. The assessment criteria for information competency at four levels developed by Bulaong, Hoch & Matthews for the Middle States Commission on Higher Education (2003) may be useful in this respect.

Barring error or omission, it seems that this has not been the cause for the slightest concern in the recent process of reforming curricula in Spanish higher education. This is so, despite the fact that, for many years now, there has been accumulated experience and a sufficient body of information or ICT literacy training studies and practices that could serve as the basis for an integral planning of

multiliteracy training.³ In addition, instruments exist to evaluate and measure an academic situation in terms of the lesser or greater degree of implication in and commitment to an appropriate planning of training in such competencies (Webber & Johnston, 2006; COFHE, 2009). However, it seems clear that, in practice, Spanish higher education still maintains that competencies of this type are learnt in an unconnected way, without any planning, simply by immersing students in the same old university environment. Changing this generalised perception demands that a decisive approach be taken by accreditation agencies and academic authorities to include these competencies in their evaluations and in their educational training and refresher training plans for teaching staff and other staff with learning support functions.

The second key challenge consists in developing the appropriate mechanisms for higher education to be able to establish the level of knowledge and experience that students bring with them when joining higher education. This will allow an appropriate planning of remedial actions required in order to try and put all students on a more or less even playing field, so that they can take advantage, as quickly as possible, of the resources that the institution puts at their disposal. Unless this happens, it effectively means blindly maintaining the determinism favouring those social classes that reach higher education with acceptable levels in terms of mastering ICTs and handling information available in today's society. Consequently the challenge in this respect is the necessary coordination and cooperation between the various educational areas when it comes to establishing integral frameworks for an approach to multiliteracy or any of its components throughout the educational cycles.⁴

The third challenge, in this instance regarding information literacy or competency, consists in producing and applying true information literacy plans that contemplate, in a well-articulated way, the different areas of responsibility and action of the various facilitators of this training, in accordance with the entry, intermediate and exit levels established and agreed for overall qualification results. That way, it would be possible to go beyond the current phase characterised by the concentration of information literacy activities in libraries (only for students in their first few years) and by the absence of certain

3. See, for example, the report on REBIUN (Spanish Network of University Libraries) and information literacies presented by Carme Santos in January 2009 at Vilanova i la Geltrú, Spain, at the 2nd Seminar on Libraries, Learning and Citizenship. Accessed: 07/01/10].

<<http://www.slideshare.net/gdurban/presentacion-rebiun-seminario-alfin-en-vilanova-presentation>>

4. See an excellent model for a lifelong information literacy framework in Scotland. [Accessed: 07/01/10].<<http://caledonianblogs.net/nilfs/>>

considerations for each degree and/or discipline. These considerations include, for example, the most appropriate educational formula to use and the best moment to start offering explanations and practical experience of specific registers of textual expression and of communication in each discipline and/or profession. There is also a lack of necessary reflection and action on when and how to introduce students to the specific techniques of research for each discipline, in line, for example, with the learning methodology based on investigation and research (Bruce, 2008; Healey & Jenkins, 2009; Hepworth & Walton, 2009). Facing up to this challenge is essential for another controversial point associated with it: the evaluation and measurement of students' individual achievements in these competencies with a view to their potential/recommended certification as a European Diploma Supplement.

An equally problematic fourth challenge is the planning of ICT literacy or competency training for university students (or, if you will, that part of ICT training that digital literacy involves), since it seems to be accepted, without any kind of critical reflection on the matter, that students new to higher education will belong, in their entirety, to the digital natives⁵ generation, transformed into Homo Sapiens Digital (Prensky, 2009). It is assumed that they will have attained, as if by magic, both universally and forever, the highest possible level of digital sapience and competency in handling computers and social networks, meaning that there is no point in planning levels of ICT proficiency for them, which Martin (2008) took the trouble to enumerate (competency, use/application, innovation/creation), or training them to attain them. It also means that there is no point in planning or training them gradually to use the various 2.0 (and above) tools on the basis of clear learning objectives, or much less so to adopt the critical social theory that Whitworth (2009) applies to the teaching of computer competency or literacy in order to go beyond the instrumental domain of a successful suite of office automation software.

To finish off, it should be said that multiliteracy training would not make much sense if it did not find its ultimate, natural setting in the fifth and essential challenge that we shall underscore as a conclusion. This challenge refers to how, and under whose responsibility, the gradual and systematic fostering of a reflexive attitude and critical thought among students can be planned, in order to fulfil

one of the traditional functions of higher education. This is becoming a pressing priority need because of the supercomplexity and uncertainty inherent to today's society. Even though multiliteracy provides tools to be able to deal with such supercomplexity and uncertainty, the fundamental instrument will never cease to be the desire to learn with a critical spirit (Barnett, 2007) throughout one's life. However, how do we incorporate training and the consolidation of that critical spirit into new curricula, and what disciplines and subjects should we associate with it?

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5. See Henry Jenkins critical review of "digital native" in the 5 December 2007 entry in his blog called Confessions of an Aca-Fan. [Accessed: 07/01/10].

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