Folksonomy, Tagging and Taxonomy for Effective Learning

Perspectives of Learning 2.0 in the XXI Century

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Abstract—**This paper reflects upon the issue posed by students' normal and extensive use of collaborative internet tools, the social web (Web 2.0). Internet-based cooperative activities are not usually well integrated with official school practice, though students dedicate most of their time to them. The paper attempts to consider the innovative collaborative practices of Web 2.0, of social bookmarking ("Tagging") as part of standard teaching, and what are the perspectives in the next future. Finally, the paper considers how the teacher's role is being re-defined. Moreover, it attempts to analyze the possibilities of letting real life interact with teaching once again and to establish reliable criteria for assessment of students' activity through the web.**

Index Terms—**Assessment, Collaborative learning, Folksonomy, Learning 2.0, Tagging, Teaching, Web 2.0.**

I. INTRODUCTION TO PROBLEM

The most recent OECD-PISA reports on competences and skills in Reading, Mathematics, and Science Literacy show low levels for Italian students between 2000 and 2006 [1]. According to the reports, the "impact of learning is not adequate". Employment rates, educational attainment, and parents' perceptions of competence, dedication, and progress of their childs' teachers are closely correlated and can affect the pupils' global performances [2]. At the same time, another OECD study says that students seem readier for a "Technology-Rich World" than their adult counterpart, showing a more dynamic mental approach to ICT [3]. From a thorough analysis of the data, it seems that Italian students are not accustomed at analyzing, interpreting, and solving non-continuous texts such as advertisements, diagrams, forms, tables within texts supporting a specific purpose: texts that are often the core part of economic and social development. Another element to consider is the students' tendency not to comply with the assignments, or, to give fragmentary answers and, even, not to give answers at all; this probably depends on the students' low levels of "self-concept" and "self efficacy" in doing well at school and for life [4]. In late 2008, the Italian Ministry of Education conducted further studies [5] about students' psychological reactions to OECD-PISA tests (apart from competences), and the outcomes showed that the students fear the teachers' judgment: the students – especially those from Southern Italy – fear to fail in almost every test. Thus, most PISA questionnaires – along with usual class works – remain completely blank (37% out of the total answers given), because of the *Angst*, or fear, of being graded and assessed. Furthermore, according to IAEEA (International Association for the Evalua-

tion of Educational Achievement), the comparative analysis of European national contexts, with particular attention to the Italian context, points at the various situations of curriculum/syllabus. There is a substantial difference among syllabuses presented, taught, perceived, and actually achieved by the students and there is not a linear progression among the mentioned syllabuses at all [6]. What is worse, on the part of students (especially the Italian ones) there is a sort of automatic association between (formal) schooling and learning, thus preventing the less motivated students from progression. As a result, the fear of being assessed and graded may stop both formal and informal learning, in a consistent amount of Italian students, at least. In recent times, educators and experts have tried to overcome the *Angst* of being assessed and graded through the encouraged use of *Portfolios*, showcases for a student's best work and achievement. Teachers' training has been organized in order to (with some uneasy routine) promote Portfolios and digital versions of them at school. Nevertheless, there is a certain underground feeling that Portfolios are not the ultimate answer, because pupils need a good degree of awareness and time, and though the Portfolio encourage the learner's autonomy and self-evaluation skills, Portfolios are still perceived by students as imposed formal practice in some cases and as bureaucratic overload by teachers [7]. Evaluations can be very useful - but collecting evaluations either means that teachers need to enter their evaluations into the portfolio, or students need to be trusted to accurately enter teacher assessments.

II. RATIONALE

In this paper I would like to consider how the internet, the collaborative or socializing tools of the internet (Web 2.0) have contributed to enhancing young peoples' attitudes towards approaching their lives to the point that internet corresponds to share and to cooperate in many forms and at their pace (both in space and time): audio, video, photo, chat, etc. Moreover, I will point at the vital contribution that students'-centered activities at school – therefore, including cooperative activities performed through the internet, Web 2.0 – can offer to the daily school practice. Web 2.0-based activities can form examples of personalized syllabuses and receive a better consideration on the part of students because they are the ultimate actors of the learning arena. Teaching ideas and activities suggested through the Web 2.0 may represent a formidable source of what once was called "authentic" material and help to reduce the emotional barriers that

lower students' levels of competence, as Neil Selwyn put it:

"... many commentators are now arguing that these Web 2.0 applications are of equal if not more importance than formal educational ICT applications in the 'real-life' educational conduct of contemporary learners and, as such, are worthy of acknowledgement by the education community" [8].

The final part of the paper is dedicated to the way Web 2.0 re-defines the teacher's role, to the analysis of the opportunities offered by the Web 2.0 to assessment and to the formal recognition of learning made through collaborative activities, tools and shared resources. The recognition has to be made in order to comply with the need of "accountability" or "readability" and validation of qualifications, as promoted by the European Union [9].

III. SCHOOL AND WEB 2.0

With the expression "Web 2.0" most technology experts define a more active use of the internet on the part of the final user [10]. This user has become increasingly creative, autonomous, and competent within broader social communities with meaningful contents. The term "Web 2.0" has not a solid or shared definition. Now it is a powerful trendy *leitmotiv* and owes its origin to a brainstorming session within the American group O'Reilly Media & MediaLive International occurred in mid-2004, also claimed the first Web 2.0 Conference in the October in the same year. In 2005 O'Reilly published what seems to remain the main literature reference to the topic: "What is Web 2.0. design Patterns and Business Models for the Next Generation of Software" [11].

According to O'Reilly, there are seven animating principles of Web 2.0:

1. The World Wide Web as a platform
2. Exploiting the connective intelligence [12]
3. Database management as a basic skill
4. End of updating cycles
5. Light programming models. Search for simplicity
6. Software is not limited to a single device
7. Experiences enriched by the user

Talking about and using the Web 2.0 at school does not imply a "School 2.0": of course, the school is not a "computer programme to upgrade". A school is a complex construction of knowledge, cultural and human relations, and of formal recognition of skills. It is not a matter of being webophobic, nor of webophilia [13], bearing in mind that the web is a pervasive and inclusive reality, a great part of the student's individual life.

In 1624 the English poet John Donne wrote "No man is an island, entire of itself; every man is a piece of the continent, a part of the main" [14]. The collaborative or socializing tools of the internet (Web 2.0) have contributed to link and enrich young peoples' lives in many forms and at their own pace (both in space and time): audio, video, photo, chat, etc.

The paradigms of modernity seem to be speed, plurality of voices, and connectivity. As De Kerckhove notes,

"The multiplication of contacts everywhere opens the possibility to unify the answers worldwide. Today economies are revised instantly, electricity embraces the globe into a single network. Any move on the stock exchange has effects on investment worldwide. This acts as a multiplier both for good and bad. Never as today was important as the intangible value of ideas associated with a product, with a company; these ideas included a flow of collective intelligence." [15]

In the past decade users' approach to internet has been aimed at finding and retrieve already structured information. With the advent of Web 2.0 the internet has profoundly changed as users have become active producers of knowledge, information, views of events, etc: the internet has enabled creative surfers to use cognitive tools, learning environments and knowledge is rapidly changing. We are increasingly changing our views about reality and making new and different connections among the different sources of knowledge itself. Students positively accept the idea that the school is no longer the only source of knowledge and understanding and more frequently tend to obtain reliable information informally *outside the school*, *not inside* it [16]. Teachers, educational authorities, single school institutions and even wider organizations may encounter increasing difficulties in being perceived reliable, authoritative, useful because all of them tend to consider students' life as a singular entity, a monadic being totally secluded from the other peers, which is not really that in real life. All these students – considered single entities at first – form social groups, instead. Today learning ideally rhymes with participating. The paradigm of learning in the XXIst century is a renowned enforcement of a learning theory centred upon the student's activity and participation to his process of acquisition of knowledge and this coincides with the essential characteristics of the Web: its openness and universality. The social internet, Web 2.0, enhances us to discover, experiment, share and modify a *corpus* of assets that once rejected any manipulation and were deeply individually-based [17]. The internet has enabled creative surfers to use cognitive tools, learning environments and strategies, critical thinking and autonomy. All these elements are probably the agents of what in 1974 Wittrock called the "generative process of information" [18].

IV. COOPERATIVE ACTIVITIES AND "LEARNING 2.0"

Cooperation through the internet, and learning through Web 2.0 and students'-centred activities can offer a vital contribution to the daily school practice. Web 2.0-based activities can form examples of personalized syllabuses, e-Portfolios, peer-reviewed tasks, and what Papert calls "strategies for pupils' re-empowerment" [19]. Teaching ideas and activities suggested through the Web 2.0 may represent a formidable source of what once was called authentic" material. For example, language examinations such as UCLES (University of Cambridge), Trinity College London, Delf (Alliance Française), ZDF (Goethe Institut), usually have reading and speaking papers taken from photos, articles, and so on. Tools as FaceBook, Flickr, WetPaint (to create personal collaborative websites or *wikis*), Wikipedia (the free online encyclopedia), and YouTube can give an effective contribution for creating authentic material. Everything can be combined with the tools of instant communication (Instant Messaging) of Web 2.0, as Meebo, Skype, or Twitter, especially when exams take place in distant places.

In my personal experimentation in class, I asked the students to perform easy activities such as creating emails (Gmail) and blogs (www.blogger.com), collaborating in

writing documents with Google Docs (http://docs.google.com) or with online (free) productivity suites as Zoho (www.zoho.com), and publishing the materials in a specific page hosted by the social platform Ning (www.ning.com). All the tools used are free of charge and do not require a complicate training or any cost. The previous (and necessary) step was to lead a brainstorming session to elicit the students' personal ideas and suggestions, so that the basic "Storyboard" came out from the students' themselves. This classroom experimentation has involved 24 students of the pre-final year of my High Secondary School ("Istituto Tecnico, vocational school, 17-18 years old) and has lasted three months. The students usually study mechanical engineering, electronics, automatized systems, etc. On the occasion, the pupils have prepared some short multimedia and thematic presentations regarding a number of related topics: music, local traditions, old jobs (sulfur mining), miners' stories and experiences to create a teaching and learning resource on narration and comparing ways of economic production. According to the topic previously defined in common, the students have also kept a record of the material found through the websearch and "reminders", like Google Notes and tags. In this case, a learning resource can be highlighted through Traifire (http://trailfire.com/), in order to make the resource available in a broader context. I also managed to encourage the students to mark sites with "Social bookmarking" with del.icio.us (http://del.icio.us) and to create conceptual maps to upload using CMap Tools (http://cmap.ihmc.us).

All the described activities can be generally easily managed in class and make learning more pleasant and varied, using just a Pc/Notebook. The experience says that the more sociable are the students, the richer is the content they can manage and produce; quite empirically, there may be a close link between the students' social intelligence (and willingness to cooperate) and their meaningful productivity. In other words, the use of Web 2.0 acts as a catalyst factor, but does not change the students' inner character, rather enhances it. I also observed some progressions on the part of shy students in acquiring skills, usually limited to the technical ones and not to the global competences in the subject studied (English language). What emerges from my limited and empirical classroom experience is that students need more organizational skills and chances to make their already existing ideas into reality; a "Web 2.0 classroom" could offer time and space to improve those skills, provided that the students have some familiarity with the chosen topics.

According to Mark Wolley [20], people and students derive many benefits from networking through the tools of Web 2.0, to infer the democracy of the same Web 2.0 and knowledge originated with the following elements that can be easily applied to daily classroom life:

- collective intelligence = collaborative
- transparent = instant gratification
- not hierarchical = democratic
- potential for passion = personal property
- open to the public = real recognition
- permanent resource = searchable

V. ASSESSING LEARNERS THROUGH WEB 2.0. THE TEACHER'S ROLE

Using Web 2.0 in classroom and assessing learners imply the re-definition of the teacher's role [21]: this teacher becomes a "network administrator and curator of knowledge". The Web 2.0 seems to transform knowledge into active learning to some extent, while assessment is still essential for a formal recognition of learned competences. If the construction of knowledge is a collaborative process, then the assessment changes with the advent of the Web. Assessment is not merely a "teacher's job": peer review and assessment are quite common features today [22].

Nevertheless, assessing students' work is not easy, since we may not adequately appreciate the individual contributions, especially in group-work and because intellectual plagiarism is always round the corner. Thus, evaluating the acquired information is vital; likewise, it is essential to understand the cognitive steps that have lead to information processing. As George Siemens put it, "When knowledge is abundant, the rapid evaluation of knowledge is important." [23], also in order to avoid the dangers of cognitive overload: in this way, the socialized knowledge can affect pupils' behaviour and performance more positively.

The Web 2.0 requires the teacher to redefine what is knowledge and the teacher's role or function, because teaching has traditionally been *bottom down*, while the current structure of the web and the organization of knowledge in the age of mass communication and interaction are *bottom up*. This mass of information is structured through the use of "folksonomies". As we will see later on, tagging and (social) bookmarking seem to recreate the mental models of large audiences of users (the "folksonomies") on the one part [24]; on the other, they contribute to give information and knowledge a new identity. The Web 2.0 obliges us to reflect on the dichotonomy between taxonomic precision and folksonomic sharing. When we believe appropriate to the tasks, collaborative learning through the web offers an alternative to traditional approaches and models, because the web is structurally related to the collaboration among equals and to the production of large quantities of material. However, the abundance of information may be counterproductive [25]: the cognitive overload might not enrich pupils but mislead them [26]. We have not to abhor redundancy or visibility of information *tout court*. Visibility has always had an important profile for ages. For the English philosopher John Locke, for example, visibility was among the necessary conditions for perceiving and dignity of existence [27]. Today visibility comes again in De Kerckhove's words: "The new thinking connective system is the screen" [28]. People exist as they put a personal diary on the web, collect and publish materials in blogs. People like David Pogue in the USA or Beppe Grillo in Italy contribute to orientate consumers' preferences and to inform them about politics and future trends.

VI. TAGGING AND TAXONOMIES OF WEB 2.0. TOWARDS A SCHOOL VIEW AND ASSESSMENT

For Linneus, to collect, to analyse, to systematize the knowledge and the experiences were the primary need of any cultivated person. Today, the process of organizing the resources in the internet can be partially effective and

extremely difficult because the net is always evolving. Therefore, it might be hard to determine what to measure and evaluate. In opposition to the announced proposals for personalized learning, in Italy often left onto written documents just for official use, knowledge in the age of Web 2.0, in the XXIst century, is in constant flow and renovation. As a matter of fact, knowledge takes advantage of the following elements:

   i. adaptability

   ii. connectivity

   iii. democracy

   iv. pluralism

   v. rapidity

Various attempts have been made in order to identify the necessary skills for the present age. One of these attempts is by the Partnership for 21st Century Skills, a consortium of famous American companies and institutions ranging from Apple to Intel, from Cisco and Microsoft to the American Federation of Teachers and the Department of Education, and others. All agree in identifying the best strategies to respond to the need of improving the pupils' competences for contemporary life. In the guidelines promoted by the Partnership we can find a number of themes that are at the core of the debate over education in Europe, such as the partiality of current studies, the abundance of subjects without an effective mastery, the excessive time spent at school, short-term memorized chunks of syllabus without any reference to Life-long-learning, as suggested by the European Union [29] instead:

- Critical thinking and problem-solving skills
- Communication skills
- Creativity and innovation skills
- Collaboration skills
- Contextual learning skills
- Information and media literacy skills [30]

All these elements listed above tend to emphasize school activity in terms of acquisition of competences (skills) and not just "contents to fill". Moreover, these elements imply educational activities that fully involve the students in the process of education and in feedback after learning. The typical linear and heavily structured organization has sometimes prevented students from being actively involved in the process of learning, as well as a quick response to their needs. It is quite likely now that multimedia and interactive capabilities of the World Wide Web can be used to improve the professional preparation of teacher credential candidates and teaching profile [31].

In formal learning measurement and assessment have been about the finite product of education. The Web 2.0 may contribute to facilitate both syllabus organization and feedback, together with the assessment of education as a process: for example, a blog can easily be transformed into an "E-Portfolio", with its performances and notes.

The classification of knowledge and skills acquired through the Web 2.0 is made thanks to "Folksonomy". According to the anonymous definition in Wikipedia,

"Folksonomy is a neologism that describes a collaborative categorization of information through the use of keywords (or tags) chosen freely. In more concrete words, this term refers to the methodology used by groups of people who spontaneously organize into categories for the information available through the internet (see Web 2.0)".

Immediately below, the anonymous compiler appropriately continues:

"The origin of the words folk *(or* folks*) and* sonomy *(contraction of taxonomy) was attributed to Thomas Vander Wal [32]. Taxonomy derives from the Greek word* taxis *("order") and* nomos *("economy", "administration")."*

Folksonomy may not be as precise as Bloom's taxonomy [33] that focuses on a hierarchical structure of activities. Bloom explored the three domains of educational activities: cognitive, affective, and psychomotor. Unfortunately, it seems that school practice has often overstressed the importance of the cognitive domain only, leaving the rest in the shadows. On the contrary, the structure of knowledge in the age of Web 2.0 varies according to the users' needs – including affective links – to the extensive (or not) use of tagging (that is marking, labeling the web resource): aggregating and categorizing information are at the basis of Web 2.0, are its core values [34].

"(...) The tag is the message. The tag is the nature of the Internet. Without the tag, without thus opportunity to share messages that are processed and sent out over the network in different pieces that follow different routes, the Internet would be a system only point to point and not distributed as it has been." [35]

Once again, the questions are still about "order": what, when, why and how to "order" the information acquired thanks to the web. In Bloom's words, our students still "separate", "compare", "analyze", "report", etc. My personal classroom experience suggests that students include a great deal of affectivity in using the web and their tools, then, it should be necessary to define the tools used and the value of the outcomes. Moreover, the lower the affective filter is, the more wishful the students are in providing tags and reviews of learning resources.

Several interesting examples of communities of users dedicate to the establishing free spaces of information management, documents, and knowledge. Scribd, ThinkFree, ThinkTag, and Zoho may be the best cases in which the tags (labels and marks) function as indicators of the cultural value of the tagged documents, usually dealing with cultural studies, scientific debates, events, and so on. ThinkFree and Zoho are cases apart: the member of the community contributes (individually) to a repository of documents using wordprocessors, spreadsheet, presentations, webnotes exclusively online with productivity tools programmed into AJAX language (Asynchronous JavaScript and XML). Thus, the author and the final user, no matter far they could be, adopt rich internet applications, usually interactive and likely to share desktops, regardless of existing operational systems and machines. Students could be trained in improving their study skills by finding and evaluating the most appropriate information through the internet. This already happens, actually, but is usually underrated by (Italian) students.

According to the present state of the technological art, it seems that the formal measurement and assessment of the acquired skills at school and through the Web 2.0 are antithetical practices. The more precise the formal recognition of learning at school is, the more shared (sometimes anonymous) is the knowledge and information discussed through the web. However, there are very interesting cases

of communities of practice, repositories of teaching resources that are identified, tagged, and reviewed, such as Oer Commons. OER Commons is an open learning network where teachers and professors can access their colleagues' course materials, share their own, and collaborate on affecting today's classrooms. It aims at using tags, ratings, comments, reviews, and social networking to create an online experience that engages educators in sharing their best teaching and learning practices. Therefore, it seems that assessing and tagging imply a very personal contribution on the part of the users (both students and teachers) in order to provide meaningful and contextualized opinions about activities performed, found resources, followed procedures, and achieved products. Then, the process is highly transparent, open to discussion, transferable. In a word, it is learning.

At this point it might be useful to point at a possible ranking of the tools of Web 2.0 [36] and their applications at school. The different tools often fall into various categories or the same ones because of their nature: for example, a social network usually includes an instrument for blogging, bookmarking, or information management. The concrete example of all this mix is provided by Elgg. Elgg combines blogs, e-portfolios, and social networking, and also includes many other functions such as file repositories, community tags, and podcasting. The service represents a new breed of open source, group software with the emphasis both on individualizing resources and on creating a welcoming social network. However, the educator should bear in mind that the *mastery of technology* is *not* the *ultimate goal* of the process of teaching and learning [37]. Then, educational activities should refer to the relevance and quality of the information and knowledge produced, not just to the technical skills. Criteria for Web 2.0 activities should stress the ability to perform group work and problem solving as better as possible. The focus should be about the relevance of

1. objective;
2. procedure;
3. product.

Appropriate grids for evalution might involve the three factors mentioned above; then, peer assessment could check the pertinence of materials and the quality of working process.

When introducing the tools of Web 2.0 into the classrooms, we should consider the peculiar natures of the tools, their user-friendly approach, the appropriacy to the learning styles, the time allocated for the activities.

Common classification includes four categories of tools:

1. *Social Networking*: describes all those instruments to establish spaces that promote or facilitate the creation and life of online communities and instances of social interaction [38]. The best known examples for the creation and management of the social network are Facebook, MySpace, and Ning. Students usually feel at ease with these tools and they may represent a good introductory step, along with Instant Messaging tools.
2. *CMS (Content Management Systems):* we refer to those tools that encourage reading, writing online, the distribution and exchange of cultural material from various sources, with tagged, classified information.

Famous cases are eXeLearning, Joomla, Ma.gnolia, and Wordpress, the well-known software for creating blogs; finally, RSS (Real Simply Syndication), that automatically provides the user with the desired contents. CMS require some technical skills and may be not immediately "usable" in classroom.

3. *Social and intelligent organization:* They are tools and resources to tag, mark, and index the content, to facilitate the storage and retrieval of information. A common – and easy to use – example is "del.icio.us".
4. *Applications and services (mash-up)* [39]. Here we include all those tools, programmes, online platforms and mixed/hybrid websites that aggregate information and content dynamically, coming out from a multiple number of sources. Notable cases are Digg, Flickr, or Google Maps. Geocatching and social mapping (attaching an identifiable tag, similar to GPS technology) seem the latest practices, especially found as services in the internet and mobile phones.

VII. CONCLUSIONS

Web 2.0 is an opportunity: there are convergences between web consumers and creators, while the borders between reading and writing, between public and private spaces progressively disappear. The unified role of consumer and creator helps educators to meet students' needs better and, at the same time, foster the appropriate and learned use of cognitive tools that make knowledge readily available for a greater number of people.

Researchers at all levels (students, faculty, staff) can quickly set up a social bookmarking page for their personal and/or professional inquiries. Beyond technical limitations, band width, computer operational systems and machines, the tools of Web 2.0 overcome the existing differences and make everyone capable of "producing knowledge".

The users of Web 2.0 technologies become capable of pursuing their learning objectives, of processing the information effectively, and of producing a final meaningful outcome that is not limited to school but is personally motivated and actively elaborated.

REFERENCES

[1] PISA (Programme for International Students Assessment), *Learning for Tomorrow's World. First Results from PISA* 2003, Paris: OECD, 2004.

[2] PISA (Programme for International Students Assessment), *Learning for Tomorrow's World. PISA 2006*, pp. 131-135, Tables A6.3c to A6.3c., Ch. 6, pp. 272-300, Annex B1.1.

[3] OECD, *Are Students Ready for a Technology-Rich World: What PISA Studies Tell Us*. In particular, Ch. 3, "Students' Use and Attitudes towards ICT", Paris: OECD, 2005.

[4] See Ref. [1], pp. 125-137.

[5] PON (Programma Operativo Nazionale) 2007-2013. "Competenze per lo sviluppo", "Informazione e sensibilizzazione sull'indagine OCSE-PISA e altre ricerche internazionali" [Information seminars about PISA studies], November 2008.

[6] IAEEA, *PIRLS (Progress in International Reading Literacy Study)* 2006; document retrievable at http://is.gd/KDv2. A good reading to explore this field is P. Foy and A. M. Kennedy, Eds., *PIRLS 2006 User Guide for the International Database*, Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College, 2008.

[7] Giovanni Moretti, "Valutazione apprendimenti e portfolio competenze", presentation at Corso Speciale D.M. 85/ 05, Università di Cagliari-Monserrato, 2007. For further readings see: Rosario Drago, *Il portfolio a scuola: una rivoluzione delle pratiche di inse-*

gnamento-apprendimento, Trento: Erickson, 2008. Clare R. Kilbane-Natalie B. Milman, *What Every School Leader Should Know About Digital Portfolios* Washington DC: Allyn & Bacon, 2003. Finally, see also Serge Ravet, "ePortfolio for a Learning Society", on behalf of EIfEL (European Institute for E-Learning), Paris: ePortfolio 2007 Conference (18-19 October, 2007).

[8] Neil Selwyn, "Web 2.0 applications as alternative environments for informal learning - a critical review", [Paper for CERI-KERIS International Expert Meeting on ICT and Educational Performance, 16-17 October 2007, *Session 6 - Alternative learning environments in practice: using ICT to change impact and outcomes*, p. 3].

[9] European Parliament and Council, *European Qualification Framework for Lifelong Learning (EQF)*, 23 April 2008, ISBN Code: 978-92-79-08474-4. See also European Commission, Commission Staff Working Document, *Progress towards the Lisbon Objectives in Education and Training Indicators and Benchmarks*, Brussels, 2008. ISBN Code: 978-92-79-09317-3.

[10] W. D. Haddad and S. Jurich, Editors, "ICT for Education: Potential and potency", in: UNESCO, *Technologies for Education: Potential, Parameters, and Prospects*, Paris: UNESCO, 2002, ISBN Code: 0-849-112-6, p. 132.

[11] Tim O'Reilly (2005). "What Is Web 2.0", [post dated 30 September 2005. Last accessed: 27 December 2008].

[12] The concept of "connective intelligence" has been first used by the Canadian scholar Derrick De Kerckhove, generally regarded as the heir of McLuhan, *La civilizzazione video-cristiana*, Milano: Feltrinelli, 1995 (1990[1]), part "Alla ricerca dell'intelligenza connettiva"; See also the lecture at *Convegno Internazionale "Professione giornalista: Nuovi Media, Nuova Informazione"*, Montesilvano (Pescara), 24 November 2001.

[13] See Tim Berners-Lee, *Weaving the Web: The Past, Present and Future of the World Wide Web by its Inventor*. London: Orion Business, 1999. See also John Seely Brown and Paul Duguid, *The Social Life of Information*, Boston: Harvard Business School Press, 2000.

[14] John Donne, *Meditation XVII*, 1624.

[15] D. De Kerckhove, *Lectio Magistralis*, Università degli Studi di Urbino, Italy, p. 10, 29 November 2004.

[16] M. du Bois-Reymond, on behalf of the Council of Europe, *Study on the links between formal and non-formal education*, Strasbourg, especially ch. 5, "Non-formal education and vocational training: problems of assessment", Brussels, March, 2003; D. Oblinger, "Educating the Net Generation", *Educause*, July/August 2003. Available at: http://is.gd/KA3H (Accessed: 12 December 2008).

[17] See OECD, *Participative Web and User-Created Content: Web 2.0, Wikis, and Social Networking*, Paris: OECD, 2007.

[18] Merlin C. Wittrock, "Learning as generative process" in *Educational Psychologist*, Vol. 11 (2), 1974, pp. 87-95 and "Generative learning processes of the brain" in *Educational Psychologist*, Vol. 27 (4), 1992, pp. 531-541.

[19] S. Papert, (2000). "What's the big idea? Toward a pedagogy of idea power", in: *IBM SYSTEMS JOURNAL*, Vol. 39, Nos. 3&4, p. 722.

[20] M. Woolley, (2007). "Web 2.0 Tools in Your Classroom", 2007. Presentation at http://is.gd/KAoz, retrieved 12 May 2008.

[21] J. Murphy – R. Lebans, "Using Web 2.0 Tools in the Secondary School Classroom: Unexpected Student Learning. Evolving Teacher Identity and Emerging Pedagogical Issues", *International Journal of Technology in Teaching and Learning*, 4 (2), 2007, pp. 134-147. Electronic version at http://is.gd/KFOt, accessed 31 May 2009.

[22] An interesting study on the subject is by T. S. Roberts, *Self, Peer, and Group Assessment in E-Learning: An Introduction*, Hershey, PA: Idea Group Inc. (IGI Global), 2006. See also R. Trinchero, *Valutare l'apprendimento nell'e-learning. Dalle abilità alle competenze*, Trento: Erickson, Quaderni di Form@re, 2006, n. 5.

[23] G. Siemens, "Connectivism: A Learning Theory for the Digital Age", 2004, revised 5 April 2005, document maintained at http://www.elearnspace.org/Articles/connectivism.htm.

[24] Robert O'Dowd, "Evaluating the outcomes of online intercultural exchange", in *English Language Teaching Journal*, Oxford University Press, Volume 61/2, April 2007, pp. 144-152.

[25] See P. Moorville, *Ambient Findability*, Sebastopol, CA: O'Reilly, 2005.

[26] Donald Clark, "NEW theories and OLD practice", in *Why Don't You...? Supporting innovative approaches in education*, London: INMARSAT, for FutureLab, British organization for academic research about ICT and future perspectives of teaching, 30-31 October 2007.

[27] J. Locke, letter to William Molyneaux dated 2 March 1693 and re-elaboration in "Of Knowledge and probability", in *Essay Concerning Human Understanding*, Book IV, Cap. 1. See also John W. e Jean S. Yolton (Eds.), *Some Thoughts Concerning Education*, Oxford: Clarendon – Oxford University Press, 2000.

[28] "The new system of connective thinking is the screen". Interview of Derrick De Kerckhove with Álvaro Bermejo on "Communication in Evolution: Social and Technological Transformation", for the "McLuhan Program in Culture and Technology" University of Toronto in Canada.

[29] See the Life Long Learning Programme of the European Union in the EACEA website.

[30] See the document *21st Century Skills Assessment*, but also Firestone, W. A., Schorr, R.Y., & Monfils, L.F., (Eds), *The ambiguity of teaching to the test: Standards, assessment, and educational reform*. Mahwah, NJ: Lawrence Erlbaum Associates, 2004. On assessment and objectives of learning are quite interesting Edgar Morin, *Seven Complex Lessons in Education for the Future*, Paris: UNESCO, 2001. Then, Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D., *Assessment for learning: Putting it into practice*. Berkshire, England: Open University Press, 2003.

[31] To explore this aspect, it is interesting to read Hough, S., Copeland, W., Pratt, D. & Stevenson-Bagnall, H., "The Use of Multi-Media, Web-based Technology to Prepare Tomorrow's Teachers Outline", In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2002* (pp. 1638-1639). Chesapeake, VA: AACE, 2002.

[32] T. Vanderwal, "Off the Top: Folksonomy Entries", 2005. Document retrieved 19 May 2008.

[33] B.S. Bloom, (Ed.), *Taxonomy of Educational Objectives Handbook 1: Cognitive Domain*, New York: Longman, Green & Co, 1956. See also Lawrence A. Tomei, *Taxonomy for the Technology Domain*, Hershey, PA: Idea Group Inc., 2005.

[34] See Luca Rosati, "La ricerca si fa sociale: il tagging e la folksonomia", in Vito Di Bari, Ed., *Web 2.0. I consigli dei principali esperti italiani e internazionali per affrontare le nuove sfide*, Milano: Il Sole 24 Ore, 2007, pp. 64-77.

[35] Interview of Giovanni Calìa with D. De Kerckhove, "Il Tag è il messaggio: intervista a Derrick De Kerckhove", post in Estrablog,19 September 2007.

[36] An interesting review is by Steve Wheeler, "Learning 2.0: Using the Social Web to Promote Collaborative Learning", workshop at *ICL '08: Interactive Computer Aided Learning*, Villach, Austria, 24-26 September 2008. See also P. D. John – S. Wheeler, *The Digital Classroom. Harnessing Technology for the Future of Learning and Teaching*, London: David Fulton Publisher – Routledge, 2007.

[37] Useful readings about how Web 2.0 is changing pedagogy are by H. Beetham – R. Sharpe, *Rethinking Pedagogy for a Digital Age: Designing and Delivering E-Learning*, London: Routledge, 2007; S. Downes, "Applications for Social and Collaborative Technologies in Education", *Symposium on Advanced Learning Technology, Fredericton, Canada*, 08 April 2008. Finally, C. McLoughlin – M. J. W. Lee, "Mapping the digital terrain: New media and social software as catalysts for pedagogic change", *Hello! Where are you in the landscape of educational technology? Proceedings ASCILITE*, Melbourne, 30 November – 3 December 2008. Document at http://is.gd/KEzr.

[38] A synthetic definition is provided by Becta - University of Nottingham, in conjunction with London Knowledge Lab and Manchester Metropolitan University, Report 2: Learners' use of Web 2.0 technologies in and out of school in Key Stages 3 and 4 (June 2008): "The primary motivation for engaging with social network-

ing sites is interacting with one's existing social network.", p. 3, 2008. A very similar conclusion is by Kirsti Ala-Mutka, Social Computing: Study on the Use and Impacts of Collaborative Content, IPTS Exploratory Research on the Socio-economic Impact of Social Computing. European Commission and Joint Research Centre Institute for Prospective Technological Studies, Sevilla, 2008. The author also provides a fully comprehensive review of collaborative content initiatives (Annex, pp. 77-83).

[39] About mash-up see interview with Marshall Kirkpatrick, "Web 2.0: Che cosa è un Mash Up? / Web 2.0: What is a Mash Up?" in Mastermedia, 20 October 2006. Kirkpatrick works as an expert for the authoritative American site TechCrunch.

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