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LORENZO CANTONI* & ISABELLA REGA**

E-LEARNING STUDIES LOOKING FOR FIXED STARS: A STUDY ON REFERENCED LITERATURE IN SITE 2001

The study presented here provides elements to answer the following question: *is there in the eLearning research community a shared body of common knowledge (authors/journals/ etc.)?*, in doing so, it tries to promote the growing of a common background, since it is of the main importance for the growing of the discipline itself; otherwise, every communication is in danger of remaining a fruitless monologue.

To reach this goal the authors analysed the Proceedings of the international conference *SITE 2001*. The corpus of data consisted of 3,910 reference items cited in 648 papers. The parameters analysed were: the most cited titles, the most cited authors, years in which referenced items were written, the most cited journals, the number of references that could be found online, languages of referenced items.

Key Words: impact factor, elearning, community, referenced literature, common ground citations

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Introduction

Research on the use of new information and communication technologies in educational settings covers a quite wide area, which hasn't well defined boundaries yet; this situation is well represented by the number of terms themselves used to name it: e-Learning, Web Based Training, On-Line Learning, Technology Enhanced Learning, Computer Based Training, Technology Based Distributed Learning, Technology Assisted Learning, etc. (Masie 2000, Bates 2000)¹. In addition, concerned studies range from education to information technology, from economics to psychology, from management to philosophy, and so on.

Nonetheless, a specific community has been growing up, devoted both to study and to promote eLearning experiences, independently from different points of view and stresses; a common (inter)disciplinary ground is being collaboratively defined and established. eLearning studies are thus moving to become a (inter)discipline, with a specific study subject/object, and the same theoretical and practical purposes: a) to study eLearning, and b) to promote adequate experiences of it.

The growing of a specific (inter)discipline is showed also by the presence of research organizations, conferences, journals, book series and academic institutes: all of them bear testimony of a common interest and a common field of research and experimentation.

The community of research and practice grown (and growing) around eLearning negotiates and builds up a common body of shared knowledge, a process necessary to its strengthening, and to make its research activities both effective and efficient.

Among the different processes through which a research community better defines itself (Kuhn 1996), there is the recognition of a set of parameters of what is to be meant by "scientific research", together with the identification of a specific hierarchy of sources: authors, journals, organisations that are commonly taken as "fixed stars" in the field; although new infor-

¹ According to a poll done by Elliott Masie (2000), organizations used: e-Learning (36%), Web Based Training (11%), On-Line Learning (10%), Computer Based Training (9%), Distance Learning (8%), while learners used: Computer Based Training (21%), On-Line Learning (18%), Web Based Training (16%), e-Learning (13%).

In this article we will use – to cover all the related area – the term eLearning, which was consecrated by European Union documents, and defined: "as the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration." (CEC 2001: 2).

mation and communication technologies have challenged every established set of parameters, and have called for new research on it (Lawrence et al. 1999, Lawrence 2001), none doubts that every scientific community has to agree on what it calls “scientific” activity/work/publication.

The negotiation of a specific hierarchy of sources and an agreement on it is not only requested by a scientific community to exist, but – more in general – by every community (Gackebach 1998), let’s, for instance, think of the necessity to have parameters according to which to accept or not a scientific expert evidence in a legal trial (Eckstein & Thumma 1998).

Among the different strategies to assess the hierarchy of sources shared by a given research community, the analysis of referenced literature has proven to be quite important, hence parameters like “impact factor”, “citation index”, etc. have been developed, all of which show how a journal/article/author is likely to impact on the knowledge of a concerned community (Evered et al. 1985; Rousseau 2002). Research on cited literature has also been extended to study its accuracy and relevance, especially in medical journals (De Lacey et al. 1985; Hall 1994; Henige 2001, O’Connor 2002).

The research presented here provides elements to answer the following question: *is there in the eLearning research community a shared body of common knowledge (authors/journals/etc.)?*

In doing so, it tries also to promote the growing of a common ground (Clark & Marshall 1981), knowing that it is of the main importance for the growing of the discipline itself; otherwise, every communication is in danger of remaining a fruitless monologue...

Research method

To answer the above question the Proceedings of the international conference *SITE 2001* (Price et al. 2001) were selected and analysed.

The SITE conference is organized yearly by the Society for Information Technology & Teacher Education, “an international association of individual teacher educators, and affiliated organizations of teacher educators in all disciplines, who are interested in the creation and dissemination of knowledge about the use of information technology in teacher education and faculty/staff development.

The Society seeks to promote research, scholarship, collaboration, exchange, and support among its membership, and to actively foster the development of new national organizations where a need emerges. SITE is the

only organization that has as its sole focus the integration of instructional technologies into teacher education programs” (SITE 2002). Beside the international conference, SITE promotes the publication of a printed journal: the *Journal of Technology and Teacher Education (JTATE)*, and of an electronic one: *Contemporary Issues in Technology & Teacher Education (CITE)*.

SITE is promoted by AACE, the Association for the Advancement of Computing in Education. AACE was founded in 1981 and it has become among the widest and most influential organisations on the use of new technologies in education. The basic aim of AACE is to study how Information and Communication Technologies (ICTs) can enhance the quality of learning and teaching at all levels. To pursue its aim AACE organises four international conferences every year: the SITE one; ED-MEDIA: World Conference on Educational Multimedia, Hypermedia and Telecommunications; E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education; and ICCE: International Conference on Computers in Education. Beside conferences, AACE publishes five quarterly journals on the field plus an annual magazine and two electronic journals.

SITE 2001 was held in Orlando, Florida from 5th to 10th March 2001 and was attended by 1,400 people.

The research corpus was hence the electronic version (on CD-ROM) of the Proceedings book (Price et al. 2001), which collected 648 papers, organised according to the following 26 topics:

● Concepts and Procedures	● PT3 Papers
● Distance Education	● Reading, Language Arts and Literacy
● Diversity and International	● Research
● Educational Computing Course	● Science
● Educational Leadership	● Simulation
● Electronic Portfolio	● Social Studies
● Faculty Development	● Special Needs
● Graduate and Inservice	● Technology Diffusion
● Instructional Design	● Telecommunications: Graduate and Inservice
● International	● Telecommunications: Preservice Applications
● Mathematics	● Telecommunications: Systems and Services
● New Media	● Theory
● Preservice Teacher Education	● Young Child

The corpus of data consisted of 3,910 items of reference cited in the 648 papers.

The goal of the analysis was to find out if some “fixed stars” could be recognised among the cited literature. According to this focus we analysed:

- the most cited (articles’ or books’) titles
- the most cited authors
- the years in which referenced items were published
- the most cited journals
- the number of references that could be found online
- the languages of referenced items

Data has been collected from the pdf file containing the proceeding book of SITE2001 and compiled into an excel file. Papers’ titles were copied in the columns, while the referenced items (“title-types”) were copied in the rows. An “x” in the intersectional cell meant that a paper contained the given reference (see figure 1).

	Paper 1	Paper 2	Paper 3	Paper 4
Title 1				
Title 2		X		X
Title 3				

Figure 1. The excel file, e.g.: title 2 is cited by papers 2 and 4.

A specific distinction is to be made between title-type and title-token: the first one is a single reference item (in figure 1 Title 1, Title 2 and Title 3 are three different title-types), while a title-token is one single occurrence of a given item (in figure 1 there are two title-tokens of the title-type 2, they are marked by the “X”, meaning that title-type 2 is quoted by paper 1 and by paper 4).

Once all the data have been transferred into the excel file some excel functions have been implemented in order to discover the figures hidden under such amount of lines and columns. In particular the implemented functions allowed to:

count the occurrences of an “X” in a given line: i.e. determine how many times a title-type has been cited as a reference

search reference items by year
search for journal titles

In the compilation phase problems were encountered due to some inconsistencies in the data corpus. We tried to normalize the gathered information items; however, it was not possible in each single case to identify a solution to assure the 100% consistency of the data set.

The most frequent cases where an intervention was needed, were:
quotation of organisations: sometimes acronyms have been used, sometimes complete names
authors' names: sometimes the same author's name was spelled in different ways
chapters of books cited as autonomous references: they were considered as autonomous items
journals' names: sometimes they were cited using different abbreviations/acronyms; moreover, journals' occurrences had to be counted manually, hence the possibility of human errors
books' titles: sometimes a slightly difference in wording/spelling has been encountered, as in the quotation standard.

Results

Results of data analysis are presented in this paragraph, in the following order: a. *title-types* and *title-tokens*, b. *authors*, c. *publication years*, d. *journals*, e. *documents available online*, f. *languages*.

a. Titles

On a corpus of 3,910 title-types, only 153 items have been cited by more than two papers, 311 have been quoted twice and 3,446 just once.

A diagram showing the scattering of the sample according to the frequency of a reference items follows:

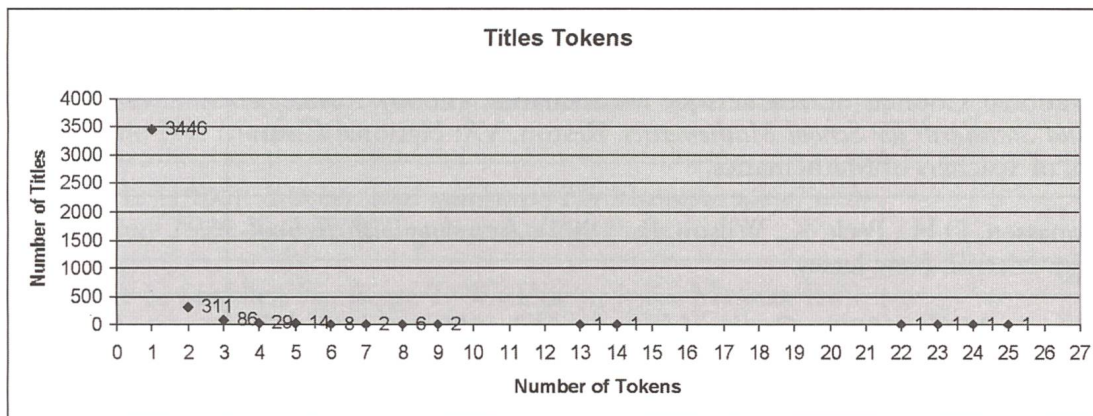


Figure 2. Title-tokens

In the following table, title-types quoted at least 6 times are ranked in descending order, they are 11 books, 6 reports published by public agencies or professional organisations, 6 journals and 1 web site:

Title-type	Occurrences
U.S. Congress, Office of Technology Assessment. (1995). <i>Teachers and technology: Making the connection</i> . Washington D.C., U.S.: Government Printing Office.	25
International Society for Technology in Education. (2000). <i>National educational technology standards for teachers</i> . Eugene, OR: International Society for Technology in Education.	24
Moursund, D., & Bielefeldt, T. (1999). <i>Will new teachers be prepared to teach in a digital age? A national survey on information technology in teacher education</i> . Eugene, OR: International Society for Technology in Education.	23
National Council for Accreditation of Teacher Education. (1997). <i>Technology and the new professional teacher: 21st century classroom</i> . Washington, D. C.: National Council for Accreditation of Teacher Education.	22
Vygotsky, L.S. (1978). <i>Mind in society</i> . Cambridge, MA: Harvard University Press.	14
Rogers, E.M. (1983). <i>Diffusion of innovations</i> . (3 rd and 4 th ed.). New York: The Free Press.	13
International Society for Technology in Education. (2000a). <i>National educational technology standards for students: Connecting curriculum and technology</i> . Eugene, OR: International Society for Technology in Education.	9

Title-type	Occurrences
National Council of Teachers of Mathematics. (2000). <i>Principles and Standards for School Mathematics</i> . Reston, VA: National Council of Teachers of Mathematics.	9
Jonassen, D.H., Peck, K., Wilson, B. (1999). <i>Learning with Technology</i> . Merrill, New Jersey.	8
Patton, M.C. (1990). <i>Qualitative evaluation and research methods</i> . (2nd ed.). London: Sage.	8
Strudler, N. & Wetzel, K. (1999). Lessons from exemplary colleges of education: Factors affecting technology integration in preservice programs. <i>Educational Technology Research and Development</i> , 63-82.	8
Becker, H.J. (1994). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. <i>Journal of Educational Computing Research</i> , 26(3), 291-321.	8
Becker, H.J. (1999). <i>Internet use by teachers: Conditions of professional use and teacher-directed student use</i> , from http://www.crito.uci.edu/TLC/findings/Internet-Use/startpage.html .	8
Brown, J.; Collins, A., & Duguid, P (1989). Situated cognition and the culture of learning. <i>Education Researcher</i> , 18, 32-42.	8
Moore, M. & Kearsley, G. (1996). <i>Distance education: A system view</i> . Belmont, CA: Wadsworth Publishing Company.	7
Campbell, D.; Cignetti, P., Melenyzer, B., Nettles, D. & Wyman, Jr., R. (1997). <i>How to develop a professional portfolio: A manual for teachers</i> . Boston: Allyn and Bacon.	7
National Research Council. (1996). <i>National science education standards</i> . Washington, DC: National Academy Press.	6
Thompson, A.E.; Schmidt, D. & Hadjiyianni, E. (1995). A three year program to infuse technology throughout a teacher education program. <i>Journal of Technology and Teacher Education</i> , 3(1), 13-24.	6
Vygotsky, L. (1986). <i>Thought and Language</i> . Cambridge, Mass: The MIT Press.	6
Wetzel, K. (1993). Teacher educators' uses of computers in teaching. <i>Journal of Technology and Teacher Education</i> , 1(4), 335-352.	6
Willis, J. W., & Mehlinger, H. D. (1996). Information technology and teacher education. In J. Sikula, T. J. Butter, & E. Guyton	6

Title-type	Occurrences
(Eds.), <i>Handbook of research on teacher education</i> (pp. 978-1029). New York, NY: Macmillan.	
Cuban, L. (1986). <i>Teachers and machines: The classroom use of technology since 1920</i> . New York: Teachers College Press.	6
Falba, C. J., Strudler, N., Bean, T. W., Dixon, J. K., Markos, P. A., McKinney, M., & Zehm, S. J. (1999). Choreographing change one step at a time: Reflections on integrating technology into teacher education courses. <i>Action in Teacher Education</i> , 21, 61-76.	6
Hall, G. E., George, A. A., & Rutherford, W. L. (1998). <i>Measuring stages of concern about the innovation: A manual for the use of the SoC Questionnaire</i> . Austin, TX: Southwest Educational Development Laboratory.	6

Figure 3. Title-types ordered by occurrences.

b. Authors

The second studied factor was the presence of frequently cited authors. In order to ascertain this, a table was compiled, showing title-types and title-tokens for each single author; only first authors were taken into account. The following table presents the top-15 list of authors ranked by title-tokens:

Author	Title-token	Title-type
International Society for Technology in Education	55	21
National Council for Accreditation of Teacher Education	37	10
Office of Technology Assessment	31	4
Jonassen, D.H	30	16
U.S. Department of Education	28	25
Becker, H.J.	27	10
Moursund, D.	26	4
Vygotsky, L.	21	3
National Council of Teachers of Mathematics	20	11
Hall, G.E.	19	9
National Centre for Education Statistics	18	10
Piaget, J.	16	14
Darling-Hammond, L.	16	10
Bandura, A.	16	8
CEO Forum on Education and Technology	15	7

Figure 4. Authors ordered by title-tokens.

c. Publication years

A graph showing the frequency of title-types according to their years of publication follows; years have been divided by five-years periods since 1960, the periods before and afterwards were considered as homogeneous periods.

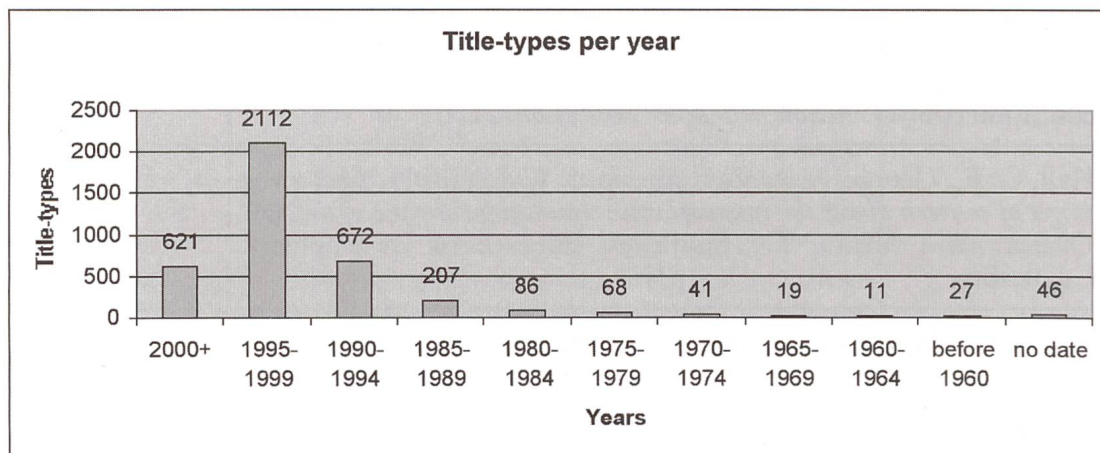


Figure 5. Title-types by publication year.

The majority of quoted references were published between 1995 and 2001 (or were in print on that time). However, it is worthy noticing that a few texts were cited that were published before 1960.

Glenny, L. A. (1959). *Autonomy of public colleges: The challenge of coordination*. New York, NY: McGraw-Hill.

Kant, I. (1959). *Critique of pure reason*. London: Dent/Everyman.

Broadbent, D. E. (1958). *Perception and Communication*. New York: Pergamon.

Coleman, J. S., Katz, E., & Menzel, H. (1957). The diffusion on an innovation among physicians. *Sociometry*, 20, 253-270.

Bloom, B. S. (Ed.). (1956). *Taxonomy of educational objectives*. New York: McKay.

Deutsch, K.W. (1956). Shifts in the balance of Communication Flow. *Public Opinion Quarterly*, 20. pp. 143-160.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, 63: 81-97.

Seigel, S. (1956). *Nonparametric Statistics for the Behavioral Sciences*. New York, NY: McGraw-Hill

Beal, G. M., & Rogers, E. M. (1954). Information sources in the adoption process of new fabrics. <i>Journal of Home Economics</i> , 49, 630-634.
Conrad, L. H. (1954). Schools can start using tv now. <i>Educational Leadership</i> , 11(6), 373-375.
Piaget, J. (1954). <i>The construction of reality in the child</i> . New York: Basic Books.
Long, M. S. (1952). Television has a part in modern education. <i>Educational Leadership</i> , 9(7), 412-417.
Piaget, J. (1952). <i>The Child's Conception of Number</i> . London: Routledge and Kegan Paul.
Lewin, K. (1951). <i>Field theory in social science</i> . New York: Harper.
Hoban, C.F., & van Ormer, E.B. (1950). <i>Instructional film research</i> . Technical Report No. SDC 269-7-19. Port Washington, NY: U.S. Naval Special Devices Center.
Polya, G. (1948). <i>How to solve it</i> . Princeton, New Jersey: Princeton University Press.
Rosenblatt, L. (1938). <i>Literature as exploration</i> . New York, NY: Appleton-Century.
Allport, G. W. (1937). <i>Personality: A psychological interpretation</i> . New York: Holt & Co.
Forman, H. J. (1935). <i>Our movie made children</i> . New York: The Macmillan Company.
Morgan, A. (1934). Radio as a cultural agency in sparsely settled regions and remote areas. In T. F. Tyler (Ed.), <i>Radio as a cultural agency: Proceedings of a National Conference on the use of radio as a cultural agency in a democracy</i> (pp. 77-83). Washington, DC: The National Committee on Education by Radio.
Dewey, J., (1933). <i>How we think: A statement of the relation of reflective thinking to the educative process</i> . Boston, MA: D. C. Heath & Co.
Darrow, B. H. (1932). <i>Radio: The assistant teacher</i> . Columbus, OH: R. G. Adams & Company.
Whitehead, A. N. (1929). <i>The aims of education</i> . New York: The Free Press.
Ellis, D. C., & Thornborough, L. (1923). <i>Motion pictures in education: A practical handbook for users of visual aids</i> . New York: Thomas Y. Crowell Company.
Dewey, J. (1916). <i>Democracy and education</i> . New York, New York: Macmillan
Barnes, M. S. (Ed.). (1911). <i>Autobiography of Edward Austin Sheldon</i> . New York: Ives-Butler Company.
Newman, J. H. (1852). <i>The Idea of a University: Defined and Illustrated in Nine Discourses Delivered to the Catholics of Dublin in Occasional Lectures and Essays Addressed to the Members of The Catholic University</i> . Martin J. Svaglic (Ed.). London: University of Notre Dame Press.

Fig. 6. Title-types published before 1960 by publication year (reverse order).

d. Journals

The following table lists the most cited periodical publications in SITE2001 papers.

Journal	Title-token	Title-type
Journal of Research on Computing in Education [now Journal of Research on Technology in Education, published by ISTE, International Society for Technology in Education]	45	31
Educational Leadership [published by The Association for Supervision and Curriculum Development]	37	29
Journal of Technology and Teacher Education [published by AACE-SITE]	36	20
The American Journal of Distance Education [at first established at The Pennsylvania State University, now published by Lawrence Erlbaum Associates]	34	28
T.H.E. Journal [Technological Horizons in Education]	31	28
Phi Delta Kappan [Published by the Phi Delta Kappa association]	30	26
Journal of Computing in Teacher Education [published by ISTE, International Society for Technology in Education]	26	16
Action in Teacher Education [published by the Association of Teacher Educators]	22	15
Educational Technology Research and Development [published by the Association for Educational Communications and Technology]	21	12
Journal of Teacher Education [published by Sage Publications in cooperation with American Association of Colleges for Teacher Education (AACTE)]	20	14
Educational Researcher [published by American Educational Research Association (AERA)]	18	14
Computers in the Schools [published by The Haworth Press, Inc.]	14	10
Journal of Educational Computing Research [published by Baywood Publishing Company, Inc.]	11	11

Journal	Title-token	Title-type
Journal of Information Technology for Teacher Education [now Technology, Pedagogy and Education, published by Triangle Journals Ltd]	11	11

Figure 7. Journals cited more than 11 times, by title-tokens.

e. Documents available online

The 13.2% (517 out of 3,910) of the total number of reference items could be retrieved also online.

f. Languages

As in every field where (new) technologies play an important role, also in this one the concerned community communicate mainly in English. In the selected corpus, 87 title-types (the 2.2%) were not in English: 39 were in Portuguese, 20 in Spanish, 15 in French, 5 in German, 4 in Afrikaans, 3 in Finnish and 1 in Danish.

Brief discussion & conclusion

Data presented above show a quite fragmented reality, without a wide common ground. The different scientific communities, from which presenters come, have not yet harmonised significantly, and this is represented by the little overlapping area when it comes to cited literature (Fig. 2).

Moreover, data in Fig. 5 show that it is a very young one, whose research “tradition” belongs mainly to the last ten years (about 70% of the title-types has been published since 1995). It is to be underlined the fact that 13.2% of title-types are available online: this makes their access and circulation quite easy.

While only few title-types are shared (and by a little number of papers, Fig. 3), governmental, research and professional organisations are known and work towards the building up of an eLearning dedicated community (Fig. 4).

Results presented in Fig. 3, 4 and 7 can become a useful starting point to compile a shared reference library for the eLearning community, in order to ground work and discussions on a common background, making them more effective and efficient.

In addition, it seems advisable to extend this kind of research to a larger corpus, covering also different years, in order to check its signifi-

cance, and to understand if progresses are made in the construction of a common (inter)disciplinary background.

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