AN ANALYSIS OF EDUCATIONAL TECHNOLOGY PUBLICATIONS: WHO, WHAT AND WHERE IN THE LAST 20 YEARS

Gloria Ofelia Natividad Beltrán del Río

Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

May 2016

APPROVED:

J. Michael Spector, Chair
Lin Lin, Minor Professor
Nicholas Evangelopoulos, Committee Member
Jerry Wircenski, Committee Member
Cathie Norris, Interim Chair of the Department of Learning Technologies
Victor Prybutok, Interim Dean of the College of Information
Costas Tsatsoulis, Dean of the Graduate School

Natividad Beltrán del Río, Gloria Ofelia. *An Analysis of Educational Technology Publications: Who, What and Where in the Last 20 Years.* Doctor of Philosophy (Applied Technology and Performance Improvement), May 2016, 234 pp., 36 tables, 8 figures, references, 96 titles.

This exploratory and descriptive study examines research articles published in ten of the top journals in the broad area of educational technology during the last 20 years: 1) *Educational Technology Research and Development* (*ETR&D*); 2) *Instructional Science*; 3) *Journal of the Learning Sciences*; 4) *TechTrends*; 5) *Educational Technology: The Magazine for Managers of Change in Education*; 6) *Journal of Educational Technology & Society*; 7) *Computers and Education*; 8) *British Journal of Educational Technology* (*BJET*); 9) *Journal of Educational Computing Research*; and 10) *Journal of Research on Technology in Education*. To discover research trends in the articles published from 1995-2014, abstracts from all contributing articles published in those ten prominent journals were analyzed to extract a latent semantic space of broad research areas, top authors, and top-cited publications. Concepts that have emerged, grown, or diminished in the field were noted in order to identify the most dominant in the last two decades; and the most frequent contributors to each journal as well as those who contributed to more than one of the journals studied were identified.

ACKNOWLEDGEMENTS

I thank God, first and foremost, for His love, His grace, and His mercy.

I have received assistance, guidance, support and encouragement of many people throughout the long process of pursuing the Doctoral degree in Applied Technology and Performance Improvement and I would like to express my sincere and heartily gratitude.

To my superb Committee Members: I owe a profound debt of appreciation to my Major Professor, Dr. J. Michael Spector, for having changed my life as a graduate student with his thoughtful guidance, warm encouragement, tremendous patience, and incredible lessons of generosity and humility. Special thanks to Dr. Lin Lin, for allowing me to participate in some of her research projects and for being not only an ideal role model but also a true friend. To Dr. Nicholas Evangelopoulos, for the countless hours devoted to guiding me through the educational research methodology process. Thank you for being an example of an extraordinary Professor. To Dr. Jerry Wircenski, for his support, guidance and inspiration.

To my children: Gloria and Agustin; Oscar and Odnoo; Luis and Anee; Victor and Sarah, for being my inspiration, my motivation, my joy, thank you all. To my grandchildren: Joaquin, Evey, Dayan, Santiago, Kalisi, and Lori; for having brought a kind of happiness to my life that cannot be compared to anything else in this world. To my whole amazing family: my Mother, brothers, sisters, and in-laws, thank you for their continuous love and support.

To my dear friends, especially to Paeng Angnakoon, Lois Knezek, and Fischer Huang, for their friendship and caring. Special thanks to Yvette Whitworth, my first friend at UNT.

To the Technological Institute of Higher Education in Saltillo, Mexico; and the D-II-11 Delegation, I am extremely thankful for their support and encouragement to pursue the Doctoral degree at the University of North Texas.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION

The field of educational technology has experienced significant change and growth in the last 50 years, influenced by historical forces, paradigm shifts in educational psychology, emerging technologies, and developing approaches to inquiry (Spector & Ren, 2015). Advanced technologies have changed and improved the fields of business, medicine, and entertainment, but commensurate changes in education have not been realized. Researchers and practitioners "who have committed their professional lives to this area had anticipated that advances in technological capacity would be matched by parallel enhancements in learning" (Schrum et al., 2005, p. 217).

Statement of the Problem

An effective return on future investments in educational technology can be realized depending on the extent to which research captures past impact and provides directions for future use of the technology. However, a lasting impact and return on technology investments in education have yet to be established. According to the 2013 U.S. Department of Education, Office of Educational Technology report, available at http://www.ed.gov/technology, technology has impacted education but has yet to transform it. It is imperative that future research in educational technology efforts consider the short-comings of past research and implementation to avoid further delays in transformation. This is probably due in part to the rapid changes in technologies and to the fact that there are many factors other than technology that influence impact and return on investments (e.g., curricula, school culture, teacher practice, funding support, social environment, etc.).

A trend is a shift or tendency within a system. Some trends may present an opportunity for advancement of an idea, while others may disrupt, challenge or threaten advancement. Some technological innovations may result in fads or temporary novelties, while others may endure for many years while receiving little attention. Schools may be unable to control the direction in which some trends may lead, but they may be able to leverage other trends to improve teaching and learning. Educational technologies may not cause complete changes in trends in education but are necessary for innovation and improvement. Spector (2013) stated in *Emerging Educational Technologies and Research Directions*: "the implications for schools really are ground-shaking in the sense that significant transformations need to occur if schools are to be responsive to such trends" (p. 22).

Given the various technological innovations and changes in learning and instruction involving technology that have been occurring, it seems reasonable to look at persistent trends and technologies that might have a positive impact on learning. To see what those educational technologies might be, one approach is to examine the work that educational technology researchers have been publishing. That is the general perspective adopted in this dissertation study. Publication information can be gathered from leading journals, journal editors, and analyses based on those publications, such as the New Media Consortium's annual Horizon Reports, http://www.nmc.org/nmc-horizon/. All of these sources are considered in this analysis of significant educational technology research and development publications in the last 20 years.

The annual National Technology Leadership Summit (NTLS) brings together editors of educational technology journals, representatives from educational associations, non-profit foundations, and private corporations, and federal policy makers to discuss the influence of

digital technologies in education and to propose recommendations as to how digital technologies can enhance education in the 21st Century.

Purpose of the Study

Technology, according to the report prepared for the U.S. Department of Education, Office of Educational Technology: *Expanding Evidence Approaches for Learning in a Digital World* (2013), has had a positive impact on education, but it has not yet resulted in wholesale educational transformation:

> Yet even with so many reasons to expect dramatic progress, something more—better use of evidence—is needed to support the creation, implementation, and continuous enhancement of high-quality learning resources in ways that improve student outcomes. In a digital world, evidence fuels innovation and makes improvement possible. Evidence is what separates real advances from mere novelties, enhanced learning from increased entertainment. In the recent past, evidence has been relatively scarce in education. And the quality of the best available evidence has often been disappointingly weak. (p. vii)

Publication in a peer-reviewed journal remains the standard means of disseminating scientific and research results, but the existence of other methods of communication may also be altering how scientists divulge and receive information. Posters, abstracts, lectures at professional gatherings, and proceedings volumes are being used more often to present preliminary results before full review (Hendler, 2007). Preprints and computer networks are increasing the ease and speed of scientific communications. These new methods of communication are in many cases just elaborations of the informal exchanges that pervade science (Carr-Chellman, 2006). To the extent that they speed and improve communication and revision, they will strengthen science. However, if publication practices, either new or traditional, bypass quality control mechanisms, they risk weakening conventions that have served science well (Bontis & Serenko, 2009).

A review of ten of the top educational technology journals, as selected at the last National Technology Leadership Summits by the journal editors who attended the summit, provides an opportunity for the current study to survey the terrain of educational research through a review of high quality published research studies and potentially provide guidance to future investigators. At the National Technology Leadership Summits, one of the questions that arise among the participants, recognized around the world for their knowledge in the field, is: *What is being published in educational technology journals and how has that changed in the last 10 years?* The findings of this study have indicated trends in the discipline of educational technology that might be used to inform the selection of special issue topics; the results will also help educational technology researchers and journal editors work together on directions for future research, and, as a result, the percentage of studies that contribute to the field and move the community forward will increase. In the long term, this should contribute to the progressive growth of research and development in the broad area of educational technology. This study reports on the emergence of new fields and new approaches to educational evidence that will have implications for learning technology developers, consumers, education researchers, policymakers, and research funders.

Research Questions

1. *Who has published research papers in Educational Technology in each of the ten selected journals for the study, during the past 20 years (Jan 1995-Dec2014)?*
2. *Who has published research papers in Educational Technology in more than one of these ten journals during the past 20 years (Jan 1995-Dec2014)?*
3. *What trends in Educational Technology research areas have these top ten journals followed in their publications during the past 20 years (Jan 1995-Dec2014)?*

4. *Which specific journals were cited most frequently during the time period determined for this study (Jan 1995-Dec2014)?*
5. *What specific research articles were cited more frequently overall and in particular 5-year periods of time in each journal during the last twenty years (Jan 1995-Dec2014)?*
6. *Which specific authors were cited most frequently overall, and which ones were most frequently cited in each journal during the past 20 years (Jan 1995-Dec2014)?*

Rationale

The ten top journals in Educational Technology selected for this study and criteria for selecting the journals for the study

The educational technology research journals were selected in collaboration with Dr. J. Michael Spector and the National Technology Leadership Coalition. The journal editors associated with the National Technology Leadership Coalition (see http://ntlcoalition.org/) identified key research journals that might be analyzed to identify educational technology research trends. The NTLC editors who were involved in the discussion over a two-year period included: Dave Edyburn (*Journal of Research on Technology in Education*), Ann Thompson (*Journal of Computing in Teacher Education*), Anita McAnear (*Learning and Leading with Technology*), Kinshuk (*Journal of Educational Technology & Society*), Peter Albion, (*Journal of Technology and Teacher Education*), Michael Spector and Tristan Johnson (*Educational Technology Research & Development*), Abbie Brown and Chuck Hodges (*TechTrends*), and Glen Bull and Lynn Bell (*Contemporary Issues in Technology and Teacher Education*). The discussion among the editors led to a long list of journals to consider. Prof. Spector subsequently published a comprehensive list of educational technology journals as part of the Association for

Education Communications and Technology (AECT) Tenure and Promotion Guide (see http://aect.site-ym.com/?publications_landing):

Peer reviewed journals:

- *Asia Pacific Educational Review*
- *British Journal of Educational Technology*
- *Computers and Education*
- *Computers in Human Behavior*
- *Distance Education*
- *Educational Computing Research*
- *Educational Researcher*
- *Educational Technology Review*
- *Educational Technology Research & Development* – a high-quality AECT sponsored journal, considered the premier journal in educational technology research
- *Educational Technology & Society* – an open access online journal published by the International Forum of Educational Technology & Society
- *Evaluation and Program Planning*
- *Journal of Applied Instructional Design* – an AECT sponsored online journal
- *Journal of Computer Assisted Learning*
- *Journal of Computers in Education*
- *Journal of Computing in Higher Education* - available to AECT members
- *Journal of Higher Education*
- *Journal of the Learning Sciences*
- *Innovative Higher Education*

- *Journal of Research on Technology in Education*
- *Instructional Science* – available to AECT members
- *Interpersonal Computing and Technology Journal*
- *International Journal of Computer-Supported Collaborative Learning* – available to AECT members
- *International Journal of Designs for Learning* – an AECT sponsored online journal
- *International Journal of Teaching and Learning in Higher Education*
- *Higher Education*
- *Performance Improvement Quarterly*
- *Quarterly Review of Distance Education* – available to AECT members
- *Review of Research in Education*
- *Simulation & Gaming*
- Smart Learning Environments
- *TechTrends* – an AECT sponsored journal influential in the educational technology community
- *Technology, Instruction, Cognition and Learning*

Non-refereed journals:

- *Educational Technology* – a journal that is very influential within the educational technology community
- *THE Journal* - *Technological Horizons in Education*

See also combined listings such as:

- *http://lrs.ed.uiuc.edu/tse-portal/publication/dans-journals.html*

- *https://docs.google.com/spreadsheet/ccc?key=0AtQrhYg4UkE_cGNyT1lXbk1XNHRzVmpxS1gwaEM2QXc&usp=drive_web#gid=1*

In discussion with editors and journal publishers and the general members of the NTLC (see http://ntlcoalition.org/), the following criteria were discussed with regard to identifying the journals that represented major research in the broad field of educational technology:

- Impact factor: The five-year impact factor was considered a critical indicator, but it was not necessarily considered a reason to rule out certain journals that clearly published research and had a significant impact of the field.
- Scope: The scope of the journal should not be too narrow (e.g., distance learning) or too broad (e.g., teacher education); the scope should encompass all aspects of educational technology research, implementation, and deployment.
- Focus: The focus should be primarily on research findings rather than on anecdotal evidence or product reports.
- Readership: The readership should be broadly representative of educational technology research on a global level rather than on research in a particular country or region.
- Authorship: Authorship should be open to researchers around the world and not those associated with one group or professional association.

Many of the journals in the long list were ruled out as failing to satisfy two or more of these criteria. Editors unanimously agreed that *Educational Technology*, while not indexed and not peer reviewed, regularly published high-quality research articles that were very widely read; indeed, that magazine is more widely read than any of the others in the list. Some prominent

journals were ruled out as they tended to publish papers specific to a region; for example, *Learning and Instruction* was ruled out as it is focused primarily on Europe and European authors. Surprisingly, the *British Journal of Educational Technology* is widely read and includes authors from all over the globe, so it was included. *The Journal of the Learning Sciences* is closely associated with one association (the International Association of the Learning Sciences) and primarily includes authors from that association. However, it has a high impact factor and has a recognized impact on the field. *Educational Technology Research & Development* and *TechTrends* (both associated with AECT) and the *Journal of Research on Technology in Education* (associated with the International Society for Technology in Education) include contributions from all over the world and regularly publish research that is widely read around the globe.

Given those criteria, the AECT publication of relevant journals, and discussions of the NTLC editors, the following list of 10 most influential educational technology journals was selected for analysis:1) *Educational Technology Research and Development* (ETR&D), 2) *Instructional Science*, 3) *Journal of the Learning Sciences*, 4) *TechTrends*, 5) *Educational Technology: The Magazine for Managers of Change in Education*, 6) *Journal of Educational Technology & Society*, 7) *Computers and Education*, 8) *British Journal of Educational Technology*, 9) *Journal of Educational Computing Research*, and 10) *Journal of Research on Technology in Education.* Table 1 shows the journals' names and the total number of articles published during the period of investigation of this study from each of the ten journals that were analyzed. Figure 1 depicts the front cover pages of the ten journals selected for this exploratory and descriptive study.

Table 1

Number of Published Articles Analyzed from Each of the Ten Journals Included in this Study (Total Number of Published Articles from January 1995 to December 2014: 9,969)

	Journal Title	**Published Articles 1995-2014**
1	*Educational Technology Research and Development (ETR&D)*	663
2	*Instructional Science*	546
3	*Journal of the Learning Sciences*	272
4	*TechTrends*	1,280
5	*Educational Technology: The Magazine for Managers of Change in Education*	1,031
6	*Journal of Educational Technology & Society*	1,253
7	*Computers and Education*	2,369
8	*British Journal of Educational Technology (BJET)*	1,202
9	*Journal of Educational Computing Research*	862
10	*Journal of Research on Technology in Education*	492

Figure 1. The front page covers of the ten journals selected for this study.

Research Methods

A RefWorks Pro database was created containing bibliographical information from the 10 journals for the 20-year period of examination (January, 1995-December, 2014). Editorials, introductions to special issues, conference reports, book reviews, paper discussion commentaries, and responses to such commentaries were not incorporated. Given the fact that the Internet has had a significant impact on science research and academic publishing especially during the last two decades (Kinshuk, Huang, Sampson & Chen, 2013), a twenty-year period was selected rather than a shorter ten-year period as originally planned. References cited in the articles reviewed were collected in a second database.

Publish or Perish software was used for the citation analysis (Harzing, 2013a). Because Publish or Perish relies on Google Scholar for its citation counts, it is not all-inclusive, but it still presents a good estimate of citation numbers and was determined to be better than any other single source for this purpose. Since it is difficult to discern which articles are shorter or lengthier pieces from the Publish or Perish interface, all published articles were included, including shorter pieces such as editorials and colloquium contributions.

Since there were more than 1,000 articles published in most of the ten journals selected for this study during the last 20 years (1995-2014), it was necessary to perform several separate searches because Publish or Perish allows access only to the first 1000 results from each search. Duplicates were then eliminated and the spurious items in the list that clearly did not belong to any of the ten journals.

Figure 2 is a snapshot of the Hazing's Publish or Perish software page that retrieved and analyzed the academic citations from Educational Technology Research and Development (ETR&D), from 1995 to 2014. Since Publish or Perish uses Google Scholar and Microsoft

Academic Search to obtain the raw citations, the number of papers and citations are higher because Google Scholar includes books, conference proceedings and a wider range of journals. As noted earlier, only research publications were included in this study. The researcher cross-referenced the papers retrieved from Publish-or-Perish for each of the journals, against the Ten Journal Master List file for accuracy and discounted those who were not contained within the master list.

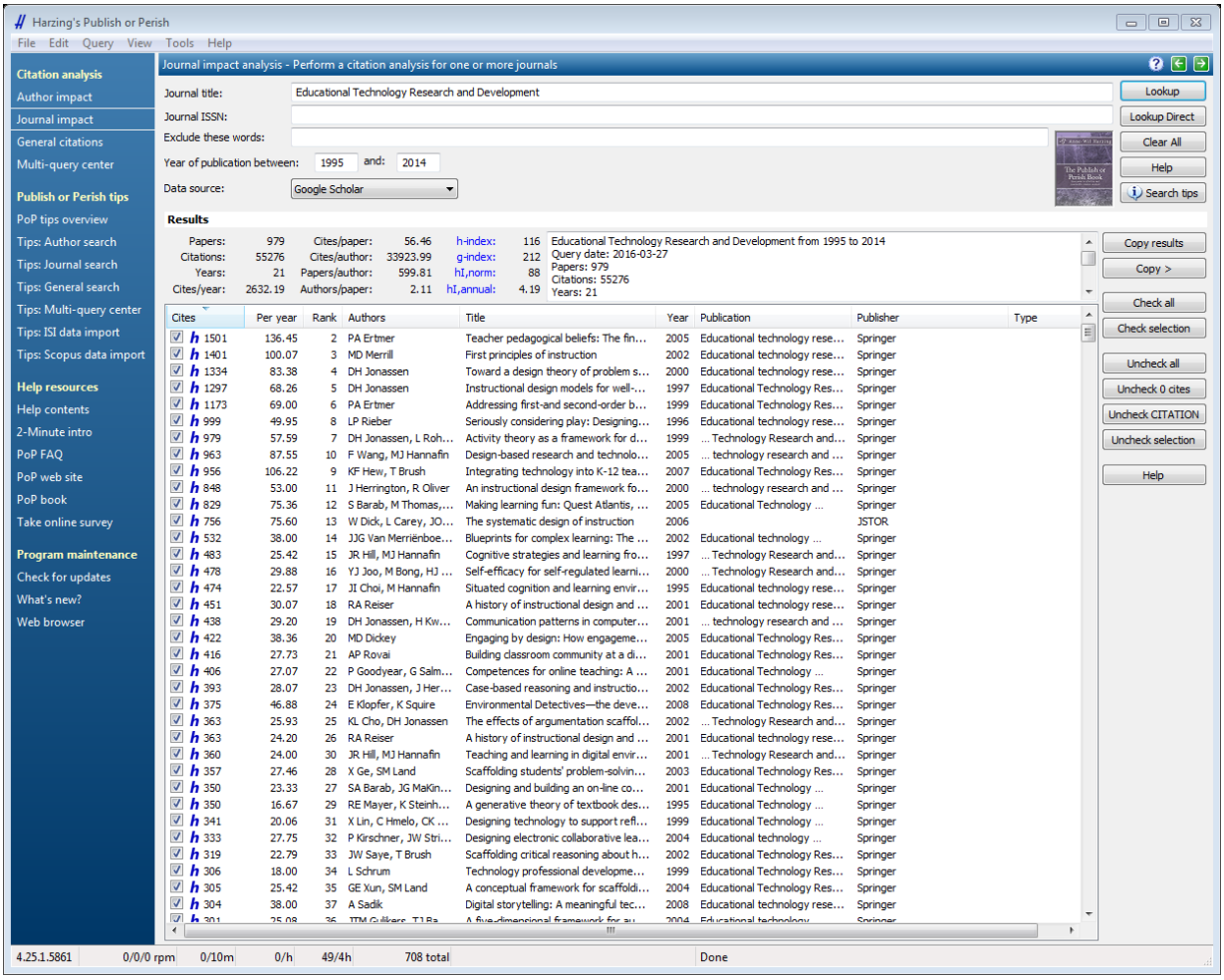


Figure 2. Snapshot of Hazing's Publish or Perish software page. ETR&D citations analysis.

Latent semantic analysis (LSA), a text analytic method that extracts underlying concepts from observed instances of word usage, was used to analyze the large body of collected research articles (9,969) published during the last 20 years in the ten journals studied. The analysis followed the guidelines in Evangelopoulos, Zhang & Prybutok (2012) and the steps recommended in Kulkarni, Apte & Evangelopoulos (2014).

Operational Definitions

Science

Science is inherently a social enterprise, contrary to the stereotype of science as a lonely, isolated search for truth. With only a few exceptions, scientific research cannot be done without drawing on the work of others or collaborating with others. Science inevitably takes place within a broad social and historical context, which gives substance, direction, and ultimately meaning to the work of individual scientists (Dennen & Spector, 2007).

The general objective of research is to extend human knowledge of the physical, biological, or social world beyond what is already known and to explore new and unusual phenomena (Barab & Squire, 2004). However, in order for human knowledge to be considered scientific, it has to be presented to others first in such a manner that they can independently critique and judge its reliability, validity, scope, and implications (Hamilton, 2002). This process occurs in many different ways. Researchers talk to their colleagues and supervisors in laboratories, in hallways, via social networks, and over the telephone. They trade data and speculations over computer networks. They give presentations at seminars and conferences. They write up their results and send them to scientific journals, which in turn send the papers to be examined by reviewers who are recognized experts in the field. After a paper is published or a

finding is presented, it is judged by other scientists in the context of what they already know from other sources. “Throughout this continuum of discussion and deliberation the ideas of individuals are collectively judged, sorted, and selectively incorporated into the consensual but ever evolving scientific worldview. In the process, individual knowledge is gradually converted into generally accepted knowledge” (Hamilton, 2002, p. 69).

Theory

When Dr. J. Michael Spector was questioned by Michael F. Shaughnessy and Susan M. Fulgham as to whether “there is a solid theory of integrating technology into education” during the interview for the Q&A with Ed Tech Leaders (*Educational Technology*, May-June 2015), his answer was:

> Educational technology is not a natural science. It is not clear to me why one would expect a solid unifying theory of technology integration. Is there a theory of integrating cement into architecture? What is needed is an appropriate scientific (i.e., skeptical) approach. We need replication studies and not more “one-off” case studies using non-standard and non-validated instruments that prevent the generalization of findings. We need standard, validated, and reliable instruments and studies that can eventually be replicated so that we can determine what is likely to work in various circumstances with different learning goals and learners. Without those missing elements, there is no way to build a theory of technology integration or a science of educational technology. What we now have and have had for far too long are fads and fancies and little sustained and systemic improvement in learning and instruction. We can do better. We can become investigators rather than advocates for a particular technology or approach.

Academic journals

As Henry Oldenburg stated, an academic journal provides a venue for researchers to “impart their knowledge to one another, and contribute what they can to the Grand design of improving natural knowledge, and perfecting all Philosophical Arts, and Sciences" (Oldenburg, 1665). Oldenburg was a founding editor of the *Philosophical Transactions of the Royal Society*.

He pioneered the practice of sharing the manuscripts that were submitted to experts who would judge their quality before publication. This was the beginning of both the modern scientific journal and the practice of peer review. *Philosophical Transactions of the Royal Society* continues to publish today and is the world's oldest published scientific journal (*Philosophical Transactions*, 1665, p. 2).

An academic or scholarly journal is a peer-reviewed or refereed periodical that distributes knowledge and provides a forum for introducing new research and for critiquing existing research.

Scholarly articles

There are two kinds of article or paper submissions in academia: solicited, where an individual has been invited to submit work either through direct contact or through a general submissions call, and unsolicited, where an individual submits a work for potential publication without directly being asked to do so (Metzler, 1994). Upon receipt of a submitted article, editors at the journal determine whether to reject the submission outright (e.g., as not well suited for the journal or of insufficient quality to justify peer review) or begin the process of peer review. In the latter case, the submission becomes subject to review by outside scholars of the editor's choosing who typically remain anonymous.

The number of these peer reviewers (or referees) varies according to each journal's editorial practice — typically, there are no fewer than two, and there may be more than three experts in the subject matter of the article who produce reports upon the content, style, and other factors, which inform the editors' publication decisions. Though these reports are generally confidential, some journals and publishers also practice public peer reviews. The editors either

choose to reject the article, ask for revisions and resubmission, or accept the article for publication. Even accepted articles are often subjected to further (sometimes considerable) editing by the journal's editorial staff before they appear in print. The peer review process can take from several weeks to several months (Ritzhaupt, Sessums & Johnson, 2012). Most of the journals involved in this study provide feedback to authors within 2 or 3 months.

A scholarly article is an article that has gone through the typical process of submission and peer review by an academic journal.

Scholarly publishing

Scholarly Publishing is the dissemination of high quality research that has been validated through peer review processes.

Prior to World War II, teaching ranked ahead of research and service in the traditional model of scholarship (Bavaro, 1995). However, in the past several decades, the definition of scholarship has shifted its emphasis from teaching to research leading to publication. (Boyer, 1990; Metzler, 1994).

The development of nuclear energy during World War II showed the importance of research to military strength (*Restructuring the university reward system*, 1997). After the war, employee research and publication became the major criteria for the evaluation of faculty for tenure and promotion (Blake & Tjoumas, 1995). Boyer (1990) discussed three phases of American scholarship: in the first phase, the colonial college focused on teaching, building character, and preparing students for civic and religious leadership. The second phase was more practical, adding service as a goal (not just serving society but reshaping it) in order for education to be considered useful (this was the beginning of applied research). The third phase,

advancement of knowledge through research, slowly began to take root in the late 1800s, becoming more prevalent in colleges and universities after World War II. In 1945, Vannevar Bush published a report in which he urged federal support for research, stating that scientific progress was imperative to the health, prosperity, and security of the nation. Soon faculty hired as teachers were being evaluated primarily as researchers. Bavaro (1995) noted that in the last decade of the 20th century, there was a trend to go back to academic roots, looking beyond publication as the main evaluation measure, with some researchers suggesting that more emphasis be placed on teaching and service and on educational research conducted in natural settings rather than in laboratories.

The idea that academics must publish or perish still seems to be solidly in place. Although teaching may now be more strongly supported in the area of education, most academics still need to find good places to publish in order to enhance their rank and income. Schoenfeld and Magnan (1992) suggested a ranking order of places to publish, in descending order by what they called a *Nielsen rating*: 1. Refereed scholarly journal, the more prestigious the better; 2. Refereed professional journal or book; 3. Book chapter; 4. Non-refereed semiprofessional periodical or textbook; 5. Conference proceedings, essay collection; 6. Semitechnical general circulation magazine; 7. General circulation magazine or newspaper; 8. Radio or TV documentary.

Prestige and ranking

All academic disciplines have a small number of journals that receive the greatest number of submissions. These journals can be selective as to what they publish. An academic journal's

prestige is earned over time based on many factors and not just on the number of articles received (Nkomo, 2009).

Journals can be rated in a number of ways. The impact factor measures the number of articles citing articles already published in natural and social science journals. Additionally, other quantitative factors (e.g., the number of citations, how quickly articles are cited, and the average *half-life* of articles) can be used for evaluation. A question remains as to whether the true prestige of a journal can be based completely upon quantitative factors. Natural science journals are categorized and ranked in the Science Citation Index, and social science journals in the *Social Sciences Citation Index* (Murray, 2009). In this study, prestige ranking are provided by SJR SCImago Journal Rank; for which prestige is understood as a combination of the number of endorsements and the prestige or importance of the journals issuing them.

Journal metrics

The term journal metrics refers to the measurement of the performance and/or impact of scholarly journals.

This is the age of metrics, an age in which there is a pervasive need to standardize, quantify, and measure most things. Scholars in the fields of science and technology generally regard this as a crucial and practical, cultural and intellectual phenomenon (Pontille & Tony, 2010). The examination of the beginnings and substance of metrics and metrology has preoccupied much of the best work in the field of education, including educational technology, for at least the past twenty-five years. Practitioners in the interconnected disciplines that make up the field of science studies usually understand how significant, contingent, and uncertain the

process of rendering nature and society in terms of grades, classes, and numbers can be (Journals under threat: “Medical History,” 2009).

Eugene Garfield (1997) developed the metric designated the journal impact factor, published by the *Institute for Scientific Information* (currently *Thomson Reuters*) in the *Journal Citation Reports (*JCR, year). The impact factor is generally and widely considered to be the most broadly disseminated bibliometric construct. Numerous authors have discussed the strengths and limitations of the impact factor and other measures of journal citation impact (e.g., Garfield, 1986, Garfield, 1997, Glänzel & Moed, 2002).

Garfield (1997) stressed that it is not fair to make comparisons between citation counts produced in different research fields because the citation potential can vary significantly from one field to another. He suggested that “the most accurate measure of citation potential is the average number of references per paper published in a given field” (p.242). He argued that since biochemical papers contain 30 cited references on average and mathematics articles 15, the citation potential in the former discipline is two times that in the latter. Moreover, variations exist in “citation characteristics as to how quickly a paper will be cited, how long the citation rate will take to peak and how long the paper will continue being cited” (Garfield, 1979, p. 248). Garfield also emphasized that disciplinary distinctions made between fields may not always be fine enough to avoid unfair comparisons. The potential of being cited differs substantially not only between disciplines but also from one specialty to another. “Evaluation studies using citation data must be very sensitive to all divisions, both subtle and gross, between areas of research; and when they are found, the study must properly compensate for disparities in citation potential” (1997, p. 249). This study will report the journal metrics: SNIP, IPP, SJR and h-Index.

SNIP

SNIP (Source Normalized Impact per Paper) measures contextual citation impact by weighting citations based on the total number of citations in a subject field. SNIP was created by Professor Henk Moed at CWTS, (Center for Science and Technology Studies) at Leiden University. It is defined as the ratio of a journal's citation count per paper and the citation potential in its subject field. Citation potential is shown to vary not only between journal subject categories – groupings of journals sharing a research field – or disciplines (e.g., journals in Mathematics, Engineering, and Social Sciences tend to have lower citation potential values than titles in Life Sciences), but also between journals within the same subject category. SNIP corrects for such differences (Moed, 2010, pp. 265-277).

IPP

IPP (The Impact per Publication) measures the ratio of citations per article published in the journal. The IPP metric measures the ratio of citations in a year (Y) to scholarly papers published in the three previous years (Y-1, Y-2, Y-3) divided by the number of scholarly papers published in those same years (Y-1, Y-2, Y-3). The IPP metric uses a citation window of three years, which is considered to be the optimal time period to accurately quantify citations in most subject fields. Taking into account the same peer-reviewed scholarly papers in both the numerator and denominator of the equation provides a fair impact measurement of the journal and diminishes the chance of manipulation.

The IPP is not normalized for the subject field and therefore gives a raw indication of the average number of citations a publication published in the journal will likely receive. When normalized for the citations in the subject field, the raw Impact per Publication becomes the

Source Normalized Impact per Paper (SNIP). Note that in the context of the calculation of SNIP, the raw Impact per Publication is usually referred to as RIP. Like SNIP, the raw Impact per Publication metric was developed by Leiden University's Centre for Science & Technology Studies (CWTS).

SJR

The SJR (the SCImago Journal Rank) is a prestige metric based on the idea that not all citations are the same. The calculation of the SJR involves three stages (http://www.scimagojr.com/SCImagoJournalRank.pdf):

1) Initial assignation of the SJR: in this stage a default prestige is assigned to every journal. Having in mind that the SJR is calculated from an iterative process which is based on the values assigned in the previous step, it is necessary to have some initial values. The calculation of the SJR is a process that converges, so these initial values don't determine a final result, but just influence the number of iterations needed.
2) Iteration process of calculation: departing from stage 1, the computation is iterated to calculate the prestige of each journal based on the prestige transferred by the rest. The process ends when the variation of the SJR between two iterations is less than a limit pre-fixed before the calculation process. The final result is the SJR of each journal.
3) Computation of SJRQ: After Stage 2, each journal has its SJR, the indicator of global prestige of a journal, computed. To obtain the SJRQ indicator, we divide the SJR by the number of articles published in the citation window. The result is the prestige average per article, since logically the prestige obtained by a journal is the result of the prestige obtained by its articles. Therefore, the prestige average per article could

be compared without having in mind other factors like the frequency of each journal, the number of articles, etc.

h-Index

The h-index is a journal-level metric that attempts to measure both the productivity and citation impact of the publications of a scholarly journal. The index was suggested in 2005 by Jorge E. Hirsch, a physicist at UCSD (University of California in San Diego). The h-index reflects both the number of publications and the number of citations per publication. Therefore, the h-index works properly only for comparing scholarly journals from the same field since citation conventions differ widely among different fields.

The h-index is intended to measure simultaneously the quality and quantity of scientific output, whereas other bibliometric indicators, such as total number of papers (which does not account for the quality of scientific publications), or total number of citations (which can be disproportionately affected by factors such as a single publication of major influence; papers proposing successful new techniques, or methods; or many publications with few citations each).

In some areas, such as knowledge management and intellectual capital, the lack of a well-established journal ranking system is perceived by academics as "a major obstacle on the way to tenure, promotion and achievement recognition" (Bontis & Serenko, 2009, pp.17). Conversely, a significant number of scientists and organizations consider the pursuit of impact factor calculations as unfavorable to the goals of science, and have signed the San Francisco Declaration on Research Assessment, known as DORA, to limit their use. If “scientific output is [to be] measured accurately and evaluated wisely,” (pp 192) the current assessment practices must be

modified and supplanted by new tools that account for—rather than overlook—the complexity and variety of research outputs (Bladek, 2013).

Open access

Access to academic journals has been greatly expanded by the Internet as their contents are available through online subscriptions with academic libraries or, in some cases, directly to any Internet user. Google Scholar and other databases index articles by subject and keywords. Some of the smaller, more specialized journals are prepared by academic departments and published only online and sometime as blogs. There is a current movement in higher education to encourage open access to everyone. Authors can self-archive papers by depositing them in a disciplinary or institutional repository where they can be searched for and read. Authors can also publish papers in a free and open access journal that does not charge for subscriptions because it is either subsidized or sustained by publication fees. In the sample used here, *Educational Technology & Society* is an indexed and peer-reviewed open access journal sponsored by IEEE (Institute of Electrical and Electronic Engineers) that is free to all with no charge to authors to publish. Open access journals further advances in their fields by facilitating the sharing of research. The influence of these open access journals has been greater in scientific fields that in the humanities. Commercial publishers have experimented with open access models while trying to protect their subscription revenues (Hendler, 2007).

Concern with the publication of "junk" journals, which have lower publishing standards, is a growing concern of the open access movement. The junk journals often have names similar to those of well-established journals. They solicit articles via email and charge the author to publish the article. The University of Colorado's Jeffrey Beall's *List of Predatory Open Access*

Publishers lists over 300 predatory journals as of April 2013, and the released list as of January 2015 included "potential, possible, or probable predatory scholarly open-access journals" with explanatory information such as statistical data about the list and links to the journals (see http://scholarlyoa.com/).

Latent semantic analysis (LSA)

Latent semantic analysis (LSA) - is a text mining technique that identifies common themes in a collection of documents. It was initially introduced as latent semantic indexing, an information retrieval and query optimization system (Deerwester, Dumais, Furnas, Landauer, and Harshman, 1990), but was eventually used to analyze textual data by extracting socially constructed components of meaning within a large body of documents, a corpus. In other words, Latent semantic analysis (LSA) is a model of knowledge representation for texts that works by applying dimension reduction to local co-occurrence data from a large collection of documents after performing singular value decomposition on it (Evangelopolous, 2015). When the reduction is applied, the system forms condensed representations for the words that incorporate higher order associations. The higher order associations are primarily responsible for any semantic similarity between words in LSA (Landauer, 2007).

Emerging educational technologies.

While educational technology integration is a challenge, it has created the interest and opportunity for education systems to better define their goals and objectives. Many countries (large and small; rich and poor; with varied ethnic, religious, language, and cultural traditions) have united with regard to their common interests and are identifying what is possible for

children 9 to 13 years of age to know and to be able to do, thus establishing new opportunities to improve personal and societal performance. Likewise, scholars and researchers from all over the world have been exploring the issue of emerging educational technologies and their impact for years. Examples of groups doing this and the efforts they have made include:

1. The New Media Consortium's Horizon Report,
2. The Roadmap for Educational Technology,
3. The European STELLAR project,
4. The GaLA: Games and Learning Alliance,
5. The IEEE Technical Committee on Learning Technology, and
6. The National Technology Leadership Coalition

The New Media Consortium (NMC) is a not-for-profit consortium of various organizations dedicated to research and application of new media and technologies in the area of learning transfer. Beginning in 2002, the NMC has administered the Horizon Project, an ongoing research-oriented effort that seeks to identify and describe emerging technologies likely to have a large impact on teaching, learning, or creative expression. On a yearly basis, the research focus is on discovery, knowledge-gathering, vetting, exploration, and knowledge sharing research likely to impact learning and instruction. By engaging in a series of conversations that include more than 400 technology professionals, campus technologists, faculty leaders from colleges and universities, and representatives of leading corporations from around the world, the NMC explores and forecasts the impact of emerging technologies across all learning sectors (Natividad, Mayes, Choi, & Spector, 2015). The NMC's annual Horizon Reports are the culmination of their research efforts.

Table 2 is adapted from the Horizon Reports and shows the significant challenges discussed in each year's report from 2004 to 2014, including predicted timelines for a featured set of technologies being adopted by a significant number of colleges and universities.

This table shows the emerging technologies expected to have a large impact over the following five years in education all around the world, as well as the significant challenges and constraints for teaching, learning, and creative inquiry in regard to adopting those technologies, according to the annual NMC Horizon Reports of that period of 10 years. Each of these technologies is described in detail in the main body of each of the reports, along with the reasons why those technologies are considered relevant to teaching, learning, and/or creative inquiry.

One might observe that an ongoing constraint has been and continues to be the need to value and integrate professional development into the culture of the schools, and more recently, the challenges faced in fulfilling the needs of today's students. As stated in the NMC Horizon Report: 2014 K-12 Edition, these trends, challenges, and technologies are having and will continue to have a significant impact on the ways in which schools approach the core missions of teaching, learning, and creative inquiry not only in developed countries but also in economically disadvantaged places.

Note: This table was adapted from the Horizon Reports from 2004 to 2014 by the researcher and was first published in the *e-Mentor* European Research Magazine in 2015.

Table 2

Emerging Technologies and the Challenges to adopt them (from the NMC Horizon Reports 2004–2014)

Significant challenges		Broad adoption expected within:		
		One year or less	**Three-to-Five Years**	**Four-to-Five Years**
2014	Low Digital Fluency of Faculty Relative Lack of Rewards for Teaching Competition from New Models of Education Scaling Teaching Innovations Expanding Access Keeping Education Relevant http://www.nmc.org/publications/2014-horizon-report-higher-ed	**Flipped Classroom and Learning Analytics**	**3D Printing-Games and Gamification**	**Quantified Self and Virtual Assistants**
2013	Faculty training lacking digital media literacy Scalable modes of assessment needed for new scholarly forms of authoring, publishing, and researching Education Processes and Practices limit new technologies Technology and Practices are not supporting the demand for personalized learning Most academics are not using new technologies for learning, teaching, or research. http://www.nmc.org/pdf/2013-horizon-report-k12.pdf	**MOOCs and Tablet Computing**	**Games & Gamification and Learning Analytics**	**3D Printing and Wearable Technology**
2012	Economic pressures and new models of education are bringing unprecedented competition to the traditional models of higher education. Appropriate metrics of evaluation lag the emergence of new scholarly forms of authoring, publishing, and researching. Digital Media Literacy as a key skill in every discipline and profession Institutional barriers impede moving forward with emerging technologies Significant challenges for libraries and university collections to document scholarship http://www.nmc.org/pdf/2012-horizon-report-HE.pdf	**Mobile apps and Tablet Computing**	**Game based Learning and Learning Analytics**	**Gesture-Based Computing and the Internet of things**
2011	Digital Media Literacy as a key skill in every discipline and profession Appropriate metrics of evaluation for new forms of authoring, publishing, and researching Economic pressures and new models of education are bringing unprecedented competition to the traditional models of higher education. Keeping pace with the rapid proliferation of information, software tools, and devices is challenging for students and teachers alike. http://www.nmc.org/pdf/2011-Horizon-Report.pdf	**Electronic Books and Mobiles**	**Augmented Reality and Game-Based Learning**	**Gesture-Based Computing and Learning Analytics**

(table continues)

Table 2 *(continued).*

Significant challenges		Broad adoption expected within:		
		One year or less	**Three-to-Five Years**	**Four-to-Five Years**
2010	The role of the academy and the way we prepare students for their future lives are changing The work of students is seen as collaborative by nature, and there is more collaboration between departments Appropriate metrics for evaluating new scholarly forms of authoring, publishing, and researching are needed. Digital media literacy as a key skill in every discipline and profession. Institutions increasingly focus more narrowly on key goals due to shrinking budgets. http://www.nmc.org/pdf/2010-Horizon-Report.pdf	**Mobile Computing and Open Content**	**Electronic Books and Simple Augmented Reality**	**Gesture-Based Computing and Visual Data Analysis**
2009	A growing need for formal instruction in key new skills, including information literacy, visual literacy, and technological literacy. Students are different, but a lot of educational material is not. There is a need for innovation and leadership at all levels of the academy. It is expected of schools to measure and prove through formal assessment that our students are learning. Higher education is expected to make use of and to deliver services, content, and media to mobile devices. http://www.nmc.org/pdf/2009-Horizon-Report.pdf	**Mobiles and Cloud Computing**	**Geo- Everything and The Personal Web**	**Semantic-Aware Applications and Smart Objects**

Limitations

The researcher acknowledges that this analysis has several limitations since there are a number of factors that may influence the research topics studied and published in the educational technology field. First of all, some research topics may receive minimal coverage in the ten top journals selected for this study because the data necessary to produce meaningful research may have not been readily available at the time of publication.

Additional sources (other journals, e.g. those aimed at special audiences, practitioners, broader audiences, second tier journals, conference proceedings, reputable Websites, etc.) could have been included, and might well be included in subsequent studies. Editorials, interviews, introductions to special issues, commentaries, book reviews, and other such articles were not

included as they seem like secondary sources. Future studies might well embrace such articles or make a comparison of those articles with the primary articles included from the 10 journals involved in this analysis.

Conversely, data for other research topics (such as those found in *Learning and Instruction*) might have been easily acquired, resulting in a large number of high-quality papers. Furthermore, it is possible that tenure and promotion requirements may have influenced the direction of research as authors typically pursue topics with the greatest potential for publication in top journals like the ten studied here.

Other limitations pertain to the methodology used in this analysis. LSA does not provide an in-depth analysis of a paper or text, it extracts the terms contained in a set of documents, and analyzes the relationships between and among that set of documents; and then it produces a set of key concepts related to the documents and terms. To address some of the limitations of LSA the researcher applied singular value decomposition (SVD) to find direct and indirect association as well as higher-order co-occurrences among the terms that resulted from the LSA.

Qualitative methods, such as detailed interviews with leading editors and researchers, might have added insight and depth and could well be included in subsequent studies to confirm or elaborate findings. However, these limitations, and others of which I might not be aware of, do not prohibit the researcher's providing at least a preliminary indication of the research trends, emerging technologies, and the authors publishing research in the area of educational technology in the last 20 years.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

During the past 3 decades, the increased interest in applying technology for the purpose of improving learning and teaching (Spector, 2012) has led to the evolution of educational technology as a mature discipline defined as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Januszewski & Molenda, 2008, p.1). Many studies focusing on the identification and progression of significant research topics, and the development of the trends in the field of education (e.g., Kinshuk, Huang, Sampson, & Chen, 2013; Lee, Driscoll & Nelson, 2007) have already been carried out, and have provided understanding and awareness into trends in scholarship.

In educational technology, studies have been done with the goal of analyzing research trends and characterizing scientific communities by reviewing research papers published in journals (e.g., Billings, Nielsen, Snyder & West, 2012; Carr-Chellman, 2006; Ely, Foley, Freeman & Scheel, 1992; Holcomb, Bray & Dorr, 2003). Most of the studies have been limited to only one journal; some have broaden their research to three and in a few occasion to 5 different journals. Other weaknesses found in the literature review were that the majority of those studies had limited their investigation to a narrow area of research; had not applied rigorous enough methodologies in their analyses; had not justified their criteria for selecting the specific journals.

For this study, the researcher sought to provide a better understanding of trends in educational technology research by examining studies published in the top ten journals in the period of 1995 -2014. The journals were: 1) *Educational Technology Research and Development (ETR&D)*; 2) *Instructional Science*; 3) *Journal of the Learning Sciences*; 4) *TechTrends*; 5) *Educational Technology: The Magazine for Managers of Change in Education*; 6) *Journal of Educational Technology & Society*; 7) *Computers and Education*; 8) *British Journal of Educational Technology (BJET)*; 9) *Journal of Educational Computing Research*; 10) *Journal of Research on Technology in Education*. These journals were accepted by scholars in the field as a substantial source of information for this study.

Historical Background

Educational technology

Ever since educational technology was recognized as a discipline of study and research, following a conflicting historical and evolutionary development of the field (Spector & Ren, 2015), many scholars, and especially educational technologists, have been preoccupied with conceptualizing a definition for educational technology in an effort to systematize and bring order to things (AECT, 2013; Cohen, 1987; Collins, 1986; Cullinan, 1988; Gagne, 1986; Reigeluth, 1989; Spector, 2012, 2016; Silber 1970, 1978a; Torkelson,1977).

Alan Januszewski related, in the *Afterword of Educational Technology: A Definition with Commentary* (Januszewski & Molenda, 2008), that while studying at Syracuse University, Dr. Donald Ely explained to his students that "the decision to use the term *definition* was originally suggested by Jim Finn, who believed that certainty in the meaning and use of terminology in the

field of educational technology was necessary to the field being recognized as a profession" (p. 341-343).

The AECT's Board of Directors agreed and approved, in 2004, after many meetings, e-mails, telephone calls, and conference calls, and with the participation of the Professors of Instructional Development and Technology (PIDT) and the Definition and Terminology Committee, a one-sentence definition for educational technology was decided upon:

> *Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources* (see http://www.aect.org/publications/EducationalTechnology/).

Previous studies

Many studies have been conducted to identify the issues, impact and trends found in relevant educational technology journals. Torkelson (1977) made a review covering 25 years, beginning in 1953, of the *Audiovisual Communication Review* (*AVCR*), which was the precursor of what eventually became *ETR&D* (*Educational Technology Research and Development*); in 1978, *AVCR* changed its name to *Educational Communications and Technology Journal* (*ECTJ*). He analyzed 553 papers with the objective to answer three fundamental questions: 1) who are we as a profession, as exemplified by our choice of terminology, purpose, and theoretical foundations? 2) What have we done? 3) Has *AVCR* made any difference in education?

Torkelson (1977) declared that even though educational communication continued to have a presence in *ETCJ*, there was little clarification of the interrelationships between communication and instructional development or instructional technology; he argued that there should be a conscious continuity of purpose and systematic inquiry in future AECT publications.

In 1989, *ECTJ* merged with the *Journal of Instructional Development* (*JID*; see http://aect.site-ym.com/?page=journal_of_instructi) into what is now called *ETR&D*, one of the oldest and most established academic journals in the field of educational technology. This study was significant because it provided an overview of the status of the educational technology profession.

Higgins, Sullivan, Harper-Marinich and Lopez (1989) surveyed AECT members' preferences about topics and types of articles published in *ETR&D*. Based upon the results of the survey, members ranked the topic of interactive video first, while subscribers ranked that third and ranked the topic of instructional development first. This raised the question as to whose preferences should be given priority since the two groups differed in terms of focus and membership.

W. Dick and W. D. Dick (1989) analyzed five volumes of articles in *JID Journal of Instructional Development* and *ECTJ Educational Communication and Technology Journal* with a primary goal to determine if there were differences in the ways experts and novices assigned articles to the respective journals. The authors found that articles published in *ECTJ* tended to be either theoretical or empirical, and the ones published in *JID* were more diversified with methodology articles, literature reviews, descriptive studies, and articles on professional concerns. The merged journal *ETR&D* now publishes both kinds of articles.

Ely, Foley, Freemand, and Schell (1992) conducted a content analysis of education technology (ET), reviewing articles from the five leading journals at that time. The journals reviewed were: *British Journal of Educational Technology (BJET), Educational and Training Technology International*, *Educational Technology*, *Educational Technology Research and Development*, and *TechTrends*. They also reviewed doctoral dissertation abstracts and

conference program descriptions. From their review, the authors identified ten emerging trends that reflected the status of the field at the time of the study. The ten were:

a) The creation of technology-based teaching/learning products is based largely upon instructional design and development principles
b) Evaluation has taken on greater importance as the concept of performance technology has been further developed
c) The number of ET case studies is growing, and they provide general guidance for potential users
d) Distance education is evident at almost every educational level and in almost every sector
e) The field of ET has more and better information about itself than ever before
f) Computers are pervasive in K-12 schools - virtually every school in the United States had microcomputers at the time
g) Telecommunications is the link that connects education to the world
h) The teacher's role in the teaching and learning process is changing as new technologies are introduced into the classroom
i) There is increasing pressure for schools to consider the adoption of technology, while at the same time concern is expressed for the impact of technology on children in the society at large; and
j) Professional education of educational technologists has stabilized in size and scope (Ely et al., 1992).

Molenda (1998, 2000, 2001, & 2002) used quantitative data to track the use and diffusion of instructional technology in various areas in an on-going study. Molenda, Russell, and Smaldino (1998) discussed ten key issues following the assessment of trends conducted by Ely (Molenda et al., 1998) and examined media and technology trends. Molenda and Harris (2001) reported that the rapid appearance of new technological developments, the merging of previously utilized media into digital format, and the changes in the related companies, made it very difficult to confirm what the problems were and how to measure them. Molenda and Sullivan updated the study in 2002, presenting trends that seemed to be emerging due to socioeconomic powers influencing business and society such as the computerization of the economy and increasing dependence upon information technology. They stated that hardware installation and deployment was necessary but insufficient for the productive use of technology in instruction. They comprehended that the move was towards patterns of practice and the stages of those patterns.

Other studies found in the literature review focused on the variety of research approaches; here are just a few of these types of research:

a) Greatly organized basic-research studies of cognitive processes prompted from communications with computers (e.g., Barab et al., 2004; Dede, 2014; Chen et al, 2011)
b) Descriptive and exploratory studies about the application of information and communication technologies as educational tools (e.g., Albaiz, 2016; Harris & Hofer, 2011)

c) Context specific, design-based research of how certain technologies function in particular environments but not in others (e.g., Amiel & Reeves, 2008; Boitshwarelo, 2011; Barab & Squire, 2004)

d) Applied research on solving schools and training organizations problems (e.g., Donham, J. 2014; Earle, 2002; Gordon & Gayeski, 2013).

Other studies focused on whether or not educational technology is effective. Topics and perspectives included the following:

a) Achievement gains for the treatment (technology supported) condition over the control condition (e.g., Favell, et al., 2007; Gordon & Gayeski, 2013)

b) Studies discouraging media comparison (e.g., Harris, 2005; Ross & Morrison, 2004, 2010), and studies showing no sustained improvement in education (Bransford et al., 2005; Reigeluth, 1989; Carr-Chellman, 2009; Spector, 2015; Spector, Merrill, Elen & Bishop, 2014)

c) Computer Assisted Instruction and training and increasing teacher effectiveness (e.g., Kumar, Graf & Kinshuk, 2011; Molenda & Sullivan, 2002; Moreno, 2004).

Many studies have been done on the trends, with the types of research and topics published including the following:

a) Trends in technology research (e.g., Ku, 2009: Mayer, et al, 2012; Spector, Merrill, Elen & Bishop, 2014)

b) Effectiveness of different forms of feedback or feedback strategies (e.g., Moreno, 2004; Moreno & Valdez, 2005; Nelson, M. M. & Schunn, 2009; Segedy, Kinnebrew & Panadero, 2013)

c) The ongoing media-effect debate (e.g., Liu & Hwang, 2010; Jonassen, 2004; Spector & Ren, 2015; White et al., 2009);

d) Program evaluation (e.g., Spector, Merrill, Elen, & Bishop, 2014; Spector 2012, 2015).

A series of analyses on educational technology journals

During the past five years, *Educational Technology: The Magazine for Managers of Change in Education*, published a series of analyses on educational technology journals (West & Rich, 2012). Richard E. West was the contributing editor and worked with 83 student co-authors. They analyzed 23 of "the most popular journals in the field" of educational technology (West, 2006, p. 41), a study which led to the first article of this series published in the July-Aug issue of 2011.

They studied the journal abstracts and keywords of a single journal at a time and reported results on the research methods employed, article types, and subject terms, during periods of 5, 8, and 10 years. From the 23 journals they analyzed, 8 are among the 10 studied for this paper: the *British Journal of Educational Technology (BJET)*; *Computers and Education*; *Educational Technology Research and Development (ETR&D)*; *Instructional Science*; the *Journal of Educational Computing Research*; the *Journal of Educational Technology and Society*; the *Journal of the Learning Sciences*; and the *Journal of Research on Technology in Education*.

I summarized the information published in each of these eight journals studies. Table 3 shows the journals for which the studies reported information on the types of articles, trends in research methods, trends in topics, major contributing authors, top cited publications, total number of articles analyzed, and authorship (the total number of authors and the number of authors who had published three or more articles in that particular journal).

Table 4 presents the methodology the authors of each of the individual journal studies followed to analyze their data and the findings they reported in their research articles. It also states the time period – the years covered – of the examination.

It is important to understand what kind of research has been conducted in the recent past, as well as the patterns and discourse flourishing in academic journals. Several recent studies have reported citation and authorship patterns, but, as shown in this chapter, most of them only within single journals (like the series of analyses in *Educational Technology: the Magazine for Manager of Change in Education*) or small groups of journals (like the Ely et al, 1992).

This study has analyzed 10 of the top journals in educational technology and will aggregate findings from individual analyses of the journals as well as findings on the field overall: trends in research topics, citations, and authorship. This information offers a way of understanding trends in scholarship over the past twenty years and potential new directions in research and publications.

Table 3

Information Reported on Each of the Eight Journals as Part of the Series of Analyses in Educational Technology: The Magazine for Managers of Change in Education

	Trends in Research Methods	**Types of articles (Methods)**	**Major Contributing Authors**	**Top Cited Publications**	**Trends in Topics**	**Total Articles Studied**	**Authorship**
British Journal of Educational Technology BJET	X	X	X	X		545	1,146, among whom 15 published 3 or more times
The Journal of the Learning Sciences	X	X	X The top one for each year 2001-2009	X The top one for each year 2001-2009	X	145	255, among whom 10 authored 3 or more
Educational Technology Research & Development ETR&D	X		X The top one for each year 2001-2009	X The top one for each year 2001-2009	X	315	557, among whom 95 authored 3 or more
Instructional Science	X		X The top one for each year 2002-2011	X The top one for each year 2002-2011		265	498, among whom 20 authored 3 or more
Journal of Educational Computing Research JECT	X		X The top one for each year 2003-2012	X 5 top cited overall	X	428	923, among whom 6 authored at least 4 papers.
Journal of Research on Technology in Education JRTE	X		X The top one for each year 2001-2009	X The top one for each year 2001-2009		273	510, among whom 14 authored 3 or more
The Journal of Educational Technology and Society	X	X	X 5 most contributing authors (from 6 to 23 authored papers)	X The top 2 cited papers per year (2010, 2011, 2012 and 2013)	X three-word phrases, and keywords	492	
Computers & Education	X	X	X	X The top one for each year 2002-2011		1,394 but used only 584 for article type analysis	3,632, among whom 53 authored 4 or more papers

Table 4

Methodology, Findings, and Years Covered on Each of the Eight Journals as Part of the Series of Analyses in Educational Technology.

	Methodology	Findings
British Journal of Educational Technology (BJET) -2001-2010 (10 years)	Wilson Web database; tallied authorship frequencies, Publish or Perish for citation counts.	Shifted their focus towards publishing more theoretical articles concentrating on emerging educational technology trends. Publications on the use of computer games and virtual reality in instructions and computers in assessment increased significantly. Papers on perceptions of educators, parents, and students have remained constant.
The Journal of the Learning Sciences 2001-2010 (10 years).	Subject term frequencies by counting ERIC EBSCO; tallied all authors; Publish or Perish software and Google Scholar for citations; and grouped closely related topics together.	Showed the top 12 article categories. Found that JLS was heavily focused on qualitative methods. A strong trend towards science and mathematics-related articles. 27% of the articles were theoretical and commentary papers.
Educational Technology Research and Development (ETR&D) 2001-2010 (10 years)	They identified the key two-word phrases from the abstracts using a word-count tool. They ranked authors by total number of publications and Publish or Perish for citation counts. For methodology trends they coded each article.	They found a balance among theory, research, and design. The majority of the two-word phrases had a strong connection to technology, research, or design in educational settings.
Instructional Science 2002-2011 (10 years)	They analyzed author provided key words; if not available they used subject terms provided by EBSCO. The words and phrases were compiled and organized by frequency in Excel spreadsheets. They coded for the methodology types. Google Scholar was utilized for citation trends.	They found a large increase in inferential studies published; a decrease in theoretical work, and an important emphasis on Cognitive Load Theory.
Journal of Educational Computing Research 2003-2012 (10 years)	The research methodologies used were coded by categories. The subject terms were extracted from the EBSCO database, then spreadsheets were created, and the data was alphabetized and analyzed for number of occurrences. Word frequency count was performed on the tiles using the websites textalyster.net and Google Scholar for citations.	*JECT* employs a primarily inferential approach. Most common topics found were 'educational technology' and 'computer assisted instruction.' From the topic analysis they found an emphasis on online and computer-based learning
Journal of Research on Technology in Education JRTE 2001-2010 (10 years)	They used the author's keywords and if not available, they used the subject terms from EBSCO database. Those keywords were grouped and counted. For the types of methodology they coded and classified the articles. They tallied the authors after they had been alphabetized and counted them. For citation analysis they used Google Scholar.	They found the majority of research methodology utilized was inferential, interpretive, and mixed method. Articles focused mainly onPK-12 settings and on technology integration, distance education, teacher education, subject education, and attitudes toward technology. Surprisingly they found a decrease in the number of published articles per year during the second half of the decade (average 32.8 vs 21.8). The articles in the last years were longer and more comprehensive.

(table continues)

Table 4 *(continued).*

	Methodology	Findings
Journal of Educational Technology and Society 2010-2014 (5 years)	They analyzed the keywords provided by the authors and also the three-word phrases from the abstracts. They coded the methodology types and used Publish or Perish for the citation analysis.	They found that the journal publishes mostly quantitative research and that many of the authors are international and most of the research is collaborative. Some of the most cited articles are related to distance learning and computer-assisted learning.
Computers and Education 2002-2011 (10 years)	The article types were coded from 584 articles out of the 1,429. Authors' keywords were used to identify trends. Words mentioned more often than 30 times were used as main categories. Abstracts were analyzed using a word counting program. They used the top 10 out of over 200 as a cut-off point.	The most common method was inferential (53%). The analysis yielded 657 keywords, which were grouped into 11 main categories, the most frequent ones being: teaching/learning strategies and interactive learning environments, and teaching and learning strategies. The majority of articles were collaborative work.

CHAPTER 3

METHODS

Data Gathering

Data collection

I was able to collect the data for this exploratory study using the University of North Texas' extensive collection of primary source research materials available to enrolled graduate students, including the Electronic Databases & e-Journals, provided by UNT Libraries' Material Delivery Service; the Interlibrary Loan Borrowing and Document Delivery Services; and On or Off Campus Access.

This study included data from bibliographical information (i.e., titles, authors' names, keywords, citation references and abstracts, publication years, and volume and issue numbers) on research published during the last 20 years, Jan 1995 – Dec 2014, in the following ten highly recognized journals in Educational Technology: 1) *Educational Technology Research and Development* (*ETR&D*); 2) *Instructional Science*; 3) *Journal of the Learning Sciences*; 4) *TechTrends*; 5) *Educational Technology: The Magazine for Managers of Change in Education*; 6) *Journal of Educational Technology & Society*; 7) *Computers and Education*; 8) *British Journal of Educational Technology (BJET)*; 9) *Journal of Educational Computing Research*; and 10) *Journal of Research on Technology in Education.*

Through the utilization of library resources, a comprehensive set of articles was collected from the above ten journals. EBSCOhost, ProQuest, Education Full Text, ERIC, Academic Search Complete, EBSCO Electronic Journal Service (EJS), and WorldCat (OCLC) Online Union Catalog were utilized and, due to the recognition that those resources might contain a

number of errors, all data in the articles were verified using the publishers' official websites. This analysis did not include the following categories of articles: editorials, introductions to special issues, conference reports, book reviews, paper discussion commentaries, and responses to such commentaries. One could argue that those kinds of articles could have been included, but they were generally regarded as secondary rather than primary (featured) articles. In a few cases, articles written by guest editors who presented their own contributions rather than simply introducing the special issue were retained.

Table 1 summarizes the number of articles published by the ten top journals during the 20 year period of review. I used RefWorks to create a personal database by importing all the articles found from the journals that were published during the last twenty years, Jan 1995 – Dec 2014. Then I exported the data from RefWorks to create Word Files and then Excel files for each one of the journals selected for this study. Nine out of the ten journals analyzed had most of their research articles available online through UNT Library Services. One of them, *Educational Technology: The Magazine for Managers of Change in Education*, is available only in print. It was challenging not only to find all the printed issues published during the last twenty years but also to create Excel Files with all the information needed for the study: Title, Author(s), Year of Publication, Volume number, Issue number, First and Last page of the article, and Abstract. Fortunately, UNT's Willis Library is a subscriber to *Educational Technology: The Magazine for Managers of Change in Education*, and I was able to look at the older issues. The last four years were available at the Non-Circulating desk. There were a small number of old issues that were missing from the corresponding binder, so those missing issues were requested from the Interlibrary Loan service.

I scanned each one of the published articles in this print only journal (*Educational Technology: The Magazine for Managers of Change in Education*), and then saved each scanned page as a PDF Pro document (with OCR – optical character recognition – capability). Next, I manually selected the title, the author(s)' name(s), and the abstract from each of the articles and copied and pasted them in their corresponding rows in an Excel file. The volume, issue, and page numbers were entered manually into the Excel cells, following the same order and format used in the rest of the Excel files created for the other nine journals.

Even after the scanned pages had been saved as a PDF Pro file, there were many mistakes; the OCR feature did not recognize all the characters from the scanned PDF files. It was necessary to double-check and clean the entries one by one (correcting the misread characters and/or completing the missing information).

One of the goals of the study was to extract high-level themes representing broad research areas, so analysis focused on article abstracts were performed. The abstracts served this purpose well because they are typically very carefully written, and their authors have made an effort to articulate their article's contribution and its position in a clearly perceived, socially constructed, intellectual structure following the conventions of the educational technology discipline. Citation information was collected from Google Scholar via Publish-Or-Perish, a free software package available from Harzing at: http://www.harzing.com/pop.htm.

Data Analysis

Dr. Nicholas Evangelopoulos was this researcher's methodology mentor throughout the analysis process, from data collection through all of the data analysis performed for this study.

Data cleanup

Step 1 – After all the necessary information from the published articles from the ten journals nominated for this study (9,969) had been compiled, the next step was to clean the data one more time. Using Excel functions, I determined the length of each article in number of pages, computed from the starting and ending pages and the size of the abstract in characters. After that, I sorted the articles according to abstract size, from the smallest to the largest. This step made possible the quick identification of which articles were not featured research articles since they did not have regular abstracts. Those articles were deleted from the file. Next, the articles were sorted by their number of pages to identify articles that were editorials, comments, conference adds, etc. Articles that were brief editorials, simple introductions to special issues, book reviews, errata, calls for papers, and comments and rejoinders, were excluded from further analysis. Some editorials or introductions to special issues were retained because they had the look and feel of a featured article; e.g., they had the size of a full article, used references, and appeared to have as their purpose to make a contribution to theory, practice, or methodology.

Step 2 – All articles were sorted by page size, from smallest to largest. Articles likely to be book reviews came at the top of the sorted list. I manually investigated each one of them by looking up the articles on the official Website of the journal to which they belonged. If the article had information pertinent to a research article, its data were manually collected; if not, the article was eliminated from the file.

Step 3 – I sorted all articles by *Publication Year*, then by *Volume*, then by *Issue*, and then by *Starting Page*. I created a new column that calculated the *Page Gap* using an Excel function.

From the information gathered in that column, I was able to identify large negative numbers in the page gaps which indicated the transition from one issue to the next issue. Large

positive numbers in the page gaps indicated a possible missing article. Those needed to be identified and searched for until found using the publisher's Website or a UNT Library Service. Then each piece of information from the articles was inserted manually into each Excel File in the appropriate row.

Once the list of articles was finalized, I added another column, headed "Article ID," and assigned an abbreviation of four or five capital letters to identify each journal plus a four-number code. At that point I had ten complete and clean Excel files, one for each of the ten journals selected for this study, which I then brought together into one single file I named *Ten Journals Master List File* (representing 9,969 papers).

Citation data collection

The citation data were obtained through running queries on Publish-or-Perish. I first ran a manual Google Scholar query on one of the authors from each of the ten journals to find out exactly how the journal name appeared in the Google Scholar results. Publish-or-Perish uses Google Scholar data to calculate its various statistics - it uses the Advanced Scholar Search capabilities of Google Scholar.

Before selecting the starting and ending year for each query, I checked the Excel files to determine a time period that included approximately 600 articles. That way I made sure the results from *Publish-or-Perish* would not show more than 1,000 articles, a requirement of the application. Google Scholar generates a larger number of papers because its databases include not just citations in journals that are listed in the Thomson ISI or Scopus database, but also citations to and in books and book chapters; conference proceedings; working papers and

government reports; and journals not listed in ISI or Scopus, including journals in languages other than English (Harzing, 2011).

I had to be very careful not to execute more than one query per 4-hour period of time. That was necessary; otherwise, Google would have blocked my searching for several hours. Another critical issue to consider was the time span of the searching stage. In order for the results to be comparable, all the queries performed on all the journals selected for the study (that are indexed- 9 out of 10) had to be completed within about 5 days during the same week. The results were saved in an Excel file.

Author data collection

First, I split the co-authors into separate cells in Excel using Excel functions. Then I created one long column that listed each co-author on a separate line, keeping in the adjacent column the Article ID to make sure I did not lose the information about who authored which paper. After that I sorted all the authors' names alphabetically. The next step was to standardize the alternative versions of the same person's name. Many times an author's name appeared as first name initial and last name; other times as last name first, then comma and first name initial; and in other cases the full first name and last name; other variations also occurred. It was necessary to bring all these variants next to each other and make them the same. Afterwards, I created a list of all unique author names, using Excel's de-duplication feature. That became the *Author Master List*. I then gave each author from the *Author Master List* a unique *Author ID*.

Author citation data collection

The citation analysis was restricted to high-impact papers. The notion high-impact was operationalized as referring to papers having 200 or more citations in Google Scholar. The final list contains 378 high-impact articles. I cross-referenced each one of the high-impact papers against the Ten Journal Master List file I had created after downloading and cleaning all the published articles from the official sources (electronic databases and the journals' official websites), and then I proceeded to curate the high-impact list for accuracy. For each one of these high-impact papers I looked up the entry in the *Author Master File*, which I used as the 'official' version of the authors, not the list returned from Google since it might have errors due to the existence of multiple versions of each paper in Google's database.

Extraction of 22 broad educational technology research areas as latent semantic factors

The collected abstracts (from all the ten journals) were analyzed using Latent Semantic Analysis (LSA), a text analytic method that extracts underlying concepts from observed instances of word usage. The analysis followed the guidelines in Evangelopoulos et al. (2012) and the steps in Kulkarni et al. (2014).

In Step 1, a term frequency matrix of term-by-document dimensionality was compiled. Each article abstract served as a document. Terms that appeared only once in the entire collection were excluded.

A standard list of 1730 pairs of British-spelled and American-spelled term variants were used to cross-reference the two spelling styles. Inverse document frequency term frequency weighting was used to promote infrequent terms and discount frequent terms. The terms were stemmed to conflate different grammatical variations of the same term.

Trivial English words ("stopwords") were also excluded; see Appendix B, which shows the list of the 31 terms that were added to the list of 534 standard English words that were excluded from the data before the corpus was analyzed.

This process of determining which words to exclude from the analysis was done in three rounds:

Round 1: A set of 31 terms were added to the standard English stoplist. Those were excluded "a priori", i.e., before the analysis, because the researcher did not want them to bias the results, since the researcher knew beforehand that they would be irrelevant to the research topics she wanted to extract. After excluding these terms, i.e., after applying the stop list, and after stemming the terms, the 4,962 stemmed terms, those were the active vocabulary in the analysis

Round 2: After implementing Singular Value Decomposition (SVD) on a 1/3 sample of 3,300 abstracts, using the 4,962 stemmed terms as the vocabulary, 100 principal components were extracted. Based on those, the "variance explained" for each term was computed (row-wise sum of squared term loadings=variance explained). Based on these "variance explained" levels (also known as "communalities"), the final set of 1255 was identified. These were the stemmed terms that explained 95% of variance.

Round 3: The final LSA analysis used a second round of SVD, which was performed on the 1255-by-9969 matrix that used (a) the selected 1255 terms and (b) the full set of 9969 abstracts. This is how the final topics were extracted.

In Step 2, singular value decomposition was performed to extract rank-ordered latent semantic dimensions, a process which extracted a relatively large number of principal components. For each term, explained variance (=communality) could be computed using the sum of squared term loadings. Terms that cumulatively explained 95% of variance were retained,

and the rest were filtered out. The top 1,260 stemmed terms explained 95% of variance in the term/document frequency matrix. In Step 3, LSA was continued via the factor analysis variant of LSA (Evangelopoulos et al., 2012). With the purpose of producing interpretable factors, the dimension space was rotated using varimax rotations. After Singular Value Decomposition (SVD), eigenvalues were computed by squaring of the singular values. Then the number of extracted factors could be decided upon, through looking for points where the average eigenvalue dropped abruptly in a *scree plot*. Those were the candidate dimensionalities. The results from these analyses disclosed three alternative candidate dimensionalities (the cut-off points for the number of dimensions to retain): 3 factors, 10 factors, and 22 factors.

The labeling process

In Step 4, the latent semantic factors were interpreted and labeled based on a cross-examination of high-loading terms and documents. Dr. J. Michael Spector and I devoted some time to going over the latent semantic factors identified by the LSA analysis that had been performed. After examining the 3, 10, and 22 factors, we opted for the 22 factors because we considered that 22 factors would be more descriptive of the elements of the intellectual structure in the field of Educational Technology. Because we had obtained high-loading terms and high-loading documents for each factor (see Tables 5, 6, and 7), we used them to label the factors (in many cases, a shortened version of the term was used to represent the root of that term as it occurred in articles). We carefully examined three different sources for each of the 22 factors: the list of high-loading terms revealed by the LSA and SVD analyses; WordMaps created from the top 25 of the high-loading articles, and WordMaps created from the titles of those articles. Tables 5, 6, and 7 list the high-loading terms identified by the LSA analysis performed for each

of the 22 factors. Appendix C and D present the lists of the high-loading terms for the 3 factor solution and the 10 factor solution respectively.

Table 5

List of the High-Loading Terms Identified by the LSA Analysis Performed for Factors 1-8

F22.1	**F22.2**	**F22.3**	**F22.4**	**F22.5**	**F22.6**	**F22.7**	**F22.8**
Learn	student	learn	perceiv	project	Discus	Preservice	learn
Theory	learn	adapt	factor	faculti	collabor	Integr	learner
Student	test	evalu	attitud	manag	online	Teacher	environ
Field	group	softwar	learn	univers	Face	Classroom	collabor
Scienc	control	system	inten	profession	interac	Profession	motiv
Practice	perform	propos	accept	program	commun	Teach	style
understand	experiment	web	efficaci	institu	social	Pedagog	strategi
Issu	achiev	object	student	ict	asynchron	Belief	softwar
Culture	score	user	influenc	distanc	forum	Tpack	test
World	condition	tool	percep	school	particip	Student	student
framework	significantli	assess	us	organ	Share	Practice	scale
Context	signific	model	behavior	implement	analysi	School	scaffold
Instruct	effect	approach	user	success	network	Curriculum	item
perspect	read	applic	social	need	group	Program	cognit
approach	differ	style	model	team	instructor	Lesson	valid
Process	particip	content	relationship	innov	student	Service	outcom
Social	compar	learner	survei	busi	messag	Plan	support
knowledg	attitud	test	gender	plan	Learn	Content	regul
Think	measur	framework	posit	member	facilit	Elementary	activ
Role	grade	multimedia	satisfac	resourc	active	Implement	attitud
Model	indic	process	affect	integr	synchron	Prepar	agent
Work	cognit	interact	motiv	cours	mediat	Pre	engag
Cognit	level	method	variabl	work	Team	Center	
conceptu	task	concept	eas	skill	discours	Interview	
commun	show	environ	signific	staff	analyz	Video	

Table 6

List of the High-Loading Terms Identified by the LSA Analysis Performed for Factors 9-16

F22.9	**F22.10**	**F22.11**	**F22.12**	**F22.13**	**F22.14**	**F22.15**	**F22.16**
Distanc	game	internet	aect	mobil	Solv	feedback	Children
Learn	plai	web	associ	learn	problem	assess	Internet
student	video	site	conven	devic	mathemat	student	School
Cours	learn	search	intern	classroom	solution	peer	Parent
univers	player	resourc	confer	student	student	tutor	Mathemat
onlin	motiv	inform	commun	wireless	learn	write	Home
instructor	digit	access	ethic	phone	style	evalu	Softwar
Face	engag	user	professio	ict	complex	portfolio	Gender
faculti	children	page	member	style	scaffold	agent	Comput
program	seriou	student	division	digit	skill	form	Ag
Class		provid	media	ubiquit	case	question	Tutor
Colleg		wide	present	cognit	structur	system	Social
lectur		world	held	handheld	Ill	respons	Attitude
Teach		network	session	innov	represent	qualiti	Young
internet		librari	california	class	task	improv	Literacy
tradition		servic	internship	propos	expert	help	Year
Ict		share	code	access	strategi	answer	Girl
institu		digit	provid	distanc	cognit	class	Elementary
		tool	anaheim	applic	tool	intellig	Access
		content	leadershi	laptop	model	grade	Faculty
		read	foundat	context	process	gender	Agent
			annual	program	tutor	faculti	Child
			opportun	experiment	prompt	review	classroom
				real	softwar	instructor	Boi
						style	interac

Table 7

List of the High-Loading Terms Identified by the LSA Analysis Performed for Factors 17-22

F22.17	F22.18	F22.19	F22.20	F22.21	F22.22
video	ict	project	read	virtual	Map
multimedia	learn	student	languag	simul	concept
present	school	learn	english	world	Style
media	student	scienc	text	environ	Collabor
lectur	commun	collabor	write	agent	Knowled
text	polici	softwar	comprehen	interact	Network
materi	inform	multimedia	literaci	life	represent
visual	compet	distanc	word	user	Distanc
interact	faculti	team	foreign	languag	Ethic
produc	program	train	children	real	Social
anim	preservic	univers	vocabulari	second	Share
student	literaci	attitud	cultur	style	Discus
digit	field	ict	simul	map	Gender
softwar	secondari	work	book	visual	Adapt
audio	primari	engin	strategi	social	Prefer
learn	digit	mathemat	reader	commun	Learn
time	instruc	tutor	program	softwar	Construct
classroom	cultur	inquiri	skill	interac	Conceptu
instructor	pupil	tpack	second	realiti	Digit
format	theori	creativ	softwar	collabor	Issu
imag	countri	engag	efl	read	Tpack
user	level	gender	learn	physic	Structur
condition	access	discus	multimedia	internet	Train
feedback	nation		stori	space	Visual
project				applic	Student

F22.2 Student Learning- Abstracts

F22.2 Student Learning – Titles

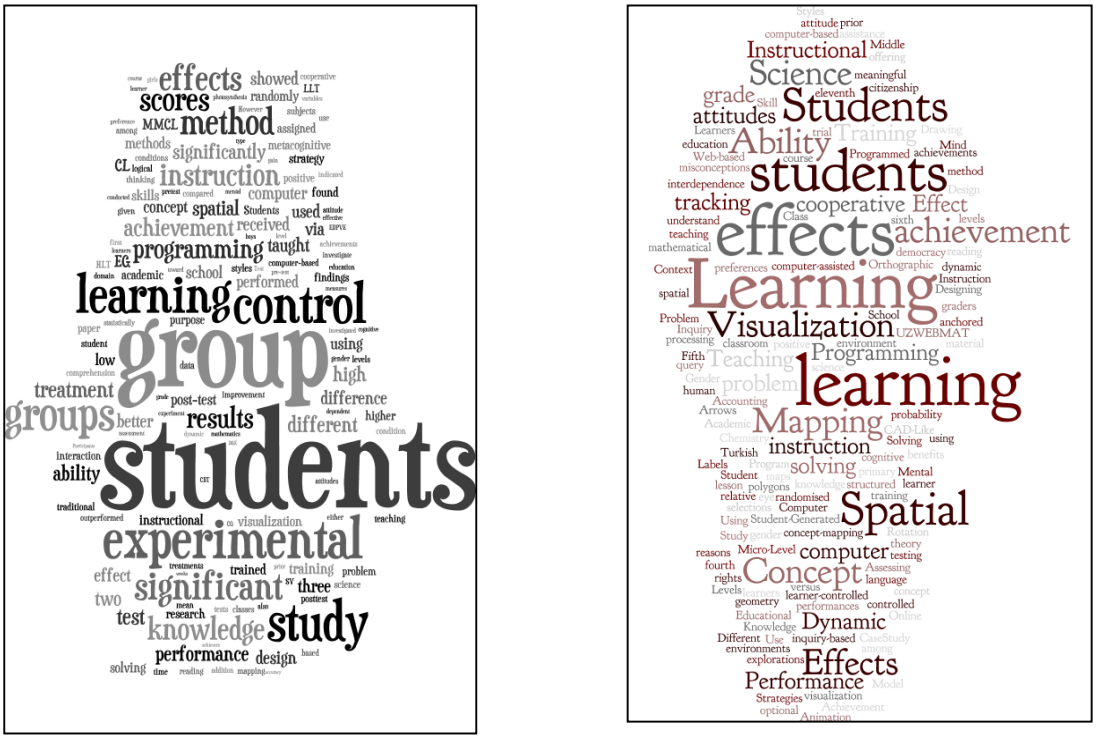


Figure 3. A WordMap from the top 25 high-loading abstracts and the WordMap from the top 25 high-loading titles for Factor 22.2, *Student Learning*.

A sample of a WordMap, for Factor 22.2 (Student Learning), using Wordle (http://www.wordle.net/), software to analyze text, was created from the abstracts and another one from the titles of the 25 top high-loaded articles. Those two WordMaps are presented here to show the three criteria used to assign the labels to the 22 Factors: 1) high-loading terms from LSA; 2) WordMaps from the abstracts, and 3) WordMaps from the titles.

All of the WordMaps (from the abstracts and from the titles) for each of the 22 factor solution can be found in Appendix E. Unlike the lists of loaded terms, which are often shortened, the WordMaps show complete words.

Factor labels and related high-loading article counts are displayed in Table 8, and a Contingency Table (cross-tabulation), Table 9, presents the article counts by journal and by topic. Table 9 has been split to show all 22 factors.

Table 8

The 22 Factors Labels and their High-Loaded Articles from the Journals Analyzed

Factor	Label	Article Count
F22.1	Learning and Instruction	1786
F22.2	Student learning	1369
F22.3	Learning Systems and Tools	714
F22.4	Learning Experiences	585
F22.5	Faculty Training and Adult Education	563
F22.6	Online Learning	520
F22.7	Teacher Preparation and Professional Development	435
F22.8	Learning Environments	352
F22.9	Distance Education	318
F22.10	Game-based Learning	308
F22.11	The Internet and Digital Literacy	400
F22.12	Professional Meetings and Associations	217
F22.13	Mobile Learning	225
F22.14	Problem-solving	266
F22.15	Assessment and Feedback	275
F22.16	Childhood Education	261
F22.17	Learning with Multimedia	268
F22.18	ICT in Learning & Instruction	225
F22.19	Experiential Learning	186
F22.20	Reading Comprehension	310
F22.21	Virtual Environments	246
F22.22	Concept Mapping	151

Table 9

Contingency Table (Cross-Tabulation). Article Counts by Journal and by Topic (22)

	F22.1	F22.2	F22.3	F22.4	F22.5	F22.6	F22.7	F22.8	F22.9	F22.10	F22.11
All journals	1786	1369	714	585	563	520	435	352	318	308	400
Journal	**T01**	**T02**	**T03**	**T04**	**T05**	**T06**	**T07**	**T08**	**T09**	**T10**	**T11**
BJET	195	116	79	65	83	61	23	49	43	49	38
CE	299	498	250	252	73	166	93	99	61	119	82
ETMAG	466	12	51	8	142	28	18	40	54	23	55
ETRD	166	117	42	24	40	28	32	23	12	26	20
IS	134	143	13	17	3	29	10	18	5	2	5
JECR	69	213	23	96	15	45	52	33	16	23	39
JETS	184	167	221	79	94	96	37	65	47	32	50
JLS	152	23	8	2	0	18	10	4	0	3	2
JRTE	49	71	12	39	30	28	91	11	19	7	13
TETR	72	11	15	3	83	21	69	10	61	24	96

	F22.12	F22.13	F22.14	F22.15	F22.16	F22.17	F22.18	F22.19	F22.20	F22.21	F22.2
All journals	217	225	266	275	261	268	225	186	310	246	151
Journal	**T12**	**T13**	**T14**	**T15**	**T16**	**T17**	**T18**	**T19**	**T20**	**T21**	**T22**
BJET	1	28	12	48	35	39	54	25	45	39	23
CE	1	78	66	91	95	81	107	38	82	86	47
ETMAG	3	26	13	6	21	23	8	17	14	33	1
ETRD	5	6	38	14	10	11	10	16	17	7	16
IS	1	0	44	24	9	11	0	2	16	5	9
JECR	1	9	33	32	37	14	6	8	43	23	13
JETS	2	54	23	42	18	24	29	26	49	28	28
JLS	0	0	16	5	10	2	1	8	0	4	4
JRTE	0	5	14	4	14	10	6	16	14	2	8
TETR	203	19	7	9	12	53	4	30	30	19	2

Cross-referencing steps

Step 1. I created a spreadsheet with the top-cited papers identified from Publish or Perish, papers which were cited 200 or more times, from each of the journals analyzed.

Step 2. I proceeded to reconcile all the entries in column F (which held the 378 top-cited papers) with all the entries in column G (which held all of the 9,969 papers) in the Excel

spreadsheet. Since I found a few errors (there were 12 missing papers), I needed to search manually for the matching papers for those remaining 12 articles. I continued this manual matching until the count of correct matches was 378.

Five papers were removed from Google's highly cited list because 2 were editorials, and editorial articles are outside of this study's scope. Two more were published in a journal that was not part of this study; Google had simply made an error here. The 5th was a book chapter, not a journal article, another result of a Google error. Of the remaining papers, 4 were found in the previous list (their titles were present, but they had slightly different form, for example containing 'teacher's' instead of 'teachers'). The final 5 were missing from the original Master List. In the process of finding these 5 papers, in order to add them to the Master List, 17 additional missing papers were discovered. This made it necessary to add 22 more papers to the Master List. I proceeded to assign an article ID to each of the highly cited papers.

Step 3. After having assigned an article ID to each of the highly cited papers, I started working on the cited authors. I proceeded to cross-reference the Master File containing all of the 9,969 papers with the list of the highly-cited articles identified by Google, which included 378 papers after the cleaning process.

Step 4. I compiled an Excel file with three spreadsheets: one showing the cited authors merged (=all in one column), the second sheet splitting them into separate columns (using Excel functions), and the third one containing the number of citations from the Google data.

This process resulted in the 378 highly-cited articles, with the authors split into different cells. Each of the co-authors received the same citation credit. Next, I rearranged the data so that all authors were listed in one long column.

Step 5. I utilized Excel's concatenate function to combine the number of citations, the articleID, and the author name, inside the same cell.

- Step 5.1. The 378 articles with their authors was presented in Matrix format. The largest number of co-authors was 12 (meaning there is one article with 12 co-authors).
- Step 5.2. This time the same information was presented but in long column format. There were 902 author-paper combinations.
- Step 5.3. I collected the same information in the spreadsheet but after number of citations, articleID, and author name were separated, using Excel functions. The co-authors were still next to each other, and they received the same citation credit.

Step 6. Standardizing the authors' names from the different sources visited was the next task. I began with the original versions of the authors' names. Then I sorted them alphabetically, generating a data set with all variants coming next to each other. After that I manually copy-pasted the most complete variant (i.e., the one that included the full version of the first name, as opposed to an initial) on all cells that had less complete variants of the same author name. In that process, a few minor typos were discovered. A few articles had more than one author in the same cell because the formatting convention had not been followed by the source (the formatting convention is a comma after the last name, and a semicolon between two co-authors).

- Step 6.1. This step resulted in the final standardized version. I created the following tables, (Tables 10.1-10.9) which shows the total number of citations each author had received from the 378 high-impact papers (papers that had gained 200 and more citations) at the time the citation analysis was completed.

Step 7. I utilized the Excel function Remove duplicates to get a list of unique author names. This resulted in the Authors Master List. It lists 748 highly-cited authors, i.e., authors who had co-authored at least one paper with 200 or more citations in one or more journals in the 'ET10 Basket' (the basket of 10 Educational Technology Journals created for this study).

- Step 7.1. I proceeded to use another Excel function to count the papers each one of the authors had authored (or co-authored). In subsequent columns, I entered the same information, but this time I sorted it in descending order, thereby creating a list with the authors who had the highest 'HIP index' at the top (High-Impact-Paper count).
- Step 7.2. In column D of the spreadsheet, I applied a "conditional cumulative sum" formula, using the following logic: if the current author name was the same as the previous, then the current number of citations was added to the previous sum; otherwise, the author was new, so the current number of citations was reported as the starting value for the total citation number. In column E, I entered a 'keep indicator function', which was set to 1 if the current author's name was different from the following one (indicating that the current cell would be the last time that particular author's name would occur), and was blank if the same author's name was listed again in the following row, meaning that the current cell was still in the middle of the accumulating total of citations for that author. Columns G, H, and I of the spreadsheet repeated the same information, but they were listed by 'keep', thereby keeping only one row for each author, showing the total number of citations. Finally, columns K and L comprised the final list of 748 highly cited authors in the ET10 basket, sorted so that those with the highest HIC index (High-Impact Citation total) were listed at the top.

Research Question No. 6:

Which specific authors were cited most frequently overall, and which ones were most frequently cited by 5-year periods of time in each of the journals during the 20 years (Jan 1995-Dec 2014) in the top journals in Educational Technology selected for this study?

Tables 10.1 to 10.9 list the authors who were the most cited in the high-impact research papers used for this analysis within the Educational Technology discipline. The authors are presented beginning from the highest number of citations received, that is, from Jonassen, David H. with 5,457 (Table 10.1); continuing down to five authors who received 200 citations each: Ben-Bassat Levy, Ronit; Gerjets, Peter; Grabowski, Barbara; Scheiter, Katharina; and Uronen, Pekka A. (Table 10.9).

Table 10.1

The Most Cited Authors from the High-Impact Papers (from 5,457 to 759 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
1	Jonassen, David H.	5457	46	Oliver, Ron	1047
2	Ertmer, Peggy A.	4713	47	Hwang, Gwo-Jen	1043
3	Barab, Sasha A.	2946	48	Chen, Yueh-Yang	1036
4	Hannafin, Michael J.	2938	49	Finger, Glenn	1036
5	Squire, Kurt D.	2357	50	Tsai, Ray J.	1036
6	Koehler, Matthew J.	2200	51	Yeh, Dowming	1036
7	Mishra, Punya	2200	52	van Keer, Hilde	1019
8	Koedinger, Kenneth R.	2138	53	van Merrienboer, Jeroen J G	1007
9	Land, Susan M.	1946	54	Kirschner, Paul A.	983
10	Bennett, Sue	1915	55	Resnick, Mitchel	968
11	Kervin, Lisa	1915	56	Papastergiou, Marina	966
12	Maton, Karl	1915	57	Rieber, Lloyd, P.	955
13	Valcke, Martin	1890	58	Kolodner, Janet L.	950
14	Chi, Michelene T. H.	1874	59	Rohrer-Murphy, Lucia	946
15	Angeli, Charoula	1826	60	Azevedo, Roger	945
16	Henderson, Austin	1819	61	Fischer, Frank	914
17	Jordan, Brigitte	1819	62	Weinberger, Armin	914
18	Anderson, John R.	1793	63	Davis, Elizabeth A.	913
19	Corbett, Albert T.	1793	64	Huang, Hsiu-Mei	903
20	Pelletier, Ray	1793	65	Jacobson, Michael J.	895
21	Anderson, Terry	1758	66	Wang, Feng	891
22	Brush, Thomas A.	1677	67	Ottenbreit-Leftwich, Anne T.	890
23	Bielaczyc, Katerine	1568	68	Sharples, Mike	885
24	Krajcik, Joseph	1542	69	Selim, Hassan M.	881
25	Barron, Brigid	1541	70	Yang, Stephen J. H.	879
26	Gunawardena, Charlotte N.	1492	71	Ainsworth, Shaaron	875
27	Lowe, Constance A.	1492	72	Chou, Chien	862
28	Pea, Roy D.	1480	73	Pelgrum, W. J.	861
29	Soloway, Elliot	1467	74	Liaw,Shu-Sheng	840
30	Sun,Pei-Chen	1395	75	Tondeur, Jo	835
31	Collins, Allan	1364	76	Mayer, Richard E.	824
32	Joseph, Diana	1364	77	Schraw, Gregory	816
33	Merrill, M. David	1332	78	Hill, Janette R.	809
34	Bonk, Curtis Jay	1311	79	Becker, Henry Jay	805
35	Edelson, Daniel C.	1300	80	Carteaux, Robert	798
36	Hmelo-Silver, Cindy E.	1276	81	Dodge, Tyler	798
37	Hew,Khe Foon	1133	82	Thomas, Michael	798
38	Tüzün, Hakan	1113	83	De Wever, B.	796
39	Dickey, Michele D.	1110	84	Boyle, James M.	793
40	Reiser, Brian J.	1105	85	Newby, Timothy J.	783
41	Nussbaum, Miguel	1076	86	Reiser, Robert A.	781
42	Hara, Noriko	1063	87	Tsai, Chin-Chung	773
43	Jochems, Wim M. G.	1061	88	Ritchie, Donn C.	764
44	Schellens, Tammy	1055	89	Valanides, Nicos	763
45	Herrington, Jan	1047	90	Oliver, Martin	759

Table 10.2

The Most Cited Authors from the High-Impact Papers (from 746 to 472 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
91	Baylor,Amy L.	746	136	Carr,Chad	556
92	So,Hyo-Jeong	739	137	Yueh, Hsiu-Ping	556
93	Ebner,Martin	738	138	Camp,Paul J.	549
94	Martens,Rob L.	699	139	Crismond,David	549
95	Strijbos,Jan-Willem	699	140	Fasse,Barbara	549
96	Kreijns,Karel	691	141	Gray,Jackie	549
97	Lee,Mark J. W.	681	142	Holbrook,Jennifer	549
98	Dalgarno,Barney	675	143	Puntambekar,Sadhana	549
99	de Freitas,Sara	675	144	Ryan,Mike	549
100	Motiwalla,Luvai F.	622	145	Tangney,Brendan	549
101	Chen,Gwo-Dong	621	146	van Braak,Johan	549
102	Marx,Ronald W.	618	147	Shea,Peter	542
103	Wang,Yi-Shun	614	148	Baran,Evrim	533
104	Tor Busch	610	149	Schmidt,Denise A.	533
105	Duncan,Ravit Golan	608	150	Shin,Tae S.	533
106	Fretz,Eric	608	151	Thompson,Ann D.	533
107	Kyza,Eleni	608	152	Wilensky,Uri	532
108	Quintana,Chris	608	153	Clark,Richard E.	521
109	García,Enrique	607	154	de Croock,Marcel B M	521
110	Romero,Cristóbal	607	155	Zurita,Gustavo	515
111	Ventura,Sebastián	607	156	Dori,Yehudit Judy	506
112	Hsiao,Ming-Chun	604	157	Yahya,Kurnia	503
113	Kozma,Robert B.	599	158	Boyle,Elizabeth A.	502
114	Lin,Xiaodong	592	159	Connolly,Thomas M.	502
115	Conole,Gráinne	587	160	Hainey,Thomas	502
116	Evans,Chris	584	161	MacArthur,Ewan	502
117	Kay,Robin H.	578	162	Warburton,Steven	501
118	Spriro, R. J.	575	163	Reeves,Thomas C.	499
119	Chen,Chih-Ming	564	164	Albirini,Abdulkafi	498
120	Demetriadis,Stavros	564	165	Hammer,David	491
121	Pomportsis,Andreas	564	166	Littlejohn,Allison	488
122	Moreno,Roxana	563	167	Margaryan,Anoush	488
123	Correa,Mónica	561	168	Vojt,Gabrielle	488
124	Cumsille,Patricio	561	169	Rourke,Liam	485
125	Flores,Patricia	561	170	Lee,Yao-kuei	483
126	Grau,Valeska	561	171	Pituch,Keenan A.	483
127	Lagos,Francisca	561	172	Chan,Y. H. C.	480
128	López,Verónica	561	173	Ngai,E. W. T.	480
129	López,Ximena	561	174	Poon,J. K. L.	480
130	Marianov,Vladimir	561	175	Lowther,Deborah L.	478
131	Rodriguez,Patricio	561	176	Addison,Paul	477
132	Rosas,Ricardo	561	177	Lane,Molly	477
133	Salinas,Marcela	561	178	Ross,Eva	477
134	Harris,Judith	560	179	Woods,Denise	477
135	Klopfer,Eric	557	180	McLoughlin,Catherine	472

Table 10.3

The Most Cited Authors from the High-Impact Papers (from 469 to 357 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
181	Koper,Rob	469	226	Holton,Douglas L.	401
182	Olivier,Bill	469	227	Yildirim,Soner	400
183	Cross,Simon	466	228	Prins,Frans J.	399
184	Healing,Graham	466	229	Nicholls,Craig	397
185	Jones,Chris	466	230	Pena-Shaff,Judith B.	397
186	Ramanau,Ruslan	466	231	Levy,Yair	392
187	Li,Tanya Beran Qing	462	232	Tam,Maureen	389
188	Schepers,Jeroen J. L.	457	233	Guzdial,Mark	387
189	van Raaij,Erik M.	457	234	Turns,Jennifer	387
190	Messina,Richard	456	235	Bowers,Clint A.	385
191	Reeve,Richard	456	236	Cannon-Bowers,Jan	385
192	Scardamalia,Marlene	456	237	Muse,Kathryn	385
193	Zhang,Jianwei	456	238	Vogel,David S.	385
194	Bong,Mimi	454	239	Vogel,Jennifer J.	385
195	Choi,Ha-Jeen	454	240	Wright,Michelle	385
196	Young-Ju,Joo	454	241	Wang,Hsiu-Yuan	384
197	Junco,Reynol	452	242	We,Ming-Cheng	384
198	Choi, Jeong-Im	448	243	Hernandez-Serrano,Julian	381
199	Pierson,Melissa E.	444	244	Lienhardt,Conrad	377
200	Hirumi,Atsusi	442	245	Meyer,Iris	377
201	Kebritchi,Mansureh	442	246	Rohs,Matthias	377
202	Amory,Alan	441	247	Schrire,Sarah	374
203	Naicker,Kevin	441	248	Fried,Carrie B.	371
204	Vincent,Jacky	441	249	Ravitz,Jason	370
205	Cromley,Jennifer G.	440	250	Fordham,Nancy	369
206	Winters,Fielding I.	440	251	Vannatta,Rachel A.	369
207	Pintrich,Paul R.	437	252	Ertl,Bernhard	368
208	Wolters,Christopher A.	437	253	Bartsch,Robert A.	366
209	Anderson,Ronald E.	435	254	Cobern,Kristi M.	366
210	Dexter,Sara L.	435	255	Park,Sung Youl	366
211	Ke,Fengfeng	435	256	Cho,Kyoo-Lak	365
212	Wheeler,Dawn	431	257	de la Fuente,P.	363
213	Wheeler,Steve	431	258	Dimitriadis,Y.	363
214	Yeomans,Peter	431	259	Gómez,E.	363
215	Catrambone,Richard	430	260	Martínez,A.	363
216	Christensen,Rhonda	430	261	Rubia,B.	363
217	Cole,Melissa	426	262	Mazman,Sacide Güzin	362
218	Kwan,Hyug Il	421	263	Usluel,Yasemin Koçak	362
219	Rovai,Alfred P.	412	264	Holzinger,Andreas	361
220	Penuel,William R.	406	265	Lee,Ming-Chi	360
221	Goodyear,Peter	405	266	Chiu,Chao-Min	359
222	Salmon,Gilly	405	267	Hsu,Meng-Hsiang	359
223	Spector,J. Michael	405	268	Lin,Tung-Ching	359
224	Steeples,Christine	405	269	Sun,Szu-Yuan	359
225	Tickner,Sue	405	270	Flanagin,Andrew J.	357

Table 10.4

The Most Cited Authors from the High-Impact Papers (from 357 to 303 citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
271	Metzger,Miriam J.	357	316	Maher,Greg	329
272	Zwarun,Lara	357	317	Pelz,William	329
273	Kirkup,Gill	355	318	Pickett,Alexandra	329
274	Li,Nai	355	319	Swan,Karen	329
275	Maddison,Sarah	354	320	Hermans,R.	326
276	Mazzolini,Margaret	354	321	Jarmon,Leslie	326
277	Fabry,Dee L.	352	322	Mayrath,Michael	326
278	Higgs,John R.	352	323	Mueller,Julie	326
279	Cunningham,Donald J.	348	324	Ross,Craig	326
280	MaKinster,James G.	348	325	Specht,Jacqueline	326
281	Moore,Julie A.	348	326	Traphagan,Tomoko	326
282	Cobb,Paul	345	327	Trivedi,Avani	326
283	diSessa,Andrea A.	345	328	Willoughby,Teena	326
284	Nathan,Mitchell J.	345	329	Wood,Eileen	326
285	Cassidy,Simon	343	330	Colella,V	323
286	Chen,Ya-Hui	343	331	Nichols, Mark	322
287	Davies,Jo	343	332	Schwartz,Daniel L.	320
288	Eachus,Peter	343	333	Drent,Marjolein	318
289	Graff,Martin	343	334	Meelissen,Martina	318
290	Lee,Hahn-Ming	343	335	Culp,Katie Mcmillan	316
291	Teo,Timothy	343	336	Honey,Margaret	316
292	Ge,Xun	341	337	Katsionis,George	316
293	Sandoval,William A.	340	338	Kupperman,Jeff	316
294	Chen,Sherry Y.	339	339	Mandinach,Ellen	316
295	Ford,Nigel	339	340	Manos,Konstantinos	316
296	Poole,Dawn M.	338	341	Virvou,Maria	316
297	Bower, Gregory	336	342	Wallace,Raven McCrory	316
298	Kinzer,Charles K.	336	343	İnal,Yavuz	315
299	Mars, Rebecca	336	344	Karakuş,Türkan	315
300	Secules,Teresa J.	336	345	Kızılkaya,Gonca	315
301	Steinhoff, Kathryn	336	346	Saye,John W.	315
302	Yang,Shih-Hsien	336	347	Yılmaz-Soylu,Meryem	315
303	Alonso,Fernando	335	348	Shashaani,Lily	308
304	López,Genoveva	335	349	Schrum,Lynne	306
305	Manrique,Daniel	335	350	Chin,Elaine	305
306	Sweller,John	334	351	De Lucia,Andrea	305
307	Lizotte,David J.	331	352	Francese,Rita	305
308	McNeill,Katherine L.	331	353	Marx,Nancy	305
309	Hundhausen,Christopher D.	330	354	Passero,Ignazio	305
310	Suthers,Daniel D.	330	355	Russell,Joel	305
311	Beers,Pieter Jelle	329	356	Tortora,Genoveffa	305
312	Fletcher-Flinn,Claire M.	329	357	Deters,Ralph	304
313	Fredericksen,Eric	329	358	Vassileva,Julita	304
314	Gravatt,Breon	329	359	Rummel,Nikol	303
315	Jan-Willem Strijbos	329	360	Spada,Hans	303

Table 10.5

The Most Cited Authors from the High-Impact papers (from 302 to 267 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
361	Asensio-Pérez,Juan I.	302	406	Szabo,Attila	285
362	Hernández-Leo,Davinia	302	407	Choi,Hee Jun	282
363	Villasclaras-Fernández,Eloy D.	302	408	Karagiorgi, Yiasemina	282
364	Derry,Sharon J.	301	409	Park,Ji-Hye	282
365	Dyke,M.	301	410	Symeou,Loizos	282
366	Engle,Randi A.	301	411	Barbour,Michael K.	279
367	Erickson,Frederick	301	412	Churchill,Daniel	279
368	Goldman,Ricki	301	413	Arauz,R.M.	277
369	Hall,Rogers	301	414	Wells,G.	277
370	Koschmann,Timothy	301	415	Annetta,Leonard A.	276
371	Lemke,Jay L.	301	416	Cheng,Meng-Tzu	276
372	Seale,J.	301	417	Holmes,Shawn Y.	276
373	Sherin,Bruce L.	301	418	Klimczak,Aimee K.	276
374	Sherin,Miriam Gamoran	301	419	Marra,Rose M.	276
375	Arnedillo Sánchez,Inmaculada	300	420	Minogue,James	276
376	Cavus,Nadire	300	421	Moore,Joi L.	276
377	Ibrahim,Dogan	300	422	De Jong,Ton	275
378	Patten,Bryan	300	423	Hannafin,Kathleen M.	275
379	Xun,G. E.	300	424	Oliver,Kevin	275
380	Murphy,Karen, L.	297	425	Brown,Scott W.	274
381	Thach, Elizabeth, C.	297	426	Kim,Hyung Nam	274
382	Triantafillou,Evangelos	297	427	Lawless,Kimberly A.	274
383	LeSage,Ann	296	428	Minstrell,Jim	273
384	Cho,Hichang	295	429	Strudler,Neal	273
385	Dabbagh,Nada	295	430	Wetzel,Keith	273
386	Davidson,Barry	295	431	Zee,Emily van	273
387	Gay,Geri	295	432	Blin,Françoise	271
388	Gilbert,Patricia K.	295	433	Elby,Andrew	271
389	Ingraffea,Anthony	295	434	Graham,Leah	271
390	Macdonald,Janet	293	435	Lee,Shinwoong	271
391	Bastiaens,Theo J.	292	436	Liu,Min	271
392	Gulikers,Judith T. M.	292	437	Moore,Zena	271
393	Sadik,Alaa	292	438	Munro,Morag	271
394	Smeets,Ed	292	439	Chen,Wenli	269
395	Tolmie,Andrew	291	440	Looi,Chee-Kit	269
396	Gros,Begoña	290	441	Seow,Peter	269
397	Blumenfeld,Phyllis	287	442	Wong,Lung-Hsiang	269
398	Fishman,Barry	287	443	Zhang,BaoHui	269
399	Braak,Johan van	286	444	Barbas,A.	267
400	Darby,Jonathan	286	445	Dyck,Jennifer L.	267
401	de Laat,Maarten	286	446	Luber,Elise S.	267
402	Dillon,Teresa	286	447	McKinney,Dani	267
403	Sang,Guoyuan	286	448	Molohides,A.	267
404	Hastings,Nigel	285	449	Palaigeorgiou,G.	267
405	Sternberg,Robert J.	285	450	Psillos,D.	267

Table 10.6

The Most Cited Authors from the High-Impact Papers (from 267 to 245 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
451	Tsoukalas,I.	267	496	García,Patricio	257
452	Vlahavas,I.	267	497	Schiaffino,Silvia	257
453	Berg,Robbie	265	498	Woody,William Douglas	257
454	Eisenberg,Michael	265	499	Laurillard,Diana	256
455	Chittaro,Luca	264	500	Mumtaz,Shazia	256
456	Ranon,Roberto	264	501	Norris,Cathleen	256
457	de-Marcos,Luis	263	502	Poirot,James	256
458	Domínguez,Adrián	263	503	Sullivan,Terry	256
459	Fernández-Sanz,Luis	263	504	Chan,Tak-Wai	255
460	Martínez-Herráiz,José-Javier	263	505	Chou,Chih-Yueh	255
461	Pagés,Carmen	263	506	Lin,Chi-Jen	255
462	Saenz-de-Navarrete,Joseba	263	507	Guthrie,John T.	254
463	Carr-Chellman,Alison	262	508	Issroff,Kim	254
464	Dawson,Shane	262	509	Jones,Ann	254
465	Duchastel,Philip	262	510	Moller,Leslie	254
466	Macfadyen,Leah P.	262	511	Rogers,Patricia L.	254
467	Sadik,Olgun	260	512	Seibert,Diane	254
468	Sendurur,Emine	260	513	Zohar,Anat	254
469	Sendurur,Polat	260	514	Belcher,John	252
470	Chang,Hsun-Fang	259	515	Bernard,Robert M.	251
471	Cho,Kwangsu	259	516	Shaffer,David W.	251
472	Duschl,Richard A.	259	517	Ayres,Paul	250
473	Glaser,Robert	259	518	Goldstone,Robert L.	250
474	John,Jenny	259	519	Greene,Barbara A.	250
475	Macher,Daniel	259	520	Son,Ji Y.	250
476	Maier,Brigitte	259	521	Brinkerhoff,Jonathan	249
477	Paechter,Manuela	259	522	Dolog,Peter	249
478	Schauble,Leona	259	523	Henze,Nicola	249
479	Schulze,Sharon	259	524	Hewitt,Jim	249
480	Schunn,Christian D.	259	525	Liao,Hsiu-Li	249
481	Barron,Ann E.	258	526	Liu,Su-Houn	249
482	Harmes,Christine	258	527	Markett,C.	249
483	Jimoyiannis,Athanassios	258	528	Nejdl,Wolfgang	249
484	Kalaydjian,Kimberly	258	529	Pratt,Jean A.	249
485	Kemker,Kate	258	530	Sánchez,I. Arnedillo	249
486	Komis,Vassilis	258	531	Weber,S.	249
487	Marton,Ference	258	532	Martín-Blas,Teresa	248
488	Nordin,Zaimuarifuddin Shukri	258	533	Serrano-Fernández,Ana	248
489	Othman,Abang Ekhsan Abang	258	534	Reynolds,David	247
490	Pang,Ming Fai	258	535	Treharne,Dave	247
491	Sam,Hong Kian	258	536	Trip,Helen	247
492	Amandi,Analía	257	537	Bebell,Damian	245
493	Baker,Crystal A.	257	538	Coles,Louisa	245
494	Campo,Marcelo	257	539	O'Dwyer,Laura	245
495	Daniel,David B.	257	540	Russell,Michael	245

Table 10.7

The Most Cited Authors from the High-Impact Papers (from 245 to 223 Citations)

	Author's Name	HIC-Index			Author's Name	HIC-Index
541	Williams,Dorothy	245		586	Wang,Qiyun	231
542	Wilson,Kay	245		587	Yang,Yuqin	231
543	Gordin,Douglas N.	244		588	Yoon,Jeong-Ok	231
544	Morrison-Shetlar,Alison I.	242		589	Byrne,Michael D.	230
545	Sanders,Diana W.	242		590	Chen,Pu-Shih Daniel	230
546	Cheung,Wing Sum	241		591	Guidry,Kevin R.	230
547	Henderson, Lyn	241		592	Lambert,Amber D.	230
548	Higgins,Steve	240		593	Shee,Daniel Y.	230
549	Hsia,Tzyh-Lih	240		594	Stasko,John T.	230
550	Smith,Heather	240		595	Benson Soong,M. H.	229
551	Tennyson,Robert D.	240		596	Chai Chua,Boon	229
552	Wall,Kate	240		597	Chuan Chan,Hock	229
553	Wu,Jen-Her	240		598	Fong Loh,Koah	229
554	Baker,Michael	239		599	Lee,Min-Hsien	229
555	Inan,Fethi A.	239		600	Parrish,Patrick E.	229
556	Lund,Kristine	239		601	Greene,Jeffrey A.	228
557	Morrison,Gary M.	239		602	McInnerney,Joanne M.	228
558	Ropp,Margaret Merlyn	239		603	Moos,Daniel C.	228
559	Ross,Steven M.	239		604	Roberts,Tim S.	228
560	Vries,Erica de	239		605	Berrett,Jared V.	226
561	Doering,Aaron	237		606	Chiarelli,Stephannie	226
562	Huffman,Doug	237		607	Howells,Cathrin	226
563	Hughes,Joan	237		608	Johnson,Scott D.	226
564	Muir-Herzig,Rozalind G.	237		609	La Fleur,Jason	226
565	Campbell,Mark	236		610	McAlpine,Lynn	226
566	Concannon,Fiona	236		611	Robertson,Judy	226
567	Darabi,A. Aubteen	236		612	Suriya,Chanidprapa	226
568	Flynn,Antoinette	236		613	Weston,Cynthia B.	226
569	Koseler,Refika	236		614	Whipp,Joan L.	226
570	Ozkan,Sevgi	236		615	Won Yoon,Seung	226
571	Paas,Fred	236		616	Chen,Meng Chang	225
572	Roblyer,Md	236		617	Killi,Kristian	225
573	Selwyn,Neil	236		618	Kuo,Chin-Hwa	225
574	Tuovinen,Juhani E.	236		619	Liu,I-Fan	225
575	Fu,Fong-Ling	233		620	Pitrik, Renate Motschnig	225
576	Su,Rong-Chang	233		621	Sun,Yeali S.	225
577	Yu,Sheng-Chin	233		622	Wible,David	225
578	Rice,Kerry Lynn	232		623	Granger,Mary J.	224
579	Wood,D.	232		624	Murray,Tom	224
580	Wood,H.	232		625	Passerini,Katia	224
581	Lang Quek,Choon	231		626	Wang,Ling	224
582	Lee,Byoung-Chan	231		627	Bai,Haiyan	223
583	Lee,In	231		628	Chang,Su-Chao	223
584	Lit Woo,Huay	231		629	Davis,N. E.	223
585	Liu,Mei	231		630	Gikandi,J. W.	223

Table 10.8

The Most Cited Authors from the High-Impact Papers (from 223 to 206 Citations)

	Author's Name	HIC-Index		Author's Name	HIC-Index
631	Keller,John M.	223	676	Young,Betty J.	211
632	Lahav,Orly	223	677	Baek,Youngkyun	210
633	Mioduser,David	223	678	Kim,Bokyeong	210
634	Morrow,D.	223	679	Park,Hyungsung	210
635	Nachmias,Rafi	223	680	Carswell,Linda	209
636	Oren,Avigail	223	681	Chi-Wai Kwok,Ron	209
637	Psotka,Joseph	223	682	Erkens,Gijsbert	209
638	Song,Sang H.	223	683	Janssen,Jeroen	209
639	Tung,Feng-Cheng	223	684	Jaspers,Jos	209
640	Hoffman,Bob	222	685	Kanselaar,Gellof	209
641	Barnett,Michael	221	686	Petre,Marian	209
642	Chung,Ching-Ju	221	687	Thomas,Pete	209
643	Riding,R. J.	221	688	Tian,Stella Wen	209
644	Sadler-Smith,Eugene	221	689	Vogel,Douglas	209
645	Hsieh,Chang-tseh	220	690	Yu,Angela Yan	209
646	Lin,Binshan	220	691	Chang,C. K.	208
647	Ruberg,Lorena F.	220	692	Murray,Orrin T.	208
648	Susskind,Joshua E.	220	693	Olcese,Nicole R.	208
649	Bertolotto,Michela	219	694	Wang,C. Y.	208
650	Kanuka,Heather	219	695	Zhu,Erping	208
651	Laflamme,Elaine	219	696	Avgeriou, Paris	207
652	McArdle,Gavin	219	697	Brem,Sarah	207
653	Monahan,Teresa	219	698	Dunlap,Joanna C.	207
654	Neumann,Tim	217	699	Ferguson,Ronald W.	207
655	Bruce,BC	216	700	Forbus,Kenneth D.	207
656	Levin,JA	216	701	Gentner,Dedre	207
657	Okan,Zühal	216	702	Heemskerk,Irma	207
658	Biemans,Harm	215	703	Hrastinski,Stefan	207
659	Brown,Margaret I.	215	704	Kuiper,Els	207
660	Draper,Stephen W.	215	705	Levidow,Björn B.	207
661	Henderson,Fiona P.	215	706	Markman,Arthur B.	207
662	Mahdizadeh,Hossein	215	707	Papasalouros, Andreas	207
663	McAteer,Erica	215	708	Retalis, Symeon	207
664	Mulder,Martin	215	709	Skordalakis, Manolis	207
665	Berson,Michael J.	214	710	van Eck,Edith	207
666	Engstrom,Mary E.	214	711	Volman,Monique	207
667	Jewett,Dusty	214	712	Wolff,Phillip	207
668	Bidjerano,Temi	213	713	Durndell,A.	206
669	Chan,Anthony	213	714	Laffey,James	206
670	Ayersman,David J.	212	715	Musser,Dale	206
671	Bayraktar,Sule	212	716	Richey,Rita C.	206
672	Lonn,Steven	211	717	Tessmer,Martin	206
673	Tabak,Iris	211	718	Thomson,K.	206
674	Teasley,Stephanie D.	211	719	Tupper,Thomas	206
675	Valdez,Alfred	211	720	Wedman,John	206

Table 10.9

The Most Cited Authors from the High-Impact Papers (from 205 to 200 citations)

	Author's Name	HIC-Index
721	Clariana,Roy	205
722	Hoskins,Sherria L.	205
723	van Hooff,Johanna C.	205
724	Wallace,Patricia	205
725	Crook,Charles	204
726	Kim,Yanghee	204
727	Price,Sara	204
728	Rogers,Yvonne	204
729	Plowman,Lydia	203
730	Stephen,Christine	203
731	Yang,Tzu-Chi	203
732	Boshuizen,Henny P. A.	202
733	Chen,Chun-Yu	202
734	Dueber,William	202
735	Grave,Willem S. de	202
736	Huang,Sih-Han	202
737	Jim Wu,Yen-Chun	202
738	Kao,Hao-Yun	202
739	Lin,Che-Hung	202
740	Schmidt,Henk G.	202
741	Wu,Wen-Hsiung	202
742	Lamon,Mary	201
743	Ben-Ari,Mordechai	200
744	Ben-Bassat Levy,Ronit	200
745	Gerjets,Peter	200
746	Grabowski,Barbara	200
747	Scheiter,Katharina	200
748	Uronen,Pekka A.	200

CHAPTER 4

PRESENTATION OF DATA

This Section introduces each one of the ten journals selected for the study and will present information and analysis results to answer the following Research Questions:

What specific research articles were cited more frequently overall and by 5-year periods of time in each journal during the last twenty years (Jan 1995-Dec 2014)?

Who has published research papers in Educational Technology in each of the ten selected journals for the study, during the past 20 years (Jan 1995-Dec 2014)?

1. *The British Journal of Educational Technology (BJET)*

The *British Journal of Educational Technology (BJET)* is an official publication of the British Educational Research Association. It is a peer-reviewed journal that aims to cover "developments in international educational and training technology" *(British Journal of Educational Technology,* n.d.). The first issue of *BJET* appeared in 1970. Since that time, the journal has increased its publication rate from three to six issues per year, including at least one issue annually devoted to a special topic. The *BJET* peer review process is unique in that submitted articles are not assigned specific reviewers, but are put into an electronic holding queue until a volunteer reviews the article. In this way, reviewers can select articles representing topics of interest to them. The journal enjoys a decidedly international preference with authors from universities around the world.

BJET specializes in publishing shorter research articles (2000-3000 words) covering "the whole range of education and training, concentrating on the theory, applications, and

development of learning technology and communications" (*British Journal of Educational Technology,* n.d.). The editorial board strives to move articles through the publication process quickly—it advertises that five weeks is required for its online submission system and review process. According to the *BJET* editors, this quick process gives it an advantage over other journals in the quickly changing field of technology in education. *BJET* also publishes book reviews, editorials, and a colloquia section devoted to works in progress and shorter pieces. The 2015 Journal Citations Reports gave BJET an impact factor of 1.318, leading to a rank of 46 out of 224 (see: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-8535/homepage/ProductInformation.html).

Table 11 shows the *British Journal of Educational Technology (BJET)* scientific indicators contained in the Scopus database (SCImago, 2007), used to assess and analyze scientific domains of the journal.

Table 12 shows the ten most cited articles overall for the time span of this study (1995-2014). For additional information on the most cited research papers, please refer to Appendix F, displaying a table of the research papers published in the *British Journal of Educational Technology* (*BJET*) which were cited 200 or more times during the twenty years (a total of 38 papers). As can be noted from Table 12, the most cited article overall in the twenty years was "*The 'digital natives' debate: A critical review of the evidence*," by Sue Bennett, Karl Maton, and Lisa Kervin, published in 2008, with 1,915 citations in as few as 6 years after first being published, at the time this analysis was completed (January 10-16, 2016).

Table 11

British Journal of Educational Technology (BJET) *Scientific Indicators*

British Journal of Educational Technology (BJET)																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,259	0,278	0,463	0,214	0,366	0,409	0,633	0,482	0,733	1,110	0,735	1,151	1,595	1,801	1,501	1,510
Total Documents	30	32	47	21	49	61	95	72	101	95	91	114	124	113	128	122
Total Docs. (3years)	70	84	89	109	100	117	131	205	228	268	268	287	300	329	351	365
Total References	557	456	868	485	1.042	1.118	1.657	1.696	2.146	1.860	2.233	2.484	3.090	3.179	3.410	4.448
Total Cites (3years)	20	36	55	40	47	83	193	242	314	466	545	848	917	947	928	755
Self Cites (3years)	6	4	14	0	10	13	22	21	23	34	19	42	53	83	86	41
Citable Docs. (3years)	70	84	87	107	96	112	124	193	214	249	251	271	285	298	316	328
Cites / Doc. (4years)	0,29	0,43	0,56	0,40	0,51	0,73	1,53	1,30	1,68	1,95	2,24	3,04	3,18	3,30	3,27	2,49
Cites / Doc. (3years)	0,29	0,43	0,63	0,37	0,49	0,74	1,56	1,25	1,47	1,87	2,17	3,13	3,22	3,18	2,94	2,30
Cites / Doc. (2years)	0,22	0,40	0,67	0,32	0,53	0,66	1,40	1,04	1,37	1,59	2,06	3,24	2,86	2,64	2,69	1,98
References / Doc.	18,57	14,25	18,47	23,10	21,27	18,33	17,44	23,56	21,25	19,58	24,54	21,79	24,92	28,13	26,64	36,46
Cited Docs.	14	24	33	30	32	49	72	102	124	155	165	204	199	217	239	215
Uncited Docs.	56	60	56	79	68	68	59	103	104	113	103	83	101	112	112	150
% International Collaboration	0,00	3,13	4,26	0,00	12,24	6,56	11,58	15,28	28,71	47,37	24,18	9,65	10,48	14,16	6,25	14,75

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 12

The Ten Most Cited Articles Published in the British Journal of Educational Technology (BJET)

Cites	Authors	Title	Year
1915	S Bennett, K Maton, L Kervin	The 'digital natives' debate: A critical review of the evidence	2008
501	S Warburton	Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching	2009
490	HM Huang	Toward constructivism for adult learners in online learning environments	2002
468	B Dalgarno, MJW Lee	What are the learning affordances of 3-D virtual environments?	2010
441	A Amory, K Naicker, J Vincent…	The use of computer games as an educational tool: identification of appropriate game types and game elements	1999
431	S Wheeler, P YEoMAnS…	The good, the bad and the wiki: Evaluating student-generated content for collaborative learning	2008
414	MD Dickey	Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education	2005
384	YS Wang, MC Wu, HY Wang	Investigating the determinants and age and gender differences in the acceptance of mobile learning	2009
343	J Davies, M Graff	Performance in e-learning: online participation and student grades	2005
339	N Ford, SY Chen	Matching/mismatching revisited: an empirical study of learning and teaching styles	2001

In Appendix G, the reader can also find a table with the five top-cited articles published in the *British Journal of Educational Technology* (*BJET*) by year, from 1995 to 2014 (20 years, and 100 papers). The years 2005, 2008, and 2009 show the highest number of citations received by the five top-cited articles: 1,627, 2,960, and 1,656 respectively.

2. *The Journal of the Learning Sciences* (*JLS*)

This cognitive science journal provides a multidisciplinary forum for the presentation of research on teaching and learning. Relevant articles come from disciplines such as artificial intelligence, cognitive science, cognitive and educational psychology, cognitive anthropology, education, and educational technology. Because the learning sciences cover the entire science/technology spectrum, the journal's main goal is to foster new ways of thinking about

learning and teaching that further the cognitive science disciplines' impact on the practice of education. Thus, the journal publishes articles that offer real-world contributions.

In 2015, Thomson Reuters, in *Journal Citation Reports* ® for 2014, ranked *Journal of the Learning Sciences* 12 out of 224 in Education & Educational Research and 9 out of 55 Psychology, Educational. *The Journal of the Learning Sciences* (*JLS*) is one of the two official journals of the International Society of the Learning Sciences (www.isls.org). *JLS* provides a multidisciplinary forum for research on education and learning as theoretical and design sciences. It publishes research that elucidates the processes of learning and the ways in which technologies, instructional practices, and learning environments can be designed to support learning in different contexts.

JLS articles draw on theoretical frameworks from such diverse fields as cognitive science, sociocultural theory, educational psychology, computer science, and anthropology. Submissions are not limited to any particular research method, but must be based on rigorous analyses that present new insights into how people learn and/or how learning can be supported and enhanced (see: http://www.tandfonline.com/loi/hlns20#.Vr_E3k32aUk).

Table 13 shows the *Journal of the Learning Sciences* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 13

Journal of the Learning Sciences *Scientific Indicators*

Journal of the Learning Sciences																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	1,392	1,112	1,646	1,383	2,506	1,982	3,160	2,717	3,090	4,355	2,221	1,758	2,337	2,344	2,764	2,680
Total Documents	10	12	12	20	12	17	13	20	16	15	20	17	18	19	21	29
Total Docs. (3years)	34	32	33	34	44	44	49	42	50	49	51	51	52	55	54	58
Total References	656	643	753	653	656	1.048	865	1.093	901	1.040	1.065	1.023	1.183	1.211	1.241	1.244
Total Cites (3years)	52	52	58	59	76	95	154	218	211	242	214	191	170	173	228	151
Self Cites (3years)	7	9	13	5	11	19	9	22	15	11	6	6	17	12	14	12
Citable Docs. (3years)	34	32	33	34	37	35	37	37	46	47	49	46	45	47	48	52
Cites / Doc. (4years)	1,53	1,64	1,82	1,84	2,11	3,30	3,76	5,04	5,02	6,80	4,97	5,65	4,10	4,31	4,61	3,64
Cites / Doc. (3years)	1,53	1,63	1,76	1,74	2,05	2,71	4,16	5,89	4,59	5,15	4,37	4,15	3,78	3,68	4,75	2,90
Cites / Doc. (2years)	1,36	1,57	1,64	1,58	1,48	2,91	5,13	5,78	2,97	4,09	3,30	3,29	3,53	3,84	3,74	2,54
References / Doc.	65,60	53,58	62,75	32,65	54,67	61,65	66,54	54,65	56,31	69,33	53,25	60,18	65,72	63,74	59,10	42,90
Cited Docs.	24	20	22	23	29	27	36	35	36	39	47	42	39	41	47	42
Uncited Docs.	10	12	11	11	15	17	13	7	14	10	4	9	13	14	7	16
% International Collaboration	0,00	0,00	0,00	5,00	0,00	0,00	15,38	20,00	25,00	80,00	5,00	23,53	5,56	10,53	9,52	3,45

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 14 shows the ten most cited articles overall for the time span of this study (1995-2014). Please refer to Appendix H, displaying a table showing the research papers published in the *Journal of the Learning Sciences* which were cited 200 or more times during the twenty years (a total of 53 papers). As can be noted from Table 14, the most cited article overall in the twenty years was "*Interaction analysis: Foundations and practice*," by Brigitte Jordan and Austin

Henderson, published in 1995; it had been the subject of 1819 citations at the time this analysis was completed (January 10-16, 2016).

Table 14

The Ten Most-Cited Articles Published in the Journal of the Learning Sciences

Cites	Authors	Title	Year
1819	B Jordan, A Henderson	Interaction analysis: Foundations and practice	1995
1793	JR Anderson, AT Corbett, KR Koedinger…	Cognitive tutors: Lessons learned	1995
1377	S Barab, K Squire	Design-based research: Putting a stake in the ground	2004
1364	A Collins, D Joseph, K Bielaczyc	Design research: Theoretical and methodological issues	2004
1291	MTH Chi	Quantifying qualitative analyses of verbal data: A practical guide	1997
786	B Barron	When smart groups fail	2003
692	DC Edelson	Design research: What we learn when we engage in design	2002
670	RD Pea	The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity	2004
608	C Quintana, BJ Reiser, EA Davis, J Krajcik…	A scaffolding design framework for software to support science inquiry	2004
583	MTH Chi	Commonsense conceptions of emergent processes: Why some misconceptions are robust	2005

In Appendix I, the reader can also find a table with the five top-cited articles published in the *Journal of the Learning Sciences* by year, from 1995 to 2014 (20 years, 100 papers). The years 2000, 2003, and 2004 show the highest number of citations received by the five top-cited articles: 1,882, 2,308, and 4,517, respectively.

3. *Educational Technology Research and Development (ETRD)*

Educational Technology Research and Development (*ETR&D*) is the only scholarly journal in the field focusing entirely on research and development in educational technology. It

is a bi-monthly publication of the Association for Educational Communications & Technology (Spector, Johnson & Young, 2014).

The *Research Section* assigns the highest priority in reviewing manuscripts to rigorous original quantitative, qualitative, or mixed methods studies on topics relating to applications of technology or instructional design in educational settings. Such contexts include K-12, higher education, and adult learning (e.g., in corporate training settings). Analytical papers that evaluate important research issues related to educational technology research and reviews of the literature on similar topics are also published. This section features well-documented articles on the practical aspects of research as well as applied theory in educational practice and provides a comprehensive source of current research information in instructional technology.

The *Development Section* publishes research on planning, implementation, evaluation, and management of a variety of instructional technologies and learning environments. Empirically-based formative evaluations and theoretically-based instructional design research papers are welcome, as are papers that report on outcomes of innovative approaches in applying technology to instructional development. Papers for the Development Section may involve a variety of research methods and should focus on one or more aspects of the instructional development process; when relevant and possible, papers should discuss the implications of instructional design decisions and provide evidence linking outcomes to those decisions.

The *Cultural and Regional Perspectives Section* (formerly *International Review*) welcomes innovative research about how technologies are being used to enhance learning, instruction, and performance specific to a culture or region. Educational technology studies submitted to this section should be situated in cultural contexts that critically examine issues and ideologies prevalent in the culture or region or by individuals or groups in the culture or region.

Theoretical perspectives can be broadly based and inclusive of research such as critical race theory, cultural-historical activity theory, and cultural models. Papers published in this section include quantitative, qualitative, and mixed-methods articles and reviews drawing on relevant theories, empirical evidence, and critical analyses of the findings, implications, and conclusions within a cultural context.

Manuscripts undergo a blind review process involving a panel of three reviewers with initial outcomes usually provided within two months. (see:

http://www.springer.com/education+%26+language/learning +%26+instruction/journal/11423).

Table 15 shows the *Educational Technology Research and Development* (*ETR&D*) scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze scientific domains of the journal.

Table 15

Educational Technology Research and Development ETR&D *Scientific Indicators*

Educational Technology Research and Development																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,444	0,422	0,500	0,515	0,824	0,847	0,600	0,954	1,152	1,546	1,090	1,495	1,787	1,205	1,703	1,609
Total Documents	26	25	25	20	22	26	29	28	29	34	45	41	46	57	46	50
Total Docs. (3years)	88	84	79	76	70	67	68	77	83	86	91	108	120	132	144	149
Total References	1.194	1.123	1.292	747	787	1.047	1.154	1.318	1.443	1.568	1.959	2.056	2.414	2.903	2.429	2.762
Total Cites (3years)	53	92	70	70	85	77	120	145	171	251	258	377	340	296	415	312
Self Cites (3years)	12	40	14	19	12	17	7	9	13	14	16	18	30	31	30	29
Citable Docs. (3years)	88	84	79	76	70	66	67	76	81	83	86	102	114	126	139	145

(table continues)

Table 15 *(continued).*

Educational Technology Research and Development																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Cites / Doc. (4years)	0,60	1,02	1,05	0,83	1,35	1,25	2,07	2,21	2,23	3,18	4,03	3,58	3,55	3,06	2,94	2,46
Cites / Doc. (3years)	0,60	1,10	0,89	0,92	1,21	1,17	1,79	1,91	2,11	3,02	3,00	3,70	2,98	2,35	2,99	2,15
Cites / Doc. (2years)	0,50	0,96	0,86	0,84	1,24	0,61	1,15	1,95	1,96	1,89	3,15	3,08	2,22	2,38	2,36	2,12
References / Doc.	45,92	44,92	51,68	37,35	35,77	40,27	39,79	47,07	49,76	46,12	43,53	50,15	52,48	50,93	52,80	55,24
Cited Docs.	32	40	37	40	34	33	41	51	49	56	74	86	86	89	113	105
Uncited Docs.	56	44	42	36	36	34	27	26	34	30	17	22	34	43	31	44
% International Collaboration	0,00	0,00	4,00	0,00	9,09	7,69	31,03	10,71	34,48	11,76	11,11	17,07	13,04	15,79	17,39	16,00

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 16 shows the ten most cited articles overall for the time span of this study (1995-2014). Please refer to Appendix J, displaying a table of the research papers published in the *Educational Technology Research and Development (ETR&D)* which were cited 200 or more times during the twenty years (a total of 64 papers). As can be noted from Table 16, the most cited article overall in the twenty years was "*Teacher pedagogical beliefs: The final frontier in our quest for technology integration?*" by Peggy A. Ertmer, published in 2005 and the subject of 1433 citations in only 9 years since the article was first published at the time this analysis was completed (January 10-16, 2016).

Table 16

The Ten Most-Cited Articles Published in Educational Technology Research and Development (ETR&D)

Cites	Authors	Title	Year
1433	PA Ertmer	Teacher pedagogical beliefs: The final frontier in our quest for technology integration?	2005
1332	MD Merrill	First principles of instruction	2002
1280	DH Jonassen	Toward a design theory of problem solving	2000
1254	DH Jonassen	Instructional design models for well-structured and III-structured problem-solving learning outcomes	1997
1130	PA Ertmer	Addressing first-and second-order barriers to change: Strategies for technology integration	1999
955	LP Rieber	Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games	1996
946	DH Jonassen, L Rohrer-Murphy	Activity theory as a framework for designing constructivist learning environments	1999
892	KF Hew, T Brush	Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research	2007
891	F Wang, MJ Hannafin	Design-based research and technology-enhanced learning environments	2005
827	J Herrington, R Oliver	An instructional design framework for authentic learning environments	2000

In Appendix K, the reader can also find a table with the five top-cited articles published in *Educational Technology Research and Development (ETR&D)* by year from 1995 to 2014 (20 years, 100 papers). The years 1999, 2000, and 2005 show the highest number of citations received by the five top-cited articles: 2,991, 3,076, and 3,779, respectively.

4. *Instructional Science*

Instructional Science is an interdisciplinary refereed scholarly journal aimed at promoting a deeper understanding of the nature, theory, and practice of the instructional process and of the learning to which it gives rise. The journal's conception of 'instruction' is broad-based, recognizing that there are many ways to stimulate and support learning. Papers published in recent years represent a wide variety of perspectives from the learning sciences. The journal

covers learning by people of all ages, in all areas of the curriculum, and in informal as well as formal learning contexts.

Although the journal occasionally publishes review articles, strong preference is given to reports of original empirical research, and the journal is unusual in giving space to full and detailed reporting of major studies. While studies focusing on learning processes, learning technology, learner characteristics, and learning outcomes are welcome, papers published in the journal all make an explicit contribution to the science of instruction by drawing out the instructional implications of new research on learning.

Instructional Science publishes a guest-edited thematic special issue in most years. Recent issues have been on cognitive load theory, networked learning, web-based instruction, teachers' thinking in higher education, epistemology and instructional design, and the francophone tradition of didactic practice. (See: http://rd.springer.com/journal/11251).

Table 17 shows the *Instructional Science* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze scientific domains of the journal.

Table 18 shows the ten most cited articles overall for the time span of this study (1995-2014). Please refer to Appendix L, displaying a table of the research papers published in the *Instructional Science* which were cited 200 or more times during the twenty years (a total of 25 papers). As can be noted from Table 18, the most cited article overall in the twenty years was "*Content analysis of online discussion in an applied educational psychology course*", by Noriko Hara, Curtis Jay Bonk, and Charoula Angeli, published in 2000 and with the high number of 1063 citations at the time this analysis was completed (January 10-16, 2016).

Table 17

Instructional Science *Scientific Indicators*

Instructional Science																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,315	0,441	0,645	0,475	0,500	0,432	0,773	1,442	1,311	1,361	1,184	0,774	1,179	1,623	1,607	1,907
Total Documents	20	17	20	21	22	21	23	17	19	26	32	36	47	56	69	55
Total Docs. (3years)	60	61	60	57	58	63	64	66	61	59	62	77	94	115	139	172
Total References	696	799	853	783	785	852	978	804	1.091	1.162	1.317	1.883	2.539	2.755	3.405	2.552
Total Cites (3years)	36	53	35	39	37	48	103	171	135	132	142	151	208	292	367	291
Self Cites (3years)	1	3	7	9	4	3	6	9	7	9	17	3	8	31	37	19
Citable Docs. (3years)	60	61	60	57	58	63	64	66	61	59	61	76	91	113	136	157
Cites / Doc. (4years)	0,60	0,93	0,82	0,88	0,67	0,95	1,79	2,26	2,12	2,76	2,80	1,99	2,76	2,81	2,85	2,24
Cites / Doc. (3years)	0,60	0,87	0,58	0,68	0,64	0,76	1,61	2,59	2,21	2,24	2,33	1,99	2,29	2,58	2,70	1,85
Cites / Doc. (2years)	0,61	0,70	0,41	0,81	0,51	0,77	1,70	2,75	1,73	1,25	2,16	1,79	2,38	2,54	1,90	1,61
References / Doc.	34,80	47,00	42,65	37,29	35,68	40,57	42,52	47,29	57,42	44,69	41,16	52,31	54,02	49,20	49,35	46,40
Cited Docs.	23	32	20	20	22	27	44	50	42	36	47	53	71	86	106	111
Uncited Docs.	37	29	40	37	36	36	20	16	19	23	15	24	23	29	33	61
% International Collaboration	15,00	0,00	0,00	14,29	9,09	28,57	21,74	29,41	26,32	19,23	28,13	13,89	14,89	28,57	21,74	29,09

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 18

The Ten Most-Cited Articles Published in Instructional Science *During the 20 Years*

Cites	Authors	Title	Year
1063	N Hara, CJ Bonk, C Angeli	Content analysis of online discussion in an applied educational psychology course	2000
816	G Schraw	Promoting general metacognitive awareness	1998
605	F Paas, A Renkl, J Sweller	Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture	2004
559	PA Ertmer, TJ Newby	The expert learner: Strategic, self-regulated, and reflective	1996
515	MJ Hannafin, SM Land	The foundations and assumptions of technology-enhanced student-centered learning environments	1997
488	RE Mayer	Cognitive, metacognitive, and motivational aspects of problem solving	1998
437	CA Wolters, PR Pintrich	Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms	1998
368	A Weinberger, B Ertl, F Fischer, H Mandl	Epistemic and social scripts in computer–supported collaborative learning	2005
360	DW Surry, JD Farquhar	Diffusion theory and instructional technology	1997
352	R Moreno	Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia	2004

In Appendix M, the reader can also find a table with the five top-cited articles published in *Instructional Science* by year, from 1995 to 2014 (20 years, 100 papers). The years 1998, 2000, and 2004 show the highest number of citations received by the five top-cited articles: 2,197, 1,691, and 1,670, respectively.

5. *TechTrends*

TechTrends is a leading publication for professionals in the educational communication and technology field. As such, its major purposes are to provide a vehicle for the exchange of information among professional practitioners concerning the management of media and programs, the application of educational technology principles and techniques to instructional programs, corporate and military training, and any other kinds of information that can contribute to the advancement of knowledge of practice in the field; to provide a means by which

practitioners can be kept current on the latest developments in the design, manufacture, and use of communications materials and devices; and to provide a vehicle for communication among the members of AECT to share information.

TechTrends considers manuscripts of the following types:

- Reports of innovative and/or exemplary practice.
- General articles discussing matters of concern to practitioners.
- Critical reviews of important literature, materials, and devices related to the field.
- Summaries of research translated into practical application.
- Reports on developmental programs and trends of national and international significance.
- News about the latest products, both materials and devices, for use in the field.
- Articles of use to managers and others with various specializations within the general educational communications and technology field.

(See: http://www.springer.com/education+%26+language/learning+%26+instruction/journal/11528).

Table 19 shows the *TechTrends* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 19

TechTrends *Scientific Indicators*

TechTrends																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,101	-	0,102	0,102	0,102	-	-	-	0,218	0,216	0,231	0,366	0,431	0,432	0,274	0,477
Total Documents	0	-	0	0	0	-	-	-	76	109	112	52	41	51	76	109
Total Docs. (3years)	16	-	10	10	10	-	-	-	68	144	253	297	273	205	144	168
Total References	0	-	0	0	0	-	-	-	614	1.226	1.168	666	517	695	1.038	1.894
Total Cites (3years)	2	-	0	0	0	-	-	-	19	33	83	132	142	134	87	125
Self Cites (3years)	0	-	0	0	0	-	-	-	2	5	5	7	8	10	7	17
Citable Docs. (3years)	16	-	9	9	9	-	-	-	55	110	187	205	193	149	119	139
Cites / Doc. (4years)	0,13	-	0,00	0,00	0,00	-	-	-	0,35	0,30	0,44	0,62	0,71	0,79	0,98	0,81
Cites / Doc. (3years)	0,13	-	0,00	0,00	0,00	-	-	-	0,35	0,30	0,44	0,64	0,74	0,90	0,73	0,90
Cites / Doc. (2years)	0,00	-	0,00	0,00	0,00	-	-	-	0,35	0,30	0,33	0,71	0,84	0,59	0,86	0,68
References / Doc.	0,00	-	0,00	0,00	0,00	-	-	-	8,08	11,25	10,43	12,81	12,61	13,63	13,66	17,38
Cited Docs.	2	-	0	0	0	-	-	-	11	24	42	71	72	53	37	56
Uncited Docs.	14	-	10	10	10	-	-	-	57	120	211	226	201	152	107	112
% International Collaboration	0,00	-	0,00	0,00	0,00	-	-	-	6,58	7,34	5,36	1,92	2,44	1,96	2,63	3,67

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 20 shows the ten most cited articles overall in *TechTrends* for the time span of this study (1995-2014). Note that the total number of research papers published in *TechTrends* which were cited 200 or more times during the twenty years were only 3. As can be seen in Table 20, the most cited article overall published in *TechTrends* during the twenty years was "*Computers as mindtools for engaging learners in critical thinking*," by David H. Jonassen,

Chad Carr, and Hsiu-Ping Yueh, published in 1998 and the subject of 556 citations at the time this analysis was completed (January 10-16, 2016).

Table 20

The Ten Most-Cited Articles Published in TechTrends *During the 20 Years*

Cites	Authors	Title	Year
556	DH Jonassen, C Carr, HP Yueh	Computers as mindtools for engaging learners in critical thinking	1998
214	ME Engstrom, D Jewett	Collaborative learning the wiki way	2005
208	OT Murray, NR Olcese	Teaching and learning with iPads, ready or not?	2011
191	S Cox, CR Graham	Using an elaborated model of the TPACK framework to analyze and depict teacher knowledge	2009
190	T Martindale, DA Wiley	Using weblogs in scholarship and teaching	2004
189	RC Graham, N Burgoyne, P Cantrell, L Smith, L St Clair…	Measuring the TPACK confidence of inservice science teachers	2009
188	PR Albion, PA Ertmer	Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology	2002
153	RF Branon, C Essex	Synchronous and asynchronous communication tools in distance education	2001
151	SA Barab, KE Hay, TM Duffy	Grounded constructions and how technology can help	1998
148	GM Johnson	Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research	2006

In Appendix N, the reader can also find a table with the five top-cited articles published in *TechTrends* by year, from 1995 to 2014 (20 years, 100 papers). The years 1998, 2004, and 2005 show the highest number of citations received by the five top-cited articles: 842, 647, and 583, respectively.

6. *Educational Technology and Society*

The Journal of Educational Technology & Society is a quarterly journal (published in January, April, July, and October). *Educational Technology & Society* seeks academic articles on

the issues affecting the developers of educational systems and educators who implement and manage such systems. The articles should discuss the perspectives of both communities and their relation to each other, working from the following premises:

- Educators aim to use technology to enhance individual learning as well as to achieve widespread education and expect the technology to blend with their individual approach to instruction. However, most educators are not fully aware of the benefits that may be obtained by proactively harnessing the available technologies and how they might be able to influence further developments through systematic feedback and suggestions.
- Educational system developers and artificial intelligence (AI) researchers are sometimes unaware of the needs and requirements of typical teachers, with a possible exception of those in the computer science domain. In transferring the notion of a 'user' from the human-computer interaction studies and assigning it to the 'student,' the educator's role as the 'implementer/ manager/user' of the technology has been forgotten.

The aim of the journal is to help the two communities better understand each other's role in the overall process of education and how they may support each other. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to Educational Technology & Society and four months thereafter. *Educational Technology & Society* invites articles with the following themes within the context of learning, education, and training:

- Open Access to Educational Resources and Systems
- Adaptive and Personalized Technology-Enhanced Learning

- Digital Game and Intelligent Toy Enhanced Learning
- Computer Supported Collaborative Learning
- Wireless, Mobile, Pervasive, and Ubiquitous Technologies for Learning
- Technology Enhanced Assessment in Formal and Informal Education
- Big Data in Education and Learning Analytics
- Technology Enhanced Subject Domain Teaching in Compulsory and Post-Compulsory (Formal) Education and Training
- Motivational and Affective Aspects in Technology Enhanced Learning
- Technology Enabled Learning of Thinking and Critical Skills
- Recommended and Expert Systems for Learning
- Technology Supported Education for People with Disabilities
- Technologies for Smart Learning
- Virtual Worlds in Learning, Education, and Training
- Knowledge Management in e-Learning
- Large Scale Implementation of Technology in Education

Table 21 shows the *Journal of Educational Technology & Society* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 21

Journal of Educational Technology & Society *Scientific Indicators*

Journal of Educational Technology and Society																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,143	0,160	0,229	0,257	0,363	0,270	0,222	0,329	0,513	0,462	0,681	0,840	1,237	1,370	0,980	0,919
Total Documents	56	92	55	92	48	56	74	87	85	85	102	83	87	119	141	84
Total Docs. (3years)	10	66	158	203	239	195	196	178	217	246	257	272	270	272	289	347
Total References	751	1.618	846	1.688	935	1.382	2.006	2.475	2.986	3.191	3.333	2.697	3.383	4.605	5.494	3.607
Total Cites (3years)	3	8	41	54	113	88	170	190	310	373	551	632	660	717	741	646
Self Cites (3years)	3	7	12	20	13	10	8	28	32	49	64	37	45	54	86	48
Citable Docs. (3years)	7	52	138	174	214	171	177	166	208	241	251	265	264	264	280	337
Cites / Doc. (4years)	0,43	0,15	0,30	0,30	0,49	0,48	0,92	1,00	1,43	1,70	2,22	2,55	2,64	2,85	2,98	2,10
Cites / Doc. (3years)	0,43	0,15	0,30	0,31	0,53	0,51	0,96	1,14	1,49	1,55	2,20	2,38	2,50	2,72	2,65	1,92
Cites / Doc. (2years)	0,43	0,15	0,31	0,35	0,38	0,47	0,99	1,23	1,28	1,47	1,92	2,13	2,18	2,20	2,29	1,86
References / Doc.	13,41	17,59	15,38	18,35	19,48	24,68	27,11	28,45	35,13	37,54	32,68	32,49	38,89	38,70	38,96	42,94
Cited Docs.	2	6	34	35	70	53	86	84	116	137	179	187	187	200	218	215
Uncited Docs.	8	60	124	168	169	142	110	94	101	109	78	85	83	72	71	132
% International Collaboration	8,93	14,13	10,91	10,87	14,58	12,50	5,41	16,09	12,94	16,47	22,55	24,10	25,29	13,45	19,86	28,57

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 22 shows the ten most cited articles published in the *Journal of Educational Technology & Society* overall for the time span of this study. Please refer to Appendix O, displaying a table of the research papers published in the *Journal of Educational Technology & Society* which were cited 200 or more times during the twenty years (a total of 17 papers). As can be noted from Table 22, the most cited article overall in the twenty years was "*Representing the learning design of units of learning*," by Rob Koper and Bill Oliver, published in 2004 and with 469 citations at the time this analysis was completed (January 10-16, 2016).

Table 22

The Ten Most-Cited Articles Published in the Journal of Educational Technology & Society *Over 17 Years (1998 – 2014)*

Cites	Authors	Title	Year
469	R Koper, B Olivier	Representing the learning design of units of learning	2004
389	M Tam	Constructivism, instructional design, and technology: Implications for transforming distance learning	2000
366	SY Park	An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning	2009
362	K Kreijns, PA Kirschner, W Jochems	The sociability of computer-supported collaborative learning environment	2002
341	GJ Hwang, CC Tsai, SJH Yang	Criteria, strategies and research issues of context-aware ubiquitous learning	2008
336	SH Yang	Using blogs to enhance critical reflection and community of practice	2009
335	SJH Yang	Context aware ubiquitous learning environments for peer-to-peer collaborative learning	2006
322	M Nichols	A theory for eLearning	2003
316	M Virvou, G Katsionis, K Manos	Combining software games with education: Evaluation of its educational effectiveness	2005
302	D Hernández-Leo, ED Villasclaras-Fernández…	COLLAGE: A collaborative Learning Design editor based on patterns	2006

In Appendix P, the reader can also find a table with the five top-cited articles published in the *Journal of Educational Technology & Society* by year, from 1998 to 2014 (17 years, 85 papers). The years 2004, 2005, and 2009 show the highest number of citations received by the five top-cited articles: 1,309, 1,227, and 4,517 respectively.

7. *Computers and Education*

Computers & Education aims to increase knowledge and understanding of ways in which digital technology can enhance education, through the publication of high quality research, which extends theory and practice. The editors welcome research papers on the pedagogical uses of digital technology, where the focus is broad enough to be of interest to a wider education community.

Computers & Education does not publish small-scale evaluations of specific software/systems in specialist domains or particular courses in individual institutions (unless the findings have broader relevance that is explicitly drawn out in the paper). Papers that include discussions of the implementation of software and/or hardware should focus on the context of use, the user/system interface, usability issues, and evaluations of the user experience and impacts on and implications for learning and teaching. *Computers & Education* welcomes review papers that include clear aims (research questions), a framework of analysis, and conclusions that reflect the aims of the paper. (See: http://www.journals.elsevier.com/computers-and-education/).

Table 23 shows the *Computers and Education* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 24 shows the ten most cited articles overall for the time span of this study (1995-2014). Please refer to Appendix Q, displaying a table of the research papers published in *Computers and Education* which were cited 200 or more times during the twenty years (a total of 134 papers). As can be noted from Table 24, the most cited article overall in the twenty years was "*What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction*," by Pei-Chen Sun, Ray J. Tsai, Glenn Finger, Yueh-Yang Chen, and Dowming Yeh, published in 2008 and the subject of the very large number of 1036 citations in only 6 years, at the time this analysis was completed (January 10-16, 2016).

Table 23

Computers and Education *Scientific Indicators*

Computers and Education																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,350	0,418	0,518	0,493	0,668	0,580	0,702	1,096	1,340	1,291	1,366	1,592	2,265	2,770	2,469	2,578
Total Documents	34	43	42	52	56	49	50	58	124	231	211	281	230	246	286	233
Total Docs. (3years)	141	130	133	119	137	150	157	155	157	232	413	566	723	722	757	762
Total References	771	1.083	1.018	1.322	1.185	1.388	1.599	2.000	3.983	9.148	9.333	12.494	11.433	12.544	14.482	13.106
Total Cites (3years)	69	83	103	96	165	163	310	353	425	790	1.657	2.897	3.832	3.965	4.216	3.434
Self Cites (3years)	10	23	15	12	22	29	22	22	47	130	238	533	603	591	585	468
Citable Docs. (3years)	141	130	133	119	135	145	151	150	153	228	409	563	717	716	744	748
Cites / Doc. (4years)	0,49	0,67	0,80	0,74	1,21	1,10	1,99	2,30	2,86	3,53	4,08	5,32	5,45	5,70	5,97	4,87
Cites / Doc. (3years)	0,49	0,64	0,77	0,81	1,22	1,12	2,05	2,35	2,78	3,46	4,05	5,15	5,34	5,54	5,67	4,59
Cites / Doc. (2years)	0,52	0,53	0,82	0,75	1,16	1,22	2,12	1,97	2,65	3,36	3,73	4,98	5,03	4,86	5,16	4,18
References / Doc.	22,68	25,19	24,24	25,42	21,16	28,33	31,98	34,48	32,12	39,60	44,23	44,46	49,71	50,99	50,64	56,25
Cited Docs.	48	48	63	46	77	79	104	99	114	182	341	503	636	643	688	662
Uncited Docs.	93	82	70	73	60	71	53	56	43	50	72	63	87	79	69	100
% International Collaboration	2,94	4,65	4,76	3,85	14,29	8,16	14,00	10,34	7,26	13,85	13,27	13,17	15,22	16,26	17,83	17,17

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 24

The Ten Most-Cited Articles Published in Computers and Education *During the 20 years*

Cites	**Authors**	**Title**	**Year**
1036	PC Sun, RJ Tsai, G Finger, YY Chen, D Yeh	What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction	2008
885	M Sharples	The design of personal mobile technologies for lifelong learning	2000
875	S Ainsworth	The functions of multiple representations	1999
861	WJ Pelgrum	Obstacles to the integration of ICT in education: results from a worldwide educational assessment	2001

(table continues)

Table 24 *(continued).*

Cites	Authors	Title	Year
796	B De Wever, T Schellens, M Valcke, H Van Keer	Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review	2006
692	M Papastergiou	Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation	2009
622	LF Motiwalla	Mobile learning: A framework and evaluation	2007
607	C Romero, S Ventura, E García	Data mining in course management systems: Moodle case study and tutorial	2008
604	C Chou, MC Hsiao	Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case	2000
584	C Evans	The effectiveness of m-learning in the form of podcast revision lectures in higher education	2008

In Appendix R, the reader can also find a table with the five top-cited articles published in the *Journal of Computers and Education* by year, from 1995 to 2014 (20 years, 100 papers). The years 2006, 2007, and 2008 show the highest number of citations received by the five top-cited articles: 2,781, 2,538, and 3,154, respectively.

8. *Journal of Educational Computing Research*

The *Journal of Educational Computing Research* is a truly interdisciplinary, rigorously refereed journal that contains a wealth of information: articles of value and interest to the educator, researcher, and scientist. Articles convey the latest in research reports and critical analyses to both theorists and practitioners. The *Journal of Educational Computing Research* addresses four primary areas of research interest:

- The outcome effects of educational computing applications, featuring findings from a variety of disciplinary perspectives which include the social, behavioral, information, and physical sciences
- The design and development of innovative computer hardware and software for use in educational environments

- The interpretation and implications of research in educational computing fields
- The theoretical and historical foundations of computer-based education.

The term "education" is viewed in its broadest sense by the journal's editors. The use of computer-based technologies at all levels of the formal education system, business and industry, home-schooling, lifelong learning, and unintentional learning environments are examined. "Computing" refers to all forms of computer applications and innovations - both hardware and software. For example, this could range from mobile and ubiquitous computing to immersive 3D simulations and games to computing-enhanced virtual learning environments. Each issue features articles useful for practitioners and theorists alike. The *Journal of Educational Computing Research* provides an international forum for interdisciplinary communication on an increasingly significant subject: research into the applications, effects, and implications of computer-based education. The journal is published in 2 volumes (4 issues each) every calendar year by Sage Publications. Issues are available in print and online. (See: https://us.sagepub.com/en-us/nam/journal-of-educational-computing-research/journal202399).

Table 25 shows the *Journal of Educational Computing Research* scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 26 shows the ten most cited articles overall for the time span of this study (1995-2014). Please refer to Appendix S, displaying a table of the research papers published in the *Journal of Educational Computing Research* which were cited 200 or more times during the twenty years (a total of 17 papers). As can be noted from Table 26, the most cited article overall in the twenty years was "*Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer*

conferencing," by Charlotte N. Gunawardena, Constance A. Lowe, and Terry Anderson, published in 1997 and with the large number of 1492 citations at the time this analysis was completed (January 10-16, 2016).

Table 25

Journal of Educational Computing Research *Scientific Indicators*

Journal of Educational Computing Research																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	0,361	0,231	0,348	0,406	0,319	0,268	0,390	0,407	0,708	0,677	0,422	0,575	0,573	0,581	0,841	0,867
Total Documents	42	46	46	43	48	35	47	43	43	40	46	46	47	35	40	30
Total Docs. (3years)	122	125	127	134	135	137	126	130	125	133	126	129	132	139	128	122
Total References	1.483	1.413	1.699	1.359	1.538	1.211	1.671	1.796	1.785	1.962	2.335	1.989	2.003	1.575	1.747	1.458
Total Cites (3years)	54	37	54	71	68	53	102	112	110	163	135	174	152	144	196	142
Self Cites (3years)	18	11	12	20	19	6	22	7	26	11	21	13	8	4	6	9
Citable Docs. (3years)	122	125	127	134	135	137	124	127	120	130	124	129	132	139	128	121
Cites / Doc. (4years)	0,44	0,43	0,54	0,49	0,58	0,45	0,82	0,84	0,95	1,48	1,32	1,59	1,38	1,21	1,49	1,26
Cites / Doc. (3years)	0,44	0,30	0,43	0,53	0,50	0,39	0,82	0,88	0,92	1,25	1,09	1,35	1,15	1,04	1,53	1,17
Cites / Doc. (2years)	0,30	0,16	0,39	0,43	0,39	0,24	0,89	0,82	0,66	1,06	0,83	0,90	1,00	0,92	1,21	1,04
References / Doc.	35,31	30,72	36,93	31,60	32,04	34,60	35,55	41,77	41,51	49,05	50,76	43,24	42,62	45,00	43,68	48,60
Cited Docs.	43	27	40	47	46	40	57	59	63	71	69	76	69	77	80	66
Uncited Docs.	79	98	87	87	89	97	69	71	62	62	57	53	63	62	48	56
% International Collaboration	0,00	4,35	0,00	4,65	6,25	14,29	4,26	13,95	6,98	30,00	10,87	8,70	10,64	14,29	12,50	26,67

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 26

The Ten Most Cited Articles Published in the Journal of Educational Computing Research *During the 20 Years*

Cites	Authors	Title	Year
1492	CN Gunawardena, CA Lowe and T. Anderson	Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing	1997
610	T Busch	Gender differences in self-efficacy and attitudes toward computers	1995
604	MJ Koehler, P Mishra	What happens when teachers design educational technology? The development of technological pedagogical content knowledge	2005
575	MJ Jacobson, RJ Spiro	Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: An empirical investigation	1995
462	TBQ Li	Cyber-harassment: A study of a new method for an old behavior	2005
385	JJ Vogel, DS Vogel, J Cannon-Bowers…	Computer gaming and interactive simulations for learning: A meta-analysis	2006
352	DL Fabry, JR Higgs	Barriers to the effective use of technology in education: Current status	1997
343	S Cassidy, P Eachus	Developing the computer user self-efficacy (CUSE) scale: Investigating the relationship between computer self-efficacy, gender and experience with computers	2002
329	CM Fletcher-Flinn, B Gravatt	The efficacy of computer assisted instruction (CAI): A meta-analysis	1995
329	K Swan, P Shea, E Fredericksen, A Pickett…	Building knowledge building communities: Consistency, contact and communication in the virtual classroom	2000

In Appendix T, the reader can also find a table with the five top-cited articles published in the *Journal of Educational Computing Research* by year, from 1995 to 2014 (20 years, 100 papers). The years 1995, 1997, and 2005 show the highest number of citations received by the five top-cited articles: 1,895, 2,475, and 1,551, respectively.

9. *Journal of Research on Technology in Education (JRTE) (2001-2014)* – Formerly Known as *Journal of Research on Computing in Education (1995- 2001)*

The *Journal of Research on Technology in Education* (*JRTE*) is the official journal of the International Society for Technology in Education - ISTE. The *Journal of Research on Technology in Education* (*JRTE*) is a premiere source for high-quality peer-reviewed research that defines the state of the art, and future horizons, of learning and teaching with technology in educational environments. *JRTE* publishes original research, literature reviews and syntheses,

and methodological reviews, policy analyses, and theoretical or conceptual positions that relate to the efficacy of instructional uses of educational technology. International in scope, the journal is published quarterly. (See: http://www.tandfonline.com/action/journalInformation ?journalCode=ujrt20#.VsEpePkrJhE)

Table 27 shows the *Journal of Research on Technology in Education* (*JRTE*) scientific indicators found in the Scopus database (SCImago, 2007), used to assess and analyze the scientific domains of the journal.

Table 28 shows the ten most cited articles overall for the time span of this study, from the journal under the name of *Journal of Research on Technology in Education* (2001-2014). Please refer to Appendix U, displaying a table of the research papers published in the *Journal of Research on Technology in Education* (*JRTE*) (2001-2014) which were cited 200 or more times during the time span of the present study (a total of 20 papers). As can be observed in Tables 28 and 29, the two most cited articles overall in the twenty years (during the time the journal changed its name) were from the same first author: Peggy A. Ertmer. Note that this journal changed its name; therefore, the most cited article from this journal under each of its two names were: "*Examining teachers; beliefs about the role of technology in the elementary classroom*," by Peggy A. Ertmer, Addison Paul, Lane Molly, Ross Eva and Woods Denise, published in 1999 in the *Journal of Research on Computing in Education* and the subject of 477 citations; and "*Teacher technology change: How knowledge, confidence, beliefs, and culture intersect,"* by Peggy A. Ertmer and Anne Ottenbreit-Leftwich, published in 2010 in the *Journal of Research on Technology in Education* (*JRTE*) and the subject of 630 citations at the time this analysis was completed (January 10-16, 2016).

Table 27

Journal of Research on Technology in Education (JRTE) *Scientific Indicators*

Journal of Research on Technology in Education																
Indicators	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SJR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,170	0,533
Total Documents	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	4
Total Docs. (3years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	30
Total References	-	-	-	-	-	-	-	-	-	-	-	-	-	-	813	239
Total Cites (3years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	29
Self Cites (3years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0
Citable Docs. (3years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	29
Cites / Doc. (4years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,83	1,00
Cites / Doc. (3years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,83	1,00
Cites / Doc. (2years)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,83	1,00
References / Doc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47,82	59,75
Cited Docs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	16
Uncited Docs.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14
% International Collaboration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,76	0,00

SJR SCImago Journal & Country Rank (see: http://www.scimagojr.com).

Table 28

The Ten Most-Cited Articles Published in the Journal of Research on Technology in Education (JRTE) (2001-2014)

Cites	Authors	Title	Year
630	PA Ertmer, AT Ottenbreit-Leftwich	Teacher technology change: How knowledge, confidence, beliefs, and culture intersect	2010
560	J Harris, P Mishra, M Koehler	Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed	2009
533	DA Schmidt, E Baran, AD Thompson…	Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers	2009
430	R Christensen	Effects of technology integration education on the attitudes of teachers and students	2002
406	WR Penuel	Implementation and effects of one-to-one computing initiatives: A research synthesis	2006
369	RA Vannatta, F Nancy	Teacher dispositions as predictors of classroom technology use	2004
294	RB Kozma	Technology and classroom practices: An international study	2003
290	B Gros	Digital games in education: The design of games-based learning environments	2007
282	RH Kay	Evaluating strategies used to incorporate technology into preservice education: A review of the literature	2006
271	M Liu, Z Moore, L Graham, S Lee	A look at the research on computer-based technology use in second language learning: A review of the literature from 1990–2000	2002

In Appendix V, the reader can also find a table with the five top-cited articles published in the *Journal of Research on Technology in Education* (JRTE) by year, from 2001 to 2014 (14 years, 70 papers). The years 2003, 2006 and 2009 show the highest number of citations received by the five top-cited articles: 1,299, 1,366 and 1,479 respectively.

The first seven years of the time span of this study, this journal's name was Journal of Research on Computing in Education. The analysis revealed 13 papers which had received 200 or more citations and such list can be found in Appendix W.

Table 29

The Ten Most-Cited Articles Published in the Journal of Research on Computing in Education (*Previous Name* Journal of Research on Technology in Education *1995-2001)*

Cites	Authors	Title	Year
477	PA Ertmer, A Paul, L Molly, R Eva…	Examining teachers' beliefs about the role of technology in the elementary classroom	1999
444	ME Pierson	Technology integration practice as a function of pedagogical expertise	2001
435	SL Dexter, RE Anderson, HJ Becker	Teachers' views of computers as catalysts for changes in their teaching practice	1999
400	S Yildirim	Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use	2000
370	HJ Becker, J Ravitz	The influence of computer and Internet use on teachers' pedagogical practices and perceptions	1999
338	DM Poole	Student participation in a discussion-oriented online course: A case study	2000
242	DW Sanders, AI Morrison-Shetlar	Student attitudes toward web-enhanced instruction in an introductory biology course	2001
239	MM Ropp	Exploring individual characteristics associated with learning to use computers in preservice teacher preparation	1999
236	MD Roblyer	Is choice important in distance learning? A study of student motives for taking Internet-based courses at the high school and community college levels	1999
223	D Mioduser, R Nachmias, O Lahav…	Web-based learning environments: Current pedagogical and technological state	2000

In Appendix X, the reader can also find a table with the five top-cited articles published in the *Journal of Research on Computing in Education* (previous name of the *Journal of Research on Technology in Education)* by year, from 1995 to 2002 (8 years, 40 papers). The years 1999, 2000 and 2001 show the highest number of citations received by the five top-cited articles: 1,755, 1,367 and 1,073 respectively.

10. *Educational Technology: The Magazine for Managers of Change in Education*

(See: the front cover inside page of the printed issues.) *Educational Technology: The Magazine for Managers of Change in Education* is a world renowned pioneer periodical in the field of technology in education and training. Published continuously since 1961, and now in its

54th year of distribution in more than one hundred countries worldwide, *Ed Tech* is regarded by many as the most important publication in this field.

Published six times annually, with each issue featuring solid, insightful, provocative, substantial papers written by the leading experts in the field, the magazine offers content that cannot be obtained in other magazines or journals. *Ed Tech* is available only as a print publication. Its contents are carefully and thoughtfully reviewed and edited. *Ed Tech* carries vital professional articles of high merit.

Ed Tech has been one of the leading publications of the field of educational technology since the early 1960s. Its editors have been instrumental in bringing about the very prominence that the term "educational technology" enjoys today in the world. The magazine title itself has been a registered trademark since the 1960s. All-important movements in the field for more than five decades — from programmed learning, to computer-aided instruction, to instructional design, to performance technology, to interactive multimedia instruction, to e-learning, to constructivist learning environments, to the learning sciences, etc. — have been covered at length in the magazine's pages. Many of the leading authors in the field today have come to international prominence via their papers published in this magazine. The contents include the work of more than 50 distinguished, world-renowned contributing editors, who write regularly on all aspects of educational technology.

Findings

Research Question 1.

Which specific journals were cited most frequently during the time period determined for this study (Jan 1995-Dec 2014)?

Journal Metrics –Data collected from http://www.journalmetrics.com/display2.php for the nine journals selected for the study that are indexed, from 1999 to 2014:

- SNIP- *Source Normalized Impact per Paper*
- IPP - *The Impact per Publication*
- SJR - *SCImago Journal Ranks* – Accounts for both, the number of citations received by the journal and the importance or prestige of the journals where such citations come from = average prestige per article.

Table 30.1

Journal Metrics: SNIP, IPP, and SJR

	Educational Technology Research & Development			***Instructional Science***			***Journal of the Learning Sciences***		
	SNIP	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**
Year	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**
	1.198	0.545	0.444	1.03	0.567	0.315	1.792	1.412	1.392
Year	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
	1.506	1.00	0.422	1.091	0.803	0.441	2.346	1.438	1.112
Year	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**
	1.123	0.633	0.50	1.11	0.55	0.645	1.95	1.515	1.646
Year	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
	1.897	0.855	0.515	1.246	0.632	0.475	3.251	1.647	1.383
Year	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**
	1.559	1.00	0.824	0.74	0.534	0.50	2.616	1.838	2.506
Year	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**
	1.891	0.909	0.847	1.021	0.651	0.432	3.495	2.2	1.982
Year	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**
	1.328	0.761	0.60	1.688	1.25	0.773	2.77	2.189	3.16
Year	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**
	1.384	0.908	0.954	1.555	1.561	1.442	3.323	2.73	2.717
Year	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
	2.322	1.198	1.152	1.637	1.607	1.311	3.493	2.667	3.09
Year	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**
	2.336	1.627	1.546	1.568	1.61	1.361	4.677	3.283	4.355
Year	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**
	2.295	1.663	1.09	1.689	1.59	1.184	3.51	2.646	2.221
Year	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**
	1.853	1.644	1.495	1.325	1.276	0.774	2.373	2.022	1.758
Year	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**
	2.108	2.009	1.787	1.422	1.571	1.179	2.239	2.511	2.337
Year	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**
	2.231	1.584	1.205	1.78	1.858	1.623	2.678	2.638	2.344
Year	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**
	2.293	2.288	1.703	1.892	2.103	1.607	3.509	3.521	2.764
Year	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**
	1.752	1.786	1.609	1.294	1.631	1.907	2.468	2.538	2.68

Table 30.2

Journal Metrics: SNIP, IPP, and SJR

	TechTrends			***Journal of Educational Technology and Society***			***Computers & Education***		
	SNIP	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**
Year	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**
	0	0	0.101	0	0	0.143	0.867	0.411	0.35
Year	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
	0	0	0	0	0	0.16	1.028	0.538	0.418
Year	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**
	0	0	0.102	0.595	0.208	0.229	1.197	0.556	0.518
Year	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
	0	0	0.102	0.791	0.27	0.257	1.49	0.639	0.493
Year	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**
	0	0	0.102	0.754	0.335	0.363	1.831	0.911	0.668
Year	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**
	0	0	0	0.677	0.321	0.27	1.783	0.827	0.58
Year	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**
	0	0	0	0.89	0.324	0.222	1.545	0.828	0.702
Year	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**
	0	0	0	1.08	0.494	0.329	2.539	1.347	1.096
Year	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
	0.138	0.189	0.218	1.349	0.67	0.513	2.775	1.595	1.34
Year	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**
	0.432	0.208	0.216	1.52	0.732	0.462	2.913	1.978	1.291
Year	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**
	0.527	0.342	0.231	1.427	1.056	0.681	2.298	2.134	1.366
Year	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**
	0.46	0.331	0.366	1.166	1.072	0.84	2.49	2.637	1.592
Year	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**
	0.704	0.531	0.431	1.609	1.466	1.237	3.127	3.327	2.265
Year	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**
	0.519	0.575	0.432	1.926	1.803	1.37	3.313	3.738	2.77
Year	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**
	0.835	0.536	0.274	1.854	1.7	0.98	3.493	3.917	2.469
Year	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**
	1.301	0.894	0.477	1.528	1.457	0.919	3.247	3.585	2.578

Table 30.3

Journal Metrics: SNIP, IPP, and SJR

	The British Journal of Educational Technology			***Journal of Educational Computing Research***			***Journal of Research on Technology in Education***		
	SNIP	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**	**SNIP**	**IPP**	**SJR**
Year	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**	**1999**
	0.718	0.243	0.259	0.536	0.426	0.361	0	0	0
Year	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**	**2000**
	0.74	0.321	0.278	0.428	0.232	0.231	0	0	0
Year	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**	**2001**
	1.251	0.563	0.463	0.436	0.362	0.348	0	0	0
Year	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
	1.255	0.346	0.214	0.728	0.5	0.406	0	0	0
Year	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**	**2003**
	1.093	0.312	0.366	0.651	0.415	0.319	0	0	0
Year	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**	**2004**
	1.618	0.425	0.409	0.542	0.299	0.268	0	0	0
Year	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**	**2005**
	1.171	0.593	0.633	0.691	0.476	0.39	0	0	0
Year	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**	**2006**
	1.252	0.615	0.482	0.767	0.528	0.407	0	0	0
Year	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**	**2007**
	1.613	0.792	0.733	0.934	0.617	0.708	0	0	0
Year	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**	**2008**
	1.715	1.114	1.11	0.819	0.723	0.677	0	0	0
Year	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**	**2009**
	1.653	1.105	0.735	0.863	0.639	0.422	0	0	0
Year	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**	**2010**
	1.976	1.445	1.151	0.901	0.808	0.575	0	0	0
Year	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**	**2011**
	2.245	1.989	1.595	0.734	0.634	0.573	0	0	0
Year	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**	**2012**
	1.741	1.976	1.801	0.752	0.711	0.581	0	0	0
Year	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**	**2013**
	1.889	2.035	1.501	1.036	1.086	0.841	0.067	0.167	0.17
Year	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**	**2014**
	1.735	1.813	1.51	0.995	1.017	0.867	1.194	0.828	0.533

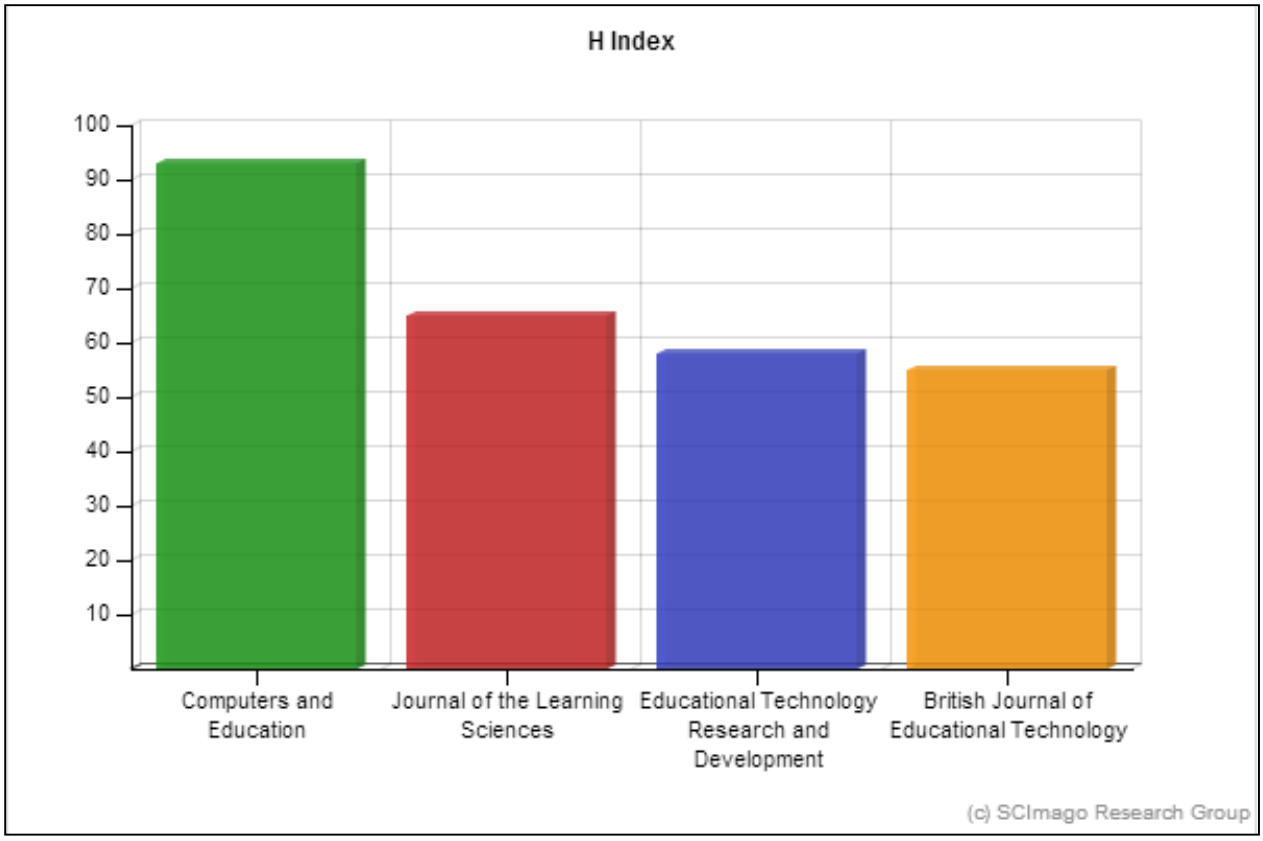


Figure 4. h-Index Graph: *Computers and Education, Journal of the Learning Sciences, Educational Technology Research and Development, British Journal of Educational Technology.*

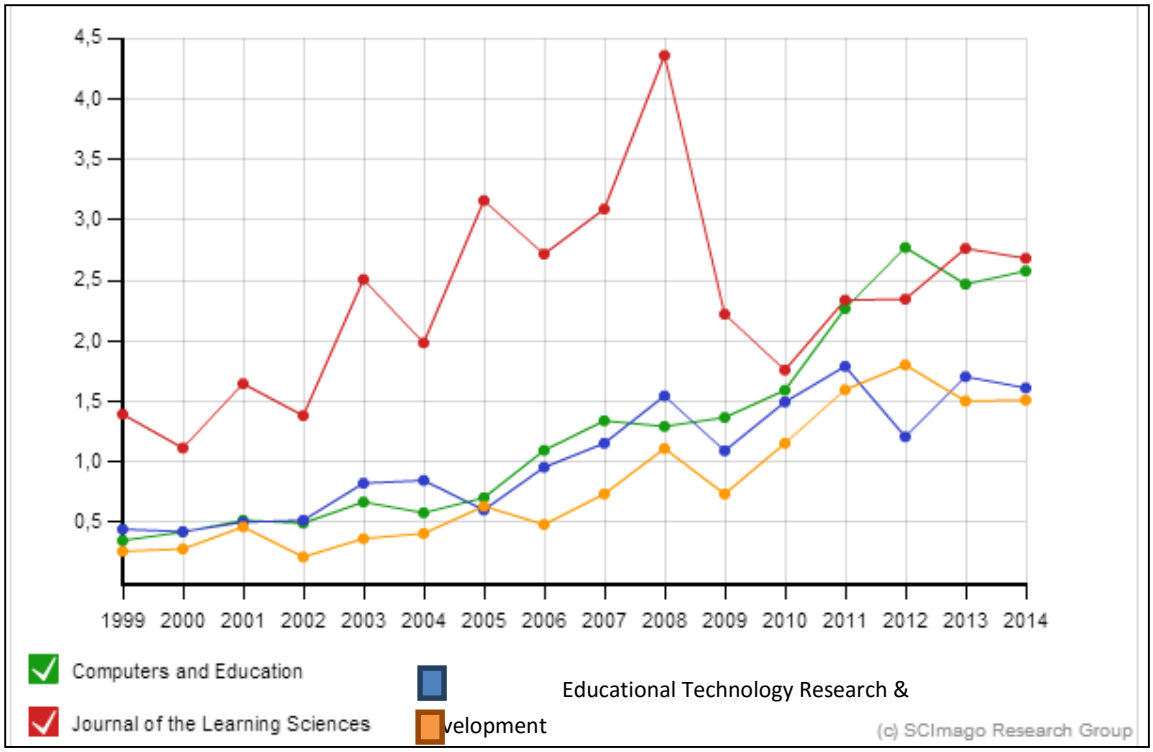


Figure 5. SJR Graph: *Computers and Education, Journal of the Learning Sciences, Educational Technology Research and Development, British Journal of Educational Technology.*

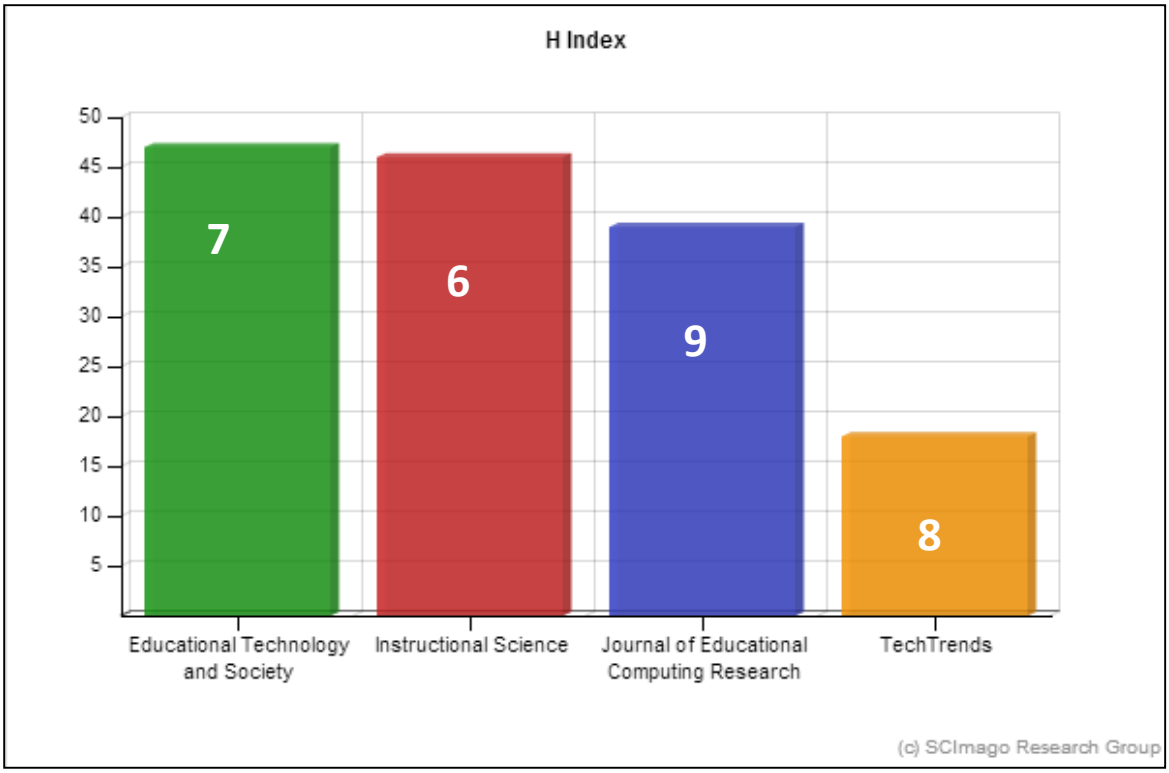


Figure 6. h-Index Graph: *Educational Technology and Society, Instructional Science, Journal of Educational Computing Research, Tech Trends*

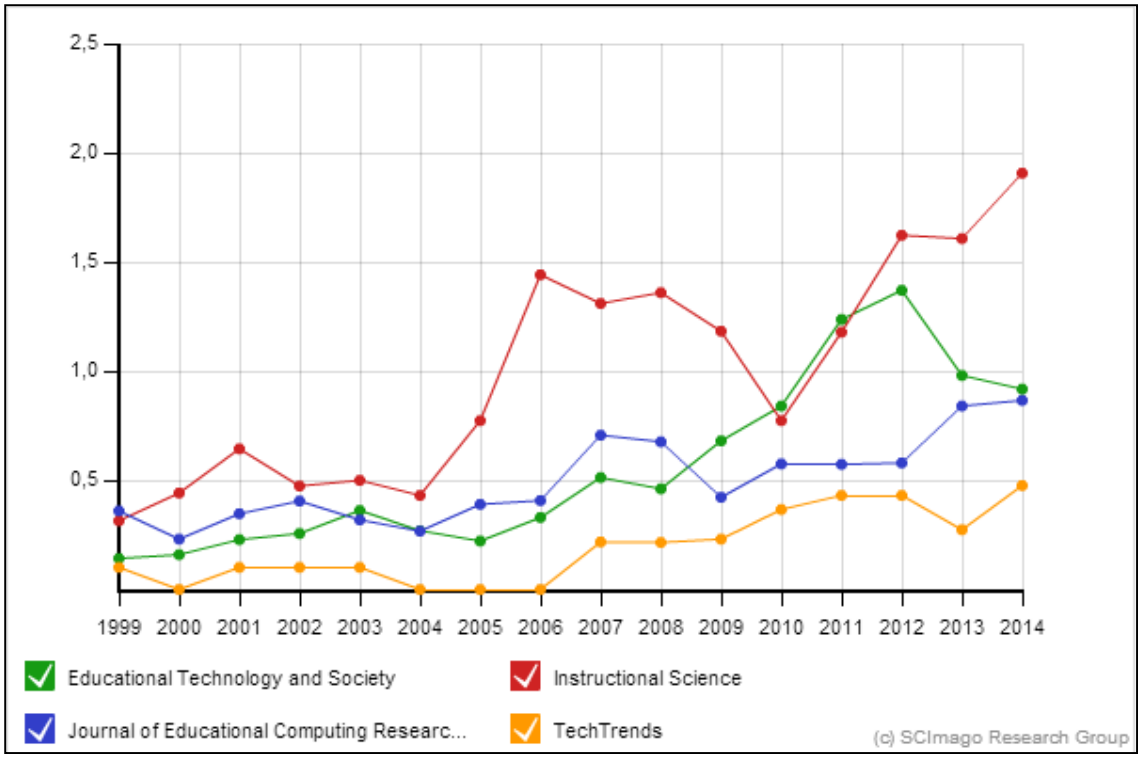


Figure 7. SJR Graph: *Educational Technology and Society, Instructional Science, Journal of Educational Computing Research, Tech Trends.*

Research Question 2

> *What specific research articles were cited more frequently overall in each journal during the last twenty years (Jan 1995-Dec 2014)?*

Table 31

Most-Cited Research Articles in Each Journal, Published from 1995 to 2014

Journal	Total High-cited papers	Author(s)	Article Title	Total Citations	Year first Published
British Journal of Educational Technology BJET	38	Sue Bennett, Karl Maton, and Lisa Kervin	The 'digital natives' debate: A critical review of the evidence	**1951**	2008 (6 years)
Journal of the Learning Sciences	53	Brigitte Jordan and Austin Henderson	"Interaction analysis: Foundations and practice"	**1819**	1995 (19 years)
Educational Technology Research & Development ETR&D	64	Peggy A. Ertmer	Teacher pedagogical beliefs: The final frontier in our quest for technology integration?	**1433**	2005 (9 years)
Instructional Science	25	Noriko Hara, Curtis Jay Bonk, and Charoula Angeli	Content analysis of online discussion in an applied educational psychology course	**1063**	2000 (14 years)
TechTrends	3	David H. Jonassen, Chad Carr, and Hsiu-Ping Yueh	Computers as mindtools for engaging learners in critical thinking	**556**	1998 (16 years)
Journal of Educational Technology and Society	17	Rob Koper and Bill Oliver	Representing the learning design of units of learning	**469**	2004 (10 years)
Computers and Education	134	Pei-Chen Sun, Ray J. Tsai, Glenn Finger, Yueh-Yang Chen, and Dowming Yeh	What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction	**1036**	2008 (6 years)
Journal of Educational Computing Research	17	Charlotte N. Gunawardena, Constance A. Lowe, and Terry Anderson	Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing	**1492**	1997 (17 years)
Journal of Research on Technology in Education	19	PA Ertmer, AT Ottenbreit-Leftwich	Teacher technology change: How knowledge, confidence, beliefs, and culture intersect	**630**	2010 (4 years)

Research Question 3

Who has published research papers in Educational Technology in multiple of these ten journals during the past 20 years (Jan 1995-Dec 2014)?

Table 32

Authors Who Have Published High-Loaded Research Articles in Multiple of these Ten Journals

Author's Name	Total	BJET	CE	ETRD	IS	JECR	JETS	JLS	JRTE	TETR	Total
Jonassen, David H.	8			ETRD, ETRD, ETRD, ETRD, ETRD					JRTE	TETR	**8**
Angeli, Charoula	3	BJET	CE		IS						**3**
Azevedo, Roger	4			ETRD	IS	JECR, JECR					**4**
Barab, Sasha A.	5			ETRD, ETRD, ETRD				JLS, JLS			**5**
Barron, Brigid	3							JLS, JLS, JLS			**3**
Brush, Thomas A.	3		CE	ETRD, ETRD							**3**
Dickey, Michele D.	3	BJET		ETRD, ETRD							**3**
Ertmer, Peggy A.	7		CE	ETRD, ETRD	IS				JRTE, JRTE, JRTE		**7**
Hannafin, Michael J.	6			ETRD, ETRD, ETRD, ETRD, ETRD	IS						**6**
Hmelo-Silver, Cindy E.	4		CE	ETRD				JLS, JLS			**4**
Hwang, Gwo-Jen	4		CE, CE, CE				JETS				**4**
Jochems, Wim M. G.	3		CE, CE				JETS				**3**
Kirschner, Paul A.	3			ETRD, ETRD			JETS				**3**
Koehler, Matthew J.	4		CE			JECR			JRTE, JRTE		**4**
Krajcik, Joseph	4							JLS, JLS JLS, JLS			**4**
Land, Susan M.	6			ETRD, ETRD, ETRD, ETRD, ETRD	IS						**6**
Mishra, Punya	4		CE			JECR			JRTE, JRTE		**4**
Pea, Roy D.	4							JLS, JLS JLS, JLS			**4**
Resnick, Mitchel	4			ETRD				JLS, JLS, JLS			**4**

(table continues)

Table 32 *(continued).*

Author's Name	Total	BJET	CE	ETRD	IS	JECR	JETS	JLS	JRTE	TETR	Total
Soloway, Elliot	4							JLS, JLS, JLS	JRTE		**4**
Squire, Kurt D.	5			ETRD, ETRD				JLS, JLS, JLS			**5**
Tondeur, Jo	3		CE, CE, CE								**3**
Tsai, Chin-Chung	3		CE		IS		JETS				**3**
Valcke, Martin	5		CE,CE, CE,CE CE								**5**
van Merrienboer, Jeroen J G	3			ETRD, ETRD, ETRD							**3**
Yang, Stephen J. H.	3		CE				JETS, JETS				**3**

Note: The authors whose article totals are highlighted in yellow published the total number of their highly cited articles in only one of the journals.

Table 33

Total Number of Authors with the Highest HIP Index (High-Impact-Paper Count)

Total HIP Articles	HIP-Index
8	1
7	1
6	2
5	3
4	9
3	10
2	76
1	646
Grand Total	**748**

Table 34

Authors' Names with the Highest HIP Index (High-Impact-Paper Count)

Author's Name		Author's Name	
Jonassen, David H.	8	Pea, Roy D.	4
Ertmer, Peggy A.	7	Resnick, Mitchel	4
Hannafin, Michael J.	6	Soloway, Elliot	4
Land, Susan M.	6	Angeli, Charoula	3
Barab, Sasha A.	5	Barron, Brigid	3
Squire, Kurt D.	5	Brush, Thomas A.	3
Valcke, Martin	5	Dickey, Michele D.	3
Azevedo, Roger	4	Jochems, Wim M. G.	3
Hmelo-Silver, Cindy E.	4	Kirschner, Paul A.	3
Hwang, Gwo-Jen	4	Tondeur, Jo	3
Koehler, Matthew J.	4	Tsai, Chin-Chung	3
Krajcik, Joseph	4	van Merrienboer, Jeroen J G	3
Mishra, Punya	4	Yang, Stephen J. H.	3

CHAPTER 5

SUMMARY AND DISCUSSION

Research Questions

The research questions for this study are the following:

Who has published research papers in Educational Technology in multiple of these ten journals during the past 20 years (Jan 1995-Dec2014)?

What trends in Educational Technology research areas have these top ten journals followed in their publications during the past 20 years (Jan 1995-Dec2014)?

Research Topics and Trends in Educational Technology

As mentioned earlier, three different sources for each of the 22 factors were examined: the list of high-loaded terms revealed by the LSA and SVD analysis, WordMaps created from the top 25 of the high-loaded articles, and WordMaps created from the titles of those articles. Tables 6, 7, and 8 list the high-loaded terms identified by the LSA analysis executed for each of the 22 factors. The topics generated by the 22-factor solution and the total numbers of published articles addressing each of the research topics are shown in Table 35.

Table 35

Factor Labels (22 Factors)

Factor	Label	Article Count
F22.1	Learning and Instruction	1786
F22.2	Student learning	1369
F22.3	Learning Systems and Tools	714
F22.4	Learning Experiences	585
F22.5	Faculty Training and Adult Education	563
F22.6	Online Learning	520
F22.7	Teacher Preparation and Professional Development	435
F22.8	Learning Environments	352
F22.9	Distance Education	318
F22.10	Game-based Learning	308
F22.11	The Internet and Digital Literacy	400
F22.12	Professional Meetings and Associations	217
F22.13	Mobile Learning	225
F22.14	Problem-solving	266
F22.15	Assessment and Feedback	275
F22.16	Childhood Education	261
F22.17	Learning with Multimedia	268
F22.18	ICT in Learning & Instruction	225
F22.19	Experiential Learning	186
F22.20	Reading Comprehension	310
F22.21	Virtual Environments	246
F22.22	Concept mapping	151

Learning technology trends

The high-loading articles are defined as articles whose loading exceeds a certain threshold (Evangelopoulos, 2013). For this study, the threshold was the articles which had been cited 200 or more times. The time series plots shown in Figure 8 display the percentage of all articles published in the ten journals, for each of the 22 topics, per year, between 1995 and 2014 (20 years). The first chart in Figure 8, F22.1 shows that the research topic *Learning and Instruction*, including papers that address research, educational systems, knowledge, design, educational theories and technology, has been consistently studied and reported on in publications during the last 20 years.

Studies on issues in the research topic of *Teacher Preparation and Professional Development,* shown in F22.7, such as pre-service, in-service, integration, TPACK, and development, have remained relatively steady in number over the course of the study period after peaking at the beginning of 2000. Similarly, publications in the research topic of *Learning Systems and Tools*, F22.3, which include papers on web-based learning, authoring, adaptive technologies, resources and systems, have remained fairly stable in number since the end of 1999 and beginning of 2000.

The time series plots F22.2, F22.13, and F22.20, however, tell a quite different story. Interest from a research perspective in the research topic of *Student Learning,* F22.2, increased dramatically after a steady period from 1995 to 2005 and appears to keep rising. The research topic of *Mobile Learning*, F22.13, shows a similar trend; however, it started with very few publications, and that trend was quite steady from 1995 to 2003; then an intense proliferation of publications led to an increasing trend that has continued since then. The research topic of *Reading Comprehension*, F22.20, with studies about students' performance, EFL, storybooks, and reading and listening skills, shows a fast increase from 1995 to 2001, then a slight decrease until the end of 2003 and since then, a stable rise.

Probably the most dramatic change in all the 22 time series plots can be observed in F22.10, on the research topic of *Game-Based Learning.* Research and publications on the utilization and effect of games and digital tools in teaching, learning, and training were very few (0.5%) during the first nine years of this study (1995-2004); then there was an extraordinarily high rise in interest in the field of educational technology beginning in 2004 and continuing up to 2012, when a peak of interest at 7% was reached, after which that momentum started to diminish in 2014. A similar trend, but not as dramatic, is revealed in F22.4, on the research topic of

Learning Experiences. Issues addressed in publications in that research topic include students' perceptions, intentions, attitudes, acceptance, and self-efficacy about technology's influence and usefulness. We can see a relatively balanced number of publications on these topics from 1995 to 2005 and then a very rapid increase until 2012, when the interest seems to have started to decline.

The research topic of *Learning Environments*, F22.8, including publications on e-learning, web-based strategies, and personalized and self-regulated learning, does not show a steady pace of publication during a period of time like those of *Game-based Learning* and *Learning Experiences*. F22.8 graph shows, instead, a consistent rise from 1996 to 2012, when the publication of papers started to decelerate.

Nearly the same pattern is presented for the research topic of *Concept Mapping*, F22.22, including articles of knowledge, strategy, collaborative approach, computer-supported education, and analysis. There was a trend of steadily increasing numbers of publications from 1995 till 2012, and from then to the end of 2014 a decrease in popularity became the trend.

Three of the time series plots present a similar pattern: studies on issues associated with *Faculty Training and Adult Education*, F22.5, such as online programs, instructional design, distance learning, and technology development programs; *Distance Education*, F22.9, such as online courses, learner-centered techniques, and educational technology; and *The Internet and Digital Literacy*, F22.11, such as web learning, technology information and resources, and students' attitudes towards online learning. These three research topics reveal in their graphs a steadily declining trend in the number of research papers published during the last 20 years. The research topic of *Faculty Training and Adult Education*, F22.5, had its peak year in 2003, reaching 12% of the published articles in educational technology; then, from 2003 to 2010, its

percentage dropped to 2%, where it has remained for the last 4 years. *Distance Education*, F22.9, had its peak at the end of 2001, reaching 7%; from then to the end of 2014, the percentage dropped to 1%. The peak for the research topic of *The Internet and Digital Literacy*, F22.11, was at the end of 1996 and beginning of 1997, when it had almost 10%; then its percentage diminished, reaching 2% at the end of 2014.

F22.12 shows a unique trend, different from all the others. Interest in the research topic of *Professional Meetings and Associations*, including issues such as educational conventions, conferences, national and international associations, leadership, divisions, intern opportunities, and life-long learning, started increasing around 2000, and then a dramatic increase in popularity took place from 2002 to 2006 (from 3% to 8%); then the popularity suddenly and dramatically decreased from 2006 to 2009 (falling from 8% to 3%) and has continued dropping during the last four years to almost 0% of published articles.

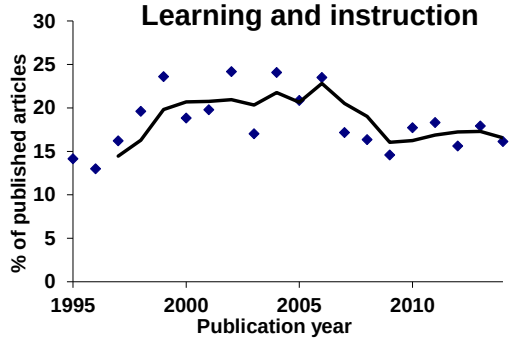
After peaking in the early 1996, 1997, the number of published studies in the research topic of *Experiential Learning*, F22.19, covering topics like multimedia, management, project-based instruction, software, team development, and interactive learning, declined to where they had started, at 1.5%, and have remained steady since then between 1 and 2%. Trends for studies in the research topic of *Childhood Education*, F22.16, addressing issues such as the early use of technology and the Internet, children's attitudes towards learning, literacy intervention, and parents involvement, follow a similar pattern, starting at approximately 3.5%, then dropping to 1.5%; since then, the number of published articles has been relatively constant, between 1.5% and 2.5%.

Studies in the research topic of *Learning with Multimedia*, F22.17, surged in early 1995 to 3.5% with publications related to multimedia presentations, design, and delivery, and showed

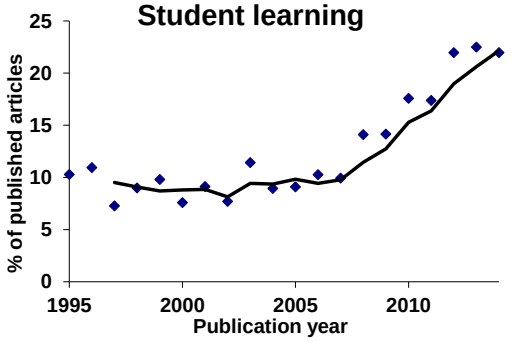
a drop during the first five years (1995-2000) but have largely maintained the momentum between 2 and 3% for the last 15 years. However, the research topic of *Online Learning,* F22.6, with research studies and publications on issues like asynchronous and face-to-face instruction, collaborative learning, online discussion, and social participation; and that of *ICT in Learning & Instruction*, F22.18, with issues associated with technology integration, student and teacher education, and information and communication technology skills and usage, started with very few research publications and suddenly exhibited a rapid increase in interest which has steadily waxed.

Articles published in the research topic of *Problem Solving*, F22.14, which include papers on complex, ill-structured and well-structured, problems solving strategies, as well as on learning systems, have remained relatively steady, with a slight upward momentum during the last five years of the study period. The research topic of *Virtual Environments*, F22.21, including topics like learning environments, simulations, research, virtual worlds, communication and collaboration, and immersive and interactive learning, maintained a solid interest from 1996 to 2005, when publications on these topics quickly gained preference from 2005 to 2010. However, the results indicate that this research topic has been losing attention during the last three years.

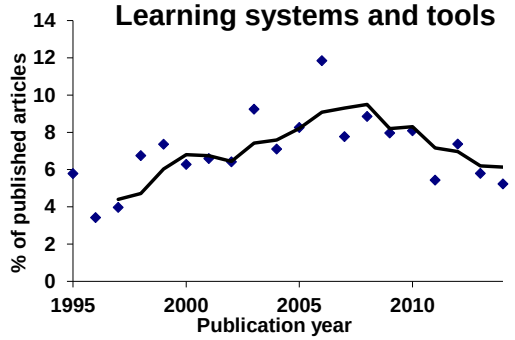
F22.1 (1,786 articles)



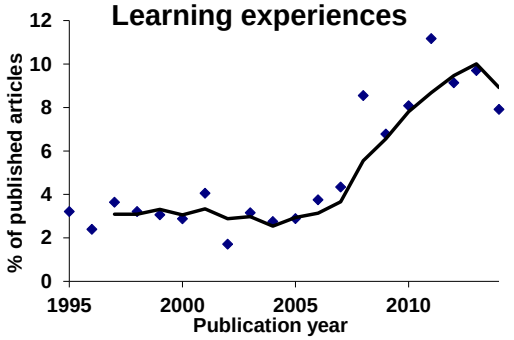
F22.2 (1,369 articles)



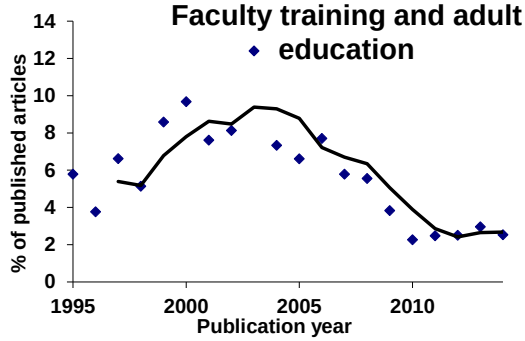
F22.3 (714 articles)



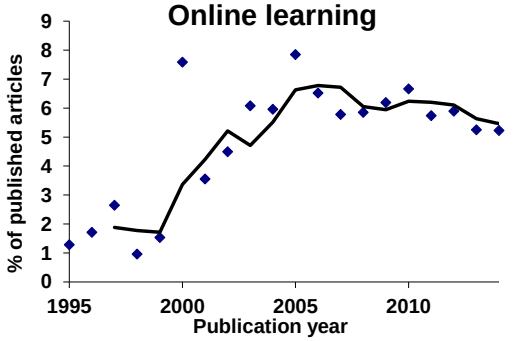
F22.4 (585 articles)



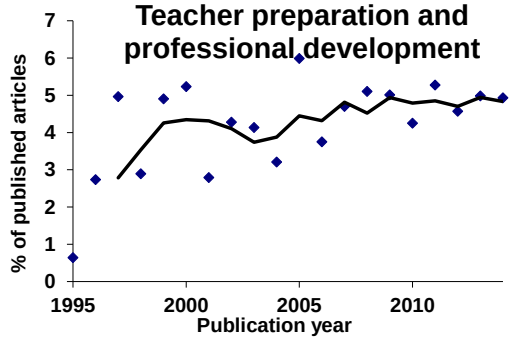
F22.5 (563 articles)



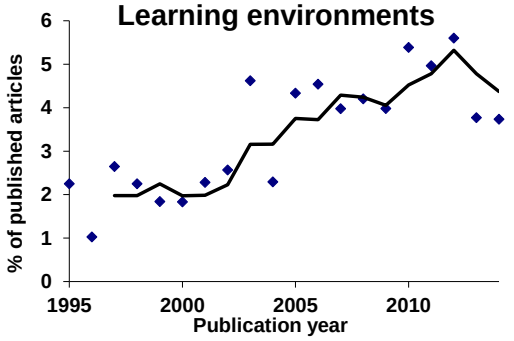
F22.6 (520 articles)



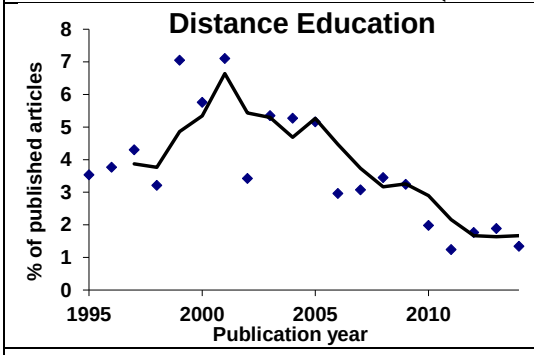
F22.7 (435 articles)



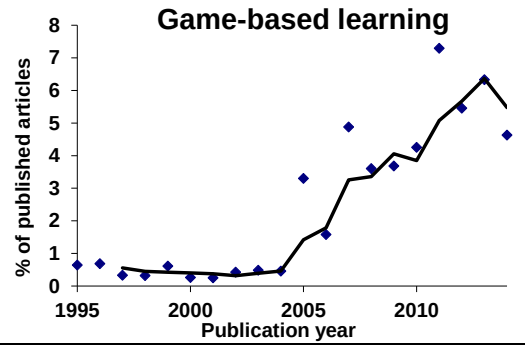
F22.8 (352 articles)



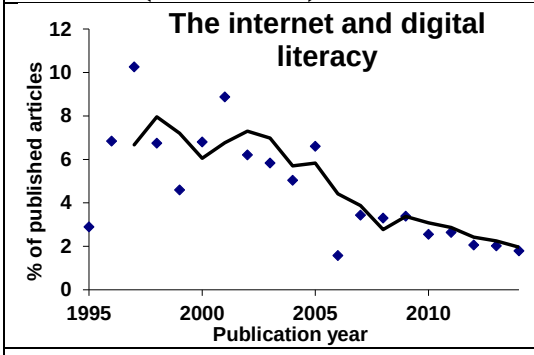
F22.9 (318 articles)



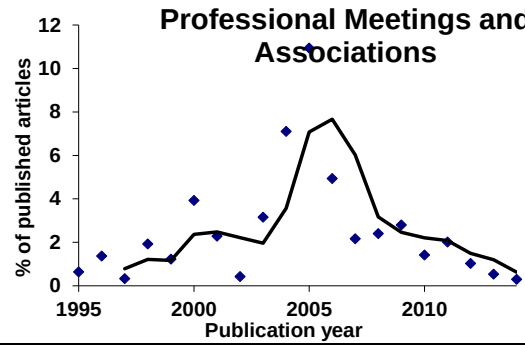
F22.10 (308 articles)



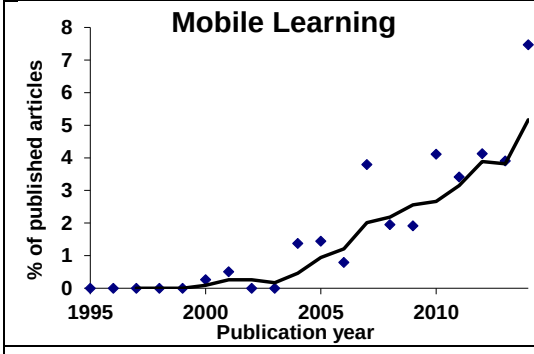
F22.11 (400 articles)



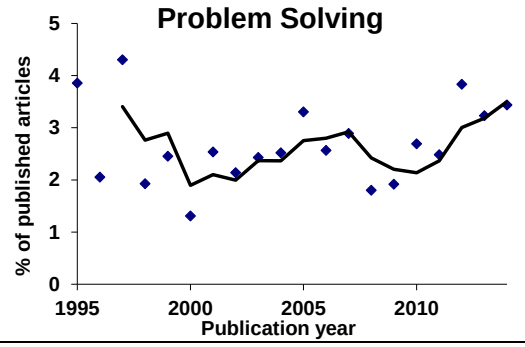
F22.12 (217 articles)



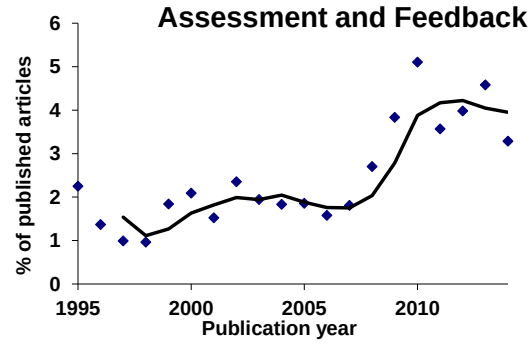
F22.13 (225 articles)



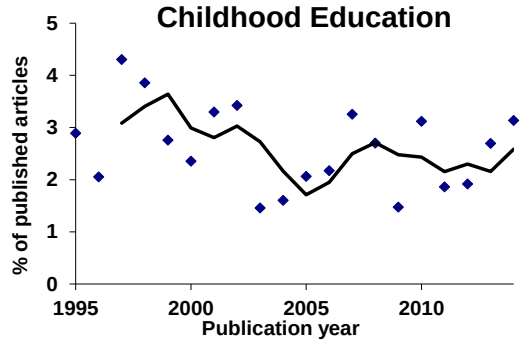
F22.14 (266 articles)



F22.15 (275 articles)



F22.16 (261 articles)



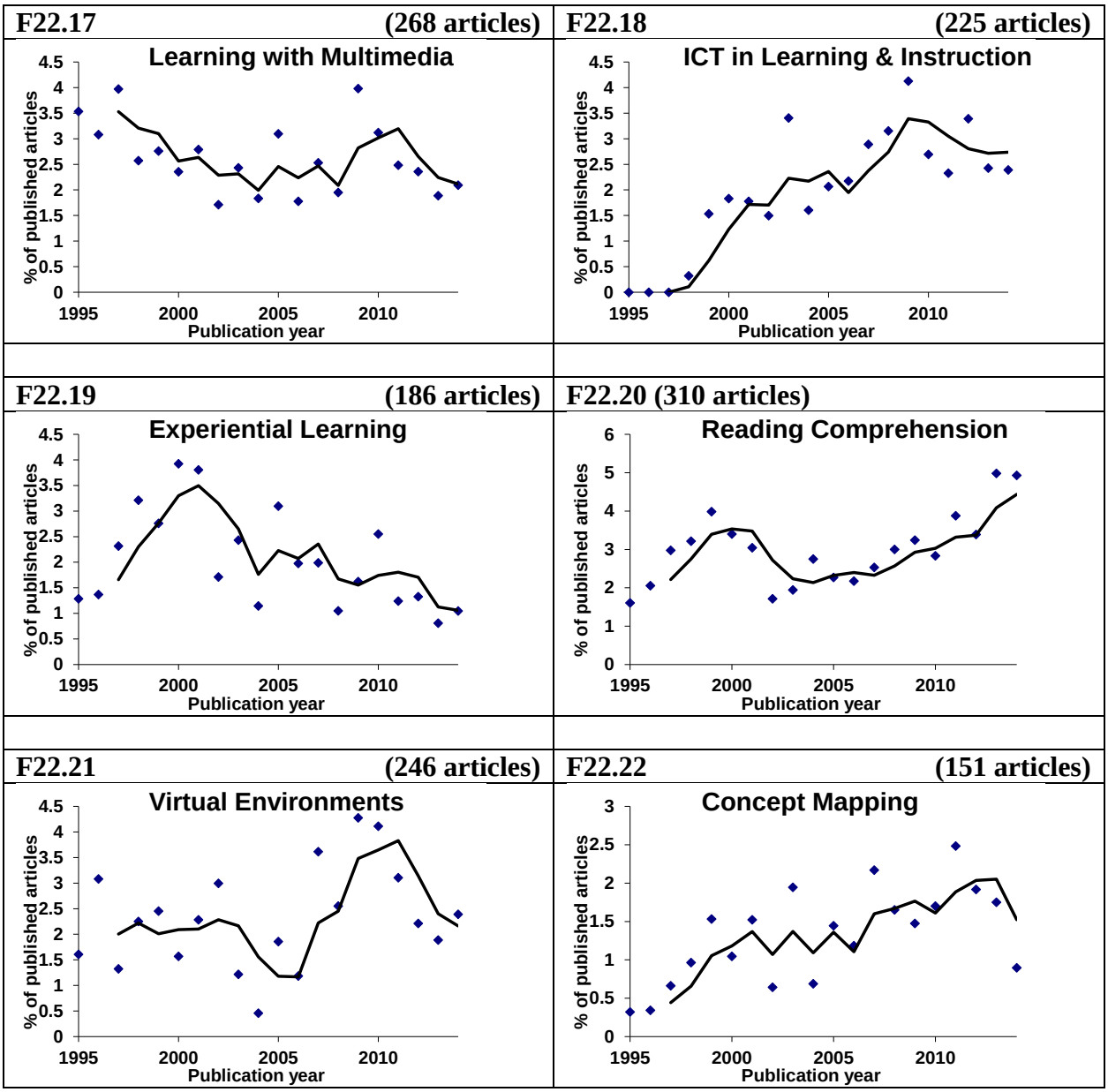


Figure 8. Time Series Plots: Percentage of all articles published per year in the ten journals, for each of the 22 topics.

Discussion

This descriptive, exploratory study has analyzed the published research articles from ten of the top journals in the Educational Technology field: 1) *Educational Technology Research*

and Development (ETR&D); 2) *Instructional Science*; 3) *Journal of the Learning Sciences*; 4) *TechTrends*; 5) *Educational Technology: The Magazine for Managers of Change in Education*; 6) *Journal of Educational Technology & Society*; 7) *Computers and Education*; 8) *British Journal of Educational Technology (BJET)*; 9) *Journal of Educational Computing Research*; 10) *Journal of Research on Technology in Education*, over a period of twenty years (Jan 1995 – Dec 2014).

During the last decades, the exponential growth of technology usage in education has influenced the focus and importance of educational technology research. Educational communication and technology researchers' work has had a vital impact not only on learners but also on all educational technology stakeholders, including instructors, designers, and development specialists and funding agencies.

We recognize the need to promote and ensure a continuing conversation in the dynamic and diverse system of scholarly communication for which researchers and scholars provide the focus and the purpose and consider it reasonable to look at persistent trends and technologies that might have a positive impact on learning. The researcher took the approach of examining what educational technology scholars had been publishing by means of analyzing the published research articles in the multidisciplinary domain of educational technology, to better understand where the discipline has been, where it is now, and where it may be headed.

Based on the analysis, I conclude that all the ten journals have attracted widespread international contributors and that all of the ten journals have significant status within the educational technology field.

Topic areas and the trends they have followed during the time covered in this study have been reported, as well as the most cited articles, the most frequently cited authors in each journal,

and the scholars who have published in multiple of the journals analyzed. The topic analysis identified the high-loaded terms that define the major elements of the intellectual structure in the field of educational technology.

Overall, this study unveils several interesting findings that help us understand the major conversations in the field. First, the results strongly emphasize learning environments that integrate technology (e.g. technology related issues, distance education, communication strategies and instructional methods, and learning experiences). The development of teachers, who will then teach children, has been frequently studied in these ten journals; an important challenge to fulfill the needs of today's students. Teachers development has also been researched and considered vital by the more than 400 technology professionals, campus technologists, faculty leaders from colleges and universities, and representatives of leading corporations from around the world who explore and forecast the impact of emerging technologies across all learning sectors, as shown in Table 2, emerging technologies and the challenges to adopt them from the Horizon Reports from the last 10 years (2004-2014).

It could be assumed that scholars are reacting to the tremendous developments in the last decades in the area of computer technologies, but the heightened interest in this area might also reflect researchers and practitioners' wish to have as much influence as possible on proactively developing the systems, models, pedagogies, policies, and technologies so as to improve the learning process in the 21st century.

These findings are interesting when compared to those of previous studies and in light of the technology trends reported in the New Media Consortium's Horizon Reports.

The researcher found these journals to be full of relevant and insightful articles for our field and hopes that the findings of this study will be of great interest to the broader community of educational technologists in general.

The conclusions from this exploratory and descriptive study will inform researchers, practitioners and stakeholders about trends that will lead to initiatives for special issues, which will disseminate findings on important and emerging phenomena.

Recommendations for Further Research

Future research could improve upon this study by targeting and analyzing sub-disciplines within the field; for example, it may be interesting to carry out a similar analysis of these ten top journals in relation to technology integration issues, distance education, or training and development.

Comparing the findings of a similar analysis of the New Media Consortium's Horizon Reports on Higher Education since 2002 with regard to trends and emerging technologies with the findings of this study would be very valuable.

As mentioned before, this research has limitations in relation to the journals chosen for this study. Other journals, e.g. those aimed at special audiences, practitioners, and broader audiences, including second tier journals, might provide different answers to questions of who, what, where, and when in educational technology publications, and finding similarities and differences could expand and develop the outcomes of the present study. Also, a study comparing information on reputable Websites reporting trends as well as other less rigorous sources with these findings could unveil information about what is being studied, researched, and published in a much wider range.

A deeper analysis of the content of papers could be conducted as a complimentary effort because one weakness of LSA is that it does not provide an in-depth analysis of a paper or text. To further explore and elaborate specific areas, complimentary studies could be carried out using such methods as Watson analytics (http://www.ibm.com/analytics/watson-analytics/).

Another area worthy of further investigation would be a careful examination of the possible reasons why most of the journals included in the present study had one of their top-cited articles published in 2004 or 2005 (see Table 36); and even to scrutinize whether there is a correlation with what might have happened in the specific years where more than one of the ten journals analyzed in this study showed the same or similar changes in the trends recognized in relation to the 22 concepts that arose from the present analysis.

Table 36

The Three Years that Received the Highest Number of Citations for the Five Top-Cited Articles Published in Each of the Journals

Journal	Year Number of Citations	Year Number of Citations	Year Number of Citations
British Journal of Educational Technology (BJET)	2005 1,627	2008 2,960	2009 1,656
Journal of the Learning Sciences (JLS)	2000 1,882	2003 2,308	2004 4,517
Educational Technology Research and Development	1999 2,991	2000 3,076	2005 3,779
Instructional Science	1998 2,197	2000 1,691	2004 1,670
TechTrends	1998 842	2004 647	2005 583
Journal of Educational Technology and Society	2004 1,309	2005 1,227	2009 4,517
Computers and Education	2006 2,781	2007 2,538	2008 3,154
Journal of Educational Computing Research	1995 1,895	1997 2,475	2005 1,551
Journal of Research on Technology in Education	2003 1,299	2006 1,366	2009 1479

It might also be worthwhile to carry out a study with the objective to identify the hypes (where there are hypes) of the maturity and adoption of the technologies and their applications researched and published in the educational technology field and how they have been and/or can be in theory relevant to solving problems and finding new opportunities in education. The Gartner Hype Cycle methodology can provide an interpretation of how a technology or application will evolve over time (see: http://www.gartner.com/technology/research/methodologies/hype-cycle.jsp).

This exploratory study may be considered the tip of a fascinating iceberg: the small and perceptible but significant part of the "who, what, where, and when" in educational technology publications, of a much larger and more complex amount of data that remains hidden, inviting and seducing researchers to unveil its accumulated treasures.

APPENDIX A

IRB

IRB Number: 15-291

Supervising Investigator: Dr. Michael Spector

Student Investigator: Gloria Natividad

Title of Project: Grants and Publications in Educational Technology

According to our IRB's interpretation of the federal regulations that define scientific "human subjects research" for the purpose of defining IRB jurisdiction (see below), this project, as described, does not fall under the purview of IRB, and therefore requires no IRB review or approval.

The role of the UNT Institutional Review Board is to review proposed "research" with "human subjects" as those terms are defined in the federal IRS regulations, 45 CFR 46:

Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes.

Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains:

(1) data through intervention or interaction with the individual, or

(2) identifiable private information.

Intervention includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. *Interaction* includes communication or interpersonal contact between investigator and subject. *Private information* includes information about behavior that occurs in

a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may readily be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

The UNT IRB has reviewed your application and has determined that this study, as described, does not fall within the scope of the "human subject" definition.

Accordingly, no further review or approval by the UNT IRB is needed for this study to proceed as presented. Because the current project was not deemed human subjects research according to the above criteria, any representation of the project to individuals cannot be characterized as approved by the UNT IRB. This includes but is not limited to consent forms.

If the data collection changes, please complete a new IRB application. IRB forms can be found at: http://research.unt.edu/faculty-resources/research-integrity-and-compliance/use-of-humans-in-research. For future reference, if you submit an IRB application involving human subjects in research, please provide a copy of your NIH or CITI human ethics training completion certificate.

I wish you the best in your project.

Chad R. Trulson, Ph .D.
Chair, UNT IRB

Shelia Bourns
Research Compliance Analyst
University of North Texas
940-565-2018
Fax 940-565-4277
shelia.bourns@unt.edu

APPENDIX B

31 EXTRA TERMS ADDED TO THE STANDARD ENGLISH “STOPLIST”

Extra terms

aim
article
author
authors
describes
discuss
discusses
examine
examined
examines
explore
explored
explores
focus
goal
investigate
investigated
investigates
paper
present
presents
previous
previously
purpose
recent
recently
reports
research
study
writer
writers

Justification:

The…	aim		of the…	article
	focus			paper
	goal			study
	purpose			

The…	author	describes
	authors	discuss
	writer	discusses
	writers	examine
	article	examined
	paper	examines
	study	explore
		explored
		explores
		investigate
		investigated
		investigates
		present
		presents

APPENDIX C

LIST OF THE HIGH-LOADING TERMS FOR THE 3 FACTOR SOLUTION

F3.1	F3.2	F3.3
learn	student	ict
student	learn	profession
environ	sttitud	commun
collabor	test	project
learner	group	internet
approach	perform	school
process	signific	universe
propos	game	integr
system	particip	practice
theori	achiev	student
model	control	resourc
problem	score	train
support	indic	inform
activ	assess	classroom
object	class	issu
context	read	faculty
cognit	result	teach
knowledg	grade	teacher
tool	level	program
teamwork	signigicanti	distanc
mobil	differ	year
interac	experiment	web
adapt	show	access
social	comput	culture
content	effect	develop

APPENDIX D

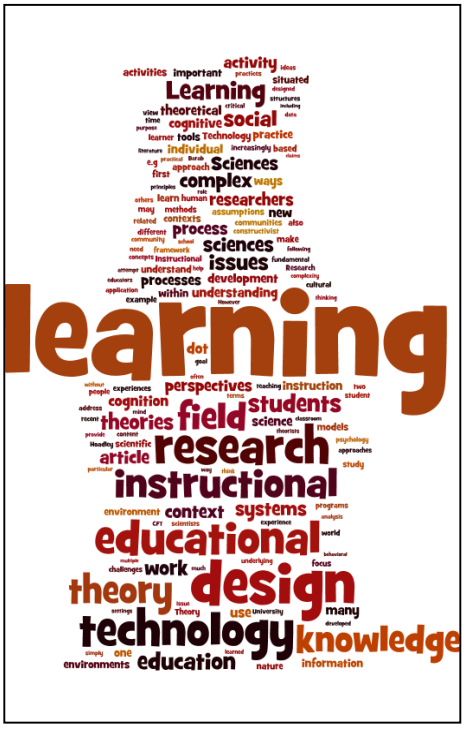
LIST OF THE HIGH-LOADING TERMS FOR THE 10 FACTOR SOLUTION

F10.1	F10.2	F10.3	F10.4	F10.5	F10.6	F10.7	F10.8	F10.9	F10.10
learn	student	attitud	web	Student	learn	student	game	children	aect
problem	learn	learn	internet	Ict	mobil	discus	plai	internet	associ
model	test	factor	distanc	School	student	onlin	video	read	conven
theori	group	perceiv	site	Project	style	collabor	learn	school	intern
process	read	internet	cours	Integr	environ	face	motiv	ict	commun
solv	problem	student	univers	Classroom	learner	interac	ict	mobil	confer
framework	perform	ict	learn	Teacher	devic	social	player	digit	ethic
knowledg	solv	gender	user	Teach	object	learn	children	cours	profession
collabor	control	efficaci	resourc	Profession	collabor	commun	simul	literaci	member
approach	experiment	survei	student	Program	achiev	instructor	engag	languag	media
practic	score	influenc	access	Curriculum	motiv	particip	digit	world	division
system	assess	inten	softwar	Univers	propos	peer	seriou	faculti	present
tool	achiev	signific	evalu	Practice	enhanc	asynchron	student	access	field
context	feedback	accept	project	implement	approach	forum	read	home	held
environ	text	percep	inform	Preservice	solv	share	virtual	parent	leadership
cognit	grade	behavior	materi	Faculty	outcom	class	role	social	code
understand	mathemat	relationship	faculti	Scienc	person	distanc	skill	distanc	session
support	condition	posit	provid	Innov	adapt	activ	internet	instructor	foundat
learner	significantli	variabl	train	Year	experi	engag		text	california
complex	program	scale	world	prepar	distanc	cours		english	internship
work	effect	social	manag	Class	english	facilit		cultur	organ
integr	cognit	affect	instructor	Skill	activ	network		classroom	program
propos	strategi	user	applic	center	experiment	messag		ag	nation
social	improv	data	system	Train	context	group		commun	train
structur	task	valid	video	cours	blend	analysi		inform	distanc

APPENDIX E

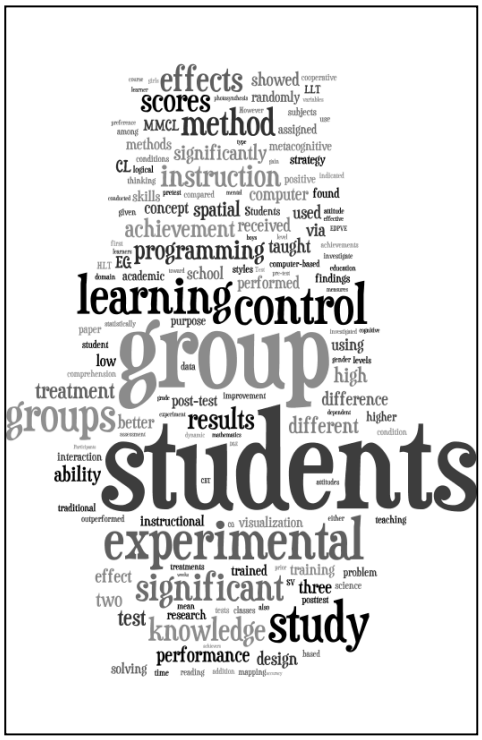
WORDMAPS FROM THE TITLES AND FROM THE ABSTRACTS

E.1 Learning and Instruction- Abstracts

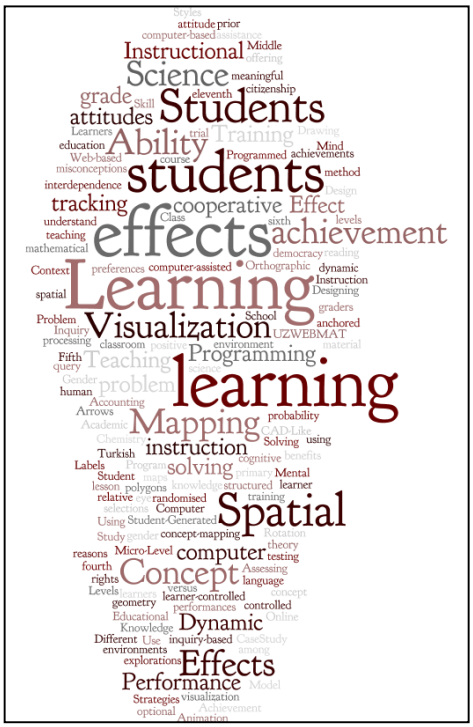


E.1 Learning and Instruction- Titles

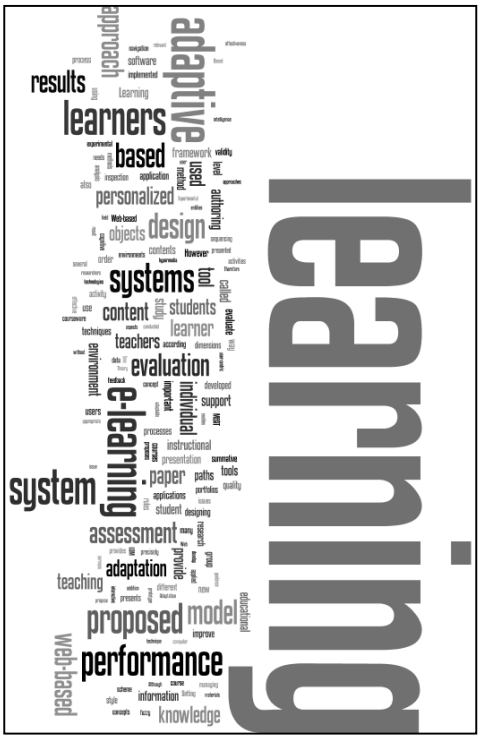
E.2 Student Learning- Abstracts



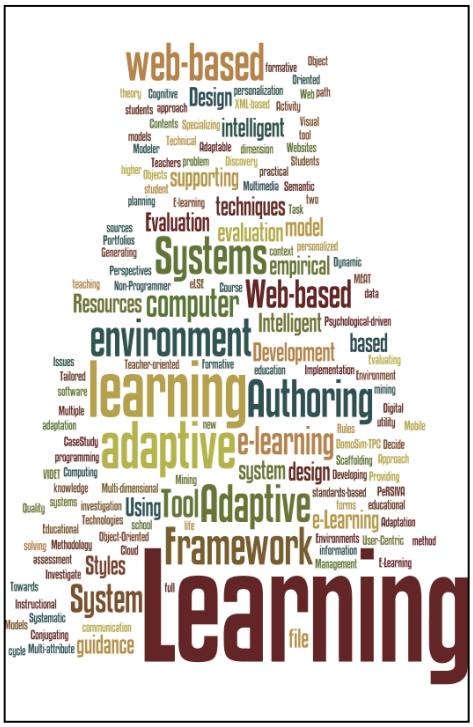
E.2 Student Learning - Titles



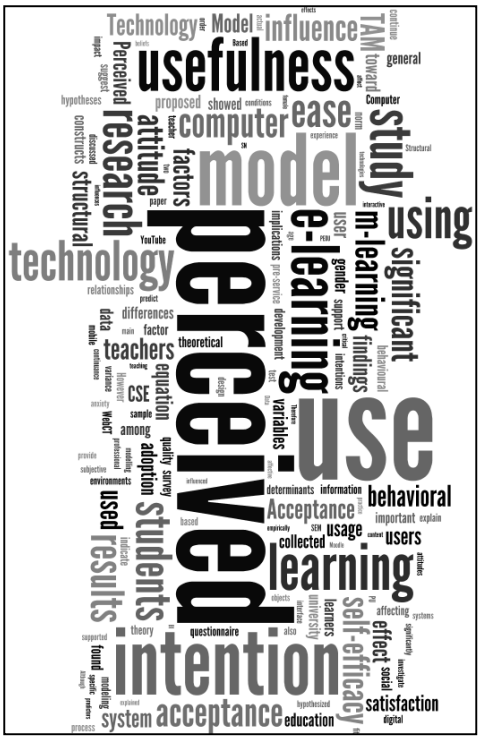
E.3 Learning Systems and Tools- Abstracts



E.3 Learning Systems and Tools - Titles



E.4 Learning Experiences- Abstracts

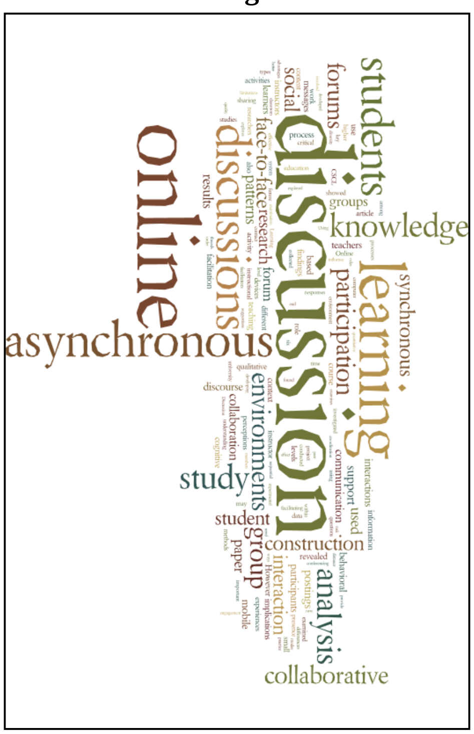


E.4 Learning Experiences- Titles

E.5 Faculty Training & Adult Education-Abstracts

E.5 Faculty Training & Adult Education-Titles

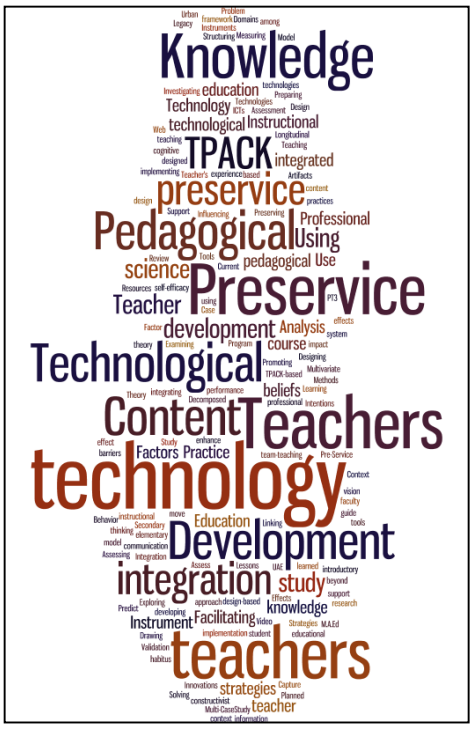
E.6 Online Learning - Abstracts



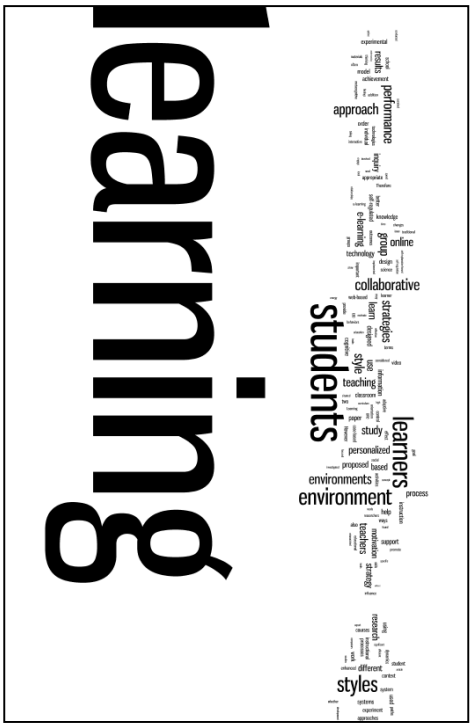
E.6 Online Learning - Titles

E.7 Teacher Preparation and Professional Development -Abstracts

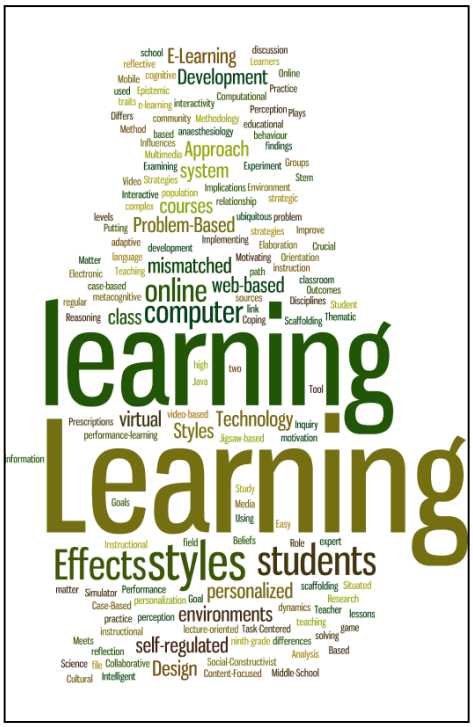
E.7 Teacher Preparation and Professional Development –Titles



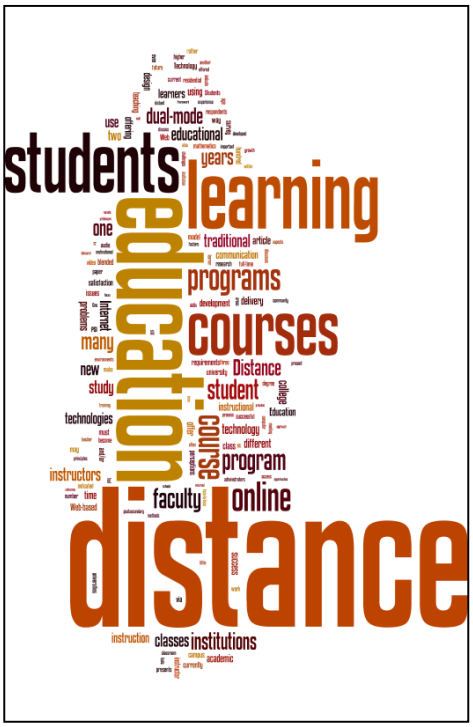
E.8 Learning Environments- Abstracts



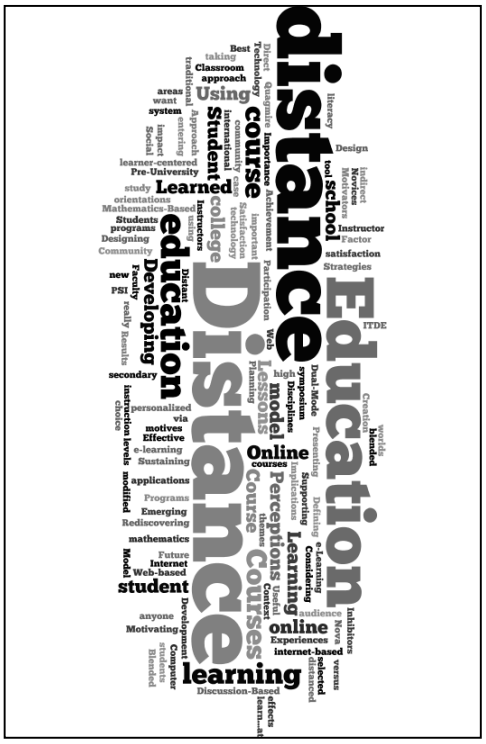
E.8 Learning Environments- Titles



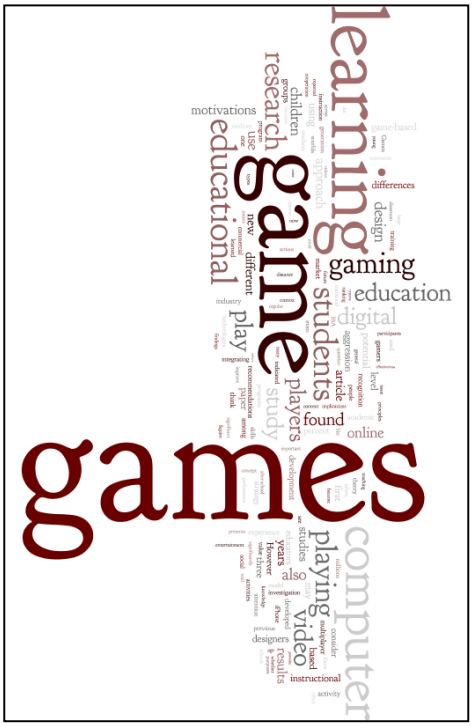
E.9 Distance Education- Abstracts



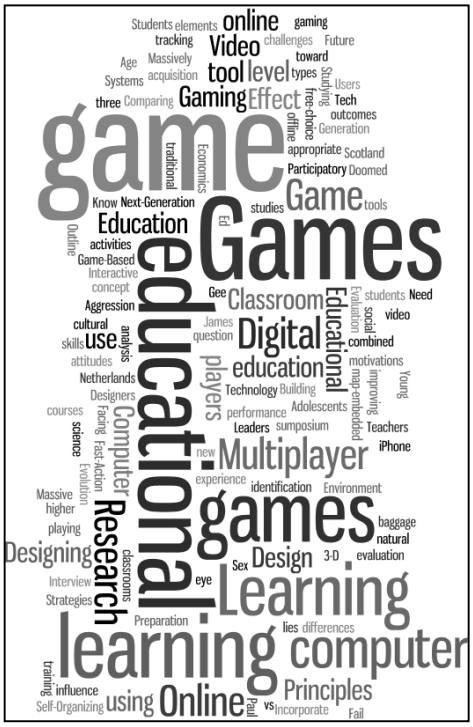
E.9 Distance Education - Titles



E.10 Game-based Learning - Abstracts

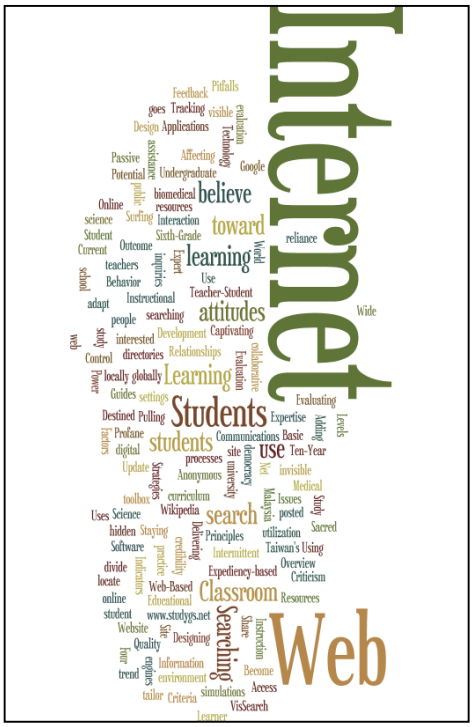


E.10 Game-based Learning- Titles

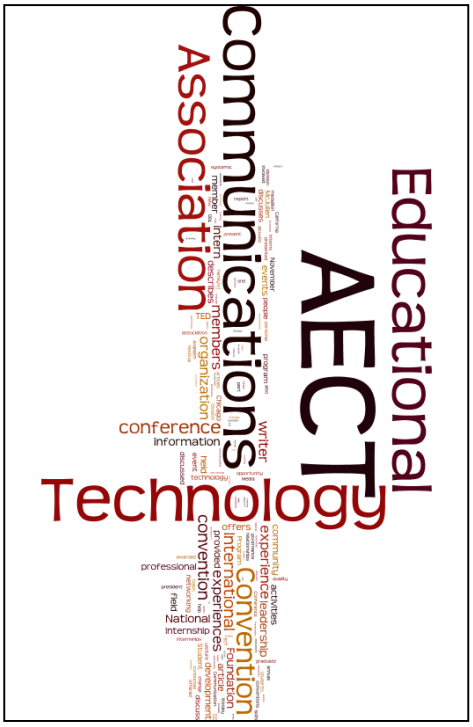


E.11 The Internet & Digital Literacy-Abstracts

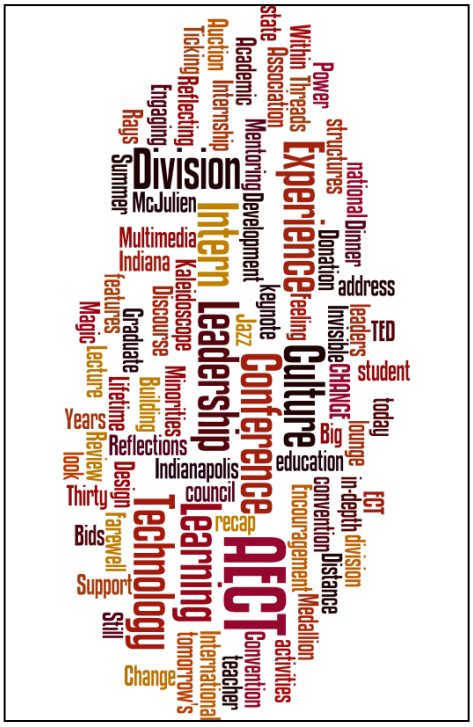
E.11 The Internet & Digital Literacy-Titles



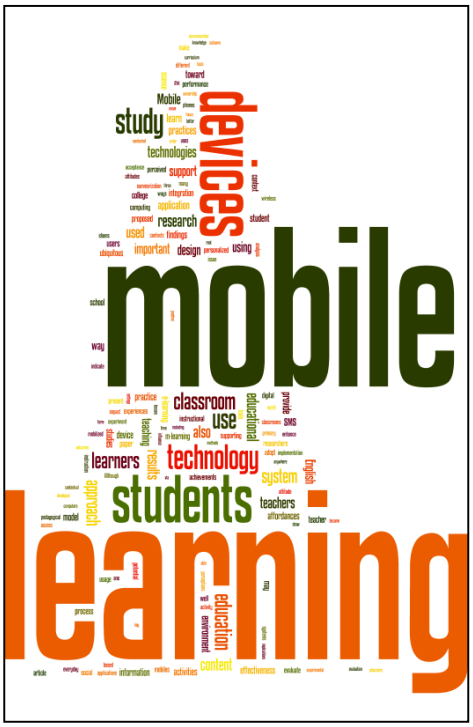
E.12 Professional Meetings and Associations - Abstracts



E.12 Professional Meetings and Associations – Titles

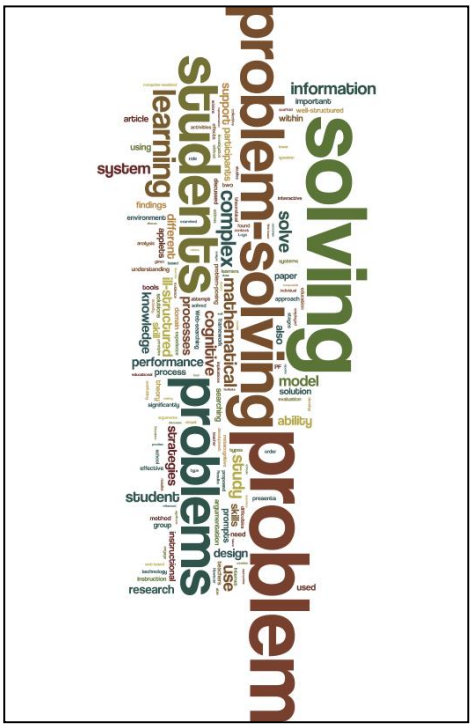


E.13 Mobile Learning - Abstracts

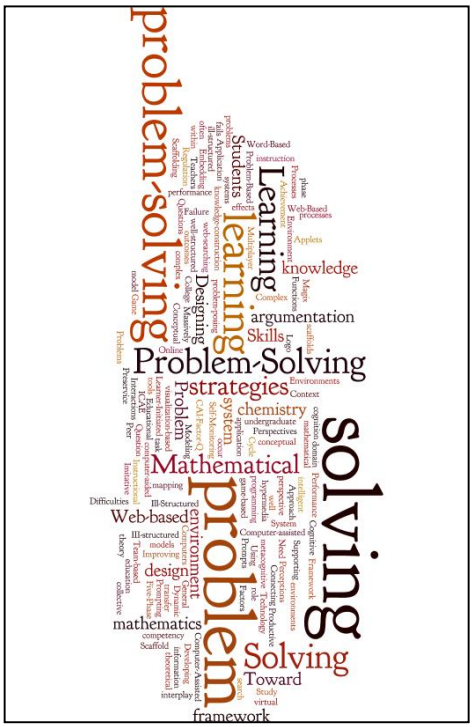


E.13 Mobile Learning- Titles

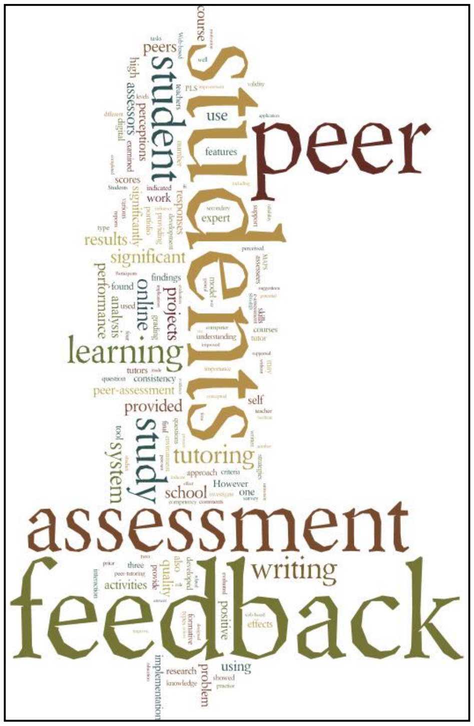
E.14 Problem Solving - Abstracts



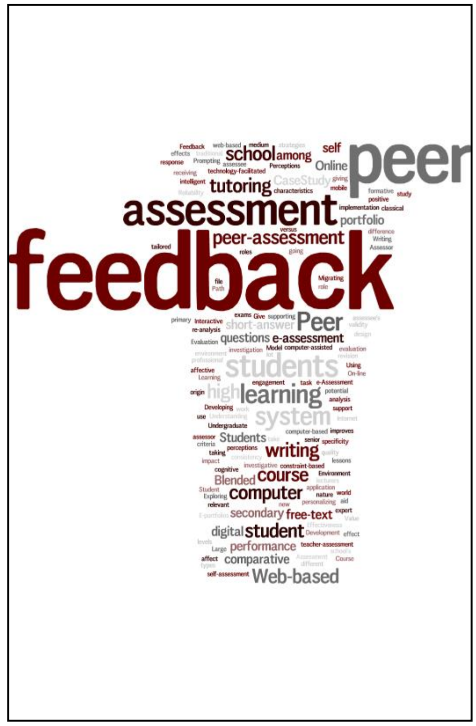
E.14 Problem Solving- Titles



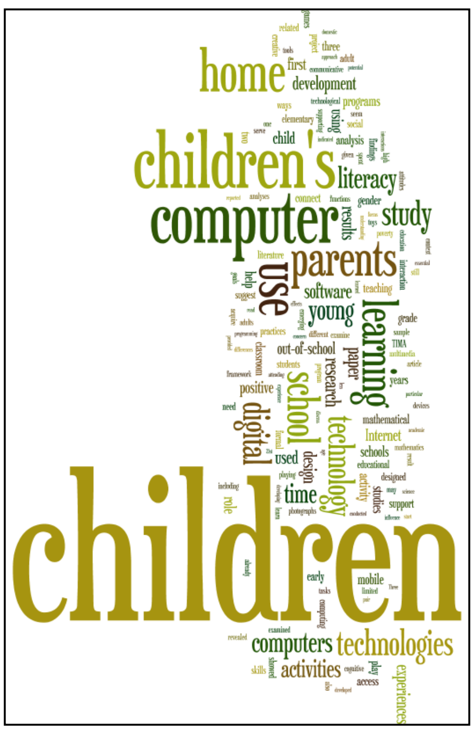
E.15 Assessment and Feedback - Abstracts



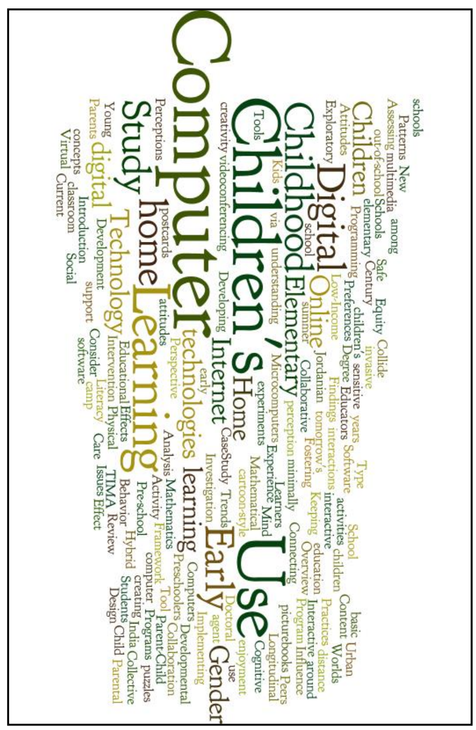
E.15 Assessment and Feedback-Titles



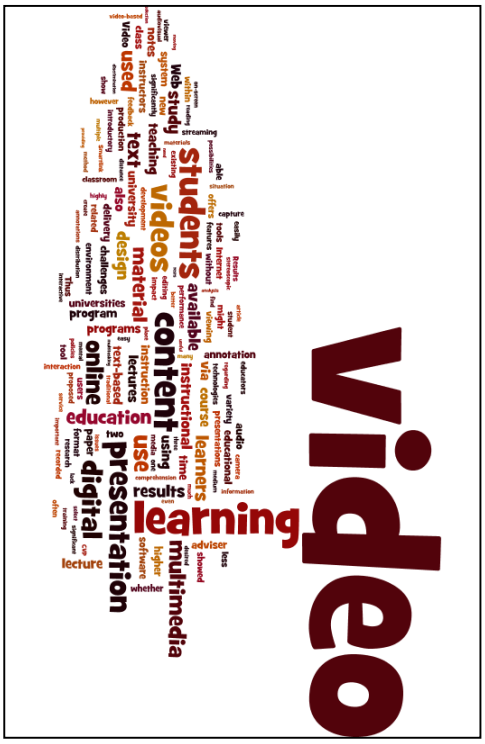
E.16 Childhood Education- Abstracts



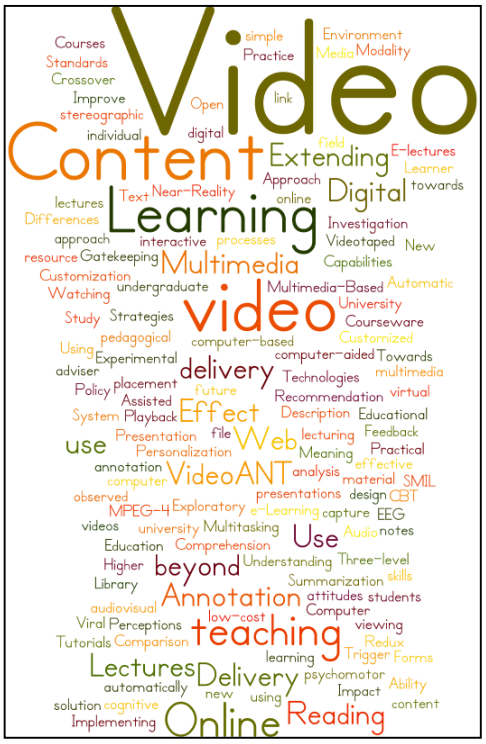
E.16 Childhood Education-Titles



E.17 Learning and Multimedia- Abstracts

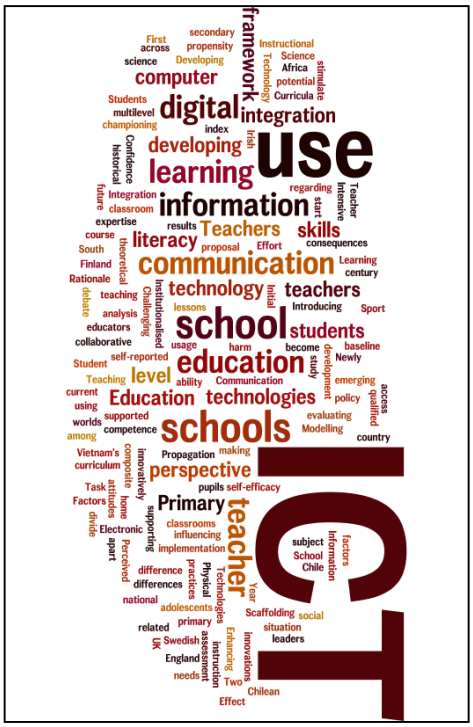


E.17 Learning and Multimedia-Titles

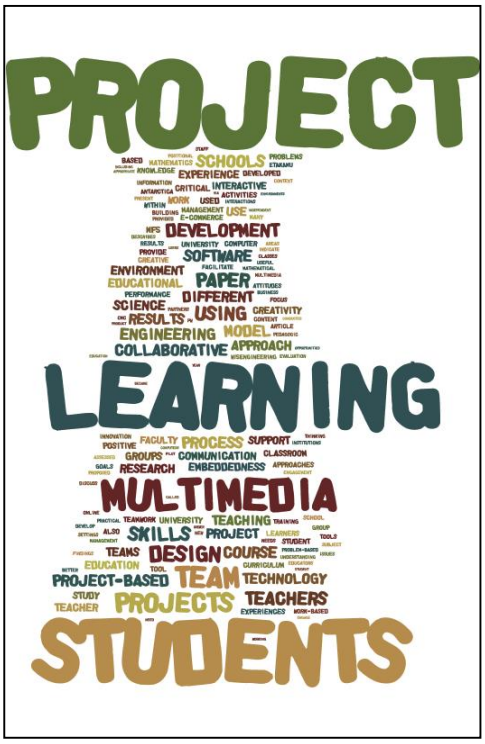


E.18 ICT in Learning and Instruction- Abstracts

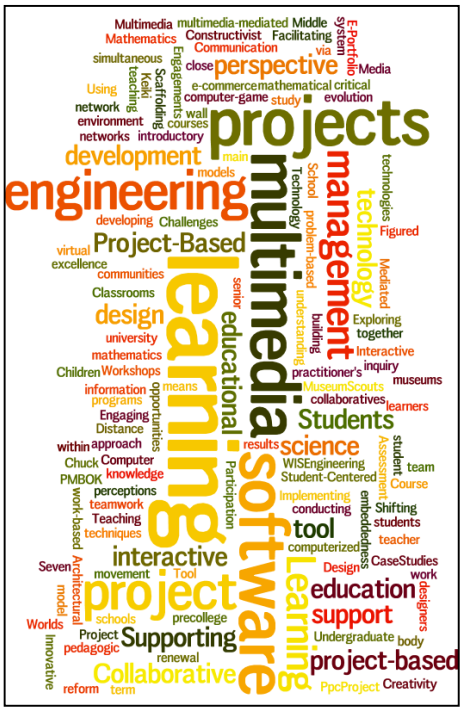
E.18 ICT in Learning and Instruction-Titles



E.19 Experiential Learning - Abstracts

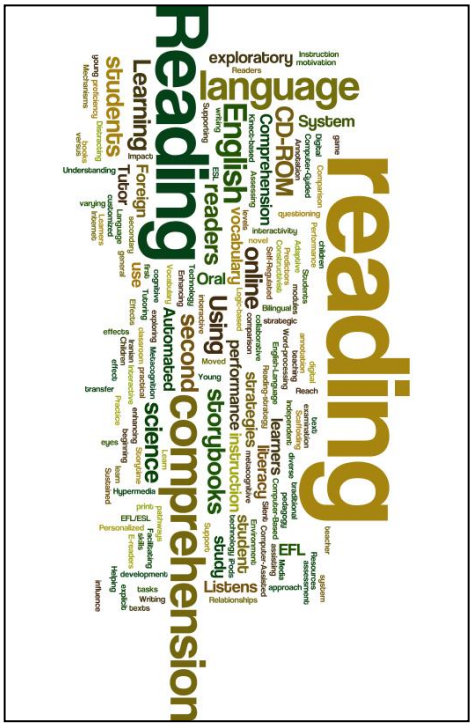


E.19 Experiential Learning –Titles

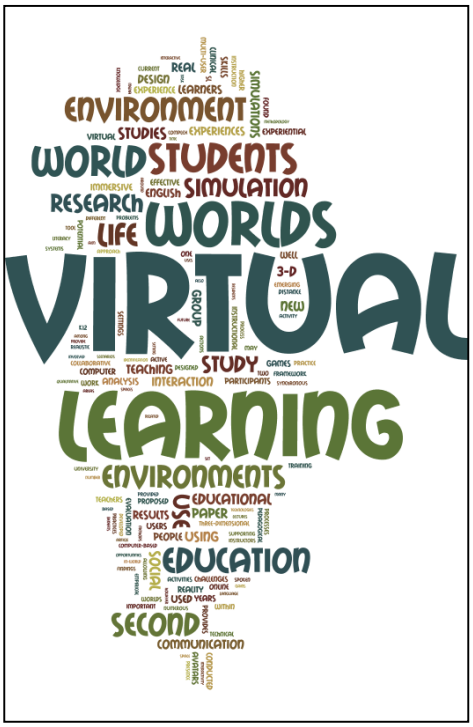


E.20 Reading Comprehension - Abstracts

E.20 Reading Comprehension –Titles

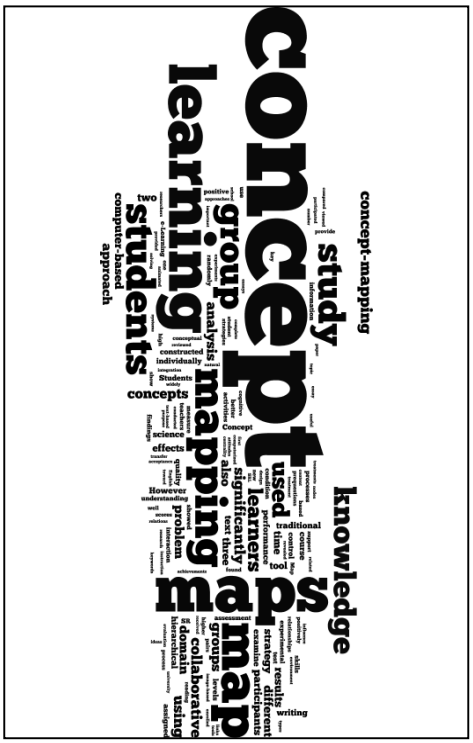


E.21 Virtual Environments - Abstracts

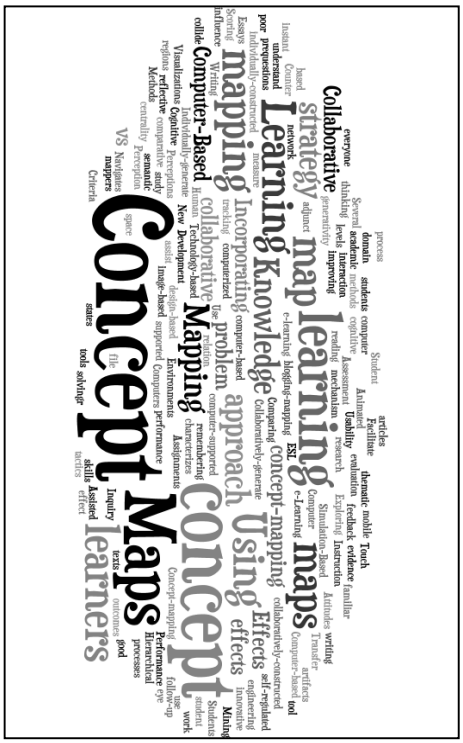


E.21 Virtual Environments –Titles

E.22 Concept Mapping - Abstracts



E.21 Concept Mapping –Titles



APPENDIX F

BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY (BJET)

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1915	S Bennett, K Maton, L Kervin	The 'digital natives' debate: A critical review of the evidence	2008
501	S Warburton	Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching	2009
490	HM Huang	Toward constructivism for adult learners in online learning environments	2002
468	B Dalgarno, MJW Lee	What are the learning affordances of 3-D virtual environments?	2010
441	A Amory, K Naicker, J Vincent…	The use of computer games as an educational tool: identification of appropriate game types and game elements	1999
431	S Wheeler, P YEoMAnS…	The good, the bad and the wiki: Evaluating student-generated content for collaborative learning	2008
414	MD Dickey	Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education	2005
384	YS Wang, MC Wu, HY Wang	Investigating the determinants and age and gender differences in the acceptance of mobile learning	2009
343	J Davies, M Graff	Performance in e-learning: online participation and student grades	2005
339	N Ford, SY Chen	Matching/mismatching revisited: an empirical study of learning and teaching styles	2001
335	F Alonso, G López, D Manrique…	An instructional model for web-based e-learning education with a blended learning process approach	2005
304	J Vassileva, R Deters	Dynamic courseware generation on the WWW	1998
300	N Cavus, D Ibrahim	m-Learning: An experiment in using SMS to support learning new English language words	2009
295	PK Gilbert, N Dabbagh	How to structure online discussions for meaningful discourse: A case study	2005
279	D Churchill	Educational applications of Web 2.0: Using blogs to support teaching and learning	2009
269	CK Looi, P Seow, BH Zhang, HJ So…	Leveraging mobile technology for sustainable seamless learning: a research agenda	2010
262	A Carr-Chellman, P Duchastel	The ideal online course	2000
259	C McLoughlin	Culturally responsive technology use: developing an on-line community of learners	1999
258	C Chou	Interactivity and interactive functions in web-based learning systems: a technical framework for designers	2003
256	D Laurillard	Multimedia and the changing experience of the learner	1995
248	C Angeli, N Valanides, CJ Bonk	Communication in a Web-based conferencing system: The quality of computer-mediated interactions	2003
247	D Reynolds, D Treharne, H Tripp	ICT—the hopes and the reality	2003
245	D Williams, L Coles, K Wilson…	Teachers and ICT: Current use and future needs	2000
241	KF Hew, WS Cheung	Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research	2010
240	K Wall, S Higgins, H Smith	'The visual helps me understand the complicated things': pupil views of teaching and learning with interactive whiteboards	2005
236	F Concannon, A Flynn…	What campus-based students think about the quality and benefits of e-learning	2005
231	Q Wang, HL Woo, CL Quek, Y Yang…	Using the Facebook group as a learning management system: An exploratory study	2012

225	K Kiili	Foundation for problem-based gaming	2007
223	SC Chang, FC Tung	An empirical investigation of students' behavioural intentions to use the online learning course websites	2008
219	H Kanuka, L Rourke, E Laflamme	The influence of instructional methods on the quality of online discussion	2007
216	Z Okan	Edutainment: is learning at risk?	2003
213	MJW Lee, C McLoughlin, A Chan	Talk the talk: Learner-generated podcasts as catalysts for knowledge creation	2008
209	L Carswell, P Thomas, M Petre, B Price…	Distance education via the Internet: The student experience	2000
207	B Dalgarno	Interpretations of constructivism and consequences for computer assisted learning	2001
205	SL Hoskins, JC Van Hooff	Motivation and ability: which students use online learning and what influence does it have on their achievement?	2005
205	R Clariana, P Wallace	Paper–based versus computer–based assessment: key factors associated with the test mode effect	2002
203	L Plowman, C Stephen	Children, play, and computers in pre-school education	2005
200	F Ke, B Grabowski	Gameplaying for maths learning: cooperative or not?	2007

APPENDIX G

BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY (BJET)

The five Top-cited Articles published per year from 1995 to 2014

Cites	Authors	Title	Year
256	D Laurillard	Multimedia and the changing experience of the learner	1995
149	D Rowntree	Teaching and learning online: a correspondence education for the 21st century?	1995
44	D Rowntree	The tutor's role in teaching via computer conferencing	1995
35	P Whalley	Imagining with multimedia	1995
24	H Tomlinson, W Henderson	Computer supported collaborative learning in schools: a distributed approach	1995
121	M Wild	Technology refusal: Rationalising the failure of student and beginning teachers to use computers	1996
97	L Plowman	Narrative, linearity and interactivity: making sense of interactive multimedia	1996
58	S Faseyitan, JN Libii…	An in service model for enhancing faculty computer self-efficacy	1996
38	R Oliver, H Oliver	Information access and retrieval with hypermedia information systems	1996
28	M Pitt	The use of electronic mail in undergraduate teaching	1996
160	M Avgerinou, J Ericson	A review of the concept of visual literacy	1997
79	B Collis, J Moonen…	Flexibility as a key construct in European training: Experiences from the TeleScopia Project	1997
61	N Selwyn	The continuing weaknesses of educational computing research	1997
47	D Lee	Factors influencing the success of computer skills learning among in-service teachers	1997
35	J Scott, J Buchanan, N Haigh	Reflections on student-centred learning in a large class setting	1997
304	J Vassileva, R Deters	Dynamic courseware generation on the WWW	1998
173	A Barron	Designing Web-based training	1998
131	SJ Bostock	Constructivism in mass higher education: a case study	1998
128	M Wild, C Quinn	Implications of educational theory for the design of instructional multimedia	1998
125	C McLoughlin, R Oliver	Maximising the language and learning link in computer learning environments	1998
441	A Amory, K Naicker, J Vincent…	The use of computer games as an educational tool: identification of appropriate game types and game elements	1999
259	C McLoughlin	Culturally responsive technology use: developing an on-line community of learners	1999
185	B Collis	Designing for differences: Cultural issues in the design of WWW-based course-support sites	1999
177	AY Chen, A Mashhadi, D Ang…	Cultural issues in the design of technology-enhanced learning systems	1999
171	R Riding, M Grimley	Cognitive style, gender and learning from multi-media materials in 11-year-old children	1999
262	A Carr-Chellman, P Duchastel	The ideal online course	2000
245	D Williams, L Coles, K Wilson…	Teachers and ICT: Current use and future needs	2000

209	L Carswell, P Thomas, M Petre, B Price…	Distance education via the Internet: The student experience	2000
92	M Collins	Comparing Web, correspondence and lecture versions of a second-year non-major biology course	2000
77	L Lynch, AJ Fawcett, RI Nicolson	Computer-assisted reading intervention in a secondary school: an evaluation study	2000
339	N Ford, SY Chen	Matching/mismatching revisited: an empirical study of learning and teaching styles	2001
207	B Dalgarno	Interpretations of constructivism and consequences for computer assisted learning	2001
195	I Jung	Building a theoretical framework of web-based instruction in the context of distance education	2001
173	S Mitra, V Rana	Children and the Internet: Experiments with minimally invasive education in India	2001
132	CC Chang	A study on the evaluation and effectiveness analysis of web-based learning portfolio (WBLP)	2001
490	HM Huang	Toward constructivism for adult learners in online learning environments	2002
205	R Clariana, P Wallace	Paper–based versus computer–based assessment: key factors associated with the test mode effect	2002
174	M Freeman, J McKenzie	SPARK, a confidential web–based template for self and peer assessment of student teamwork: benefits of evaluating across different subjects	2002
165	J Trindade, C Fiolhais, L Almeida	Science learning in virtual environments: a descriptive study	2002
158	M Peat, S Franklin	Supporting student learning: the use of computer–based formative assessment modules	2002
258	C Chou	Interactivity and interactive functions in web-based learning systems: a technical framework for designers	2003
248	C Angeli, N Valanides, CJ Bonk	Communication in a Web-based conferencing system: The quality of computer-mediated interactions	2003
247	D Reynolds, D Treharne, H Tripp	ICT—the hopes and the reality	2003
216	Z Okan	Edutainment: is learning at risk?	2003
199	P Brusilovsky	Adaptive navigation support in educational hypermedia: the role of student knowledge level and the case for meta-adaptation	2003
198	E Murphy	Recognising and promoting collaboration in an online asynchronous discussion	2004
175	R Koper, J Manderveld	Educational modelling language: modelling reusable, interoperable, rich and personalised units of learning	2004
156	E Sadler-Smith, PJ Smith	Strategies for accommodating individuals' styles and preferences in flexible learning programmes	2004
142	R Mason, C Pegler, M Weller	E-portfolios: an assessment tool for online courses	2004
122	R Koper, C Tattersall	New directions for lifelong learning using network technologies	2004
414	MD Dickey	Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education	2005
343	J Davies, M Graff	Performance in e-learning: online participation and student grades	2005
335	F Alonso, G López, D Manrique…	An instructional model for web-based e-learning education with a blended learning process approach	2005
295	PK Gilbert, N Dabbagh	How to structure online discussions for meaningful discourse: A case study	2005

240	K Wall, S Higgins, H Smith	'The visual helps me understand the complicated things': pupil views of teaching and learning with interactive whiteboards	2005
170	CP Lim, D Nonis, J Hedberg	Gaming in a 3D multiuser virtual environment: Engaging students in science lessons	2006
165	N Shin	Online learner's 'flow'experience: an empirical study	2006
147	RE Ferdig	Assessing technologies for teaching and learning: understanding the importance of technological pedagogical content knowledge	2006
128	D Dicheva, C Dichev	TM4L: Creating and browsing educational topic maps	2006
107	E Melis, G Goguadze, M Homik…	Semantic-aware components and services of ActiveMath	2006
225	K Kiili	Foundation for problem-based gaming	2007
219	H Kanuka, L Rourke, E Laflamme	The influence of instructional methods on the quality of online discussion	2007
200	F Ke, B Grabowski	Gameplaying for maths learning: cooperative or not?	2007
189	J Tondeur, J Van Braak…	Curricula and the use of ICT in education: Two worlds apart?	2007
187	S Grimshaw, N Dungworth…	Electronic books: Children's reading and comprehension	2007
1915	S Bennett, K Maton, L Kervin	The 'digital natives' debate: A critical review of the evidence	2008
431	S Wheeler, P YEoMAnS…	The good, the bad and the wiki: Evaluating student-generated content for collaborative learning	2008
223	SC Chang, FC Tung	An empirical investigation of students' behavioural intentions to use the online learning course websites	2008
213	MJW Lee, C McLoughlin, A Chan	Talk the talk: Learner-generated podcasts as catalysts for knowledge creation	2008
178	R Wood, J Ashfield	The use of the interactive whiteboard for creative teaching and learning in literacy and mathematics: A case study	2008
501	S Warburton	Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching	2009
384	YS Wang, MC Wu, HY Wang	Investigating the determinants and age and gender differences in the acceptance of mobile learning	2009
300	N Cavus, D Ibrahim	m-Learning: An experiment in using SMS to support learning new English language words	2009
279	D Churchill	Educational applications of Web 2.0: Using blogs to support teaching and learning	2009
192	M Wang, R Shen, D Novak…	The impact of mobile learning on students' learning behaviours and performance: Report from a large blended classroom	2009
468	B Dalgarno, MJW Lee	What are the learning affordances of 3-D virtual environments?	2010
269	CK Looi, P Seow, BH Zhang, HJ So…	Leveraging mobile technology for sustainable seamless learning: a research agenda	2010
241	KF Hew, WS Cheung	Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research	2010
189	DJ Ketelhut, BC Nelson, J Clarke…	A multi-user virtual environment for building and assessing higher order inquiry skills in science	2010
168	S De Freitas, G Rebolledo-Mendez…	Learning as immersive experiences: Using the four-dimensional framework for designing and evaluating immersive learning experiences in a virtual world	2010
145	Z Akyol, DR Garrison	Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning	2011

145	GJ Hwang, CC Tsai	Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010	2011
128	GJ Hwang, YR Shi, HC Chu	A concept map approach to developing collaborative Mindtools for context-aware ubiquitous learning	2011
106	JL Shih, HC Chu, GJ Hwang	An investigation of attitudes of students and teachers about participating in a context-aware ubiquitous learning activity	2011
72	DC Brooks	Space matters: The impact of formal learning environments on student learning	2011
231	Q Wang, HL Woo, CL Quek, Y Yang…	Using the Facebook group as a learning management system: An exploratory study	2012
125	SY Park, MW Nam, SB Cha	University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model	2012
98	GJ Hwang, PH Wu	Advancements and trends in digital game-based learning research: a review of publications in selected journals from 2001 to 2010	2012
96	LH Wong	A learner-centric view of mobile seamless learning	2012
89	R Edmunds, M Thorpe, G Conole	Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach	2012
119	R Junco, CM Elavsky…	Putting twitter to the test: Assessing outcomes for student collaboration, engagement and success	2013
45	F Wang, JK Burton	Second Life in education: A review of publications from its launch to 2011	2013
38	GJ Hwang, HY Sung, CM Hung…	A knowledge engineering approach to developing educational computer games for improving students' differentiating knowledge	2013
38	W Ng, H Nicholas	A framework for sustainable mobile learning in schools	2013
35	J McPake, L Plowman…	Pre-school children creating and communicating with digital technologies in the home	2013
64	TD Cochrane	Critical success factors for transforming pedagogy with mobile Web 2.0	2014
39	I Mayer, G Bekebrede, C Harteveld…	The research and evaluation of serious games: Toward a comprehensive methodology	2014
29	CM Kim, SW Park, J Cozart	Affective and motivational factors of learning in online mathematics courses	2014
25	J Castaño-Muñoz, JM Duart…	The Internet in face-to-face higher education: Can interactive learning improve academic achievement?	2014
24	SN Şad, Ö Göktaş	Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools	2014

APPENDIX H

JOURNAL OF THE LEARNING SCIENCES

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1819	B Jordan, A Henderson	Interaction analysis: Foundations and practice	1995
1793	JR Anderson, AT Corbett, KR Koedinger…	Cognitive tutors: Lessons learned	1995
1377	S Barab, K Squire	Design-based research: Putting a stake in the ground	2004
1364	A Collins, D Joseph, K Bielaczyc	Design research: Theoretical and methodological issues	2004
1291	MTH Chi	Quantifying qualitative analyses of verbal data: A practical guide	1997
786	B Barron	When smart groups fail	2003
692	DC Edelson	Design research: What we learn when we engage in design	2002
670	RD Pea	The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity	2004
608	C Quintana, BJ Reiser, EA Davis, J Krajcik…	A scaffolding design framework for software to support science inquiry	2004
583	MTH Chi	Commonsense conceptions of emergent processes: Why some misconceptions are robust	2005
549	JL Kolodner, PJ Camp, D Crismond…	Problem-based learning meets case-based reasoning in the middle-school science classroom: Putting learning by design (tm) into practice	2003
497	BJ Reiser	Scaffolding complex learning: The mechanisms of structuring and problematizing student work	2004
454	B Barron	Achieving coordination in collaborative problem-solving groups	2000
401	CE Hmelo, DL Holton, JL Kolodner	Designing to learn about complex systems	2000
387	M Guzdial, J Turns	Effective discussion through a computer-mediated anchored forum	2000
345	KR Koedinger, MJ Nathan	The real story behind story problems: Effects of representations on quantitative reasoning	2004
345	AA DiSessa, P Cobb	Ontological innovation and the role of theory in design experiments	2004
340	WA Sandoval	Conceptual and epistemic aspects of students' scientific explanations	2003
331	KL McNeill, DJ Lizotte, J Krajcik…	Supporting students' construction of scientific explanations by fading scaffolds in instructional materials	2006
330	DD Suthers, CD Hundhausen	An experimental study of the effects of representational guidance on collaborative learning processes	2003
323	V Colella	Participatory simulations: Building collaborative understanding through immersive dynamic modeling	2000
320	DL Schwartz	The emergence of abstract representations in dyad problem solving	1995
320	MJ Jacobson, U Wilensky	Complex systems in education: Scientific and educational importance and implications for the learning sciences	2006
316	R McCrory Wallace, J Kupperman…	Science on the Web: Students online in a sixth-grade classroom	2000
306	CE Hmelo	Problem-based learning: Effects on the early acquisition of cognitive skill in medicine	1998
305	R Kozma, E Chin, J Russell, N Marx	The roles of representations and tools in the chemistry laboratory and their implications for chemistry learning	2000
305	EA Davis	Prompting middle school science students for productive reflection: Generic and directed prompts	2003

303	N Rummel, H Spada	Learning to collaborate: An instructional approach to promoting collaborative problem solving in computer-mediated settings	2005
301	SJ Derry, RD Pea, B Barron, RA Engle…	Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics	2010
287	B Fishman, RW Marx, P Blumenfeld…	Creating a framework for research on systemic technology innovations	2004
277	G Wells, RM Arauz	Dialogue in the classroom	2006
273	E Van Zee, J Minstrell	Using questioning to guide student thinking	1997
271	D Hammer, A Elby	Tapping epistemological resources for learning physics	2003
265	M Resnick, R Berg, M Eisenberg	Beyond black boxes: Bringing transparency and aesthetics back to scientific investigation	2000
265	A Kelly	Design research in education: Yes, but is it methodological?	2004
263	M Resnick	Beyond the centralized mindset	1996
259	L Schauble, R Glaser, RA Duschl…	Students' understanding of the objectives and procedures of experimentation in the science classroom	1995
258	F Marton, MF Pang	On some necessary conditions of learning	2006
255	J Zhang, M Scardamalia, R Reeve…	Designs for collective cognitive responsibility in knowledge-building communities	2009
254	A Zohar, YJ Dori	Higher order thinking skills and low-achieving students: Are they mutually exclusive?	2003
252	YJ Dori, J Belcher	How does technology-enabled active learning affect undergraduate students' understanding of electromagnetism concepts?	2005
250	RL Goldstone, JY Son	The transfer of scientific principles using concrete and idealized simulations	2005
249	J Hewitt	Toward an understanding of how threads die in asynchronous computer conferences	2005
244	DN Gordin, RD Pea	Prospects for scientific visualization as an educational technology	1995
239	E De Vries, K Lund, M Baker	Computer-mediated epistemic dialogue: Explanation and argumentation as vehicles for understanding scientific notions	2002
224	T Murray	Authoring knowledge-based tutors: Tools for content, instructional strategy, student model, and interface design	1998
221	SA Barab, M Barnett, K Squire	Developing an empirical account of a community of practice: Characterizing the essential tensions	2002
220	D Hammer	Misconceptions or p-prims: How may alternative perspectives of cognitive structure influence instructional perceptions and intentions	1996
212	M Resnick, U Wilensky	Diving into complexity: Developing probabilistic decentralized thinking through role-playing activities	1998
211	I Tabak	Synergy: A complement to emerging patterns of distributed scaffolding	2004
207	D Gentner, S Brem, RW Ferguson…	Analogical reasoning and conceptual change: A case study of Johannes Kepler	1997
205	K Squire, E Klopfer	Augmented reality simulations on handheld computers	2007
204	K Bielaczyc	Designing social infrastructure: Critical issues in creating learning environments with technology	2006

APPENDIX I

JOURNAL OF THE LEARNING SCIENCES

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
244	DN Gordin, RD Pea	Prospects for scientific visualization as an educational technology	1995
260	L Schauble, R Glaser, RA Duschl…	Students' understanding of the objectives and procedures of experimentation in the science classroom	1995
320	DL Schwartz	The emergence of abstract representations in dyad problem solving	1995
1793	JR Anderson, AT Corbett, KR Koedinger…	Cognitive tutors: Lessons learned	1995
1819	B Jordan, A Henderson	Interaction analysis: Foundations and practice	1995
162	WM Roth	Art and artifact of children's designing: A situated cognition perspective	1996
164	NB Songer	Exploring learning opportunities in coordinated network-enhanced classrooms: A case of kids as global scientists	1996
176	G Hume, J Michael, A Rovick…	Hinting as a tactic in one-on-one tutoring	1996
220	D Hammer	Misconceptions or p-prims: How may alternative perspectives of cognitive structure influence instructional perceptions and intentions	1996
263	M Resnick	Beyond the centralized mindset	1996
91	GEA Solomon	Conceptual change and wine expertise	1997
123	EB Coleman, AL Brown, ID Rivkin	The effect of instructional explanations on learning from scientific texts	1997
207	D Gentner, S Brem, RW Ferguson…	Analogical reasoning and conceptual change: A case study of Johannes Kepler	1997
274	E Van Zee, J Minstrell	Using questioning to guide student thinking	1997
1291	MTH Chi	Quantifying qualitative analyses of verbal data: A practical guide	1997
30	J Roschelle	Activity theory: A foundation for designing learning technology?	1998
48	JN Moschkovich	Resources for refining mathematical conceptions: Case studies in learning about linear functions	1998
212	M Resnick, U Wilensky	Diving into complexity: Developing probabilistic decentralized thinking through role-playing activities	1998
224	T Murray	Authoring knowledge-based tutors: Tools for content, instructional strategy, student model, and interface design	1998
308	CE Hmelo	Problem-based learning: Effects on the early acquisition of cognitive skill in medicine	1998
21	R Lehrer, M Lee, A Jeong	Reflective teaching of Logo	1999
55	AM Shapiro	The relevance of hierarchies to learning biology from hypertext	1999
59	T Chaney-Cullen, TM Duffy	Strategic teaching framework: Multimedia to support teacher change	1999
83	R Ploetzner, E Fehse, C Kneser…	Learning to relate qualitative and quantitative problem representations in a model-based setting for collaborative problem solving	1999
87	K VanLehn	Rule-learning events in the acquisition of a complex skill: An evaluation of CASCADE	1999
316	R McCrory Wallace, J Kupperman…	Science on the Web: Students online in a sixth-grade classroom	2000
323	V Colella	Participatory simulations: Building collaborative understanding through immersive dynamic modeling	2000

387	M Guzdial, J Turns	Effective discussion through a computer-mediated anchored forum	2000
401	CE Hmelo, DL Holton, JL Kolodner	Designing to learn about complex systems	2000
455	B Barron	Achieving coordination in collaborative problem-solving groups	2000
129	M Umaschi Bers	Identity construction environments: Developing personal and moral values through the design of a virtual city	2001
154	SA Barab, KE Hay…	Constructing networks of action-relevant episodes: An in situ research methodology	2001
163	SA Barab, D Kirshner	Guest editors' introduction: Rethinking methodology in the learning sciences	2001
164	M Guzdial, J Rick, C Kehoe	Beyond adoption to invention: Teacher-created collaborative activities in higher education	2001
184	KJ Kurtz, CH Miao, D Gentner	Learning by analogical bootstrapping	2001
136	D Carraher, A Schliemann	The transfer dilemma	2002
197	S Ainsworth, P Bibby, D Wood	Examining the effects of different multiple representational systems in learning primary mathematics	2002
220	SA Barab, M Barnett, K Squire	Developing an empirical account of a community of practice: Characterizing the essential tensions	2002
239	E De Vries, K Lund, M Baker	Computer-mediated epistemic dialogue: Explanation and argumentation as vehicles for understanding scientific notions	2002
692	DC Edelson	Design research: What we learn when we engage in design	2002
305	EA Davis	Prompting middle school science students for productive reflection: Generic and directed prompts	2003
330	DD Suthers, CD Hundhausen	An experimental study of the effects of representational guidance on collaborative learning processes	2003
340	WA Sandoval	Conceptual and epistemic aspects of students' scientific explanations	2003
549	JL Kolodner, PJ Camp, D Crismond…	Problem-based learning meets case-based reasoning in the middle-school science classroom: Putting learning by design (tm) into practice	2003
787	B Barron	When smart groups fail	2003
497	BJ Reiser	Scaffolding complex learning: The mechanisms of structuring and problematizing student work	2004
608	C Quintana, BJ Reiser, EA Davis, J Krajcik…	A scaffolding design framework for software to support science inquiry	2004
670	RD Pea	The social and technological dimensions of scaffolding and related theoretical concepts for learning, education, and human activity	2004
1365	A Collins, D Joseph, K Bielaczyc	Design research: Theoretical and methodological issues	2004
1377	S Barab, K Squire	Design-based research: Putting a stake in the ground	2004
249	J Hewitt	Toward an understanding of how threads die in asynchronous computer conferences	2005
250	RL Goldstone, JY Son	The transfer of scientific principles using concrete and idealized simulations	2005
252	YJ Dori, J Belcher	How does technology-enabled active learning affect undergraduate students' understanding of electromagnetism concepts?	2005
304	N Rummel, H Spada	Learning to collaborate: An instructional approach to promoting collaborative problem solving in computer-mediated settings	2005
582	MTH Chi	Commonsense conceptions of emergent processes: Why some misconceptions are robust	2005

204	K Bielaczyc	Designing social infrastructure: Critical issues in creating learning environments with technology	2006
258	F Marton, MF Pang	On some necessary conditions of learning	2006
279	G Wells, RM Arauz	Dialogue in the classroom	2006
320	MJ Jacobson, U Wilensky	Complex systems in education: Scientific and educational importance and implications for the learning sciences	2006
331	KL McNeill, DJ Lizotte, J Krajcik…	Supporting students' construction of scientific explanations by fading scaffolds in instructional materials	2006
113	S Barab, T Dodge, MK Thomas…	Our designs and the social agendas they carry	2007
137	J van Aalst, CKK Chan	Student-directed assessment of knowledge building using electronic portfolios	2007
158	A Sfard	When the rules of discourse change, but nobody tells you: Making sense of mathematics learning from a commognitive standpoint	2007
166	CE Hmelo-Silver, S Marathe, L Liu	Fish swim, rocks sit, and lungs breathe: Expert-novice understanding of complex systems	2007
205	K Squire, E Klopfer	Augmented reality simulations on handheld computers	2007
90	RL Goldstone, U Wilensky	Promoting transfer by grounding complex systems principles	2008
104	MM Chiu	Flowing toward correct contributions during group problem solving: A statistical discourse analysis	2008
126	NS Nasir, V Hand	From the court to the classroom: Opportunities for engagement, learning, and identity in basketball and classroom mathematics	2008
138	JN Bailenson, N Yee, J Blascovich…	The use of immersive virtual reality in the learning sciences: Digital transformations of teachers, students, and social context	2008
172	N Mercer	The seeds of time: Why classroom dialogue needs a temporal analysis	2008
56	EA van Es	Participants' roles in the context of a video club	2009
69	KL McNeill, J Krajcik	Synergy between teacher practices and curricular scaffolds to support students in using domain-specific and domain-general knowledge in writing arguments to …	2009
83	MS Gresalfi	Taking up opportunities to learn: Constructing dispositions in mathematics classrooms	2009
96	P Cobb, Q Zhao, C Dean	Conducting design experiments to support teachers' learning: A reflection from the field	2009
256	J Zhang, M Scardamalia, R Reeve…	Designs for collective cognitive responsibility in knowledge-building communities	2009
76	A Gupta, D Hammer, EF Redish	The case for dynamic models of learners' ontologies in physics	2010
84	E Etkina, A Karelina, M Ruibal-Villasenor…	Design and reflection help students develop scientific abilities: Learning in introductory physics laboratories	2010
91	C Chin, J Osborne	Supporting argumentation through students' questions: Case studies in science classrooms	2010
102	AC Barton, E Tan	We be burnin'! Agency, identity, and science learning	2010
301	SJ Derry, RD Pea, B Barron, RA Engle…	Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics	2010
36	BB Schwarz, CS Asterhan	E-moderation of synchronous discussions in educational settings: A nascent practice	2011
37	KE Metz	Disentangling robust developmental constraints from the instructionally mutable: Young children's epistemic reasoning about a study of their own design	2011

42	EM Nussbaum, OV Edwards	Critical questions and argument stratagems: A framework for enhancing and analyzing students' reasoning practices	2011
65	J Zhang, HY Hong, M Scardamalia…	Sustaining knowledge building as a principle-based innovation at an elementary school	2011
164	MPJ Habgood, SE Ainsworth	Motivating children to learn effectively: Exploring the value of intrinsic integration in educational games	2011
35	P Cobb, K Jackson	Analyzing educational policies: A learning design perspective	2012
42	R Nemirovsky, C Rasmussen, G Sweeney…	When the classroom floor becomes the complex plane: Addition and multiplication as ways of bodily navigation	2012
51	DM Belenky, TJ Nokes-Malach	Motivation and transfer: The role of mastery-approach goals in preparation for future learning	2012
106	MW Alibali, MJ Nathan	Embodiment in mathematics teaching and learning: Evidence from learners' and teachers' gestures	2012
113	M Kapur, K Bielaczyc	Designing for productive failure	2012
21	NA Shea, RG Duncan	From theory to data: The process of refining learning progressions	2013
21	FS Azevedo	The tailored practice of hobbies and its implication for the design of interest-driven learning environments	2013
31	JD Gobert, M Sao Pedro, J Raziuddin…	From log files to assessment metrics: Measuring students' science inquiry skills using educational data mining	2013
43	F Jeppsson, J Haglund, TG Amin…	Exploring the use of conceptual metaphors in solving problems on entropy	2013
43	MT Hora, JJ Ferrare	Instructional systems of practice: A multidimensional analysis of math and science undergraduate course planning and classroom teaching	2013
49	W Sandoval	Conjecture mapping: An approach to systematic educational design research	2014
18	M Kapur	Comparing learning from productive failure and vicarious failure	2014
18	C Bereiter	Principled practical knowledge: Not a bridge but a ladder	2014
16	P Blikstein, M Worsley, C Piech, M Sahami…	Programming pluralism: Using learning analytics to detect patterns in the learning of computer programming	2014
15	D Hammer, LK Berland	Confusing claims for data: A critique of common practices for presenting qualitative research on learning	2014

APPENDIX J

EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT (ETR&D)

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1433	PA Ertmer	Teacher pedagogical beliefs: The final frontier in our quest for technology integration?	2005
1332	MD Merrill	First principles of instruction	2002
1280	DH Jonassen	Toward a design theory of problem solving	2000
1254	DH Jonassen	Instructional design models for well-structured and III-structured problem-solving learning outcomes	1997
1130	PA Ertmer	Addressing first-and second-order barriers to change: Strategies for technology integration	1999
955	LP Rieber	Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games	1996
946	DH Jonassen, L Rohrer-Murphy	Activity theory as a framework for designing constructivist learning environments	1999
892	KF Hew, T Brush	Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research	2007
891	F Wang, MJ Hannafin	Design-based research and technology-enhanced learning environments	2005
827	J Herrington, R Oliver	An instructional design framework for authentic learning environments	2000
798	S Barab, M Thomas, T Dodge, R Carteaux…	Making learning fun: Quest Atlantis, a game without guns	2005
521	JJG Van Merriënboer, RE Clark…	Blueprints for complex learning: The 4C/ID-model	2002
470	JR Hill, MJ Hannafin	Cognitive strategies and learning from the World Wide Web	1997
454	YJ Joo, M Bong, HJ Choi	Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction	2000
448	JI Choi, M Hannafin	Situated cognition and learning environments: Roles, structures, and implications for design	1995
443	RA Reiser	A history of instructional design and technology: Part I: A history of instructional media	2001
421	DH Jonassen, H Kwon II	Communication patterns in computer mediated versus face-to-face group problem solving	2001
412	AP Rovai	Building classroom community at a distance: A case study	2001
407	MD Dickey	Engaging by design: How engagement strategies in popular computer and video games can inform instructional design	2005
405	P Goodyear, G Salmon, JM Spector, C Steeples…	Competences for online teaching: A special report	2001
381	DH Jonassen, J Hernandez-Serrano	Case-based reasoning and instructional design: Using stories to support problem solving	2002
365	KL Cho, DH Jonassen	The effects of argumentation scaffolds on argumentation and problem solving	2002
352	E Klopfer, K Squire	Environmental Detectives—the development of an augmented reality platform for environmental simulations	2008
348	SA Barab, JG MaKinster, JA Moore…	Designing and building an on-line community: The struggle to support sociability in the inquiry learning forum	2001
341	X Ge, SM Land	Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions	2003

339	JR Hill, MJ Hannafin	Teaching and learning in digital environments: The resurgence of resource-based learning	2001
338	RA Reiser	A history of instructional design and technology: Part II: A history of instructional design	2001
336	X Lin, C Hmelo, CK Kinzer, TJ Secules	Designing technology to support reflection	1999
336	RE Mayer, K Steinhoff, G Bower, R Mars	A generative theory of textbook design: Using annotated illustrations to foster meaningful learning of science text	1995
329	P Kirschner, JW Strijbos, K Kreijns, PJ Beers	Designing electronic collaborative learning environments	2004
315	JW Saye, T Brush	Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments	2002
306	L Schrum	Technology professional development for teachers	1999
300	GE Xun, SM Land	A conceptual framework for scaffolding III-structured problem-solving processes using question prompts and peer interactions	2004
297	EC Thach, KL Murphy	Competencies for distance education professionals	1995
292	JTM Gulikers, TJ Bastiaens, PA Kirschner	A five-dimensional framework for authentic assessment	2004
292	A Sadik	Digital storytelling: A meaningful technology-integrated approach for engaged student learning	2008
289	MD Dickey	Game design and learning: A conjectural analysis of how massively multiple online role-playing games (MMORPGs) foster intrinsic motivation	2007
276	RM Marra, JL Moore, AK Klimczak	Content analysis of online discussion forums: A comparative analysis of protocols	2004
275	MJ Hannafin, KM Hannafin, SM Land…	Grounded practice and the design of constructivist learning environments	1997
273	N Strudler, K Wetzel	Lessons from exemplary colleges of education: Factors affecting technology integration in preservice programs	1999
266	L Rourke, T Anderson	Validity in quantitative content analysis	2004
265	SM Land	Cognitive requirements for learning with open-ended learning environments	2000
256	X Lin	Designing metacognitive activities	2001
254	L Moller	Designing communities of learners for asynchronous distance education	1998
250	SM Land, BA Greene	Project-based learning with the World Wide Web: A qualitative study of resource integration	2000
250	JJG Van Merriënboer, P Ayres	Research on cognitive load theory and its design implications for e-learning	2005
241	L Henderson	Instructional design of interactive multimedia: A cultural critique	1996
239	DL Lowther, SM Ross, GM Morrison	When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom	2003
239	FA Inan, DL Lowther	Factors affecting technology integration in K-12 classrooms: A path model	2010
236	F Paas, JE Tuovinen, JJG Van Merrienboer…	A motivational perspective on the relation between mental effort and performance: Optimizing learner involvement in instruction	2005
229	PE Parrish	The trouble with learning objects	2004
228	M Resnick	Technologies for lifelong kindergarten	1998

228	R Azevedo, DC Moos, JA Greene, FI Winters…	Why is externally-facilitated regulated learning more effective than self-regulated learning with hypermedia?	2008
226	JL Whipp, S Chiarelli	Self-regulation in a web-based course: A case study	2004
223	SH Song, JM Keller	Effectiveness of motivationally adaptive computer-assisted instruction on the dynamic aspects of motivation	2001
220	TC Reeves, J Herrington, R Oliver	A development research agenda for online collaborative learning	2004
219	O Park, J Lee	Adaptive instructional systems	2003
211	R Moreno, A Valdez	Cognitive load and learning effects of having students organize pictures and words in multimedia environments: The role of student interactivity and feedback	2005
207	JC Dunlap	Problem-based learning and self-efficacy: How a capstone course prepares students for a profession	2005
206	J Laffey, T Tupper, D Musser, J Wedman	A computer-mediated support system for project-based learning	1998
206	M Tessmer, RC Richey	The role of context in learning and instructional design	1997
204	Y Kim, AL Baylor	A social-cognitive framework for pedagogical agents as learning companions	2006
202	SA Barab, KD Squire, W Dueber	A co-evolutionary model for supporting the emergence of authenticity	2000
201	J Zhang, M Scardamalia, M Lamon, R Messina…	Socio-cognitive dynamics of knowledge building in the work of 9-and 10-year-olds	2007

APPENDIX K

EDUCATIONAL TECHNOLOGY RESEARCH AND DEVELOPMENT (ETR&D)

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
448	JI Choi, M Hannafin	Situated cognition and learning environments: Roles, structures, and implications for design	1995
336	RE Mayer, K Steinhoff, G Bower, R Mars	A generative theory of textbook design: Using annotated illustrations to foster meaningful learning of science text	1995
297	EC Thach, KL Murphy	Competencies for distance education professionals	1995
150	LP Rieber	A historical review of visualization in human cognition	1995
114	RD Hannafin, HJ Sullivan	Learner control in full and lean CAI programs	1995
955	LP Rieber	Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games	1996
241	L Henderson	Instructional design of interactive multimedia: A cultural critique	1996
170	SM Land, MJ Hannafin	A conceptual framework for the development of theories-in-action with open-ended learning environments	1996
133	JD Young	The effect of self-regulated learning strategies on performance in learner controlled computer-based instruction	1996
131	LP Rieber	Animation as feedback in a computer-based simulation: Representation matters	1996
1254	DH Jonassen	Instructional design models for well-structured and III-structured problem-solving learning outcomes	1997
470	JR Hill, MJ Hannafin	Cognitive strategies and learning from the World Wide Web	1997
275	MJ Hannafin, KM Hannafin, SM Land…	Grounded practice and the design of constructivist learning environments	1997
206	M Tessmer, RC Richey	The role of context in learning and instructional design	1997
156	TB Means, DH Jonassen, FM Dwyer	Enhancing relevance: Embedded ARCS strategies vs. purpose	1997
254	L Moller	Designing communities of learners for asynchronous distance education	1998
228	M Resnick	Technologies for lifelong kindergarten	1998
206	J Laffey, T Tupper, D Musser, J Wedman	A computer-mediated support system for project-based learning	1998
191	J Petraglia	The real world on a short leash: The (mis) application of constructivism to the design of educational technology	1998
107	TA Brush	Embedding cooperative learning into the design of integrated learning systems: rationale and guidelines	1998
1130	PA Ertmer	Addressing first-and second-order barriers to change: Strategies for technology integration	1999
946	DH Jonassen, L Rohrer-Murphy	Activity theory as a framework for designing constructivist learning environments	1999
336	X Lin, C Hmelo, CK Kinzer, TJ Secules	Designing technology to support reflection	1999
306	L Schrum	Technology professional development for teachers	1999
273	N Strudler, K Wetzel	Lessons from exemplary colleges of education: Factors affecting technology integration in preservice programs	1999
1280	DH Jonassen	Toward a design theory of problem solving	2000
827	J Herrington, R Oliver	An instructional design framework for authentic learning environments	2000

454	YJ Joo, M Bong, HJ Choi	Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in Web-based instruction	2000
265	SM Land	Cognitive requirements for learning with open-ended learning environments	2000
250	SM Land, BA Greene	Project-based learning with the World Wide Web: A qualitative study of resource integration	2000
443	RA Reiser	A history of instructional design and technology: Part I: A history of instructional media	2001
421	DH Jonassen, H Kwon II	Communication patterns in computer mediated versus face-to-face group problem solving	2001
412	AP Rovai	Building classroom community at a distance: A case study	2001
405	P Goodyear, G Salmon, JM Spector, C Steeples…	Competences for online teaching: A special report	2001
348	SA Barab, JG MaKinster, JA Moore…	Designing and building an on-line community: The struggle to support sociability in the inquiry learning forum	2001
1332	MD Merrill	First principles of instruction	2002
521	JJG Van Merriënboer, RE Clark…	Blueprints for complex learning: The 4C/ID-model	2002
381	DH Jonassen, J Hernandez-Serrano	Case-based reasoning and instructional design: Using stories to support problem solving	2002
365	KL Cho, DH Jonassen	The effects of argumentation scaffolds on argumentation and problem solving	2002
315	JW Saye, T Brush	Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments	2002
341	X Ge, SM Land	Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions	2003
239	DL Lowther, SM Ross, GM Morrison	When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom	2003
219	O Park, J Lee	Adaptive instructional systems	2003
197	S Pedersen, M Liu	Teachers' beliefs about issues in the implementation of a student-centered learning environment	2003
170	T Brush, K Glazewski, K Rutowski, K Berg…	Integrating technology in a field-based teacher training program: The PT3@ ASU project	2003
329	P Kirschner, JW Strijbos, K Kreijns, PJ Beers	Designing electronic collaborative learning environments	2004
300	GE Xun, SM Land	A conceptual framework for scaffolding III-structured problem-solving processes using question prompts and peer interactions	2004
292	JTM Gulikers, TJ Bastiaens, PA Kirschner	A five-dimensional framework for authentic assessment	2004
276	RM Marra, JL Moore, AK Klimczak	Content analysis of online discussion forums: A comparative analysis of protocols	2004
266	L Rourke, T Anderson	Validity in quantitative content analysis	2004
1433	PA Ertmer	Teacher pedagogical beliefs: The final frontier in our quest for technology integration?	2005
891	F Wang, MJ Hannafin	Design-based research and technology-enhanced learning environments	2005

798	S Barab, M Thomas, T Dodge, R Carteaux…	Making learning fun: Quest Atlantis, a game without guns	2005
407	MD Dickey	Engaging by design: How engagement strategies in popular computer and video games can inform instructional design	2005
250	JJG Van Merriënboer, P Ayres	Research on cognitive load theory and its design implications for e-learning	2005
204	Y Kim, AL Baylor	A social-cognitive framework for pedagogical agents as learning companions	2006
191	MD Dickey	Game design narrative for learning: Appropriating adventure game design narrative devices and techniques for the design of interactive learning environments	2006
128	JM Brill, MJ Bishop, AE Walker	The competencies and characteristics required of an effective project manager: A web-based Delphi study	2006
126	Y Lou, RM Bernard, PC Abrami	Media and pedagogy in undergraduate distance education: A theory-based meta-analysis of empirical literature	2006
111	Y Kim, AL Baylor, PALS Group	Pedagogical agents as learning companions: The role of agent competency and type of interaction	2006
892	KF Hew, T Brush	Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research	2007
289	MD Dickey	Game design and learning: A conjectural analysis of how massively multiple online role-playing games (MMORPGs) foster intrinsic motivation	2007
201	J Zhang, M Scardamalia, M Lamon, R Messina…	Socio-cognitive dynamics of knowledge building in the work of 9-and 10-year-olds	2007
180	RE West, G Waddoups, CR Graham	Understanding the experiences of instructors as they adopt a course management system	2007
168	A Amory	Game object model version II: a theoretical framework for educational game development	2007
352	E Klopfer, K Squire	Environmental Detectives—the development of an augmented reality platform for environmental simulations	2008
292	A Sadik	Digital storytelling: A meaningful technology-integrated approach for engaged student learning	2008
228	R Azevedo, DC Moos, JA Greene, FI Winters…	Why is externally-facilitated regulated learning more effective than self-regulated learning with hypermedia?	2008
157	GA Gunter, RF Kenny, EH Vick	Taking educational games seriously: using the RETAIN model to design endogenous fantasy into standalone educational games	2008
135	F Ke	Computer games application within alternative classroom goal structures: cognitive, metacognitive, and affective evaluation	2008
157	KF Hew	Use of audio podcast in K-12 and higher education: A review of research topics and methodologies	2009
95	PE Parrish	Aesthetic principles for instructional design	2009
85	I Choi, K Lee	Designing and implementing a case-based learning environment for enhancing ill-structured problem solving: Classroom management problems for prospective …	2009
84	HY Hong, FR Sullivan	Towards an idea-centered, principle-based design approach to support learning as knowledge creation	2009
81	RH Kay, L Knaack	Assessing learning, quality and engagement in learning objects: the Learning Object Evaluation Scale for Students (LOES-S)	2009
239	FA Inan, DL Lowther	Factors affecting technology integration in K-12 classrooms: A path model	2010

150	T Traphagan, JV Kucsera, K Kishi	Impact of class lecture webcasting on attendance and learning	2010
115	TJ Kopcha	A systems-based approach to technology integration using mentoring and communities of practice	2010
98	P Pirnay-Dummer, D Ifenthaler, JM Spector	Highly integrated model assessment technology and tools	2010
91	B Hoffman, L Nadelson	Motivational engagement and video gaming: A mixed methods study	2010
107	Y Lee, J Choi	A review of online course dropout research: implications for practice and future research	2011
94	W Hung	Theory to reality: A few issues in implementing problem-based learning	2011
69	MP Arnone, RV Small, SA Chauncey…	Curiosity, interest and engagement in technology-pervasive learning environments: a new research agenda	2011
57	M Liu, L Horton, J Olmanson, P Toprac	A study of learning and motivation in a new media enriched environment for middle school science	2011
56	AL Baylor	The design of motivational agents and avatars	2011
110	S Aydin	A review of research on Facebook as an educational environment	2012
95	YM Huang, TH Liang, YN Su, NS Chen	Empowering personalized learning with an interactive e-book learning system for elementary school students	2012
60	GJ Hwang, HY Sung, CM Hung, I Huang…	Development of a personalized educational computer game based on students' learning styles	2012
42	P Nedungadi, R Raman	A new approach to personalization: integrating e-learning and m-learning	2012
39	DH Jonassen	Designing for decision making	2012
116	RS Davies, DL Dean, N Ball	Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course	2013
86	S Abramovich, C Schunn, RM Higashi	Are badges useful in education?: it depends upon the type of badge and expertise of learner	2013
41	G Veletsianos, R Kimmons, KD French	Instructor experiences with a social networking site in a higher education setting: Expectations, frustrations, appropriation, and compartmentalization	2013
27	S Greiff, S Wüstenberg, DV Holt, F Goldhammer…	Computer-based assessment of Complex Problem Solving: concept, implementation, and application	2013
22	JR Segedy, JS Kinnebrew, G Biswas	The effect of contextualized conversational feedback in a complex open-ended learning environment	2013
25	S Järvelä, PA Kirschner, E Panadero…	Enhancing socially shared regulation in collaborative learning groups: designing for CSCL regulation tools	2014
22	GJ Hwang, CM Hung, NS Chen	Improving learning achievements, motivations and problem-solving skills through a peer assessment-based game development approach	2014
19	YM Huang, SH Huang, TT Wu	Embedding diagnostic mechanisms in a digital game for learning mathematics	2014
13	SK Wang, HY Hsu, T Campbell, DC Coster…	An investigation of middle school science teachers and students use of technology inside and outside of classrooms: considering whether digital natives are more …	2014
12	JA Hyman, MT Moser, LN Segala	Electronic reading and digital library technologies: understanding learner expectation and usage intent for mobile learning	2014

APPENDIX L

INSTRUCTIONAL SCIENCE

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1063	N Hara, CJ Bonk, C Angeli	Content analysis of online discussion in an applied educational psychology course	2000
816	G Schraw	Promoting general metacognitive awareness	1998
605	F Paas, A Renkl, J Sweller	Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture	2004
559	PA Ertmer, TJ Newby	The expert learner: Strategic, self-regulated, and reflective	1996
515	MJ Hannafin, SM Land	The foundations and assumptions of technology-enhanced student-centered learning environments	1997
488	RE Mayer	Cognitive, metacognitive, and motivational aspects of problem solving	1998
437	CA Wolters, PR Pintrich	Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms	1998
368	A Weinberger, B Ertl, F Fischer, H Mandl	Epistemic and social scripts in computer–supported collaborative learning	2005
360	DW Surry, JD Farquhar	Diffusion theory and instructional technology	1997
352	R Moreno	Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia	2004
340	JC Taylor	Fifth generation distance education	2001
334	J Sweller	Instructional design consequences of an analogy between evolution by natural selection and human cognitive architecture	2004
285	RJ Sternberg	Metacognition, abilities, and developing expertise: What makes an expert student?	1998
275	T De Jong	Cognitive load theory, educational research, and instructional design: some food for thought	2010
274	KA Lawless, SW Brown	Multimedia learning environments: Issues of learner control and navigation	1997
267	R Azevedo, AF Hadwin	Scaffolding self-regulated learning and metacognition–Implications for the design of computer-based scaffolds	2005
229	MH Lee, CC Tsai	Exploring teachers' perceived self-efficacy and technological pedagogical content knowledge with respect to educational use of the World Wide Web	2010
226	L McAlpine, C Weston	Reflection: Issues related to improving professors' teaching and students' learning	2000
223	J Psotka	Immersive training systems: Virtual reality and education and training	1995
222	BOB Hoffmann, D Ritchie	Using multimedia to overcome the problems with problem based learning	1997
221	E Sadler-Smith, R Riding	Cognitive style and instructional preferences	1999
212	R Azevedo, JG Cromley, FI Winters, DC Moos…	Adaptive human scaffolding facilitates adolescents' self-regulated learning with hypermedia	2005
208	E Zhu	Interaction and cognitive engagement: An analysis of four asynchronous online discussions	2006
202	WS De Grave, HPA Boshuizen, HG Schmidt	Problem based learning: Cognitive and metacognitive processes during problem analysis	1996
200	P Gerjets, K Scheiter, R Catrambone	Designing instructional examples to reduce intrinsic cognitive load: Molar versus modular presentation of solution procedures	2004

APPENDIX M

INSTRUCTIONAL SCIENCE

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
223	J Psotka	Immersive training systems: Virtual reality and education and training	1995
65	RS Perez, JF Johnson, CD Emery	Instructional design expertise: A cognitive model of design	1995
54	M Chen	A methodology for characterizing computer-based learning environments	1995
53	Y San Chee	Cognitive apprenticeship and its application to the teaching of Smalltalk in a multimedia interactive learning environment	1995
46	OC Park, SS Gittelman	Dynamic characteristics of mental models and dynamic visual displays	1995
559	PA Ertmer, TJ Newby	The expert learner: Strategic, self-regulated, and reflective	1996
202	WS De Grave, HPA Boshuizen, HG Schmidt	Problem based learning: Cognitive and metacognitive processes during problem analysis	1996
192	C Howell-Richardson, H Mellar	A methodology for the analysis of patterns of participation within computer mediated communication courses	1996
141	G Dall'Alba, J Sandberg	Educating for competence in professional practice	1996
134	WR Klemm, JR Snell	Enriching computer-mediated group learning by coupling constructivism with collaborative learning	1996
515	MJ Hannafin, SM Land	The foundations and assumptions of technology-enhanced student-centered learning environments	1997
360	DW Surry, JD Farquhar	Diffusion theory and instructional technology	1997
274	KA Lawless, SW Brown	Multimedia learning environments: Issues of learner control and navigation	1997
222	BOB Hoffmann, D Ritchie	Using multimedia to overcome the problems with problem based learning	1997
141	CE Hmelo, GS Gotterer, JD Bransford	A theory-driven approach to assessing the cognitive effects of PBL	1997
816	G Schraw	Promoting general metacognitive awareness	1998
488	RE Mayer	Cognitive, metacognitive, and motivational aspects of problem solving	1998
437	CA Wolters, PR Pintrich	Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms	1998
285	RJ Sternberg	Metacognition, abilities, and developing expertise: What makes an expert student?	1998
171	AF Gourgey	Metacognition in basic skills instruction	1998
221	E Sadler-Smith, R Riding	Cognitive style and instructional preferences	1999
110	R Cox, J McKendree, R Tobin, J Lee, T Mayes	Vicarious learning from dialogue and discourse	1999
95	A Balcytiene	Exploring individual processes of knowledge construction with hypertext	1999
52	J Rouet, JM Passerault	Analyzing learner-hypermedia interaction: An overview of online methods	1999
43	S Naidu, M Oliver	Critical incident-based computer supported collaborative learning	1999
1063	N Hara, CJ Bonk, C Angeli	Content analysis of online discussion in an applied educational psychology course	2000

226	L McAlpine, C Weston	Reflection: Issues related to improving professors' teaching and students' learning	2000
168	H Astleitner	Designing emotionally sound instruction: The FEASP-approach	2000
138	L Mason, P Boscolo	Writing and conceptual change. What changes?	2000
96	L Cooper	On-line courses: Tips for making them work	2000
340	JC Taylor	Fifth generation distance education	2001
141	T Anderson, C Howe, R Soden, J Halliday, J Low	Peer interaction and the learning of critical thinking skills in further education students	2001
123	SP Lajoie, C Guerrera, SD Munsie, NC Lavigne	Constructing knowledge in the context of BioWorld	2001
122	NM Seel	Epistemology, situated cognition, and mental models:'Like a bridge over troubled water'	2001
120	CKK Chan	Peer collaboration and discourse patterns in learning from incompatible information	2001
128	MA Dahlgren, LO Dahlgren	Portraits of PBL: Students' experiences of the characteristics of problem-based learning in physiotherapy, computer engineering and psychology	2002
100	R Azevedo	Beyond intelligent tutoring systems: Using computers as METAcognitive tools to enhance learning?	2002
98	HM Cuevas, SM Fiore, RL Oser	Scaffolding cognitive and metacognitive processes in low verbal ability learners: Use of diagrams in computer-based training environments	2002
94	JAR Arts, WH Gijselaers, MSR Segers	Cognitive effects of an authentic computer-supported, problem-based learning environment	2002
67	B Dalgarno	The potential of 3D virtual learning environments: A constructivist analysis	2002
176	MF Pang, F Marton	Beyond``lesson study'': Comparing two ways of facilitating the grasp of some economic concepts	2003
158	M De Laat, V Lally	Complexity, theory and praxis: Researching collaborative learning and tutoring processes in a networked learning community	2003
120	PG Schrader, DJ Leu Jr, CK Kinzer, R Ataya…	Using Internet delivered video cases, to support pre-service teachers' understanding of effective early literacy instruction: An exploratory study	2003
103	RM Pilkington, SA Walker	Facilitating debate in networked learning: Reflecting on online synchronous discussion in higher education	2003
99	MM Recker, A Walker, K Lawless	What do you recommend? Implementation and analyses of collaborative information filtering of web resources for education	2003
605	F Paas, A Renkl, J Sweller	Cognitive load theory: Instructional implications of the interaction between information structures and cognitive architecture	2004
352	R Moreno	Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia	2004
334	J Sweller	Instructional design consequences of an analogy between evolution by natural selection and human cognitive architecture	2004
200	P Gerjets, K Scheiter, R Catrambone	Designing instructional examples to reduce intrinsic cognitive load: Molar versus modular presentation of solution procedures	2004
179	A Renkl, RK Atkinson, CS Große	How fading worked solution steps works–a cognitive load perspective	2004
368	A Weinberger, B Ertl, F Fischer, H Mandl	Epistemic and social scripts in computer–supported collaborative learning	2005
267	R Azevedo, AF Hadwin	Scaffolding self-regulated learning and metacognition–Implications for the design of computer-based scaffolds	2005

212	R Azevedo, JG Cromley, FI Winters, DC Moos…	Adaptive human scaffolding facilitates adolescents' self-regulated learning with hypermedia	2005
172	I Choi, SM Land, AJ Turgeon	Scaffolding peer-questioning strategies to facilitate metacognition during online small group discussion	2005
143	N Dabbagh, A Kitsantas	Using web-based pedagogical tools as scaffolds for self-regulated learning	2005
208	E Zhu	Interaction and cognitive engagement: An analysis of four asynchronous online discussions	2006
112	D Gijbels, G Van De Watering, F Dochy…	New learning environments and constructivism: The students' perspective	2006
80	G Corbalan, L Kester, JJG Van Merriënboer	Towards a personalized task selection model with shared instructional control	2006
68	LM Ling, P Chik, MF Pang	Patterns of variation in teaching the colour of light to Primary 3 students	2006
64	YH Guan, CC Tsai, FK Hwang	Content analysis of online discussion on a senior-high-school discussion forum of a virtual physics laboratory	2006
150	KD Simons, JD Klein	The impact of scaffolding and student achievement levels in a problem-based learning environment	2007
139	M De Laat, V Lally, L Lipponen, RJ Simons	Online teaching in networked learning communities: A multi-method approach to studying the role of the teacher	2007
133	R Luppicini	Review of computer mediated communication research for education	2007
113	H Jeong, MTH Chi	Knowledge convergence and collaborative learning	2007
100	B Kim, TC Reeves	Reframing research on learning with technology: In search of the meaning of cognitive tools	2007
145	RD Roscoe, MTH Chi	Tutor learning: The role of explaining and responding to questions	2008
127	SMM Loyens, D Gijbels	Understanding the effects of constructivist learning environments: Introducing a multi-directional approach	2008
117	LJ Zhang	Constructivist pedagogy in strategic reading instruction: Exploring pathways to learner development in the English as a second language (ESL) classroom	2008
97	D Gijbels, M Segers, E Struyf	Constructivist learning environments and the (im) possibility to change students' perceptions of assessment demands and approaches to learning	2008
95	TS Hilbert, A Renkl	Concept mapping as a follow-up strategy to learning from texts: what characterizes good and poor mappers?	2008
166	MM Nelson, CD Schunn	The nature of feedback: How different types of peer feedback affect writing performance	2009
88	K Berthold, THS Eysink, A Renkl	Assisting self-explanation prompts are more effective than open prompts when learning with multiple representations	2009
77	S Llinares, J Valls	The building of pre-service primary teachers' knowledge of mathematics teaching: interaction and online video case studies	2009
54	PA Howard-Jones, S Demetriou	Uncertainty and engagement with learning games	2009
54	S Lam, RW Cheng, WYK Ma	Teacher and student intrinsic motivation in project-based learning	2009
275	T De Jong	Cognitive load theory, educational research, and instructional design: some food for thought	2010
229	MH Lee, CC Tsai	Exploring teachers' perceived self efficacy and technological pedagogical content knowledge with respect to educational use of the World Wide Web	2010
99	KF Hew, WS Cheung, CSL Ng	Student contribution in asynchronous online discussion: A review of the research and empirical exploration	2010
93	M Kapur	Productive failure in mathematical problem solving	2010

75	L Mason, A Boldrin, N Ariasi	Searching the Web to learn about a controversial topic: are students epistemically active?	2010
80	P Van den Bossche, W Gijselaers, M Segers…	Team learning: building shared mental models	2011
75	D Ifenthaler, I Masduki, NM Seel	The mystery of cognitive structure and how we can detect it: tracking the development of cognitive structures over time	2011
74	JH Kaufman, CD Schunn	Students' perceptions about peer assessment for writing: their origin and impact on revision work	2011
73	M Holmqvist	Teachers' learning in a learning study	2011
59	M Kapur	A further study of productive failure in mathematical problem solving: Unpacking the design components	2011
63	M Kapur	Productive failure in learning the concept of variance	2012
51	J Lu, N Law	Online peer assessment: effects of cognitive and affective feedback	2012
47	MF Pang, LM Ling	Learning study: Helping teachers to use theory, develop professionally, and produce new knowledge to be shared	2012
38	K Stegmann, C Wecker, A Weinberger, F Fischer	Collaborative argumentation and cognitive elaboration in a computer-supported collaborative learning environment	2012
36	M Bannert, P Reimann	Supporting self-regulated hypermedia learning through prompts	2012
43	AF Wise, J Speer, F Marbouti, YT Hsiao	Broadening the notion of participation in online discussions: examining patterns in learners' online listening behaviors	2013
28	NC DiDonato	Effective self-and co-regulation in collaborative learning groups: An analysis of how students regulate problem solving of authentic interdisciplinary tasks	2013
22	JHL Koh, CS Chai, CC Tsai	Examining practicing teachers' perceptions of technological pedagogical content knowledge (TPACK) pathways: a structural equation modeling approach	2013
22	G Olympiou, Z Zacharias	Making the invisible visible: Enhancing students' conceptual understanding by introducing representations of abstract objects in a simulation	2013
20	L Mason, P Boscolo, MC Tornatora, L Ronconi	Besides knowledge: A cross-sectional study on the relations between epistemic beliefs, achievement goals, self-beliefs, and achievement in science	2013
26	G Blomberg, MG Sherin, A Renkl, I Glogger…	Understanding video as a tool for teacher education: investigating instructional strategies to promote reflection	2014
11	KD Könings, T Seidel, S Brand-Gruwel…	Differences between students' and teachers' perceptions of education: profiles to describe congruence and friction	2014
10	NG Holmes, J Day, AHK Park, DA Bonn, I Roll	Making the failure more productive: scaffolding the invention process to improve inquiry behaviors and outcomes in invention activities	2014
10	K Loibl, N Rummel	The impact of guidance during problem-solving prior to instruction on students' inventions and learning outcomes	2014
9	TK Rogat, KR Adams-Wiggins	Other-regulation in collaborative groups: implications for regulation quality	2014

APPENDIX N

TECHTRENDS

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
60	M Simonson, C Schlosser	More than fiber distance education in Iowa	1995
47	M Simonson	Does anyone really want to learn at a distance?	1995
26	TS Pool, SM Blanchard, SA Hale	From over the Internet	1995
17	MA Bruce, RA Shade	Effective Teaching and Learning Strategies Using	1995
14	G Davidson, MM Maurer	Leadership in instructional technology	1995
98	LL Wolcott	Distant, but not distanced	1996
49	J Repman, S Logan	Interactions at a distance	1996
40	AA Carr	Distinguishing systemic from systematic	1996
39	PM Jenlink, CM Reigeluth, AA Carr, LM Nelson	An expedition for change: Facilitating the systemic change process in school districts	1996
35	BO Barker, MW Dickson	Distance learning technologies in K-12 schools	1996
38	JA Duffield	Trials, tribulations, and minor successes	1997
36	L McHenry, M Bozik	From a distance student voices from the interactive video classroom	1997
26	R Muffoletto	Reflections on designing and producing an Internet-based course	1997
24	D Tiene	Student perspectives on distance learning with interactive television	1997
24	A Kovalchick	Technology portfolios as instructional strategy	1997
556	DH Jonassen, C Carr, HP Yueh	Computers as mindtools for engaging learners in critical thinking	1998
151	SA Barab, KE Hay, TM Duffy	Grounded constructions and how technology can help	1998
102	WP Leggett, KA Persichitte	Blood, sweat, and TEARS: 50 years of technology implementation obstacles	1998
18	KL Peck	Ready... fire... aim! Toward meaningful technology standards for educators and students	1998
15	DL Lowther, GR Morrison	The NTeQ model: A framework for technology integration	1998
54	M Simonson	Equivalency theory and distance education	1999
50	S Smaldino	Instructional design for distance education	1999
26	GC Rakes	Teaching visual literacy in a multimedia age	1999
23	RV Price	Designing a college Web-based course using a modified personalized system of instruction (PSI) model	1999
18	C Schlosser, M Burmeister	Best of both worlds: The Nova ITDE model of distance education	1999
60	K Krueger, L Hansen, S Smaldino	Preservice teacher technology competencies	2000
55	NH Dabbagh	The challenges of interfacing between face-to-face and online instruction	2000
34	J Summerville	WebQuests	2000
33	R Foshay, C Bergeron	Web-based education: A reality check	2000
32	MA Zisow	Teaching style and technology	2000

153	RF Branon, C Essex	Synchronous and asynchronous communication tools in distance education	2001
113	ZL Berge, L Muilenburg	Obstacles faced at various stages of capability regarding distance education in institutions of higher education	2001
91	L Whetstone, AA Carr-Chellman	Preparing preservice teachers to use technology: Survey results	2001
38	KB Hopper	Is the internet a classroom?	2001
36	B Akkoyunlu, F Orhan	The use of computers in K-12 Schools in Turkey	2001
188	PR Albion, PA Ertmer	Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology	2002
64	J Moore, S Barab	The inquiry learning forum	2002
64	M Thomas, M Mitchell, R Joseph	A cultural embrace	2002
49	S Mandell, DH Sorge, JD Russell	Tips for technology integration	2002
43	T Pearson	A technology crisis facing minority students	2002
95	S Cox, RT Osguthorpe	How do instructional design professionals spend their time?	2003
87	AS Gibbons	What and how do designers design?	2003
82	N Dabbagh	Scaffolding: An important teacher competency in online learning	2003
55	B Cameron	The effectiveness of simulation in a hybrid and online networking course	2003
51	A Ali	Instructional design and online instruction	2003
190	T Martindale, DA Wiley	Using weblogs in scholarship and teaching	2004
142	SE Kirkley, JR Kirkley	Creating next generation blended learning environments using mixed reality, video games and simulations	2004
123	A Carstens, J Beck	Get ready for the gamer generation	2004
116	E Klopfer, S Yoon	Developing games and simulations for today and tomorrow's tech savvy youth	2004
76	N DeKanter	Gaming redefines interactivity for learning	2004
214	ME Engstrom, D Jewett	Collaborative learning the wiki way	2005
147	K Squire, L Giovanetto, B Devane, S Durga	From users to designers: Building a self-organizing game-based learning environment	2005
95	J Robertson, J Good	Children's narrative development through computer game authoring	2005
73	SS Elizabeth	Evolution in the classroom: What teachers need to know about the video game generation	2005
54	E Hayes	Women, video gaming and learning: Beyond stereotypes	2005
148	GM Johnson	Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research	2006
105	B Beatty, C Ulasewicz	Faculty perspectives on moving from Blackboard to the Moodle learning management system	2006
72	C Mims, D Polly, C Shepherd, F Inan	Examining PT3 projects designed to improve preservice education	2006
64	JC Dunlap	Using guided reflective journaling activities to capture students' changing perceptions	2006
63	RE West, G Wright, B Gabbitas, CR Graham	Reflections from the introduction of blogs and RSS feeds into a preservice instructional technology course	2006

142	WR Watson, SL Watson	What are learning management systems, what are they not, and what should they become?	2007
77	EW Black, D Beck, K Dawson, S Jinks, M DiPietro	Considering implementation and use in the adoption of an LMS in online and blended learning environments	2007
62	DA Falvo, BF Johnson	The use of learning management systems in the United States	2007
62	JC Dunlap, D Sobel, DI Sands	Designing for deep and meaningful student-to-content interactions	2007
41	D Steinman	Educational experiences and the online student	2007
136	DM Casey	The historical development of distance education through technology	2008
105	A Artino	Practical guidelines for online instructors	2008
95	RC Richey, KH Silber, DP Ely	Reflections on the 2008 AECT Definitions of the Field	2008
80	SK Wang, HY Hsu	Reflections on using blogs to expand in-class	2008
78	L Moller, W Foshay, J Huett	Implications for instructional design on the potential of the web	2008
191	S Cox, CR Graham	Using an elaborated model of the TPACK framework to analyze and depict teacher knowledge	2009
189	RC Graham, N Burgoyne, P Cantrell, L Smith, L St Clair…	Measuring the TPACK confidence of inservice science teachers	2009
105	LB Holcomb	Results & lessons learned from1: 1 laptop initiatives: A collective review	2009
97	P Mishra, MJ Koehler, K Kereluik	Looking back to the future of educational technology	2009
82	MM Snyder	Instructional-design theory to guide the creation of online learning communities for adults	2009
40	P Lowenthal, BG Wilson	Labels do matter! A critique of AECT's redefinition of the field	2010
33	LB Holcomb, CM Beal	Capitalizing on Web 2.0 in the social studies context	2010
31	A Hirumi, B Appelman, L Rieber, R Van Eck	Preparing instructional designers for game-based learning: Part 1	2010
27	SB Steinweg, SC Williams, JN Stapleton	Faculty use of tablet PCs in teacher education and K-12 settings	2010
25	WC Allan, JL Erickson, P Brookhouse, JL Johnson	Teacher professional development through a collaborative curriculum project–an example of TPACK in Maine	2010
208	OT Murray, NR Olcese	Teaching and learning with iPads, ready or not?	2011
95	B Teclehaimanot, T Hickman	Student-teacher interaction on Facebook: What students find appropriate	2011
89	CM Walker, BR Sockman, S Koehn	An exploratory study of cyberbullying with undergraduate university students	2011
57	RS Davies	Understanding technology literacy: A framework for evaluating educational technology integration	2011
42	RD Morris	Web 3.0: Implications for online learning	2011

128	B McClanahan, K Williams, E Kennedy, S Tate	A breakthrough for Josh: How use of an iPad facilitated reading improvement	2012
84	K Lee	Augmented reality in education and training	2012
48	DW Denton	Enhancing instruction through constructivism, cooperative learning, and cloud computing	2012
37	CH Tu, L Sujo-Montes, CJ Yen, JY Chan, M Blocher	The integration of personal learning environments & open network learning environments	2012
27	S Fuegen	The impact of mobile technologies on distance education	2012
66	J Enfield	Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN	2013
41	MFG Lin, ES Hoffman, C Borengasser	Is social media too social for class? A case study of Twitter use	2013
30	C Roseth, M Akcaoglu, A Zellner	Blending synchronous face-to-face and computer-supported cooperative learning in a hybrid doctoral seminar	2013
27	P Mishra, A Yadav	Rethinking technology & creativity in the 21st century	2013
23	C Shaltry, D Henriksen, ML Wu, WP Dickson	Situated learning with online portfolios, classroom websites and Facebook	2013
16	M Dunleavy	Design principles for augmented reality learning	2014
13	HT Zimmerman, SM Land	Facilitating place-based learning in outdoor informal environments with mobile computers	2014
12	SA Yoon, J Wang	Making the invisible visible in science museums through augmented reality devices	2014
12	E Baran, AP Correia	A professional development framework for online teaching	2014
11	R Kimmons	Social networking sites, literacy, and the authentic identity problem	2014

APPENDIX O

JOURNAL OF EDUCATIONAL TECHNOLOGY & SOCIETY

Articles cited 200 or more times. Published between Jan 1998- Dec 2014

Cites	Authors	Title	Year
469	R Koper, B Olivier	Representing the learning design of units of learning	2004
389	M Tam	Constructivism, instructional design, and technology: Implications for transforming distance learning	2000
366	SY Park	An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning	2009
362	K Kreijns, PA Kirschner, W Jochems	The sociability of computer-supported collaborative learning environment	2002
341	GJ Hwang, CC Tsai, SJH Yang	Criteria, strategies and research issues of context-aware ubiquitous learning	2008
336	SH Yang	Using blogs to enhance critical reflection and community of practice	2009
335	SJH Yang	Context aware ubiquitous learning environments for peer-to-peer collaborative learning	2006
322	M Nichols	A theory for eLearning	2003
316	M Virvou, G Katsionis, K Manos	Combining software games with education: Evaluation of its educational effectiveness	2005
302	D Hernández-Leo, ED Villasclaras-Fernández…	COLLAGE: A collaborative Learning Design editor based on patterns	2006
282	Y Karagiorgi, L Symeou	Translating constructivism into instructional design: Potential and limitations	2005
282	JH Park, HJ Choi	Factors influencing adult learners' decision to drop out or persist in online learning	2009
258	HK Sam, AEA Othman, ZS Nordin	Computer self-efficacy, computer anxiety, and attitudes toward the Internet: A study among undergraduates in Unimas	2005
249	N Henze, P Dolog, W Nejdl	Reasoning and ontologies for personalized e-learning in the semantic web	2004
228	JM McInnerney, TS Roberts	Online learning: Social interaction and the creation of a sense of community	2004
225	R Motschnig-Pitrik, A Holzinger	Student-centered teaching meets new media: Concept and case study	2002
207	P Avgeriou, A Papasalouros, S Retalis…	Towards a pattern language for learning management systems	2003

APPENDIX P

JOURNAL OF EDUCATIONAL TECHNOLOGY & SOCIETY

Five most-cited articles per year (1998-2014)

Cites	Authors	Title	Year
43	A Pincas	Successful online course design: Virtual frameworks for discourse construction	1998
11	K Luchini	Problems and potentials in web-based instruction, with particular focus on distance learning	1998
2	P Wiesner	Web delivery of training and education for industry: Some thoughts	1998
2	TP Abeles	Remember the future, imagine the past	1998
1	JR Layton	Integrating Computer Technology into the Classroom	1998
169	KE Dooley	Towards a holistic model for the diffusion of educational technologies: An integrative review of educational innovation studies	1999
128	TH Spotts	Discriminating factors in faculty use of instructional technology in higher education	1999
97	SM Miller, KL Miller	Using instructional theory to facilitate communication in web-based courses	1999
79	SH Lee	Usability testing for developing effective interactive multimedia software: Concepts, dimensions, and procedures	1999
68	CJ Brahler, NS Peterson, EC Johnson	Developing on-line learning materials for higher education: An overview of current issues	1999
389	M Tam	Constructivism, instructional design, and technology: Implications for transforming distance learning	2000
185	J Rogers	Communities of practice: A framework for fostering coherence in virtual learning communities	2000
165	M Oliver	An introduction to the evaluation of learning technology	2000
116	C Quinn, S Hobbs	Learning objects and instruction components	2000
99	R Nachmias, D Mioduser, A Oren, J Ram	Web-supported emergent-collaboration in higher education courses	2000
127	YJ Dori, M Barak	Virtual and physical molecular modeling: Fostering model perception and spatial understanding	2001
120	M Moallem	Applying constructivist and objectivist learning theories in the design of a web-based course: Implications for practice	2001
105	M Martinez	Key design considerations for personalized learning on the web	2001
93	M Neo, KTK Neo	Innovative teaching: Using multimedia in a problem-based learning environment	2001
88	C Ziguras	Educational technology in transnational higher education in South East Asia: the cultural politics of flexible learning	2001
362	K Kreijns, PA Kirschner, W Jochems	The sociability of computer-supported collaborative learning environment	2002
225	R Motschnig-Pitrik, A Holzinger	Student-centered teaching meets new media: Concept and case study	2002
136	C Cope, P Ward	Integrating learning technology into classrooms: The importance of teachers' perceptions	2002
117	D Sampson, C Karagiannidis, F Cardinali	An architecture for web-based e-learning promoting re-usable adaptive educational e-content	2002
117	D Eseryel	Approaches to evaluation of training: Theory & practice	2002
322	M Nichols	A theory for eLearning	2003

207	P Avgeriou, A Papasalouros, S Retalis…	Towards a pattern language for learning management systems	2003
137	KS Hong, KW Lai, D Holton	Students' satisfaction and perceived learning with a web-based course	2003
130	JS Lee, H Cho, G Gay, B Davidson…	Technology acceptance and social networking in distance learning	2003
121	KS Hong, AA Ridzuan, MK Kuek	Students' attitudes toward the use of the Internet for learning: A study at a university in Malaysia	2003
469	R Koper, B Olivier	Representing the learning design of units of learning	2004
249	N Henze, P Dolog, W Nejdl	Reasoning and ontologies for personalized e-learning in the semantic web	2004
228	JM McInnerney, TS Roberts	Online learning: Social interaction and the creation of a sense of community	2004
191	L Aroyo, D Dicheva	The new challenges for e-learning: The educational semantic web	2004
172	W Sugar, F Crawley, B Fine	Examining teachers' decisions to adopt new technology	2004
316	M Virvou, G Katsionis, K Manos	Combining software games with education: Evaluation of its educational effectiveness	2005
282	Y Karagiorgi, L Symeou	Translating constructivism into instructional design: Potential and limitations	2005
258	HK Sam, AEA Othman, ZS Nordin	Computer self-efficacy, computer anxiety, and attitudes toward the Internet: A study among undergraduates in Unimas	2005
187	I Jung	ICT-pedagogy integration in teacher training: application cases worldwide	2005
184	P Karampiperis, D Sampson	Adaptive learning resources sequencing in educational hypermedia systems	2005
335	SJH Yang	Context aware ubiquitous learning environments for peer-to-peer collaborative learning	2006
302	D Hernández-Leo, ED Villasclaras-Fernández…	COLLAGE: A collaborative Learning Design editor based on patterns	2006
187	A Delwiche	Massively multiplayer online games (MMOs) in the new media classroom	2006
172	R Koper	Editorial: Current research in learning design	2006
157	P Nokelainen	An empirical assessment of pedagogical usability criteria for digital learning material with elementary school students	2006
196	R Klamma, MA Chatti, E Duval, H Hummel…	Social software for life-long learning	2007
196	E Yukselturk, S Bulut	Predictors for student success in an online course	2007
156	M Wolpers, J Najjar, K Verbert, E Duval	Tracking actual usage: the attention metadata approach	2007
150	TL Leacock, JC Nesbit	A framework for evaluating the quality of multimedia learning resources	2007
135	G Paquette	An ontology and a software framework for competency modeling and management	2007
341	GJ Hwang, CC Tsai, SJH Yang	Criteria, strategies and research issues of context-aware ubiquitous learning	2008
189	T Amiel, TC Reeves	Design-based research and educational technology: Rethinking technology and the research agenda	2008
151	N Wagner, K Hassanein, M Head	Who is responsible for e-learning success in higher education? A stakeholders' analysis	2008

141	B Akkoyunlu, MY Soylu	A study of student's perceptions in a blended learning environment based on different learning styles	2008
126	T Teo, WS Luan, CC Sing	A cross-cultural examination of the intention to use technology between Singaporean and Malaysian pre-service teachers: an application of the Technology …	2008
366	SY Park	An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning	2009
336	SH Yang	Using blogs to enhance critical reflection and community of practice	2009
282	JH Park, HJ Choi	Factors influencing adult learners' decision to drop out or persist in online learning	2009
166	L Shen, M Wang, R Shen	Affective e-learning: Using “emotional” data to improve learning in pervasive learning environment	2009
158	IYL Chen, NS Chen, Kinshuk	Examining the factors influencing participants' knowledge sharing behavior in virtual learning communities	2009
198	CS Chai, JHL Koh, CC Tsai	Facilitating preservice teachers' development of technological, pedagogical, and content knowledge (TPACK)	2010
194	MOM El-Hussein, JC Cronje	Defining mobile learning in the higher education landscape	2010
115	YL Jeng, TT Wu, YM Huang, Q Tan, SJH Yang	The add-on impact of mobile applications in learning strategies: A review study	2010
111	JL Shih, CW Chuang, GJ Hwang	An inquiry-based mobile learning approach to enhancing social science learning effectiveness	2010
95	AG Almekhlafi, FA Almeqdadi	Teachers' perceptions of technology integration in the United Arab Emirates school classrooms	2010
120	YH Lee, YC Hsieh, CN Hsu	Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use e-learning systems	2011
83	M Woo, S Chu, A Ho, X Li	Using a wiki to scaffold primary-school students' collaborative writing	2011
81	O El-Gayar, M Moran, M Hawkes	Students' acceptance of tablet PCs and implications for educational institutions	2011
75	N Tselios, S Daskalakis, M Papadopoulou	Assessing the acceptance of a blended learning university course	2011
60	SS Vattam, AK Goel, S Rugaber…	Understanding complex natural systems by articulating structure-behavior-function models	2011
162	SB Shum, R Ferguson	Social learning analytics	2012
139	W Greller, H Drachsler	Translating learning into numbers: A generic framework for learning analytics	2012
95	YK Türel, TE Johnson	Teachers' belief and use of interactive whiteboards for teaching and learning	2012
83	AL Dyckhoff, D Zielke, M Bültmann, MA Chatti…	Design and implementation of a learning analytics toolkit for teachers	2012
72	C Zhu	Student satisfaction, performance, and knowledge construction in online collaborative learning	2012
77	CS Chai, JHL Koh, CC Tsai	A review of technological pedagogical content knowledge	2013
46	S Flumerfelt, G Green	Using lean in the flipped classroom for at risk students	2013
41	S Wright, A Fugett, F Caputa	Using e-readers and Internet resources to support comprehension	2013

40	PH Hung, GJ Hwang, YF Lin, TH Wu, IH Su	Seamless connection between learning and assessment-applying progressive learning tasks in mobile ecology inquiry	2013
40	X Gu, Y Zhu, X Guo	Meeting the “Digital Natives”: Understanding the acceptance of technology in classrooms	2013
31	HC Chu	Potential negative effects of mobile learning on students' learning achievement and cognitive load—a format assessment perspective	2014
24	GJ Hwang, PH Hung, NS Chen, GZ Liu	Mindtool-Assisted In-Field Learning (MAIL): an advanced ubiquitous learning project in Taiwan	2014
23	SB Dias, JA Diniz	Towards an enhanced learning management system for blended learning in higher education incorporating distinct learners' profiles	2014
18	D Eseryel, V Law, D Ifenthaler, X Ge, R Miller	An investigation of the interrelationships between motivation, engagement, and complex problem solving in game-based learning	2014
16	TH Liang, YM Huang	An investigation of reading rate patterns and retrieval outcomes of elementary school students with e-books	2014

APPENDIX Q

COMPUTERS & EDUCATION

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1036	PC Sun, RJ Tsai, G Finger, YY Chen, D Yeh	What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction	2008
885	M Sharples	The design of personal mobile technologies for lifelong learning	2000
875	S Ainsworth	The functions of multiple representations	1999
861	WJ Pelgrum	Obstacles to the integration of ICT in education: results from a worldwide educational assessment	2001
796	B De Wever, T Schellens, M Valcke, H Van Keer	Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review	2006
692	M Papastergiou	Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation	2009
622	LF Motiwalla	Mobile learning: A framework and evaluation	2007
607	C Romero, S Ventura, E García	Data mining in course management systems: Moodle case study and tutorial	2008
604	C Chou, MC Hsiao	Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case	2000
584	C Evans	The effectiveness of m-learning in the form of podcast revision lectures in higher education	2008
561	R Rosas, M Nussbaum, P Cumsille, V Marianov…	Beyond Nintendo: design and assessment of educational video games for first and second grade students	2003
546	A Weinberger, F Fischer	A framework to analyze argumentative knowledge construction in computer-supported collaborative learning	2006
542	AL Baylor, D Ritchie	What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms?	2002
520	HM Selim	Critical success factors for e-learning acceptance: Confirmatory factor models	2007
515	G Zurita, M Nussbaum	Computer supported collaborative learning using wirelessly interconnected handheld computers	2004
515	C Angeli, N Valanides	Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content …	2009
503	MJ Koehler, P Mishra, K Yahya	Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology	2007
502	TM Connolly, EA Boyle, E MacArthur, T Hainey…	A systematic literature review of empirical evidence on computer games and serious games	2012
498	A Albirini	Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers	2006
488	A Margaryan, A Littlejohn, G Vojt	Are digital natives a myth or reality? University students' use of digital technologies	2011
483	KA Pituch, Y Lee	The influence of system characteristics on e-learning use	2006
480	EWT Ngai, JKL Poon, YHC Chan	Empirical examination of the adoption of WebCT using TAM	2007
470	HJ So, TA Brush	Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors	2008

466	C Jones, R Ramanau, S Cross, G Healing	Net generation or digital natives: is there a distinct new generation entering university?	2010
458	S De Freitas, M Oliver	How can exploratory learning with games and simulations within the curriculum be most effectively evaluated?	2006
457	EM Van Raaij, JJL Schepers	The acceptance and use of a virtual learning environment in China	2008
452	R Junco	The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement	2012
427	SS Liaw	Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system	2008
426	M Cole	Using Wiki technology to support student engagement: Lessons from the trenches	2009
413	SS Liaw, HM Huang, GD Chen	Surveying instructor and learner attitudes toward e-learning	2007
399	JW Strijbos, RL Martens, FJ Prins, WMG Jochems	Content analysis: What are they talking about?	2006
397	JB Pena-Shaff, C Nicholls	Analyzing student interactions and meaning construction in computer bulletin board discussions	2004
392	Y Levy	Comparing dropouts and persistence in e-learning courses	2007
377	M Ebner, C Lienhardt, M Rohs, I Meyer	Microblogs in Higher Education–A chance to facilitate informal and process-oriented learning?	2010
374	S Schrire	Knowledge building in asynchronous discussion groups: Going beyond quantitative analysis	2006
371	CB Fried	In-class laptop use and its effects on student learning	2008
366	RA Bartsch, KM Cobern	Effectiveness of PowerPoint presentations in lectures	2003
363	A Martınez, Y Dimitriadis, B Rubia, E Gómez…	Combining qualitative evaluation and social network analysis for the study of classroom social interactions	2003
362	SG Mazman, YK Usluel	Modeling educational usage of Facebook	2010
361	HM Selim	An empirical investigation of student acceptance of course websites	2003
361	M Ebner, A Holzinger	Successful implementation of user-centered game based learning in higher education: An example from civil engineering	2007
360	MC Lee	Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model	2010
359	CM Chiu, MH Hsu, SY Sun, TC Lin, PC Sun	Usability, quality, value and e-learning continuance decisions	2005
357	MJ Metzger, AJ Flanagin, L Zwarun	College student Web use, perceptions of information credibility, and verification behavior	2003
355	N Li, G Kirkup	Gender and cultural differences in Internet use: A study of China and the UK	2007
354	M Mazzolini, S Maddison	Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums	2003
343	CM Chen, HM Lee, YH Chen	Personalized e-learning system using item response theory	2005
343	T Teo	Modelling technology acceptance in education: A study of pre-service teachers	2009
326	L Jarmon, T Traphagan, M Mayrath, A Trivedi	Virtual world teaching, experiential learning, and assessment: An interdisciplinary communication course in Second Life	2009

326	J Mueller, E Wood, T Willoughby, C Ross…	Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration	2008
326	R Hermans, J Tondeur, J van Braak, M Valcke	The impact of primary school teachers' educational beliefs on the classroom use of computers	2008
318	M Drent, M Meelissen	Which factors obstruct or stimulate teacher educators to use ICT innovatively?	2008
315	H Tüzün, M Yılmaz-Soylu, T Karakuş, Y İnal…	The effects of computer games on primary school students' achievement and motivation in geography learning	2009
305	A De Lucia, R Francese, I Passero, G Tortora	Development and evaluation of a virtual campus on Second Life: The case of SecondDMI	2009
301	G Conole, M Dyke, M Oliver, J Seale	Mapping pedagogy and tools for effective learning design	2004
300	JW Strijbos, RL Martens, WMG Jochems	Designing for interaction: Six steps to designing computer-supported group-based learning	2004
300	B Patten, IA Sánchez, B Tangney	Designing collaborative, constructionist and contextual applications for handheld devices	2006
297	E Triantafillou, A Pomportsis, S Demetriadis	The design and the formative evaluation of an adaptive educational system based on cognitive styles	2003
296	RH Kay, A LeSage	Examining the benefits and challenges of using audience response systems: A review of the literature	2009
295	H Cho, G Gay, B Davidson, A Ingraffea	Social networks, communication styles, and learning performance in a CSCL community	2007
293	J Macdonald	Assessing online collaborative learning: process and product	2003
292	E Smeets	Does ICT contribute to powerful learning environments in primary education?	2005
291	A Tolmie, J Boyle	Factors influencing the success of computer mediated communication (CMC) environments in university teaching: a review and case study	2000
286	G Conole, M De Laat, T Dillon, J Darby	'Disruptive technologies','pedagogical innovation': What's new? Findings from an in-depth study of students' use and perception of technology	2008
286	G Sang, M Valcke, J van Braak, J Tondeur	Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology	2010
285	A Szabo, N Hastings	Using IT in the undergraduate classroom: should we replace the blackboard with PowerPoint?	2000
279	MK Barbour, TC Reeves	The reality of virtual schools: A review of the literature	2009
276	LA Annetta, J Minogue, SY Holmes, MT Cheng	Investigating the impact of video games on high school students' engagement and learning about genetics	2009
274	HN Kim	The phenomenon of blogs and theoretical model of blog use in educational contexts	2008
274	M Papastergiou	Exploring the potential of computer and video games for health and physical education: A literature review	2009
271	F Blin, M Munro	Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory	2008
267	S Demetriadis, A Barbas, A Molohides…	“Cultures in negotiation”: teachers' acceptance/resistance attitudes considering the infusion of technology into schools	2003
267	D McKinney, JL Dyck, ES Luber	iTunes University and the classroom: Can podcasts replace Professors?	2009

264	L Chittaro, R Ranon	Web3D technologies in learning, education and training: Motivations, issues, opportunities	2007
263	A Domínguez, J Saenz-de-Navarrete, L De-Marcos…	Gamifying learning experiences: Practical implications and outcomes	2013
262	LP Macfadyen, S Dawson	Mining LMS data to develop an “early warning system” for educators: A proof of concept	2010
260	PA Ertmer, AT Ottenbreit-Leftwich, O Sadik…	Teacher beliefs and technology integration practices: A critical relationship	2012
259	K Cho, CD Schunn	Scaffolded writing and rewriting in the discipline: A web-based reciprocal peer review system	2007
259	T Schellens, M Valcke	Fostering knowledge construction in university students through asynchronous discussion groups	2006
259	M Paechter, B Maier, D Macher	Students' expectations of, and experiences in e-learning: Their relation to learning achievements and course satisfaction	2010
259	GJ Hwang, HF Chang	A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students	2011
258	A Jimoyiannis, V Komis	Computer simulations in physics teaching and learning: a case study on students' understanding of trajectory motion	2001
257	P García, A Amandi, S Schiaffino, M Campo	Evaluating Bayesian networks' precision for detecting students' learning styles	2007
257	WD Woody, DB Daniel, CA Baker	E-books or textbooks: Students prefer textbooks	2010
256	S Mumtaz	Children's enjoyment and perception of computer use in the home and the school	2001
255	CY Chou, TW Chan, CJ Lin	Redefining the learning companion: the past, present, and future of educational agents	2003
254	A Jones, K Issroff	Learning technologies: Affective and social issues in computer-supported collaborative learning	2005
251	DW Shaffer	Epistemic frames for epistemic games	2006
249	C Markett, IA Sánchez, S Weber, B Tangney	Using short message service to encourage interactivity in the classroom	2006
249	SH Liu, HL Liao, JA Pratt	Impact of media richness and flow on e-learning technology acceptance	2009
248	T Martín-Blas, A Serrano-Fernández	The role of new technologies in the learning process: Moodle as a teaching tool in Physics	2009
240	GJ Hwang	A conceptual map model for developing intelligent tutoring systems	2003
240	JH Wu, RD Tennyson, TL Hsia	A study of student satisfaction in a blended e-learning system environment	2010
237	RG Muir-Herzig	Technology and its impact in the classroom	2004
236	N Selwyn	Students' attitudes toward computers: Validation of a computer attitude scale for 16–19 education	1997
236	S Ozkan, R Koseler	Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation	2009
235	F Ke	A case study of computer gaming for math: Engaged learning from gameplay?	2008
233	CE Hmelo-Silver	Analyzing collaborative knowledge construction: Multiple methods for integrated understanding	2003
233	FL Fu, RC Su, SC Yu	EGameFlow: A scale to measure learners' enjoyment of e-learning games	2009
232	H Wood, D Wood	Help seeking, learning and contingent tutoring	1999

231	BC Lee, JO Yoon, I Lee	Learners' acceptance of e-learning in South Korea: Theories and results	2009
230	MD Byrne, R Catrambone, JT Stasko	Evaluating animations as student aids in learning computer algorithms	1999
230	DY Shee, YS Wang	Multi-criteria evaluation of the web-based e-learning system: A methodology based on learner satisfaction and its applications	2008
230	PSD Chen, AD Lambert, KR Guidry	Engaging online learners: The impact of Web-based learning technology on college student engagement	2010
229	MHB Soong, HC Chan, BC Chua, KF Loh	Critical success factors for on-line course resources	2001
226	SD Johnson, C Suriya, SW Yoon, JV Berrett…	Team development and group processes of virtual learning teams	2002
226	J Robertson, C Howells	Computer game design: Opportunities for successful learning	2008
225	IF Liu, MC Chen, YS Sun, D Wible, CH Kuo	Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community	2010
224	K Passerini, MJ Granger	A developmental model for distance learning using the Internet	2000
223	J Tondeur, H Van Keer, J van Braak, M Valcke	ICT integration in the classroom: Challenging the potential of a school policy	2008
223	M Kebritchi, A Hirumi, H Bai	The effects of modern mathematics computer games on mathematics achievement and class motivation	2010
223	JW Gikandi, D Morrow, NE Davis	Online formative assessment in higher education: A review of the literature	2011
221	CM Chen, CJ Chung	Personalized mobile English vocabulary learning system based on item response theory and learning memory cycle	2008
220	B Lin, C Hsieh	Web-based teaching and learner control: A research review	2001
220	JE Susskind	PowerPoint's power in the classroom: Enhancing students' self-efficacy and attitudes	2005
219	T Monahan, G McArdle, M Bertolotto	Virtual reality for collaborative e-learning	2008
219	M Kebritchi	Examining the pedagogical foundations of modern educational computer games	2008
217	S De Freitas, T Neumann	The use of 'exploratory learning'for supporting immersive learning in virtual environments	2009
215	SW Draper, MI Brown, FP Henderson, E McAteer	Integrative evaluation: an emerging role for classroom studies of CAL	1996
215	H Mahdizadeh, H Biemans, M Mulder	Determining factors of the use of e-learning environments by university teachers	2008
213	P Shea, T Bidjerano	Community of inquiry as a theoretical framework to foster “epistemic engagement” and “cognitive presence” in online education	2009
211	S Lonn, SD Teasley	Saving time or innovating practice: Investigating perceptions and uses of Learning Management Systems	2009
210	B Kim, H Park, Y Baek	Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning	2009

209	J Janssen, G Erkens, G Kanselaar, J Jaspers	Visualization of participation: Does it contribute to successful computer-supported collaborative learning?	2007
209	AY Yu, SW Tian, D Vogel, RCW Kwok	Can learning be virtually boosted? An investigation of online social networking impacts	2010
208	GD Chen, CK Chang, CY Wang	Ubiquitous learning website: Scaffold learners by mobile devices with information-aware techniques	2008
207	M Volman, E van Eck, I Heemskerk, E Kuiper	New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education	2005
207	S Hrastinski	A theory of online learning as online participation	2009
206	A Durndell, K Thomson	Gender and computing: a decade of change?	1997
204	C Crook	Children as computer users: the case of collaborative learning	1998
204	S Price, Y Rogers	Let's get physical: The learning benefits of interacting in digitally augmented physical spaces	2004
203	GJ Hwang, TC Yang, CC Tsai, SJH Yang	A context-aware ubiquitous learning environment for conducting complex science experiments	2009
202	WH Wu, YCJ Wu, CY Chen, HY Kao, CH Lin…	Review of trends from mobile learning studies: A meta-analysis	2012
200	RBB Levy, M Ben-Ari, PA Uronen	The Jeliot 2000 program animation system	2003

APPENDIX R

COMPUTERS & EDUCATION

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
194	AL Russell	Stages in learning new technology: Naive adult email users	1995
120	AD Yakimovicz, KL Murphy	Constructivism and collaboration on the Internet: Case study of a graduate class experience	1995
117	BG Silverman	Computer supported collaborative learning (CSCL)	1995
99	L Schrum	Educators and the Internet: A case study of professional development	1995
74	K Watabe, M Hamalainen, AB Whinston	An Internet based collaborative distance learning system: CODILESS	1995
215	SW Draper, MI Brown, FP Henderson, E McAteer	Integrative evaluation: an emerging role for classroom studies of CAL	1996
151	D Squires, J Preece	Usability and learning: evaluating the potential of educational software	1996
116	E Aimeur, C Frasson	Analyzing a new learning strategy according to different knowledge levels	1996
96	R Pilkington, C Parker-Jones	Interacting with computer-based simulation: The role of dialogue	1996
95	R Wegerif	Using computers to help coach exploratory talk across the curriculum	1996
236	N Selwyn	Students' attitudes toward computers: Validation of a computer attitude scale for 16–19 education	1997
206	A Durndell, K Thomson	Gender and computing: a decade of change?	1997
170	IJ Reinen, T Plomp	Information technology and gender equality: a contradiction in terminis?	1997
140	YB Kafai, CC Ching, S Marshall	Children as designers of educational multimedia software	1997
87	A Sloane	Learning with the Web: Experience of using the World Wide Web in a learning environment	1997
204	C Crook	Children as computer users: the case of collaborative learning	1998
172	B Collis	New didactics for university instruction: why and how?	1998
162	B Shneiderman	Relate–Create–Donate: a teaching/learning philosophy for the cyber-generation	1998
144	M Ward, D Newlands	Use of the Web in undergraduate teaching	1998
141	D Laurillard	Multimedia and the learner's experience of narrative	1998
875	S Ainsworth	The functions of multiple representations	1999
232	H Wood, D Wood	Help seeking, learning and contingent tutoring	1999
230	MD Byrne, R Catrambone, JT Stasko	Evaluating animations as student aids in learning computer algorithms	1999
173	G Shaw, N Marlow	The role of student learning styles, gender, attitudes and perceptions on information and communication technology assisted learning	1999
129	AF Smeaton, G Keogh	An analysis of the use of virtual delivery of undergraduate lectures	1999
885	M Sharples	The design of personal mobile technologies for lifelong learning	2000
604	C Chou, MC Hsiao	Internet addiction, usage, gratification, and pleasure experience: the Taiwan college students' case	2000

291	A Tolmie, J Boyle	Factors influencing the success of computer mediated communication (CMC) environments in university teaching: a review and case study	2000
285	A Szabo, N Hastings	Using IT in the undergraduate classroom: should we replace the blackboard with PowerPoint?	2000
224	K Passerini, MJ Granger	A developmental model for distance learning using the Internet	2000
861	WJ Pelgrum	Obstacles to the integration of ICT in education: results from a worldwide educational assessment	2001
258	A Jimoyiannis, V Komis	Computer simulations in physics teaching and learning: a case study on students' understanding of trajectory motion	2001
256	S Mumtaz	Children's enjoyment and perception of computer use in the home and the school	2001
229	MHB Soong, HC Chan, BC Chua, KF Loh	Critical success factors for on-line course resources	2001
220	B Lin, C Hsieh	Web-based teaching and learner control: A research review	2001
542	AL Baylor, D Ritchie	What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms?	2002
226	SD Johnson, C Suriya, SW Yoon, JV Berrett…	Team development and group processes of virtual learning teams	2002
190	KP King	Educational technology professional development as transformative learning opportunities	2002
189	M Xenos, C Pierrakeas, P Pintelas	A survey on student dropout rates and dropout causes concerning the students in the Course of Informatics of the Hellenic Open University	2002
180	KA Papanikolaou, M Grigoriadou, GD Magoulas…	Towards new forms of knowledge communication: the adaptive dimension of a web-based learning environment	2002
561	R Rosas, M Nussbaum, P Cumsille, V Marianov…	Beyond Nintendo: design and assessment of educational video games for first and second grade students	2003
366	RA Bartsch, KM Cobern	Effectiveness of PowerPoint presentations in lectures	2003
363	A Martınez, Y Dimitriadis, B Rubia, E Gómez…	Combining qualitative evaluation and social network analysis for the study of classroom social interactions	2003
361	HM Selim	An empirical investigation of student acceptance of course websites	2003
357	MJ Metzger, AJ Flanagin, L Zwarun	College student Web use, perceptions of information credibility, and verification behavior	2003
515	G Zurita, M Nussbaum	Computer supported collaborative learning using wirelessly interconnected handheld computers	2004
397	JB Pena-Shaff, C Nicholls	Analyzing student interactions and meaning construction in computer bulletin board discussions	2004
301	G Conole, M Dyke, M Oliver, J Seale	Mapping pedagogy and tools for effective learning design	2004
300	JW Strijbos, RL Martens, WMG Jochems	Designing for interaction: Six steps to designing computer-supported group-based learning	2004
237	RG Muir-Herzig	Technology and its impact in the classroom	2004
359	CM Chiu, MH Hsu, SY Sun, TC Lin, PC Sun	Usability, quality, value and e-learning continuance decisions	2005

343	CM Chen, HM Lee, YH Chen	Personalized e-learning system using item response theory	2005
292	E Smeets	Does ICT contribute to powerful learning environments in primary education?	2005
254	A Jones, K Issroff	Learning technologies: Affective and social issues in computer-supported collaborative learning	2005
220	JE Susskind	PowerPoint's power in the classroom: Enhancing students' self-efficacy and attitudes	2005
796	B De Wever, T Schellens, M Valcke, H Van Keer	Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review	2006
546	A Weinberger, F Fischer	A framework to analyze argumentative knowledge construction in computer-supported collaborative learning	2006
498	A Albirini	Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers	2006
483	KA Pituch, Y Lee	The influence of system characteristics on e-learning use	2006
458	S De Freitas, M Oliver	How can exploratory learning with games and simulations within the curriculum be most effectively evaluated?	2006
622	LF Motiwalla	Mobile learning: A framework and evaluation	2007
520	HM Selim	Critical success factors for e-learning acceptance: Confirmatory factor models	2007
503	MJ Koehler, P Mishra, K Yahya	Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology	2007
480	EWT Ngai, JKL Poon, YHC Chan	Empirical examination of the adoption of WebCT using TAM	2007
413	SS Liaw, HM Huang, GD Chen	Surveying instructor and learner attitudes toward e-learning	2007
1036	PC Sun, RJ Tsai, G Finger, YY Chen, D Yeh	What drives a successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction	2008
607	C Romero, S Ventura, E García	Data mining in course management systems: Moodle case study and tutorial	2008
584	C Evans	The effectiveness of m-learning in the form of podcast revision lectures in higher education	2008
470	HJ So, TA Brush	Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors	2008
457	EM Van Raaij, JJL Schepers	The acceptance and use of a virtual learning environment in China	2008
692	M Papastergiou	Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation	2009
515	C Angeli, N Valanides	Epistemological and methodological issues for the conceptualization, development, and assessment of ICT–TPCK: Advances in technological pedagogical content …	2009
426	M Cole	Using Wiki technology to support student engagement: Lessons from the trenches	2009
343	T Teo	Modelling technology acceptance in education: A study of pre-service teachers	2009
326	L Jarmon, T Traphagan, M Mayrath, A Trivedi	Virtual world teaching, experiential learning, and assessment: An interdisciplinary communication course in Second Life	2009
466	C Jones, R Ramanau, S Cross, G Healing	Net generation or digital natives: is there a distinct new generation entering university?	2010

377	M Ebner, C Lienhardt, M Rohs, I Meyer	Microblogs in Higher Education–A chance to facilitate informal and process-oriented learning?	2010
362	SG Mazman, YK Usluel	Modeling educational usage of Facebook	2010
360	MC Lee	Explaining and predicting users' continuance intention toward e-learning: An extension of the expectation–confirmation model	2010
286	G Sang, M Valcke, J van Braak, J Tondeur	Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology	2010
488	A Margaryan, A Littlejohn, G Vojt	Are digital natives a myth or reality? University students' use of digital technologies	2011
259	GJ Hwang, HF Chang	A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students	2011
223	JW Gikandi, D Morrow, NE Davis	Online formative assessment in higher education: A review of the literature	2011
197	CR Graham	Theoretical considerations for understanding technological pedagogical content knowledge (TPACK)	2011
183	LH Wong, CK Looi	What seams do we remove in mobile-assisted seamless learning? A critical review of the literature	2011
502	TM Connolly, EA Boyle, E MacArthur, T Hainey…	A systematic literature review of empirical evidence on computer games and serious games	2012
452	R Junco	The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement	2012
260	PA Ertmer, AT Ottenbreit-Leftwich, O Sadik…	Teacher beliefs and technology integration practices: A critical relationship	2012
202	WH Wu, YCJ Wu, CY Chen, HY Kao, CH Lin…	Review of trends from mobile learning studies: A meta-analysis	2012
193	N Rutten, WR van Joolingen, JT van der Veen	The learning effects of computer simulations in science education	2012
263	A Domínguez, J Saenz-de-Navarrete, L De-Marcos…	Gamifying learning experiences: Practical implications and outcomes	2013
160	HK Wu, SWY Lee, HY Chang, JC Liang	Current status, opportunities and challenges of augmented reality in education	2013
124	F Sana, T Weston, NJ Cepeda	Laptop multitasking hinders classroom learning for both users and nearby peers	2013
113	A Di Serio, MB Ibáñez, CD Kloos	Impact of an augmented reality system on students' motivation for a visual art course	2013
98	R Cheung, D Vogel	Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning	2013
67	RA Sánchez, V Cortijo, U Javed	Students' perceptions of Facebook for academic purposes	2014
46	L De-Marcos, A Domínguez, J Saenz-de-Navarrete…	An empirical study comparing gamification and social networking on e-learning	2014
42	Z Merchant, ET Goetz, L Cifuentes…	Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis	2014
36	WW Porter, CR Graham, KA Spring, KR Welch	Blended learning in higher education: Institutional adoption and implementation	2014

35	N Kucirkova, D Messer, K Sheehy, CF Panadero	Children's engagement with educational iPad apps: Insights from a Spanish classroom	2014

APPENDIX S

JOURNAL OF EDUCATIONAL COMPUTING RESEARCH

Articles cited 200 or more times. Published between Jan 1995- Dec 2014

Cites	Authors	Title	Year
1492	CN Gunawardena, CA Lowe and T. Anderson	Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing	1997
610	T Busch	Gender differences in self-efficacy and attitudes toward computers	1995
604	MJ Koehler, P Mishra	What happens when teachers design educational technology? The development of technological pedagogical content knowledge	2005
575	MJ Jacobson, RJ Spiro	Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: An empirical investigation	1995
462	TBQ Li	Cyber-harassment: A study of a new method for an old behavior	2005
385	JJ Vogel, DS Vogel, J Cannon-Bowers…	Computer gaming and interactive simulations for learning: A meta-analysis	2006
352	DL Fabry, JR Higgs	Barriers to the effective use of technology in education: Current status	1997
343	S Cassidy, P Eachus	Developing the computer user self-efficacy (CUSE) scale: Investigating the relationship between computer self-efficacy, gender and experience with computers	2002
329	CM Fletcher-Flinn, B Gravatt	The efficacy of computer assisted instruction (CAI): A meta-analysis	1995
329	K Swan, P Shea, E Fredericksen, A Pickett…	Building knowledge building communities: Consistency, contact and communication in the virtual classroom	2000
316	KMM Culp, M Honey, E Mandinach	A retrospective on twenty years of education technology policy	2005
308	L Shashaani	Gender differences in computer attitudes and use among college students	1997
254	R Azevedo, JT Guthrie, D Seibert	The role of self-regulated learning in fostering students' conceptual understanding of complex systems with hypermedia	2004
254	PL Rogers	Barriers to adopting emerging technologies in education	2000
251	R Azevedo, RM Bernard	A meta-analysis of the effects of feedback in computer-based instruction	1995
220	LF Ruberg, DM Moore, CD Taylor	Student participation, interaction, and regulation in a computer-mediated communication environment: A qualitative study	1996
216	BC Bruce, JA Levin	Educational technology: Media for inquiry, communication, construction, and expression	1997

APPENDIX T

JOURNAL OF EDUCATIONAL COMPUTING RESEARCH

Five most-cited articles per year (1995-2014)

Cites	Authors	Title	Year
610	T Busch	Gender differences in self-efficacy and attitudes toward computers	1995
575	MJ Jacobson, RJ Spiro	Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: An empirical investigation	1995
329	CM Fletcher-Flinn, B Gravatt	The efficacy of computer assisted instruction (CAI): A meta-analysis	1995
251	R Azevedo, RM Bernard	A meta-analysis of the effects of feedback in computer-based instruction	1995
130	TA Barker, JK Torgesen	An evaluation of computer-assisted instruction in phonological awareness with below average readers	1995
220	LF Ruberg, DM Moore, CD Taylor	Student participation, interaction, and regulation in a computer-mediated communication environment: A qualitative study	1996
198	KA Lawless, JM Kulikowich	Understanding hypertext navigation through cluster analysis	1996
139	RP Niemiec, C Sikorski, HJ Walberg	Learner-control effects: A review of reviews and a meta-analysis.	1996
124	TA Hays	Spatial abilities and the effects of computer animation on short-term and long-term comprehension	1996
119	R Corston, AM Colman	Gender and social facilitation effects on computer competence and attitudes toward computers	1996
1492	CN Gunawardena, CA Lowe…	Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing	1997
352	DL Fabry, JR Higgs	Barriers to the effective use of technology in education: Current status	1997
308	L Shashaani	Gender differences in computer attitudes and use among college students	1997
216	BC Bruce, JA Levin	Educational technology: Media for inquiry, communication, construction, and expression	1997
107	E Christmann, J Badgett, R Lucking	Microcomputer-based computer-assisted instruction within differing subject areas: A statistical deduction	1997
113	MJ Brosnan	The impact of psychological gender, gender-related perceptions, significant others, and the introducer of technology upon computer anxiety in students	1998
109	CJ Bonk, S Malikowski, C Angeli…	Web-based case conferencing for preservice teacher education: Electronic discourse from the field	1998
98	EB Susman	Cooperative learning: A review of factors that increase the effectiveness of cooperative computer-based instruction	1998
95	V Ramalingam, S Wiedenbeck	Development and validation of scores on a computer programming self-efficacy scale and group analyses of novice programmer self-efficacy	1998
82	C Presno	Taking the byte out of Internet anxiety: instructional techniques that reduce computer/Internet anxiety in the classroom	1998
171	J Schacter, C Fagnano	Does computer technology improve student learning and achievement? How, when, and under what conditions?	1999
107	AM Shapiro	The relationship between prior knowledge and interactive overviews during hypermedia-aided learning	1999
98	TS Chan, TC Ahern	Targeting motivation—adapting flow theory to instructional design	1999
96	SK Macgregor	Hypermedia navigation profiles: Cognitive characteristics and information processing strategies	1999

88	P Dias, MJ Gomes, AP Correia	Disorientation in hypermedia environments: Mechanisms to support navigation	1999
329	K Swan, P Shea, E Fredericksen, A Pickett…	Building knowledge building communities: Consistency, contact and communication in the virtual classroom	2000
254	PL Rogers	Barriers to adopting emerging technologies in education	2000
174	DS Niederhauser, RE Reynolds…	The influence of cognitive load on learning from hypertext	2000
164	BA Greene, SM Land	A qualitative analysis of scaffolding use in a resource-based learning environment involving the World Wide Web	2000
156	TC Reeves	Alternative assessment approaches for online learning environments in higher education	2000
165	J Van Braak	Individual characteristics influencing teachers' class use of computers	2001
144	GV Davidson-Shivers, LY Muilenburg…	How do students participate in synchronous and asynchronous online discussions?	2001
128	U Wolfradt, J Doll	Motives of adolescents to use the Internet as a function of personality traits, personal and social factors	2001
102	RL Bangert-Drowns, C Pyke	A Taxonomy of Student Engagement with Educational Software: An Exploration of Literate Thinking with Electronic Text.	2001
99	T Volery	Online education: An exploratory study into success factors	2001
343	S Cassidy, P Eachus	Developing the computer user self-efficacy (CUSE) scale: Investigating the relationship between computer self-efficacy, gender and experience with computers	2002
131	J Margerum-Leys, RW Marx	Teacher knowledge of educational technology: A case study of student/mentor teacher pairs	2002
95	AL Baylor	Agent-based learning environments as a research tool for investigating teaching and learning	2002
92	L Lipponen, M Rahikainen…	Effective participation and discourse through a computer network: Investigating elementary students' computer supported interaction	2002
84	C Hoyles, R Noss, R Adamson	Rethinking the microworld idea	2002
195	J Hewitt	How habitual online practices affect the development of asynchronous discussion threads	2003
174	AL Baylor, J Ryu	The effects of image and animation in enhancing pedagogical agent persona	2003
145	RE Mayer	Elements of a science of e-learning	2003
110	K Guinee, MB Eagleton, TE Hall	Adolescents' Internet search strategies: Drawing upon familiar cognitive paradigms when accessing electronic information sources	2003
107	LD Bendixen, K Hartley	Successful learning with hypermedia: The role of epistemological beliefs and metacognitive awareness	2003
254	R Azevedo, JT Guthrie, D Seibert	The role of self-regulated learning in fostering students' conceptual understanding of complex systems with hypermedia	2004
173	DF Kauffman	Self-regulated learning in web-based environments: Instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs	2004
169	B Barron	Learning ecologies for technological fluency: Gender and experience differences	2004
161	M Russell, D Bebell, J Higgins	Laptop learning: A comparison of teaching and learning in upper elementary classrooms equipped with shared carts of laptops and permanent 1: 1 laptops	2004
144	A Wise, J Chang, T Duffy…	The effects of teacher social presence on student satisfaction, engagement, and learning	2004

604	MJ Koehler, P Mishra	What happens when teachers design educational technology? The development of technological pedagogical content knowledge	2005
462	TBQ Li	Cyber-harassment: A study of a new method for an old behavior	2005
316	KMM Culp, M Honey, E Mandinach	A retrospective on twenty years of education technology policy	2005
90	X Ge, CH Chen, KA Davis	Scaffolding novice instructional designers' problem-solving processes using question prompts in a web-based learning environment	2005
79	RE Clark, S Choi	Five design principles for experiments on the effects of animated pedagogical agents	2005
385	JJ Vogel, DS Vogel, J Cannon-Bowers…	Computer gaming and interactive simulations for learning: A meta-analysis	2006
129	DS McNamara, TP O'Reilly, RM Best…	Improving adolescent students' reading comprehension with iSTART	2006
116	KUI Xie, TK Debacker, C Ferguson	Extending the traditional classroom through online discussion: The role of student motivation	2006
78	M Bannert	Effects of reflection prompts when learning with hypermedia	2006
77	R Kay	Addressing gender differences in computer ability, attitudes and use: The laptop effect	2006
138	SE Anderson, RM Maninger	Preservice teachers' abilities, beliefs, and intentions regarding technology integration	2007
106	JA Greene, R Azevedo	Adolescents' use of self-regulatory processes and their relation to qualitative mental model shifts while using hypermedia	2007
102	N Cavus, H Uzunboylu, D Ibrahim	Assessing the success rate of students using a learning management system together with a collaborative tool in web-based teaching of programming languages	2007
86	SR Malikowski, ME Thompson…	A model for research into course management systems: Bridging technology and learning theory	2007
58	Y Rosen, G Salomon	The differential learning achievements of constructivist technology-intensive learning environments as compared with traditional ones: A meta-analysis	2007
129	D Grimes, M Warschauer	Learning with laptops: A multi-method case study	2008
114	J Lei, Y Zhao	One-to-one computing: What does it bring to schools?	2008
91	RX Guo, T Dobson, S Petrina	Digital natives, digital immigrants: An analysis of age and ICT competency in teacher education	2008
80	YM Lin, GY Lin, JM Laffey	Building a social and motivational framework for understanding satisfaction in online learning	2008
58	PS Nicolle, Y Lou	Technology adoption into teaching and learning by mainstream university faculty: A mixed methodology study revealing the “how, when, why, and why not”	2008
118	A Doering, G Veletsianos, C Scharber…	Using the technological, pedagogical, and content knowledge framework to design online learning environments and professional development	2009
107	TA Zucker, AK Moody, MC McKenna	The effects of electronic books on pre-kindergarten-to-grade 5 students' literacy and language outcomes: A research synthesis	2009
49	JHL Koh, TW Frick	Instructor and student classroom interactions during technology skills instruction for facilitating preservice teachers' computer self-efficacy	2009
45	T Teo	The impact of subjective norm and facilitating conditions on pre-service teachers' attitude toward computer use: A structural equation modeling of an extended …	2009
43	H Lin, KD Kelsey	Building a networked environment in Wikis: The evolving phases of collaborative learning in a Wikibook project	2009

67	M Moran, M Hawkes, O El Gayar	Tablet personal computer integration in higher education: Applying the unified theory of acceptance and use technology model to understand supporting factors	2010
66	RE Mayer, CI Johnson	Adding instructional features that promote learning in a game-like environment	2010
50	L Donovan, T Green, K Hartley	An examination of one-to-one computing in the middle school: Does increased access bring about increased student engagement?	2010
38	A Corbett, L Kauffman, B Maclaren…	A Cognitive Tutor for genetics problem solving: Learning gains and student modeling	2010
35	JR Stowell, D Bennett	Effects of online testing on student exam performance and test anxiety	2010
114	ML Niess	Investigating TPACK: Knowledge growth in teaching with technology	2011
90	JHL Koh, H Divaharan	Developing pre-service teachers' technology integration expertise through the TPACK-developing instructional model	2011
55	HA Spires, JP Rowe, BW Mott…	Problem solving and game-based learning: Effects of middle grade students' hypothesis testing strategies on learning outcomes	2011
49	J Ahn	Digital divides and social network sites: Which students participate in social media?	2011
43	KJ Kim, TW Frick	Changes in student motivation during online learning	2011
47	DL Lowther, FA Inan, JD Strahl…	Do one-to-one initiatives bridge the way to 21st century knowledge and skills?	2012
34	B Holfeld, M Grabe	Middle school students' perceptions of and responses to cyber bullying	2012
28	O Korat, A Shamir	Direct and indirect teaching: Using e-books for supporting vocabulary, word reading, and story comprehension for young children	2012
28	LL Lou, Z Yan, A Nickerson…	An examination of the reciprocal relationship of loneliness and Facebook use among first-year college students	2012
23	W Cassidy, K Brown, M Jackson	“Making Kind Cool”: Parents' Suggestions for Preventing Cyber Bullying and Fostering Cyber Kindness	2012
19	Y Bao, T Xiong, Z Hu, M Kibelloh	Exploring gender differences on general and specific computer self-efficacy in mobile learning adoption	2013
16	LH Porras-Hernández…	Strengthening TPACK: A broader notion of context and the use of teacher's narratives to reveal knowledge construction	2013
16	C Angeli, N Valanides	Technology mapping: An approach for developing technological pedagogical content knowledge	2013
15	C Mouza, R Karchmer-Klein	Promoting and assessing pre-service teachers' technological pedagogical content knowledge (TPACK) in the context of case development	2013
14	SNK Benson, CL Ward	Teaching with technology: Using TPACK to understand teaching expertise in online higher education	2013
16	A Tarhini, K Hone, X Liu	Measuring the moderating effect of gender and Age on e-learning acceptance in England: A structural equation modeling approach for an extended technology …	2014
9	R Shadiev, WY Hwang, SC Yeh…	Effects of unidirectional vs. reciprocal teaching strategies on web-based computer programming learning	2014
4	I Celik, I Sahin, AO Akturk	Analysis of the Relations among the Components of Technological Pedagogical and Content Knowledge (Tpack): A Structural Equation Model	2014
3	DD Holland, RT Piper	A Technology Integration Education (Tie) Model: Millennial Preservice Teachers' Motivations about Technological, Pedagogical, and Content Knowledge (Tpack) …	2014
2	UGH Fors, WT Gunning	The impact of different scoring rubrics for grading virtual patient-based exams	2014

APPENDIX U

JOURNAL OF RESEARCH ON TECHNOLOGY IN EDUCATION

Articles cited 200 or more times. Published between Jan 2001- Dec 2014

Cites	Authors	Title	Year
477	PA Ertmer, A Paul, L Molly, R Eva…	Examining teachers' beliefs about the role of technology in the elementary classroom	1999
630	PA Ertmer, AT Ottenbreit-Leftwich	Teacher technology change: How knowledge, confidence, beliefs, and culture intersect	2010
560	J Harris, P Mishra, M Koehler	Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed	2009
533	DA Schmidt, E Baran, AD Thompson…	Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers	2009
430	R Christensen	Effects of technology integration education on the attitudes of teachers and students	2002
406	WR Penuel	Implementation and effects of one-to-one computing initiatives: A research synthesis	2006
369	RA Vannatta, F Nancy	Teacher dispositions as predictors of classroom technology use	2004
294	RB Kozma	Technology and classroom practices: An international study	2003
290	B Gros	Digital games in education: The design of games-based learning environments	2007
282	RH Kay	Evaluating strategies used to incorporate technology into preservice education: A review of the literature	2006
271	M Liu, Z Moore, L Graham, S Lee	A look at the research on computer-based technology use in second language learning: A review of the literature from 1990–2000	2002
258	AE Barron, K Kemker, C Harmes…	Large-scale research study on technology in K–12 schools: Technology integration as it relates to the National Technology Standards	2003
256	C Norris, T Sullivan, J Poirot…	No access, no use, no impact: snapshot surveys of educational technology in K# x2013; 12	2003
254	D Jonassen	Using cognitive tools to represent problems	2003
249	J Brinkerhoff	Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices	2006
245	D Bebell, M Russell, L O'Dwyer	Measuring teachers' technology uses: Why multiple-measures are more revealing	2004
237	A Doering, J Hughes, D Huffman	Preservice teachers: Are we thinking with technology?	2003
232	KL Rice	A comprehensive look at distance education in the K–12 context	2006
224	L Wang, PA Ertmer, TJ Newby	Increasing preservice teachers' self-efficacy beliefs for technology integration	2004
212	S Bayraktar	A meta-analysis of the effectiveness of computer-assisted instruction in science education	2001

APPENDIX V

JOURNAL OF RESEARCH ON TECHNOLOGY IN EDUCATION

Five most-cited articles per year (2001-2014)

Cites	Authors	Title	Year
212	S Bayraktar	A meta-analysis of the effectiveness of computer-assisted instruction in science education	2001
197	MH Hopson, RL Simms, GA Knezek	Using a technology-enriched environment to improve higher-order thinking skills	2001
140	AT Lumpe, E Chambers	Assessing teachers' context beliefs about technology use	2001
118	MO Thirunarayanan, A Perez-Prado	Comparing web-based and classroom-based learning: A quantitative study	2001
104	JK Gallini, D Barron	Participants' perceptions of web-infused environments: A survey of teaching beliefs, learning approaches, and communication	2001
430	R Christensen	Effects of technology integration education on the attitudes of teachers and students	2002
271	M Liu, Z Moore, L Graham, S Lee	A look at the research on computer-based technology use in second language learning: A review of the literature from 1990–2000	2002
139	YM Wang	When technology meets beliefs: Preservice teachers' perception of the teacher's role in the classroom with computers	2002
137	H Pillay	An investigation of cognitive processes engaged in by recreational computer game players: Implications for skills of the future	2002
127	NB Adams	Educational computing concerns of postsecondary faculty	2002
294	RB Kozma	Technology and classroom practices: An international study	2003
258	AE Barron, K Kemker, C Harmes…	Large-scale research study on technology in K–12 schools: Technology integration as it relates to the National Technology Standards	2003
256	C Norris, T Sullivan, J Poirot…	No access, no use, no impact: snapshot surveys of educational technology in K# x2013; 12	2003
254	D Jonassen	Using cognitive tools to represent problems	2003
237	A Doering, J Hughes, D Huffman	Preservice teachers: Are we thinking with technology?	2003
369	RA Vannatta, F Nancy	Teacher dispositions as predictors of classroom technology use	2004
245	D Bebell, M Russell, L O'Dwyer	Measuring teachers' technology uses: Why multiple-measures are more revealing	2004
224	L Wang, PA Ertmer, TJ Newby	Increasing preservice teachers' self-efficacy beliefs for technology integration	2004
112	S Judge, K Puckett, B Cabuk	Digital Equity: New Findings from the Early Childhood Longitudinal Study*	2004
91	C Pollard, R Pollard	Research priorities in educational technology: A Delphi study	2004
197	S Vonderwell, S Zachariah	Factors that influence participation in online learning	2005
170	A Staples, MC Pugach, DJ Himes	Rethinking the technology integration challenge: Cases from three urban elementary schools	2005
158	N Strudler, K Wetzel	The diffusion of electronic portfolios in teacher education: Issues of initiation and implementation	2005
156	K Swan, M Hooft, A Kratcoski…	Uses and effects of mobile computing devices in K–8 classrooms	2005
149	NE Davis, MD Roblyer	Preparing teachers for the “Schools that technology built” Evaluation of a program to Train teachers for virtual schooling	2005
406	WR Penuel	Implementation and effects of one-to-one computing initiatives: A research synthesis	2006

282	RH Kay	Evaluating strategies used to incorporate technology into preservice education: A review of the literature	2006
249	J Brinkerhoff	Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices	2006
232	KL Rice	A comprehensive look at distance education in the K–12 context	2006
197	M Barak, A Lipson, S Lerman	Wireless laptops as means for promoting active learning in large lecture halls	2006
290	B Gros	Digital games in education: The design of games-based learning environments	2007
191	Q Li	Student and teacher views about technology: A tale of two cities?	2007
162	S Vonderwell, X Liang, K Alderman	Asynchronous discussions and assessment in online learning	2007
149	BS Barker, J Ansorge	Robotics as means to increase achievement scores in an informal learning environment	2007
147	M David Merrill	A task-centered instructional strategy	2007
172	C Mouza	Learning with laptops: Implementation and outcomes in an urban, under-privileged school	2008
133	HA Spires, JK Lee, KA Turner…	Having our say: Middle grade student perspectives on school, technologies, and academic engagement	2008
120	M Hofer, KO Swan	Technological pedagogical content knowledge in action: A case study of a middle school digital documentary project	2008
97	SHH Chang, RA Smith	Effectiveness of personal interaction in a learner-centered paradigm distance education class based on student satisfaction	2008
83	SJ Warren, MJ Dondlinger, SA Barab	A MUVE towards PBL writing: Effects of a digital learning environment designed to improve elementary student writing	2008
560	J Harris, P Mishra, M Koehler	Teachers' technological pedagogical content knowledge and learning activity types: Curriculum-based technology integration reframed	2009
533	DA Schmidt, E Baran, AD Thompson…	Technological pedagogical content knowledge (TPACK) the development and validation of an assessment instrument for preservice teachers	2009
180	D Palak, RT Walls	Teachers' beliefs and technology practices: A mixed-methods approach	2009
107	M Mendicino, L Razzaq…	A comparison of traditional homework to computer-supported homework	2009
99	JW Hur, TA Brush	Teacher Participation in Online Communities: Why Do Teachers Want to Participate in Self-generated Online Communities of K–12 Teachers?	2009
630	PA Ertmer, AT Ottenbreit-Leftwich	Teacher technology change: How knowledge, confidence, beliefs, and culture intersect	2010
193	LJ Couse, DW Chen	A tablet computer for young children? Exploring its viability for early childhood education	2010
118	B Means	Technology and education change: Focus on student learning	2010
97	J Clarke-Midura, C Dede	Assessment, technology, and change	2010
73	GE Hall	Technology's Achilles heel: Achieving high-quality implementation	2010
158	JB Harris, MJ Hofer	Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional …	2011
116	JT Abbitt	Measuring technological pedagogical content knowledge in preservice teacher education: A review of current methods and instruments	2011
109	H Holden, R Rada	Understanding the influence of perceived usability and technology self-efficacy on teachers' technology acceptance	2011

76	G Falloon	Making the connection: Moore's theory of transactional distance and its relevance to the use of a virtual classroom in postgraduate online teacher education	2011
43	H Miranda, M Russell	Predictors of teacher-directed student use of technology in elementary classrooms: A multilevel SEM approach using data from the USEIT study	2011
50	Y Rosen, D Beck-Hill	Intertwining digital content and a one-to-one laptop environment in teaching and learning: Lessons from the time to know program	2012
45	M Hofer, N Grandgenett	TPACK development in teacher education: A longitudinal study of preservice teachers in a secondary MA Ed. program	2012
42	D Kiger, D Herro, D Prunty	Examining the influence of a mobile learning intervention on third grade math achievement	2012
30	A Sadaf, TJ Newby, PA Ertmer	Exploring factors that predict preservice teachers' intentions to use web 2.0 technologies using decomposed theory of planned behavior	2012
25	S Dash, R Magidin de Kramer…	Impact of Online Professional Development or Teacher Quality and Student Achievement in Fifth Grade Mathematics	2012
29	L Brantley-Dias, PA Ertmer	Goldilocks and TPACK: Is the construct 'just right?'	2013
16	AD Ritzhaupt, F Liu, K Dawson…	Differences in student information and communication technology literacy based on socio-economic status, ethnicity, and gender: Evidence of a digital divide in …	2013
12	S Weeden, B Cooke, M McVey	Underage children and social networking	2013
12	TM Gunn, M Hollingsworth	The implementation and assessment of a shared 21st century learning vision: A district-based approach	2013
11	VH Shinas, S Yilmaz-Ozden, C Mouza…	Examining domains of technological pedagogical content knowledge using factor analysis	2013
16	JP Carpenter, DG Krutka	How and why educators use Twitter: A survey of the field	2014
11	M Liu, R Scordino, R Geurtz, C Navarrete…	A Look at Research on Mobile Learning in K–12 Education From 2007 to the Present	2014
9	KM Thomas, BW O'Bannon, VG Britt	Standing in the schoolhouse door: teacher perceptions of mobile phones in the classroom	2014
6	RD Visser, LC Evering, DE Barrett	# TwitterforTeachers: The Implications of Twitter as a Self-Directed Professional Development Tool for K–12 Teachers	2014
5	LS Green, FA Inan, NJ Maushak	A Case Study: The Role of Student-Generated Vidcasts in K–12 Language Learner Academic Language and Content Acquisition	2014

APPENDIX W

JOURNAL OF RESEARCH ON COMPUTING IN EDUCATION

Articles cited 200 or more times. Published between Jan 1995- Dec 2001

Cites	Authors	Title	Year
477	PA Ertmer, A Paul, L Molly, R Eva…	Examining teachers' beliefs about the role of technology in the elementary classroom	1999
444	ME Pierson	Technology integration practice as a function of pedagogical expertise	2001
435	SL Dexter, RE Anderson, HJ Becker	Teachers' views of computers as catalysts for changes in their teaching practice	1999
400	S Yildirim	Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use	2000
370	HJ Becker, J Ravitz	The influence of computer and Internet use on teachers' pedagogical practices and perceptions	1999
338	DM Poole	Student participation in a discussion-oriented online course: A case study	2000
242	DW Sanders, AI Morrison-Shetlar	Student attitudes toward web-enhanced instruction in an introductory biology course	2001
239	MM Ropp	Exploring individual characteristics associated with learning to use computers in preservice teacher preparation	1999
236	MD Roblyer	Is choice important in distance learning? A study of student motives for taking Internet-based courses at the high school and community college levels	1999
223	D Mioduser, R Nachmias, O Lahav…	Web-based learning environments: Current pedagogical and technological state	2000
214	MJ Berson	Effectiveness of computer technology in the social studies: A review of the literature	1996
212	DJ Ayersman	Reviewing the research on hypermedia-based learning	1996
211	BJ Young	Gender differences in student attitudes toward computers	2000

APPENDIX X

JOURNAL OF RESEARCH ON COMPUTING IN EDUCATION

Five most-cited articles per year (1995- 2002)

Cites	Authors	Title	Year
114	AM Gilmore	Turning teachers on to computers: Evaluation of a teacher development program	1995
103	DJ Ayersman, W Michael Reed	Effects of learning styles, programming, and gender on computer anxiety	1995
78	ED Bunderson, ME Christensen	An analysis of retention problems for female students in university computer science programs	1995
66	CA MacArthur, V Pilato, M Kercher…	Mentoring: An approach to technology education for teachers	1995
50	NB Strudler	The role of school-based technology coordinators as change agents in elementary school programs: A follow-up study	1995
214	MJ Berson	Effectiveness of computer technology in the social studies: A review of the literature	1996
212	DJ Ayersman	Reviewing the research on hypermedia-based learning	1996
182	AC Bugbee Jr	The equivalence of paper-and-pencil and computer-based testing	1996
101	HG Weller	Assessing the impact of computer-based learning in science	1996
92	A Hirumi, A Bermudez	Interactivity, distance education, and instructional systems design converge on the information superhighway	1996
141	K Matthew	A comparison of the influence of interactive CD-ROM storybooks and traditional print storybooks on reading comprehension	1997
109	L Cifuentes, KL Murphy, R Segur…	Design considerations for computer conferences	1997
106	RT Chiero	Teachers' perspectives on factors that affect computer use	1997
103	E Christmann, J Badgett, R Lucking	Progressive comparison of the effects of computer-assisted instruction on the academic achievement of secondary students	1997
99	T Campbell	Technology, multimedia, and qualitative research in education	1997
180	DM Dusick	What social cognitive factors influence faculty members' use of computers for teaching? A literature review	1998
170	K Rex, RM Roth	The relationship of computer experience and computer self-efficacy to performance in introductory computer literacy courses	1998
140	Y Zhang, S Espinoza	Relationships among computer self-efficacy, attitudes toward computers, and desirability of learning computing skills	1998
124	A Mitra	Categories of computer use and their relationships with attitudes toward computers	1998
112	YKC Liao	Effects of hypermedia versus traditional instruction on students' achievement: A meta-analysis	1998
477	PA Ertmer, A Paul, L Molly, R Eva…	Examining teachers' beliefs about the role of technology in the elementary classroom	1999
435	SL Dexter, RE Anderson, HJ Becker	Teachers' views of computers as catalysts for changes in their teaching practice	1999
370	HJ Becker, J Ravitz	The influence of computer and Internet use on teachers' pedagogical practices and perceptions	1999
239	MM Ropp	Exploring individual characteristics associated with learning to use computers in preservice teacher preparation	1999
236	MD Roblyer	Is choice important in distance learning? A study of student motives for taking Internet-based courses at the high school and community college levels	1999
400	S Yildirim	Effects of an educational computing course on preservice and inservice teachers: A discussion and analysis of attitudes and use	2000

338	DM Poole	Student participation in a discussion-oriented online course: A case study	2000
223	D Mioduser, R Nachmias, O Lahav…	Web-based learning environments: Current pedagogical and technological state	2000
211	BJ Young	Gender differences in student attitudes toward computers	2000
195	BC Howard, S McGee, N Schwartz…	The experience of constructivism: Transforming teacher epistemology	2000
444	ME Pierson	Technology integration practice as a function of pedagogical expertise	2001
241	DW Sanders, AI Morrison-Shetlar	Student attitudes toward web-enhanced instruction in an introductory biology course	2001
140	DE Doty, SR Popplewell, GO Byers	Interactive CD-ROM storybooks and young readers' reading comprehension	2001
131	EW Christensen, UP Anakwe…	Receptivity to Distance Learnings The Effect of Technology, Reputation, Constraints, and Learning Preferences	2001
117	SM Butzin	Using instructional technology in transformed learning environments: An evaluation of Project CHILD	2001
178	C Mouza	Learning to teach with new technology: Implications for professional development	2002
121	MD Roblyer, JC Marshall	Predicting success of virtual high school students: Preliminary results from an educational success prediction instrument	2002
91	S Pedersen, M Liu	The transfer of problem-solving skills from a problem-based learning environment: The effect of modeling an expert's cognitive processes	2002
84	AP Rovai, MD Childress	Explaining and predicting resistance to computer anxiety reduction among teacher education students	2002
60	L Schrum, R Skeele, M Grant	One college of education's effort to infuse technology: A systemic approach to revisioning teaching and learning	2002

REFERENCES

Albaiz, T. (2016). The pearl side of online portfolios: A descriptive study on the rich experience of using pearltrees by master students of teaching English as a foreign language. *TOJET: The Turkish Online Journal of Educational Technology. 15*(1), 136-140.

Amiel, T. & Reeves, T. C. (2008). Design-based research and educational technology: Rethinking technology and the research agenda. *Journal of Educational Technology & Society, 11*(4), 29-40.

Association for Educational Communications and Technology. (2013). Definition. In A. Januszewski, & M. Molenda (Eds.), *Educational technology: A definition with commentary* (pp. 1–14). New York: Lawrence Erlbaum Associates.

Association for Educational Communications and Technology. (2013). Afterword. In A. Januszewski, & M. Molenda (Eds.), *Educational technology: A definition with commentary* (pp. 341–349). New York: Lawrence Erlbaum Associates.

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *Journal of the Learning Sciences, 13*(1), 1-14.

Bavaro, J. A. (1995). A review of the construct of scholarship in the literature. (Eric Document Reproduction Service No. ED381064).

Beall, J. (2012). Beall's List: Potential, possible, or probable predator scholarly open-access publishers. *Scholarly Open Access*. https://scholarlyoa.com/publishers/

Billings, C., Nielsen, P. L., Snyder, A., Sorensen, A., & West, R. E. (2012). Educational technology research journals: Journal of Research on Technology in Education, 2001–2010. *Educational Technology*, *52*(4), 37–41.

Bladek, M. (2013). DORA: San Francisco Declaration on Research Assessment. *College & Research Libraries. News. 75*, 191-196

Blake, V L. & Tjoumas, R. (1995). Through the looking glass darkly: Research agendas and faculty attitudes regarding periodical prestige. *Education for Information, 13*, 103-115.

Boitshwarelo, B. (2011). Proposing an integrated research framework for connectivism: Utilising theoretical synergies. *IRRODL The International Review of Research in Open and Distributed Learning. 12*(3), 1-11.

Bontis, N., & Serenko, A. (2009). A follow-up ranking of academic journals.Journal of Knowledge Management. 13(1): 17. doi:10.1108/13673270910931134. CiteSeerX: 10.1.1.178.6943.

Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate.* Princeton, NJ: Carnegie Foundation for the Advancement of Teaching.

Bransford, J. D., Vye, N. J., Stevens, R., Kuhl, P., Schwartz, D., Bell, P., … & Sabelli, N. (2005). Learning theories and education: Toward a decade of synergy. In P. Alexander & P. Winne (Eds.), *Handbook of educational psychology (Volume 2)* (pp. 209-244). Mahwah, NJ: Erlbaum.

Bull, G., Knezek, G., Roblyer, M.D., Schrum, L., & Thompson, A. (2005). A proactive approach to a research agenda for educational technology. *Journal of Research on Technology in Education*, *37*(3), 217-220.

Bush, V. (1945). A report to the President. Science the Endless Frontier. *National Science Foundation.* United States Government Printing Office. Washington, D. C.

Carr-Chellman, A. (2006). Where do educational technologists really publish? An examination of successful emerging scholars' publication outlets. *British Journal of Educational Technology, 37*(1), 5–15.

Cohen, D. K. (1987). Educational technology, policy and practice. *Educational Evaluation and Policy Analysis 9*(2), 153-170.

Collins, R. (1986). Is the 1980's Sociology in the doldrums? *American Journal of Sociology, 91*(6), 1336-1355.

Cullinan, D. (1988). Basic research and basic needs in research on learning disabilities. *Journal of Learning Disabilities. 21(*4), 227-229.

Dede, C. (2014). The role of technology in deeper learning. New York, NY: Jobs for the Future.

Deerwester, S., Dumais, S., Furnas, G., Landauer, T., & R. Harshman. Indexing by Latent Semantic Analysis. *Journal of the American Society for Information Science,* 1990, 41:6, 391–407.

Dennen, V., & Spector, J. M. (2007). Preparing educational technology leaders: Reflections on the past, present and future. *Educational Technology, 47*(4), 5-12.

Dick, W., & Dick, D. (1989). Analytical and empirical comparisons of the Journal of Instructional Development and Educational Communication and Technology Journal. *Educational Technology Research and Development, 37*(1), 81-88.

Donham, J. (2014). “Inquiry.” In *Inquiry and the Common Core*, edited by V.H. Harada and S. Coatney, 3-16. Santa Barbara, CA: Libraries Unlimited.

Earle, R.S. (2002). The integration of instructional technology into public education: Promises and challenges. *ET Magazine, 42*(1), 5 -13.

Ely, D. P., Foley, A., Freeman, W., & Scheel, N. (1992). Trends in educational technology 1991. In D. P. Ely & B. B. Minor (Eds.), *Educational Media and Technology Yearbook, 18,*1-29.

Evangelopoulos, N. (2015). Thematic orientation of the ISJ within a semantic space of IS research. *Information Systems Journal*. doi: 10.1111/isj.12084

Evangelopoulos, N., Zhang, X., & Prybutok, V. (2012). Latent semantic analysis: Five methodological recommendations. *European Journal of Information Systems, 21*, 70–86.

Favell, A., Feldblum, M., & Smith, M. P. (2007). The human face of global mobility: A research agenda. *Society*, *44*(2), 15-25.

Gagne', R. M. (1986). Instructional technology: the research field. *Journal of Instructional Development. 8*(3), 7-14.

Garfield, E. (1997). Dispelling a few common myths about Journal Citation Impacts. *The Scientist, 11*(3), 240-249. http://www.garfield.library.upenn.edu/commentaries/tsv11(03)p11y19970203.pdf

Garfield, E. (1986). Which medical journals have the greatest impact? *Annals of Internal Medicine 105*(2), 313-320. http://www.garfield.library.upenn.edu/essays/v10p007y1987.pdf

Glänzel, W., & Moed, H. F. (2002). Journal impact measures in bibliometric research. *Scientometrics, 53*(2), 171-193.

Gordon, S., & Gayeski, D. (2013). Preparing college students for real-world 2.0: Towards a recipe for the "secret sauce." *Educational Technology, 53*(1), 12-19.

Hamilton, N. W. (2002). *Academic Ethics: Problems and Materials on Professional Conduct and Shared Governance.* Greenwood Publishing Group: United States of America.

Harris, J. (2005). Our Agenda for Technology Integration: It's Time to Choose. *Contemporary Issues in Technology and Teacher Education, 5*(2), 116-122. Association for the Advancement of Computing in Education (AACE).

Harris, J., & Hofer, M. J. (2011). Technological pedagogical content knowledge (TPACK) in action: A descriptive study of secondary teachers' curriculum-based, technology-related instructional planning. *Journal of Research on Technology in Education, 43*(3), 211-229.

Harzing, A. W. (2013a). A preliminary test of Google Scholar as a source for citation data: a longitudinal study of Nobel Prize winners. *Scientometrics, 94*(3), 1057–1075.

Harzing, A. W. (2013b). *Publish or Perish, version 3.* Retrieved January 6, 2016, from *http://www.harzing.com/pop.htm*

Hendler, J. (2007). Reinventing Academic Publishing-Part 1. *IEEE Intelligent Systems 22* (5): 2–3. doi:10.1109/MIS.2007.4338485.

Higgins, N., Sullivan, H., Harper-Marinick, M., & Lopez C. (1989). Perspective on educational technology research and development. Educational Technology Research and Development, 57(1), 7-17.

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences. 102*, 16569–16572.

Holcomb, T.L., Bray, K. E., & Dorr, D. L. (2013). Publications in educational instructional technology: perceived values of ed tech professionals. *Educational Technology, 43*(3), 53-57

Januszewski, A., & Molenda, M. (Eds.). (2008). *Educational technology: A definition with commentary*. Routledge: New York and London.

Jonassen, D. H. (2004). Handbook of Research on Educational Communications and Technology (2nd ed). Lawrence Erlbaum Associates: London

Journals under Threat: A Joint Response from History of Science, Technology and Medicine Editors. (2009). *Medical History, 53*(1), 1-4.

Kinshuk, Huang, H.-W., Sampson, D., & Chen, N.-S. (2013). Trends in Educational Technology through the lens of the highly cited articles published in the Journal of Educational Technology and Society. *Educational Technology & Society, 16*(2), 3-20.

Ku, H.-Y. (2009). Twenty years of productivity in ETR&D by institutions and authors. *Educational Technology Research and Development, 57*(6), 801-805.

Kulkarni, S., Apte, U., & Evangelopoulos, N. (2014). The use of latent semantic analysis in operations management research. *Decision Sciences, 45*, 971-994.

Kumar, V., Graf, S., & Kinshuk. (2011). Causal competencies and learning styles: A framework for adaptive instruction. *Journal of e-Learning and Knowledge Society, 7*(3), 13-31.

Landauer, T. K. (2007). *Handbook of Latent Semantic Analysis*. Laurence Erlbaum Associates.

Liu, G. Z., & Hwang, G. J. (2010). A key step to understanding paradigm shifts in e-learning: towards context-aware ubiquitous learning. *British Journal of Educational Technology*, *41*(2), E1-E9.

Lee, Y., Driscoll, M. P., & Nelson, D. W. (2007). Trends in research: a content analysis of major journals. In M. G. Moore (Ed.), *Handbook of Distance Education* (pp. 31-41). Mahway, NJ: Lawrence Erlbaum.

Mayer, A. R., Francis, J., Harrison, J. B., McPhillen, A. S., & West, R. E. (2012*). Educational technology research journals: Performance Improvement Quarterly, 2001–2010. Educational Technology*, *52*(5):34–38.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43-59.

Metzler, M. W. (1994). Scholarship reconsidered for the professoriate of 2010. *Quest, 46*, 440-455.

Moed, H. R. (2010a). Measuring contextual citation impact of scientific journals. *Journal of Infometrics,* DOI: :10.1016/ j.joi.2010.01.002.

Molenda, M., & Harris, P. (2001). Issues and trends in instructional technology. In R. M. Branch & M. A. Fitzgerald (Eds.), *Educational Media and Technology Yearbook, 26,* 3-15.

Molenda, M., Russell, J. D., & Smaldino, S. (1998). Trends in Media and Technology in education and training. In R. M. Branch & M. A. Fitzgerald (Eds.), *Educational Media and Technology Yearbook, 23,* 2-13.

Molenda, M., & Sullivan, M. (2000). Issues and trends in instructional technology. In R. M. Branch & M. A. Fitzgerald (Eds.), *Educational Media and Technology Yearbook, 25,* 3-13.

Molenda, M., & Sullivan, M. (2002). Issues and trends in instructional technology: Hitting the plateau. In M. A. Fitzgerald, M. Orey, & R. M. Branch (Eds.), *Educational Media and Technology Yearbook, 27,* 3-18.

Moreno, R. (2004). Decreasing cognitive load for novice students: Effects of explanatory versus corrective feedback in discovery-based multimedia. *Instructional Science, 32*(1), 99-113.

Moreno, R., & Valdez, A. (2005). Cognitive load and learning effects of having students organize pictures and words in multimedia environments: The role of student interactivity and feedback. Special Issue. *Educational Technology Research and Development, 53*(3), 35-45.

Murray, R. (2009). Writing for Academic Journals (2nd. Ed.) McGraw-Hill Education. ISBN 978-0-335-23458-5.

Natividad, G., Mayes, R., Choi, R., & Spector, J. M. (2015). Balancing stable educational goals with changing educational technologies. *E-Mentor*, *1*(58), 83-94.

Nelson, M. M., & Schunn, C. D. (2009). The nature of feedback: How different types of peer feedback affect writing performance. *Instructional Science, 37*(4), 375-401.

Nkomo, S. M. (2009). The seductive power of academic journal rankings: challenges of searching for the otherwise. *Academy of Management Learning and Education, 8*(1), 106–112.

Philosophical Transactions: Giving some Accompt of the present undertakings, studies, and labours of the Ingenious in many considerable parts of the World, (1665 and 1666) Vol 1. p.2 https://books.google.com/books?id=4u2DURXGT-IC&pg=PA5-IA1&dq=Henry+Oldeburg+iimpart+their+knowledge+to+one+another,&hl=en&sa=X&ved=0ahUKEwjfqYDd353LAhXFvIMKHSI1DR4Q6AEIJDAB#v=onepage&q=Henry%20Oldeburg%20iimpart%20their%20knowledge%20to%20one%20another%2C&f=false

Pontille, D., & Torny, D. (2010). The controversial policies of journal ratings: Evaluating social sciences and humanities**.** *Research Evaluation***,** *19*(5), 347-360 doi**:** 10.3152/095820210X12809191250889.

Reigeluth, C. M. (1989). Educational technology at the crossroads: New mindsets and new directions. *Educational Technology Research and Development. 37*(1), 67-80.

Restructuring the university reward system. (1997). Sid W. Richardson Foundation, Fort Worth, TX. (Eric Document Reproduction Service No. ED411740).

Ritzhaupt, A. D., Sessums, C., & Johnson, M. (2012). Where should educational technologists publish their research? *Educational Technology, 52*(6):47–56.

Ross, S. M., & Morrison, G. R. (2004). Experimental research methods. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed., pp. 1021–1043). Mahwah, NJ: Lawrence Erlbaum Associates.

Ross, S. M., Morrison, G. R., & Lowther, D. L. (2010). Educational technology research past and present:Balancing rigor and relevance to impact school learning. *Contemporary Educational Technology*, *1*(1), 17-35.

Schoenfeld, A.C., & Magnan, R. (1992) *Mentor in a manual: Climbing the academic ladder to tenure.* Madison, WI: Magna Publications.

Schrum, L., Bull, G., Knezek, G., Roblyer, M., & Thompson, A. (2005). A proactive approach to a research agenda for educational technology. *Journal of Research on Technology in Education*, *37*(3), 217-220. Retrieved from http://search.proquest.com/docview/274703986?accountid=7113

Segedy, J. R., Kinnebrew, J. S., & Biswas, G. (2013). The effect of contextualized conversational feedback in a complex open-ended environment. *Educational Technology, Research and Development*, *61*(1), 71-89.

Silber, K. H. (1970). What field are we in anyhow? *Audio Visual Instruction, 15* (5), 21-24.

Silber, K. H. (1978a). Problems and needed directions in the profession of educational technology. *Educational Technology and Communications Journal, 26*(2), 174-185.

Spector, J. M. (2012). *Foundations of educational technology: Integrative approaches and interdisciplinary perspectives*. New York: Routledge.

Spector, J. M. (2013). Emerging Educational Technologies and Research Directions. *Journal of Educational Technology & Society*, *16*(2), 21–30.

Spector, J.M. (2015). Advancing the State of the Art in Advanced Learning Technologies:[Re]Connecting Theory, Research, Practice and Policy," in *Advanced Learning Technologies (ICALT), 2015 IEEE 15th International Conference on* , vol., no., pp.2-3, 6-9 July 2015 doi: 10.1109/ICALT.2015.155

Spector, J. M. (2016). *Foundations of educational technology: Integrative approaches and interdisciplinary perspectives* (2nd ed.). New York: Routledge.

Spector, J. M., & Ren, Y. (2015). History of educational technology. In J. M. Spector (Ed.), The SAGE *Encyclopedia of educational technology* (pp. 335-344). Thousand Oaks, CA: Sage Publications.

Spector, J. M., Johnson, T. E., & Young, P. A. (2014c). An editorial on research and development in and with educational technology. *Educational Technology Research & Development, 62*(2), 1-12.

Spector, J. M., Merrill, M. D., Elen, J., & Bishop, M. J. (Eds.) (2014). *Handbook of research on educational communications and technology* (4th ed.). New York: Springer.

Torkelson, G. M. (1977). AVCR - One quarter century: Evolution of theory and research. *Audio Visual Communication Review*, *25*(4), 317-358.

U.S. Department of Education. (2010). *National education technology plan.* Retrieved from: https://www.ed.gov/sites/default/files/netp2010.pdf

U.S. Department of Education. (2013). Office of Educational Technology, *Expanding Evidence Approaches for Learning in a Digital World,* Washington, D.C.

West, R. E., & Rich, P. J. (2012). Rigor, impact, and prestige: a proposed framework for evaluating scholarly publications. *Innovative Higher Education, 37*(5), 359–371.

White, H.D., Boell, S.K., Yu, H., Davis, M., Wilson, C., & Cole F.T.H. (2009). Libcitations: A measure for comparative assessment of book publications in the humanities and social sciences. *Journal of the American Society for Information Science*, *60*(6), 1083-1096.

Winson-Geideman, K., & Evangelopoulos, N. (2013). Research in Real Estate, 1973-2010: A three-journal comparison. *Journal of Real Estate Literature, 21*(2), 255-267.

Winson-Geideman, K., & Evangelopoulos, N. (2013). Reading lists for Ph.D. seminars in Real State. *Journal of Real Estate Practice and Education, 16(*1), 41-82.

Zaugg, H., Amado, M., Small, T., & West, R. E. (2011). Educational technology research journals: Educational Technology Research and Development, 2001–2010. *Educational Technology, 51*(5), 43–47.