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Analysis of Educational Technology, Research and Design, 2001-2010

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Author Biographies

Holt Zaugg is a doctoral student in Educational Inquiry, Measurement, and Evaluation studying communication patterns in engineering students working on global, virtual teams.

Mayavel Armado is a master's student in Instructional Psychology and Technology studying.

Tyler Small is a master's student in Instructional Psychology and Technology studying the history of theory in IP&T.

Richard E. West is an Assistant Professor in Instructional Psychology and Technology studying collaborative creativity and online learning.

Abstract

This article examines 10 years (2001-2010) of journal articles from *Educational Technology, Research, and Design* (ETRD) to determine trends in article topics, key contributing authors, citation patterns and methodological trends. Our analysis identified several unique characteristics of this journal over the past decade including a balance between theory, research, and design, as well as a commitment to international perspectives.

Analysis of Educational Technology, Research and Design, 2001-2010

Educational Technology Research and Design (ETRD) uniquely focuses on both research and development in educational technology (as stated in ETRD's Aims and Scope). It is divided into two sections. The research section includes original, rigorous qualitative, quantitative, and mixed methods educational studies with a focus on technology application or instructional design. The development section examines instructional technologies and learning environments with an emphasis on planning, implementation, evaluation and management (ETRD, nd.). The journal uses a blind review process and also includes book reviews, international review articles, and research abstracts. The current editors are Michael J. Hannafin (research) and J. Michael Spector (development). In this study we examined 315 published articles from ETRD's past 10 years (2001 – 2010) and consider the trends in article topics, authorship, citations, and methodologies.

Method

This analysis only considered research, development, and international review full-length articles ($n=315$). As a result, book reviews, research abstracts, and articles introducing special issues were not included. First, to identify the key two-word phrases distinguishing research in this journal over the past decade, the top two-word phrases from the abstracts available online were identified using a word count tool (www.writewords.org.uk/word_count.asp). Two word phrases containing prepositions and connector words such as “of”, “to”, “and” were excluded. In one case, the singular and plural form of the word phrase was combined. Since some articles used in this analysis did not provide an abstract online, only the available abstracts were used. For this reason, this

analysis is not considered complete, but does contain enough available information to show patterns in what was emphasized in the journal over the last decade.

Second, we ranked authors by total number of publications for the 10-year period.

Third, using Publish or Perish software (Harzing, 2011), we analyzed the Google Scholar citation pattern for all published articles and reviews (including shorter pieces).

Finally, to determine methodological trends, each article was coded as belonging to one of seven possible categories. Three authors coded one year (2001) together to establish agreement on coding definitions. Thereafter, each author coded three years of articles. A second coder verified an article's code either by request of the initial coder or by a secondary random check. Where disagreement occurred, the two authors discussed the differences until reaching consensus.

Codings used to classify article methodologies were:

- **Developmental/Design based:** The research had a developmental or design focus. Its primary purpose was to describe a current design or developmental cycle with the intent of explaining how this <http://scholarsarchive.byu.edu/cycle> was an improvement from a previous iteration or indicated research paths for future improvement.
- **Survey:** This research primarily relies on survey techniques that result in a descriptive summary.
- **Quantitative:** Research studies that are quasi-experimental, experimental, or correlational and seek to report comparisons between research groups.
- **Qualitative:** Research studies that include case studies, ethnographies, interviews, observations, or document analysis. The focus is on interpretive research.

- **Theoretical/Philosophical:** These studies include literature reviews, theoretical frameworks, and descriptions of design and instructional models or approaches. The article relies on an analysis of literature or theory, rather than new research data.
- **Content/Discourse:** These studies analyze the content or makeup of web communication, focusing on the types of conversation exchanges.
- **Combined methods:** Research that combines quantitative and qualitative research methods.

Findings

Journal Topics. The highest-rated word phrases for all years in the available abstracts were used as one estimation of the most common ETRD topics over the 10-year period. The highest-ranked phrases are listed in Table 1.

Table 1

Highest-ranked two-word phrases using available abstracts for articles for the years 2001-2010.

<u>Total Count</u>	<u>Two-Word Phrase</u>
70	problem solving
69	instructional design
54	learning environment(s)
30	computer based
27	cognitive load
26	case study
23	web based
21	higher education
21	educational technology
20	instructional designers
20	ill structured
19	teacher evaluation
19	problem based
19	e learning
18	future research
17	self-efficacy

These topics provide little surprise in a journal dedicated to the research, design and use of technology to further educational efforts. The majority of two-word phrases have a strong connection to technology (i.e. computer based, e learning), research (i.e. case study, future research), or design (i.e. problem solving, instructional design, and learning environment(s)) in educational settings. However, there are a few interesting findings. First, each of the top three phrases focus on designed improvements in education, and many phrases show a strong commitment to improving students' problem solving abilities in complex settings (i.e. problem based, problem solving, and ill structured) or the use of theoretically-based solutions to educational challenges (i.e. cognitive load, self-efficacy, and future research). Interestingly, "learning environments" is ranked high (#3), perhaps showing that scholars publishing in this journal are equally focused on instructor and learner perspectives. Only four of these 16 phrases emphasize technology, perhaps indicating that this journal and its authors have evolved to a point where technological interventions are not seen as solutions in and of themselves but as nuanced aspects of overall design approaches to improving education.

Authors. Out of the 315 articles, there were a total of 557 authors averaging 1.8 authors per paper. There were 95 authors (approximately 17%) who were published two or more times. This provides one indicator of key authors in the field. Approximately 73% of the articles (229) had two or more authors, showing a strong trend toward author collaboration for successful publication.

The order of authors supports a trend first described by Ku (2009) that examined 20 years of ETRD articles (1989-2008) and ranked authors by a productivity score determined by order of authorship. Three of the top five authors (Hannifin, Sullivan and Jonassen) in

our analysis were also listed as top authors in Ku's study. However, the large proportion of authors publishing only once (approximately 83%) indicates an openness to new authorship in ETRD.

Table 2

Authors publishing three or more articles for the years 2001-2010.

<u>Authors</u>	<u>Total Articles</u>
Sullivan, Howard	9
Hannafin, Michael J.	8
van Merrienboer, Jeroen J. G.	8
Kirschner, Paul A.	6
Jonassen, David H	6
Baylor, Amy	4
Klein, James D.	4
Ku, Heng-Yu	4
Lockee, Barbara B.	4
Olina, Zane	4
Barab, Sasha	3
Bishop, M J	3
Brush, Thomas	3
Clariana, Roy B.	3
Ertmer, Peggy	3
Hew, Khe Foon	3
Hoadley, Christopher	3
Kopcha, Theodore J.	3
Ku, Heng-Yu	3
Land, Susan M.	3
Magliaro, Susan G.	3
Pedersen, Susan	3
Reeves, Thomas C.	3
van den Akker, Jan	3

Citations. We used Harzing's (2011) Publish or Perish program to analyze Google Scholar citations for all published articles. According to this analysis, ETRD had a total of 838 citations for the period of 2001-2009. This represents an average of 26.95 citations per paper and just over 93 citations per year. This is a higher citation rate than that

reported in Gall et. al (2010), indicating differences between databases since Gall et. al used the Social Science Citation Index.

The following table shows the top cited papers for the years 2001-2009. We did not include 2010 as the articles were too new to have meaningful counts. Three important caveats should be noted: 1) the worth of citations counted by Google Scholar may be debatable, as citation counts from any database would be, 2) Google Scholar is not necessarily comprehensive, and 3) many citation counts are close and continue to fluctuate, meaning there could be changes to the following list. However, despite these limitations, this analysis helped discover several seminal articles.

Table 3

Most-cited articles between 2001-2009 for ETRD. Analysis completed in May, 2011.

<u>Year</u>	<u>Citations</u>	<u>Authors</u>	<u>Article</u>
2009	27	Hong & Sullivan	Towards an idea-centered, principle-based design approach to support leaning as knowledge creation.
2008	81	Klopfer & Squire	Environmental detectives - the development of an augmented reality platform for environmental simulations.
2007	121	Hew & Bush	Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research.
2006	57	Kim & Baylor	A social-cognitive framework for pedagogical agents as learning companions.
2005	318	Barab, Thomas, & Dodge	Making learning fun: Quest Atlantis, a game without guns.
2004	126	Parrish	The trouble with learning objects.
2003	109	Ge & Land	Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions.
2002	669	Merrill	First principles of instruction.
2001	292	Reiser	A history of instructional design and technology: Part I: A history of instructional media.

Methodologies. Finally, we coded the articles according to their research method. In coding we discovered different patterns in the types of methods used for research and development articles, versus articles published in international review (IR). As a result, table 5 reports the percent of annual articles in each category both including the IR articles and excluding the IR articles (indicated in brackets).

There were a few interesting findings. First, while content discourse analysis only accounted for 5% of the total published articles in this time period, virtually all of these articles were published in the last four years, perhaps reflecting the increasing influence of social and interactive media. A typical article of this type is Erlandson, Nelson and Savenye (2010) who examined the effect of communication modality on cognitive load and science inquiry learning for students completing a science inquiry curriculum in an educational multi-user virtual environment. As virtual communication technologies and social networks become more ingrained in educational pursuits, this appears to be a growing area of opportunity for fruitful research.

Second, theoretical and philosophical articles dominated the number of published articles over the 10-year period, but have sharply decreased in the last five years. This shift away from theoretical work may be due to several possibilities. For example, this decrease may be due to corresponding increases in developmental/design articles and content/discourse articles. Also, many earlier issues contained articles describing or defining the field (e.g. Reiser, 2001a; Reiser, 2001b), articles proposing new instructional approaches based on a synthesis of the literature (Bishop & Cates, 2001; Ley, 2001), or articles describing new design models (such as Van Merriënboer, Clark, & de Croock, 2002). It could be that the field of instructional design and educational technology has reached a

point where scholars are no longer exploring theoretical foundations and are instead extending theory through research and design. However, it raises the question about whether theoretical work continues to be important, especially as learning environments and educational technologies evolve rapidly in the Internet Age. Finally, IR articles earlier in the decade were mostly categorized as theoretical pieces, to a larger degree than R & D articles.

Table 4

Categorization of Research Methods (2001-2010) for ETRD expressed as percent of yearly total. Brackets indicate percent of yearly total with internationally reviewed articles removed.

Year	Developmental /Design	Survey	Quantitative	Qualitative	Theoretical /Philosophical	Content /Discourse	Combined Methods
2001	.16(.16)	.03(.03)	.26(.26)	.06(.06)	.45(.45)	0(0)	.03(.03)
2002	.08(.04)	.04(0)	.27(.23)	.12(.08)	.50(.38)	0(0)	0(0)
2003	.04(.04)	.04(.04)	.32(.29)	.36(.25)	.14(.07)	0(0)	.11(.07)
2004	.03(.03)	.03(.03)	.13(.13)	.16(.09)	.59(.28)	.03(.03)	.03(.03)
2005	.10(.07)	0(0)	.28(.28)	.17(.17)	.41(.31)	0(0)	.03(.03)
2006	.07(.07)	0(0)	.23(.23)	.27(.13)	.40(.27)	0(0)	.03(.03)
2007	.07(.07)	.14(.10)	.17(.14)	.24(.17)	.28(.24)	.07(.07)	.03(.03)
2008	.14(.14)	.07(.04)	.25(.25)	.14(.11)	.14(.14)	.07(.07)	.18(.14)
2009	.14(.14)	.05(.02)	.26(.26)	.21(.19)	.21(.17)	.12(.12)	0(0)
2010	.18(.18)	0(0)	.38(.38)	.08(.05)	.15(.13)	.15(.15)	.08(.08)
Total	.10(.10)	.04(.03)	.26(.25)	.18(.13)	.32(.24)	.05(.05)	.05(.04)

Conclusions

Our analysis confirms ETRD's commitment to publishing research and development articles relating to educational technology, design, and instruction. It also indicates several unique characteristics of this journal over the past decade including a commitment to a balance between knowledge gained through strong theoretical inquiry, research, and design. This finding was further verified by the most common word phrases identified in the abstracts, as there were many phrases related to theories, specific technologies (especially related to the Internet), and both instructor and learner perspectives on education. The journal also has shown a strong dedication to international issues (17% of the articles this decade were accepted under International Review), as well as an openness to new research methodologies to match emerging technologies, such as content analysis for analyzing virtual networks. As educational technologies and learning environments continue to evolve, maintaining this balance should provide the journal with a strong position for providing new strategies, theories, and tools for educating learners in the 21st Century.

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