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The Influence of One Scholar on Another: A Citation Analysis of Highly Cited Authors in Instructional Design and Technology

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Authors in Instructional Design and Technology

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ABSTRACT

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Authors in Instructional Design and Technology

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While many historical articles and chapters on the foundations of Instructional Design
and Technology (IDT) have painted an accurate picture of the field, it has been 21 years since
anyone has given emphasis to the relationships of influence among IDT scholars. Many have
written on various elements of the field, emphasizing events according to their own experience,
which have increased our overall understanding of IDT. However, without insight on
the connections between these pieces, the field appears to be only a broad array of isolated silos,
each filled with its own research interest. This research sought to discover IDT's genealogy of
influence. Three main research questions were asked: "Currently, who are the most influential
scholars in IDT?" "Who influenced today's most influential scholars?" and "What ideas were
most influential in the scholars' relationships?" The ten most influential names in IDT were
discovered, and their genealogies of influence were traced. The ideas that were most influential
in the relationships between theorists were summarized into the following groups of fields:
General Education, IDT (and its contributors), Psychology, Sociology and Anthropology, and
Adult and Higher Education. This research found an IDT field that was very diverse but very
connected. Another important result was much less expected: the prevalence of psychology as a
significant influence on both past work and current big ideas. Implications are discussed, such as
revising definitions of the field.

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Chapter 1: Introduction

The field of Instructional Design and Technology is a heterogeneous mix of academic backgrounds. Because very few universities offer undergraduate programs in IDT (e.g., Walden University, California State Chico, and Western Illinois University), individuals enter IDT "from the entire range of undergraduate majors" (Dick, 1987, p. 194). It may be advantageous for this diverse audience to understand the network of scholars from which modern IDT ideas and processes have descended. This understanding may, in turn, unite the general understanding of the IDT field.

Rob Reiser (2007a) contended that "Professionals should know a field's history" (p. 17). In particular, several authors have stated the importance of knowing the history of Instructional Design and Technology (IDT). In the forward of Saettler's *The Evolution of American Educational Technology* (1990), Donald P. Ely wrote, "A serious professional is concerned about his/her heritage... the search is somewhat akin to the recent preoccupation with genealogical 'roots'" (p. xxv). Allen (1971) also stated, "It may be helpful to review what has happened during the past 20 years" (p. 5). If that was true more than forty years ago, it is equally important today. Therefore, this research examines the "genealogy" of the major scholars and research that shape the IDT field today.

Research Questions

The purpose of this study was threefold: first, to identify the most influential IDT scholars over the past decade; second, to trace the influence of prior scholarship on these authors' work through a citation analysis; and third, to reveal which ideas in these relationships were most influential. Revealing this specific historical information may inform the way we teach, study and write about the field of instructional design.

Question one: "Currently, who are the most influential scholars in IDT?" We asked this question to help us know where to turn for authoritative advice on various topics in IDT. It was answered in two steps. First, an existing analysis (Ritzhaupt, Sessums, & Johnson, 2011) was used to identify the journals in IDT that were perceived to have the greatest "academic prestige" (p. 7). From these journals, 10 scholars were identified who were cited most over the past 10 years (2001 to 2010), using the software program Publish or Perish (Harzing, 2011). These 10 most influential scholars comprised the first level of the IDT genealogy (i.e., the most recent generation). Academic influence was represented by one scholar citing another (Aylward, Roberts, Colombo, & Steele, 2008; Gall, Ku, Gurney, Tseng, & Yeh, 2004; Ozcinar, 2009).

Question two: "Who influenced today's most influential scholars?" As with many innovations, research is the result of collaboration (Sawyer, 2007). In academic writing, we sometimes build on ideas of "collaborators" who have long since passed away. Although asynchronous, these collaborators deserve credit. This credit is most frequently given not by claims of co-authorship but by citations. This allows readers to see who influenced the development of ideas.

This question was answered by performing a citation analysis on each Level 1 author's ten most cited works, located via Publish or Perish. The scholars cited most by the Level 1 author across those ten most influential works became the second level in that scholar's genealogy. Level 2 was composed of three *parent* scholars. (Even though authors usually cite themselves far more than anyone else, authors were not considered parents of themselves in this genealogy). This pattern was continued, tracing the flow of influence back through one more generation (Level 3).

Question three: "What ideas were most influential in the scholars' relationships?"

Knowing the names of the most prominent IDT scholars would be nice but incomplete without knowing what they have contributed to the field. This research identifies the ideas that were most influential between each pair of scholars in the analysis. The results and discussion chapters give insights into where the IDT field came from, how scholars cite one another, and how ideas flow from one generation of scholars to the next. This research shows a new and different perspective than the histories and foundations texts that our current literature offers.

Chapter 2: Literature Review

This literature review will define the IDT field and then describe how the existing body of relevant literature answers the three central research questions.

Robert Reiser (2007a) defined the field of Instructional Design and Technology (IDT) as follows:

> The field of instructional design and technology (also known as instructional
> technology) encompasses the analysis of learning and performance problems, and
> the design, development, implementation, evaluation, and management of
> instructional and noninstructional processes and resources intended to improve
> learning and performance in a variety of settings, particularly educational
> institutions and the workplace. Professionals in the field of instructional design
> and technology often use systematic instructional design procedures and employ
> instructional media to accomplish their goals. Moreover, in recent years, they
> have paid increasing attention to noninstructional solutions to some performance
> problems. Research and theory related to each of the aforementioned areas is also
> an important part of the field. (p. 18)

For this study, Reiser's definition was used because it was the most current and fitting for research on scholars and where these scholars' ideas originated. Specifically, the last sentence of Reiser's definition is the most relevant because it mentions the role of research and theory: "Research and theory related to each of the aforementioned areas is also an important part of the field" (p. 18).

Question One: "Currently, Who Are the Most Influential Scholars in IDT?"

To whom should we look for guidance in IDT? Who are the most successful masters of thought in our field? Authors of historical texts of IDT have based their answers to this question on their own experiences or have let their own experiences guide their review of the literature. Baker (1973) confirmed that "A description of any educational activity always occurs in the light of the author's biases" (p. 245). Also, Shrock (1995) stated, "this chapter necessarily reflects judgments based on my experiences in the field" (p. 11). Likewise, in Allen's (1971) report of Instructional Media Research, "Dr. Allen looks back on those years and gives us the benefit of his perspectives on research and research programs during that time" (p. 5).

While experiential evidence from eminent researchers has produced several historical and foundational accounts, these accounts vary considerably. This point was illustrated by the following true story. In 2004 three researchers set out to find the single most important work in the field of instructional technology, the one that could inform their foundational knowledge of the field with the greatest perspective. To accomplish this, they built a survey and distributed it to the ITForum. Essentially, the main question of the survey was "Who do you think should be studied in a foundations course in IDT?" To their surprise, they received 42 different answers from 42 different respondents. No two respondents agreed (Shepherd, 2007). This implied there was no consensus in our field on the question of who is most influential.

Similarly, several groups within IDT (e.g., instructional theory, instructional development, and instructional design) have presented their best interpretation of "who's who," but with greatly varying perspectives. A search, though not exhaustive, yielded nine book chapters and articles that focused on the history and/or foundations of IDT or its close relatives (e.g., Instructional Development). To gauge the degree of agreement (or disagreement) among

these different historical accounts, I coded these chapters and articles for the number of foundational/research events mentioned, per decade, per article (see Table 1). A research event was coded only if it also included a researcher's name and a year or decade in which the event took place. With this information, the decade was identified in which each work reported the most events. Most frequently, the decade with the most events was adjacent to the runners up and contained two times more events than any other decade within the same report. However, authors did not agree on the decade when the most activity took place.

Table 1

Number of Scholarly Activities Reported by Nine Authors of Foundations and Historical Works

Author	Yr of work	Decade											Tot. Citations
		1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	
Shepherd	2008	1	0	0	0	0	0	0	0	2	3	3	9
Reiser	2007	2	1	2	4	7	11	20	10	6	6	1	70
Driscoll	2007	0	0	0	1	0	0	2	1	2	16	4	26
Shrock	1995	0	1	5	1	1	4	5	1	0	0	n/a	18
Johnson	1989	0	0	0	0	0	0	0	1	9	n/a	n/a	10
Dick	1987	0	0	0	0	0	5	18	8	0	n/a	n/a	31
Meierhenry	1980	0	0	0	0	0	2	7	1	n/a	n/a	n/a	10
Baker	1973	2	1	1	0	1	1	2	2	n/a	n/a	n/a	10
Allen	1971	0	0	1	0	2	6	12	6	n/a	n/a	n/a	27
	Tot. Per Yr	5	3	9	6	11	29	66	30	19	25	8	

For each author's account of the history and/or foundations of IDT, the apex decade was highlighted, in which the highest number of research events took place. Within the nine texts, a research event was coded when an author reported a researcher, a development in research or theory, along with the name of at least one scholar. For many author's accounts, there was no available data (signified by an "n/a") for decades after the account was written. Further, in several of the accounts, the last decade had less activity. In some cases (e.g., Meierhenry and Allen) this was, in part, due to a limited exposure (one to three years) within that last decade at the time of writing. This contributed to an illusion that the period of greatest activity was the 1960s. Another contribution to this illusion was Shrock's bimodal results. Although she

contributed a shaded box to the sixties, she also claimed an equal number of activities in the 1920s (which was unique). This table empirically illustrates the vast differences between different authors' histories of IDT. The raw data for this table is located in Appendix A.

Four of the nine articles and chapters in the analysis (Allen, 1971; Dick, 1987; Meierhenry, 1980; and Reiser, 2007a), reported the most activity in the 1960s (although both Baker's and Allen's reports were then so recent that he could not have meaningfully compared any decade after 1960). The 1980s were also reported to have the most activity (Johnson, 1989), as were the 1990s (Driscoll, 2007). Two authors had an equally high number of events in two different decades. Shrock (1995) reported equal highs in the 1920s and the 1960s, and Shepherd (2007) reported equal highs in the 1990s and the 2000s. More different still, one author saw a relatively equal number of activities in each decade from the 1900s through the 1970s (Baker, 1973).

Another example of disparities between histories started with Meierhenry (1980), who reported that the major developments in instructional theory "seemingly... have occurred at five year intervals" (p. 16). This appeared to be based merely on his own perspective, because other researchers (e.g., Johnson, 1989; Shrock, 1995) sorted historical developments into decades, while some (e.g., Saettler, 1990) presented developments in even larger chronological divisions. Still, others represent the history in periods not always delineated by even divisions of time (e.g., Reiser, 2007). The disparity between these accounts demonstrates that historians and foundations experts disagree on who, what, and when IDT's most significant events occurred.

Many have discussed "significant contributors" to the various fields associated with IDT. One example was a series of more than fifteen articles being published by Reeves in *Educational Technology* (see Reeves, 2006). Each article highlighted a scholar who has made "significant

contributions" to the field of Educational Technology. The series represented a selection of many truly "significant contributors" to the field. However, it made absolutely no claim to represent *the most* significant contributors. Thus, there was no way to know (based on this collection of articles) just how significant each contributor was. The articles have historical value, but they don't provide evidence that these contributors are still affecting IDT today. For example, while Charles Hoban may have been influential in early IDT discussions, it is unclear how IDT professionals are influenced directly by his ideas today.

In order to approach this time-sensitive question from a different angle, the author reviewed sources that were less than 15 years old. This unsuccessful search revealed no books written with the sole purpose to reveal the most influential scholars in the field. However, one related book chapter, one foundations chapter, and two papers with an historical approach were worthy of note.

The book *The Instructional Design Knowledge Base* (Richey, 2011) and the chapter *Psychological Foundations of Instructional Design* (Driscoll, 2007) did not identify the most influential scholars in IDT. This was simply not a component of any of their claims. In fact, the reason is not a fault of Driscoll and Richey but a natural feature of the foundations approach. Foundations approaches are generally idea based. By design, Driscoll included the major ideas and many influential scholars, but no claims regarding the most influential scholars in IDT.

The two recent historical chapters, "A history of instructional design and technology" (Reiser, 2007a) and "A brief history of instructional technology and the ideas affecting it" (Shepherd, 2007) also did not respond to this question (also by design). Again, it was not within the scope of either chapter to include today's most influential IDT scholars. In defense of the historical approach, information in histories is often structured around past events, rather than

people. Therefore, neither of these works revealed the most influential scholars in contemporary IDT works.

If newness were not the issue, the first major question might already have had its answer. In 1990, Saettler published an enormous historical volume: *The Evolution of American Educational Technology*. In it, he presented what he felt were the most influential scholars up to that point in time, including Dewey, Thorndike, Skinner, Gagné, Calfee, Miller, Koyllonen, Weiner, and Atkinson. However, since the book is over two decades old and cannot indicate if or to what extent these scholars influence today's IDT work, it was precluded from the current discussion. Several other histories under review also failed to expose today's most influential scholars, simply because of their age (e.g., Allen, 1971; Baker, 1973; Hannafin and Rieber, 1989; Johnson, 1989; Meierhenry, 1980; Shrock, 1995; and Walter, 1987). One further question was raised regarding Saettler's method of inclusion: what were his criteria for inclusion? Were they his personal interpretation of available resources, or did he use more objective criteria so his results could be duplicated? Although he used "great effort... to use scholarly historical and research data based on the best available primary and secondary sources," (1990, p. xxviii) his methods were not transparent. Thus, we could not understand his exact method, nor could we replicate Saettler's (1990) process that he used.

Because of the disparities in the existing body of literature and due to the covertness in the methods by which influential events or people were included or excluded, there was a need for further research to identify the most influential IDT scholars within contemporary IDT literature.

Question Two: "Who Influenced Today's Most Influential Scholars?"

Who guided, persuaded, and molded the minds of current eminent scholars in IDT? More specifically, whose ideas were most persuasive to them? And, who exactly did they cite the most in their most influential works? Did IDT history diverge broadly into several related fields, or did it converge on someone like John Dewey? Although this search extended back over 100 years of history, there was little to no evidence in the literature that linked the eminent researchers of past decades to one another, or to more recent prominent researchers in IDT (e.g., Garrison, Merrill, Jonassen, van Merriënboer, etc.). Further, since it was not known who the most influential scholars in the field were, they could not be linked to anyone in the past. It was likely that some or most of the eminent figures mentioned in the older histories (e.g., by Allen, 1971; Baker, 1973; Saettler, 1990) have influenced today's most influential scholars, but there was no explicit evidence to confirm this claim as of the writing of this literature review.

It was noted that short chains of influence were occasionally presented in the reviewed histories. For example, Richey (2011) showed a connection when she discussed communication theory: "[Campos's] model is influenced by the work of three major scholars: Jean Piaget, Jean-Blaise Grize, and Jürgen Habermas" (p. 37). In this example, Richey linked a total of four scholars together, showing two generations of academic influence. Unfortunately, the links that were sporadically scattered throughout the literature were similarly short and isolated.

A different, but related example was given by Meierhenry (1980) as he discussed communication theory. He explained that Edgar Dale and Charles Hoban were both leaders in the movement, but he did not imply (one way or the other) whether Dale and Hoban influenced one another, who they influenced, or who influenced either of them. Ironically, although Richey devoted an entire chapter to Communication Theory, she did not mention Dale or Hoban. This

contradiction begs the question: how did Dale, Hoban, Campos, Piaget, Grize, and Jabermas fit together, if at all, within the larger communication theory movement?

The history of the IDT field is incomplete. These gaps between accounts illustrate the need for clarification. Many isolated mini-chains of two or even three links were found in the literature. However, these mini-chains were scattered and isolated among various topics. As a result, the representation of IDT scholars is choppy and fragmented. Do influential IDT scholars influence one another, or do they draw their influence from other fields? There is some raw evidence available for answering this question in nearly all journal articles. Accompanying each paper is a list of references indicating who influenced the development of their ideas. Knowing that researchers influence one another, but not having any systematic account of who influenced whom, illustrated a clear need for additional research. The most logical place to begin this research was to answer the question of who was most influential in IDT. From there, we sought to discover who influenced these scholars, thus beginning a genealogy that could eventually extend to the far reaches of the field, as the research continues.

In short, the most influential scholars in IDT were yet unknown. Further, there had been no systematic and transparent effort to link IDT scholars together. Although this aspect of IDT history had never been researched, I believed that doing so would enrich the field, connect it to its roots, and better inform the design of future instruction.

Question Three: "What Ideas Were Most Influential in the Scholars' Relationships?"

My review of the literature revealed a plethora of ideas (e.g., cognitive load, ed psych, constructivism, distance learning, etc.). However, without knowing which relationships are relevant, it is impossible to synthesize the ideas. Therefore, this question is somewhat irrelevant to the literature review.

Chapter 3: Method

In order to understand the genealogy of scholars from which modern IDT ideas and processes have descended, and thus unite the general understanding of the IDT field, I used the following methodical steps: First, I identifed the top 10 journals in IDT. Second, I identified the most influential scholars within those journals. Third, I proposed and reported the method and results of a test sample of finding the second and third generation of scholars. Fourth, I identified the most influential ideas between these scholars. After gathering this data, I interpreted it and then discussed the limitations and justifications of the method.

Procedures

Identification of the top 10 journals in Instructional Design and Technology. In the search to find a list of journals that represented the IDT field, many lists that claimed to represent the IDT field in one way or the other were found. However, similar to the histories of the IDT field, their purposes varied, and because very few aligned with the purposes of this research, very few were considered for this project. For example, one purpose was to show where emerging scholars in our field tend to publish (e.g., Carr-Chellman, 2006). Another was to provide publishing scholars with appropriate avenues for article submission and to provide tenure committees with a measuring stick wherewith to judge the quality of young faculty's CVs (Maushak, 2000). Another purpose of past research was to analyze trends (Hannafin, 1991; Ozcinar, 2009). However, most of these past lists were not useable in this research because they did not satisfy the following three important constraints. First, for this study, results that went beyond the researchers' opinions were desired. Thus, a list that was created through a systematic, methodical, and disciplined method was needed. Second, it was important that the criteria for the list were based on more than just trends. For this study, the focus is on academic prestige,

because we correlate academic prestige with influence (the more academic prestige a journal has, the more influence it is assumed to have in the field of IDT research and theory). Third, the list needed to be recent, and the more recent the better, as the IDT field, like any other, changes over time. Under these conditions, only two useable lists were found: Holcomb, Bray, and Dorr (2003), and Ritzhaupt, Sessums and Johnson (2011). However, Holcomb, Bray, and Dorr's list (2003) was published more than eight years before Ritzhaupt, Sessums, and Johnson's list (2011). Therefore, the second list was chosen.

Ritzhaupt, Sessums, and Johnson (2011) constructed their top-10 list in three steps. First, they constructed a list of "59 unique journals related to the field of educational technology" by combining several other lists (e.g., Holcomb, Bray, & Dorr, 2003; Cabell, 2007). Second, they sent out the survey to "three prominent educational technology listservs: the Association of Educational and Communication Technology (AECT) members' listserv, the ITFORUM listserv, and the American Educational Research Association's (AERA) Special Interest Group on Instructional Technology member listserv" (p. 4). Third, they analyzed the 79 responses from six different countries, controlling for factors such as "gender, years in the field, academic classification, ethnicity, and research interests." Finally a top ten list was created, which is reproduced in Table 2.

Identification of the most influential scholars. The list from Table 2 was used as the "Top 10 Journals in IDT," meaning those journals that are most influential. It was within these most influential journals that we presumed to identify the most influential scholars in IDT.

Table 2

Top 10 Journals in Instructional Design and Technology, Ranked by Journal Prestige

| Rank	Journal	M	SD
1	Educational Technology Research and Development	8.63	2.38
2	British Journal of Educational Technology	7.52	2.51
3	Computers & Education	6.59	2.89
4	Distance Education: An International Journal	6.05	2.76
5	The American Journal of Distance Education	6.05	3.17
6	Journal of Research on Technology in Education	6.03	3.09
7	Journal of Computing in Higher Education	5.92	2.62
8	Journal of Distance Education	5.84	2.73
9	Journal of Educational Technology and Society	5.75	3.03
10	Cognition and Instruction	5.68	3.18

Note: Reproduced from Ritzhaupt, Sessums, and Johnson's paper (2011). The Mean and Standard Deviation were based on a 10 point scale in a survey "with 1=Never heard of journal, 2=Low academic prestige, and 10=High academic prestige," (p. 5).

For each of the 10 most academically prestigious journals, an inquiry was made using the free software Publish or Perish (Harzing, 2011). This inquiry was limited to the past 10 years (2001 to 2010) of publications for each journal in order to keep the search results "current." Publish or Perish produced 1000 articles for each journal, making 10,000 journal articles in all. Next, the master list of 10,000 was pared down. After duplicates, errors, and articles with zero citations were sifted out, 3,827 remained. These 3,827 articles were placed in a list, then alphabetized by author. Next, the total number of citations per author was calculated, and the list was sorted again by these totals. The top of this list then represented the modern, most influential scholars in IDT, thus creating the first level of the IDT genealogy, and answering the first research question.

Alternative indexing tools (other than Publish or Perish) were considered. One available alternative was the ISI Web of Knowledge database. This database has been used for similar research (e.g., Ozcinar, 2009). However, as Fairbairn et al. (2008) discovered, only 18.4% of 1024 education journals included in their own review are even included in the ISI. Scopus,

another citation database, suffers from this problem even more as only 4% of the 17,500 indexed journals even represent the social sciences. Since ISI and Scopus do not include information on several of the journals in Ritzhaupt's list, they were not viable for this study.

   The number of Level 1 scholars. The number of scholars included for the first level of this analysis was 10. This decision was based upon the graph in Figure 1 (below), which shows the number of total citations for the top 100 scholars among the most prestigious journals over the last 10 years.
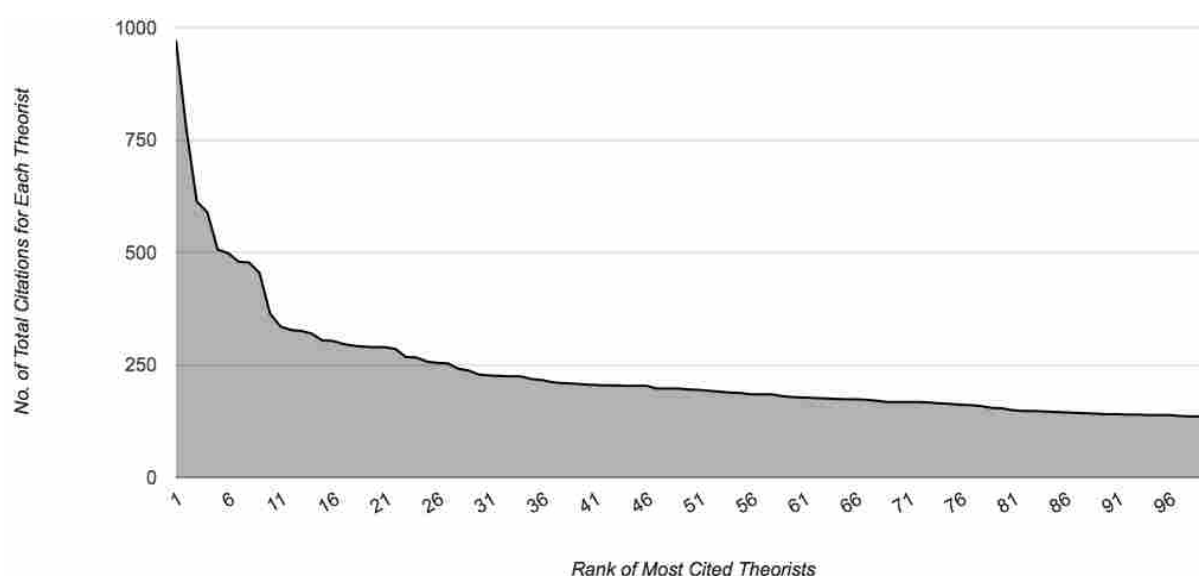
Figure 1. Number of Total Citations of the 100 Most Influential Scholars (in the Top 10 Journals of IDT).

   This graph provides two reasons for including only the 10 most cited scholars. First, these scholars have a significant number of citations, and second, after the first 10 scholars, there is no considerable difference in the number of citations between one scholar and the next.

   The dramatic spike on the left end of Figure 1 is the first focus of this research. These scholars (having the most citations) represent the current greatest influencers in IDT, according to the aforementioned analysis. Although it might be more informative to have a genealogy of

influence with two to three hundred scholars on this first level, this spike represents the *most influential* scholars of our time.

Time period of Level 1 scholars' publications. Top citations from all years were reviewed, and the average year of publication for the top 50 articles was 1993 (too old for the purpose of showing who is currently having the most impact on the field). This supports the idea of limiting the search to the last 10 years. This way, the *recent* most influential scholars will be emphasized, instead of those who are the most influential *of all time*. The most influential of all time (those older researchers) will emerge in the second and third generations, if not the first as well.

Top influences on Level 1 scholars. In order to decipher who influenced today's most influential scholars, another inquiry in Publish or Perish was performed to retrieve the top 10 most cited works of each Level 1 scholar (see "The number of top works..." section, below). This included papers presented at conferences, books, book chapters, e-book chapters, Web pages, traditional journal articles, etc. The only requirement of these works was that the Level 1 scholar was the first author, and that the work be among his or her 10 most cited (and therefore, most influential) works, per an author citation search using Publish or Perish. After these top 10 works were identified, the reference list of each work was located (through Internet access, inter-library loan, etc.). In some cases, this included up to a thousand references per work (e.g., Jonassen's book, Handbook of Individual Differences, Learning, and Instruction), making several thousand references per scholar.

Number of "parents" of each Level 1 scholar. Each scholar on the first level had three parents in the second level. The decision for this method was based on results of a test sample

(see "Test Sample" section, below). I anticipated a total of approximately 30 scholars on Level 2 of the genealogy, and there ended up being 31.

Top influences of Level 2 scholars. The method for this step differed slightly from the process used to identify the Level 2 scholars. In order to trace the flow of influence backward from the Level 2 scholars to the Level 3 scholars, I had to identify who the Level 2 scholars were most influenced by when they wrote the works that influenced the Level 1 scholars. Therefore, for the citation analysis of Level 2, I included only those works that Level 1 scholars had cited. In this way, I traced the path of influence in a genealogical fashion, and identified the Level 3 Scholars.

Number of "parents" of each Level 2 scholar. For each Level 2 scholar, there were three parents on Level 3 as well. The only exception was when there was a tie for one of the ranks that created more than three parents. However, in this case, they were analyzed in the same manner as before. I anticipated approximately 90 scholars in Level 3 of the genealogy, but there were in fact only 88.

Construction of a test sample. A test sample of five established IDT scholars was used to refine and validate the methods for this study. The number five was chosen because it was a sufficient predictor of the functionality of the methods, which were, in fact, refined as a result of the sample exercise. Further, the sample was representative of the 10 scholars that were eventually used for this study (three of the sample scholars ended up in the list of Level 1 scholars).

The sample included two well-known scholars from the Instructional Psychology and Technology department at Brigham Young University (i.e., David Wiley and Andrew Gibbons), and three other well-known researchers in the field (David Merrill, David Jonassen, and Sasha

Barab). The methods for the test sample were used to obtain the first and second generations of a

sample genealogy, and these methods were repeated for this research project, as described in the

following paragraphs.

Figure 2 includes information on the five sample scholars. It shows the average frequency

with which these Level 1 scholars referenced their (Level 2) top 10 influencers (in their top 10

most cited works). Similar to the graph of Level 1 scholars, this graph of Level 2 scholars also

contains a dramatic spike on the left side (see Figure 2).
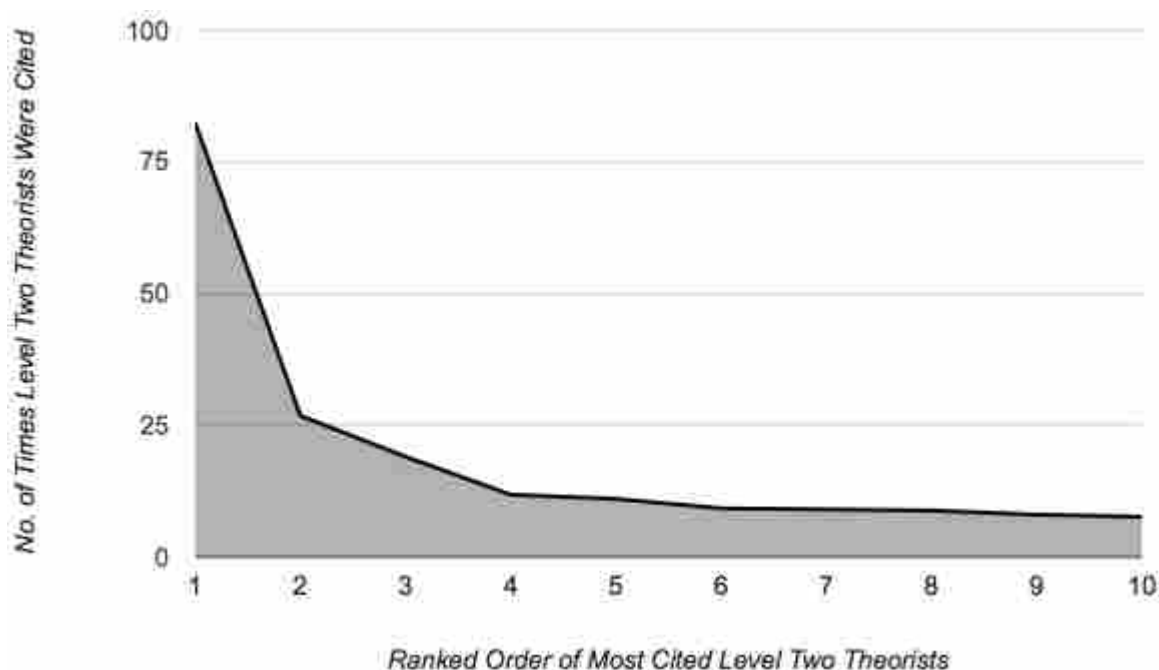
Figure 2. Average Citation Frequency of Level 1 Scholars Referring to Level 2 Scholars.

The information for this graph was gathered from the average of a sample of five

scholars: David Wiley, Andy Gibbons, David Jonassen, David Merrill, and Sasha Barab. The

spike on the left represents the scholars in Level 2 that were most influential (those that the Level

1 scholar cited the most). After the first four scholars (from left to right), the graph begins to

asymptote. Most of the time, the very tip of this spike actually represented the frequency with

which the scholar cited him or herself. For the purposes of this study, influencing one's self was

not included in the analysis. Thus, excluding authors' many self-citations, there were three "parents" for each Level 1 and Level 2 scholar. The only exception to the limit of three was when there was a tie. For example, when three scholars tied for the rank of "third most influential." In this case there were a total of five parents in that level.

Determination of number of top works included for each scholar. Ten of the "most cited" (most influential) works were included for each Level 1 scholar. Similar to the previous thread of logic based on Figure 1, this number is based on research indicating the frequency of an author's citations. Figure 3 shows an average of five sample scholars' works.

If solely based on the graph, the cutoff for the top ranked works could have been four or seven, because of the decreased steepness of the graph around those points. However, based on the high variance between the works in the test sample, a more conservative number was chosen: 10. This was done with the intention to include a more representative sample of who scholars cited the most *across* their most influential works. One implication of this was that the resulting top three second level scholars were those who were more consistently cited, and this list was more robust in the presence of occasional works that contained a large number of references (e.g., Jonassen's *Handbook of Individual Differences, Learning, and Instruction*, which contains about a thousand references).

Although these graphs helped to establish the methods for identifying the Level 1 scholars, I had to adjust the method for identifying the Level 2 and Level 3 scholars. The reason for this was that, based on the purposes of this research, it was more important to trace the *flow* of influence than to trace the path of *most* influence. Simply looking up the Level 2 scholars in Publish or Perish would have identified their *most* influential works. However, to find out where the ideas came from that affected the Level 1 scholars, I analyzed the actual references that were
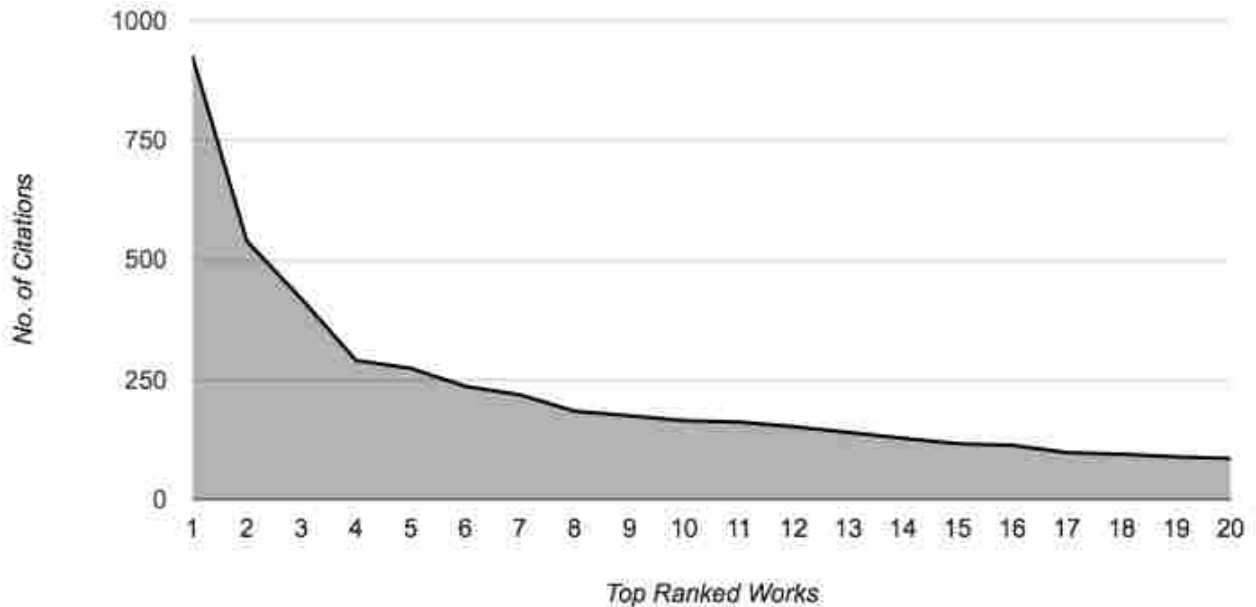
Figure 3. The number of citations for each of the top-ranked works for the average scholar in a sample.

Note: This graph shows the average number of citations (for the most cited works) of the same sample group that was represented in figure 2. In this case, the average number of citations is shown for each work, according to rank. There is a clear spike on the left, which gradually tapers off around 10. This provides an appropriate cut off point for the number of significant works to use for each scholar.

in the most influential works of the Level 1 scholars. In this way I traced the paths of influence (and the ideas) back through Level 2 and on to Level 3.

Identification of most influential ideas in inter-scholar relationships.   The genealogy of IDT would have been but a bare skeleton without including the major ideas that each scholar contributed to the field. To add substance, then, I identified the research each scholar was best known for (according to the data).

In order to find this information for Level 1 scholars, I analyzed the 10 most cited works, and synthesized a word or phrase that best described those works. To find the same information for the Level 2 scholars, I had to look at their works that were cited by Level 1 scholars in the *Reference* sections of those top 10 works that were previously mentioned. I then synthesized this collection of works to a word or phrase that best described each Level 2 scholar's work. I did the same for the Level 3 scholars, as they were referenced by Level 2 scholars.

In addition, once I had compiled the list of names and areas of research foci for each scholar, I searched on the Web for each scholar's professional website. Here I was able to confirm the full name of each scholar, the academic discipline, the topic (that I had synthesized) fitting with their profile, and whether or not the scholar was still active at the institution at which he or she last worked (many were deceased or retired). Several scholars did not have a professional website. This was mostly due to the life span of the scholar not intersecting with the computer age; for example, John Dewey passed away over half a century ago.

In order to bring face validity to my coding of academic disciplines, I asked a panel of six IDT professors at a major private university to identify the academic discipline of each scholar. In all but two cases (out of 128 cases) the majority of this panel agreed with my original

decision, therefore, I added myself to the panel, making a total of seven on the panel. This made "the panel's" votes easier to assess, chart, and discuss.

The selection of the six panel members (excluding myself) was based first on relevance of their professional background and second on their availability. I selected a number of IDT professors to approach, and those who were willing to participate were included on the panel.

Interpretation of data. Perhaps more important than individual scholar's programs of research were the emergent patterns throughout the network of citations. For example, if the scholars most cited by today's scholars do not actually hail from within the IDT field, what does this mean for the passing down of ideas (or lack thereof) within the field? Likewise, are there groups of scholars that tended to be cited more by one group over another? After the citations were identified, each scholar's unique contributions were highlighted. This final, generative analysis helped to synthesize the flow of ideas within IDT.

Limitations

The main limitation regarded the analysis of only the reference lists of the top 10 cited papers of each top scholar. Because of this restriction, the analysis did not account for the number of in-text citations used within the body of each work, which could have led to significantly different results. For example, if David Merrill cited Walter Dick only once in the reference list for a particular paper, but 15 times within the text of that single paper, it would seem that Dick should receive more weight in the analysis than another scholar who appeared only once in the reference list but with much less frequency in the text. In order to completely overcome this obstacle, future researchers are invited to analyze the entire text of the documents in question (10 documents for each of 130 scholars), count the frequency of each in-text citation,

and compare the results. Until that time, the assumption will be carried that the citation analysis will yield results that will represent the scholarly influence of one researcher on another.

Another limitation of using citation analysis was the lag between cutting edge work, and the bulk of citations that make it appear most popular. Therefore, a citation analysis can't possibly represent who is the most cutting edge *now* because the most popular recent papers do not have many citations, and cannot be easily distinguished from those papers that will ultimately never receive a large number of citations.

Somewhat related to this lag is a limitation regarding the direction of research: going backward. This method will reveal the most academically influential scholars in IDT, and who influenced them etc., going backward through time. However, it will not capture the beginning of the entire IDT movement. In other words, these influential scholars' roots may not be the same as the most recognized roots of IDT. This issue is critical to the perspective with which it is observed.

Lastly, in a reference list, the scholars may have been citing people who they agreed with (building upon ideas) or they may have been citing people who they were criticizing (changing direction). One example of the latter occurrence was Larry Cuban. He cited public schools and school boards, not because he agreed with their thinking but because he saw need for reform. He constantly criticized them, and so he cited them more than he cited anyone else.

Justification of Use of Citation Analysis

There were many other ways we could have examined the flow of influence through the field of IDT. One of these was by "personal experience." Another was by self-report. In the following paragraphs I evaluate these two methods.

Evaluation of "personal experience" method. Before this research, the IDT story had not been told in any other way. While some authors leaned toward their personal experience with the literature they selected (e.g., Reiser, 2007a), others base their writings more on their own personal recall (e.g., Meierhenry, 1980). Indeed, historians using this method seem inextricably bound by the invisible tentacles of chance, personal perception, and opinion. While there have been several respectable accounts of IDT history (e.g., Reiser, 2007a; Saettler, 1990; etc.), the nature of my research questions would have required far more than a photographic memory over several decades (which would be susceptible to missing details not within sight). My specific research questions would have required a writer to have total *omniscience* of the whole IDT field (and its contributaries) to have had the capacity to answer completely. Certainly this has remained impossible, as demonstrated by the many contradictions between the experts discussed herein. One of those contradictions with specific relevance here is in the story about the three researchers who asked the IT Forum, essentially: "who do *you* think should be studied in a foundations course," and received 42 completely different responses. It was my impression that only differences in *personal experience* could account for such a variety of answers to the same question. Personal experience seemed imminently doomed in this research context. Therefore, I did not use it to gather my data.

Evaluation of "self-report" method. Many researchers have cautioned against using self-report "to provide accurate retrospective information on [participants'] daily lives," (Csikszentmihalyi & Larsen, 1992, p. 43). Common sense might have told us that people who kept records of communication (or those who carefully wrote down citations in a list at the end of a paper) should have been able to self-report more accurately than those who did not write such information down. However, across seven studies on informant accuracy, Bernard et al.

(1984) found that even "informants who usually kept records of their behavior (e.g., ham radio operators) were *not* more accurate than those who did not" (p. 499). This information was pertinent, since, under this method I would have asked people to self-report on a behavior that they had indeed recorded themselves. "But," the reader might ask, "how severe is this problem with self-report? Bernard et al. found that "people can recall or predict less than half of their communications, measured either on amount or on frequency" (p. 499). Since my research questions focused on the frequency of a type of asynchronous communication, I would hesitate to employ such an inaccurate method.

Bernard et al. (1984) also found that the accuracy of self-report declined over time. This is of particular interest here. For example, Sasha Barab's top 10 most cited (most influential) works were published an average of nine years before the writing of this research. Therefore, asking him to tell who influenced his most influential work would be asking him to recall who he wrote down, in select reference lists, almost a decade ago. According to Bernard and his associates, Barab would probably be incorrect with half or more of his self-reported list (even without the nine year lapse). This idea that people often report inaccurately has been confirmed by Blacker and Brass (1979), who discovered that people are even inaccurate in self-reporting how many births they have had, or how many siblings they have.

These issues with self-report were compounded with the problem of *who* should self-report or, for that matter, *who should choose* who should self-report? Finally, self-report was not used for this analysis because I tried it, and it did not work. I asked two faculty in my own department to self-report on who they cited most, and in fact only about half of their lists were accurate (compared to my analysis of who they really cited most). These results show that even

if we could identify, obtain cooperation with, and question all the right people, their responses would probably not be very accurate.

Therefore, although there are other methods I could have used for this study, I chose to use this form of citation analysis because it was the most defensible, systematic, and transparent method I could find.

Chapter 4: Results

Through citation analysis of the 10 journals that Ritzhaupt, Sessums, and Johnson (2011) found as the ten most prestigious journals in IDT, I identified the 10 most influential scholars in IDT by a simple count of the most cited authors in each journal. This made up the latest generation (Level 1) of the IDT genealogy. Using the 10 most cited works from each of these Level 1 scholars, I found the three scholars who were most cited by each Level 1 scholar. This group (Level 2) is the group who had the greatest influence on the currenlty most influential scholars in the IDT field. Finally, I analyzed the 10 most cited works of each scholar in the Level 2 group, and found the three most-cited scholars in their Level 2 cited works.

These results were represented in two ways. First, I showed the three groups (Level 1, Level 2, and Level 3), in response to the first two research questions regarding who influenced today's most influential IDT scholars. Then, I represented the whole genealogy in a single network, in hopes of seeing citation patterns. I discuss each of these representations in turn.

Question One: "Currently, Who Are the Most Influential Scholars in IDT?"

Summarized in Table 3 are the currently most influential scholars in IDT, the academic field or subfield they represent, their activity in the field, and the research topic for which they were most cited in the said list of journals. The list of top 25 scholars is located in Appendix B.

Although this list of scholars represents those who have been cited the most in the field of IDT, they also are among the most recognizable in the field. There were three major areas represented by the 10 most influential scholars in IDT. IDT was oft claimed, but others were Distance Education and the Learning Sciences. At the time of writing, most (90%) of the most influential scholars in IDT were still active in the field, and all were still living. Their topics range from "theories and principles of IDT" to "cognitive load."

Table 3

Level 1 Scholars: Today's 10 most influential scholars in IDT

Rank	Scholar	Field	Topic	Activity
1	D. Randy Garrison	Dist. Ed	Distance education	Active
2	M. David Merrill	IDT	Theories & Principles of ID	Retired
3	David H. Jonassen	IDT	Constructivism & Computers	Active
4	Sasha A. Barab	Learning Sci.	Virtual learning communities	Active
5	Michele D. Dickey	IDT*	Learning in Virtual Worlds	Active
6	Roxana Moreno	Ed Tech	Interactive multimedia learning environments	Active
7	Robert Koper	Ed Tech	Modeling learning & Lifelong learning	Active
8	Peg A. Ertmer	Ed Tech	Technology integration & the expert learner	Active
9	Alfred P. Rovai	Dist. Ed*	Building distance learning communities	Active
10	Jeroen van Merriënboer	IDT	Complex Learning, cognitive load, & programmed instruction	Active

*Four or more members of a panel (of seven IDT experts) did not know what field these scholars were in, off hand.

To familiarize the reader with each of these authors, I provide a brief biography of each of these top 10 scholars below.

#1. D. Randy Garrison. Garrison was educated and experienced the majority of his career in Canada. He obtained his Ph.D. in Adult Education from the University of British Columbia and has published five books and nearly 100 journal articles and book chapters. He has come to be a strong voice in the Distance Education community, and his works are well read and well cited. Most influential among these, in the period covered by this analysis, were the article "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education" (cited by 1053) and the book *E-Learning in the 21st Century: A Framework for Research and Practice* (cited by 1020).

#2. M. David Merrill. Merrill received his Ph.D. from the University of Illinois and taught as a faculty at many universities including George Peabody College, Brigham Young University–Provo, Stanford University, the University of Southern California, Utah State

University, Brigham Young University–Hawaii, and Florida State University. The majority of his career was spent first at BYU–Provo and later at Utah State University. He has written many articles, chapters, and books and worked on many projects in Instructional Design. Among his most recent and influential works was "First Principles of Instruction" (cited by 768).

#3. David H. Jonassen. Jonassen obtained his Doctor of Education from Temple University in Educational Media/Educational Psychology and currently works at the University of Missouri. He has published several books, including *Learning with Technology: A Constructivist Perspective* (cited by 1633), *Computers as Mindtools for Schools: Engaging in Critical Thinking* (cited by 1050), and *Computers in the Classroom: Mindtools for Critical Thinking* (cited by 855). He has also published many chapters and journal articles, including "Designing Constructivist Learning Environments" (cited by 1097) and "Objectivism Versus Constructivism: Do We Need a New Philosophical Paradigm?" (cited by 874).

#4. Sasha A. Barab. Barab received his Ph.D. in Cognition and Instruction from the University of Connecticut and currently researches and teaches at Indiana University. Barab has contributed much to the field, especially with his work with virtual learning communities. In fact, he wrote a book that reflects some of his ideas on this topic, called *Designing for Virtual Communities in the Service of Learning* (cited by 242). Some of his other most influential works include the following three articles: "From Practice Fields to Communities of Practice" (cited by 796), "Design-Based Research: Putting a Stake in the Ground" (cited by 565), and "Making Learning Fun: Quest Atlantis, a Game Without Guns" (cited by 405).

#5. Michelle D. Dickey. Dickey taught at Ohio State University's Instructional Design and Technology program, where she also earned her Ph.D. She was an instructional designer at Otterbein College and an Associate Professor at Miami University. She has authored many

works, including "Three-Dimensional Virtual Worlds and Distance Learning: Two Case Studies of Active Worlds as a Medium for Distance Education," (cited by 175).

#6. Roxana Moreno. Moreno received her Ph.D. from the University of California at Santa Barbara in psychology, with an emphasis in cognitive science. Currently, she is an Associate Professor at the University of New Mexico in the Educational Psychology program. Some of her most influential works include "Nine Ways to Reduce Cognitive Load in Multimedia Learning" (803 citations), "A Split Attention Affect in Multimedia Learning" (734 citations), and "Cognitive Principles of Multimedia Learning: The Role of Modality and Contiguity" (cited by 593).

#7. Robert Koper. Koper is a professor of Educational Technology at the Open University of the Netherlands. Koper wrote a book called *Learning Design: A Handbook on Modeling and Delivering Networked Education and Training* (cited by 389) and co-authored a book with van Merriënboer called *Integrated E-Learning: Implications for Pedagogy, Technology and Organization* (cited by 137).

#8. Peg A. Ertmer. Ertmer earned her Ph.D. in Instructional Research and Development from Purdue University. She currently researches and teaches about student-centered instructional approaches and strategies at Purdue University in the Department of Curriculum and Instruction. Some of her most influential works have been "Addressing First- and Second-Order Barriers to Change: Strategies for Technology Integration" (cited by 440), "Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective" (cited by 395), and "Teacher Pedagogical Beliefs: The Final Frontier in Our Quest for Technology Integration?" (cited by 352).

#9. Alfred P. Rovai. Rovai received his Ph.D. from Old Dominion University in Norfolk, VA. Before that, he completed two masters degrees: one in education from the same university, and one in public administration from University of Northern Colorado. Currently he is a professor of education at Regent University. Some of his most influential works include "Building Sense of Community at a Distance" (cited by 520), and "Development of an Instrument to Measure Classroom Community" (cited by 270).

#10. Jeroen J. G. van Merriënboer. Merriënboer received his Ph.D. in Educational Sciences from the University of Twente. Currently he is on the faculty of Health, Medicine, and Life Sciences of Maastricht University. There, he holds a chair in Learning and Instruction. Some of van Merriënboer's most influential works are "Cognitive Architecture and Instructional Design" (cited by 1678), "Integrated E-Learning: Implications for Pedagogy, Technology and Organization" (cited by 137), and "Research on Cognitive Load Theory and Its Design Implications for E-Learning" (cited by 123).

Question Two: "Who Influenced Today's Most Influential Scholars?"

After discovering the most cited scholars, I then analyzed the references in each of their 10 most cited publications to identify whose work most influenced the Level 1 scholars (see Table 4). Also shown in this table are the field the scholars represent, the scholars' academic activity, and the topic of their research that was most influential (as aggregated from the citation analysis).

Level 1 scholars mostly represented a small niche of disciplines (i.e., IDT, Learning Sciences, and Distance Ed). However, Level 2 authors represented a much broader variety of disciplines, including Ed Psych, Sociology, Anthropology, Clinical Psychology, and General

Table 4

Level 2 Scholars: The Scholars Who Influenced the Work of Today's Most Influential Scholars (Via Citation Analysis)

Scholar	Field	Topic	Activity
Amy Bruckman	Learning Sci.*	Constructivist collaborative virtual learning	Active
Barry Wellman	Sociology*	Network Communities	Active
Charles M. Reigeluth	IDT	ID theory	Active
Charlotte N. Gunawardena	Dist. Ed	Social presence & computer conferencing	Active
Chris Dede	Ed Tech	Learning in virtual worlds	Active
Dale H. Schunk	Ed Psych	Self-efficacy & Self-regulation	Active
David H. Jonassen	IDT	Constructivist learning with technology	Active
David W. McMillan	Clin. Psych***	Sense of community	Active
Fred Paas	Ed Psych	Cognitive Load in complex learning	Active
Gavriel Salomon	Ed Psych	Facilitating cognition with technology	Retired
Gilbert Paquette	Ed Tech	E-learning, modeling, & objects	Active
Henry J. Becker	Gen. Ed***	Computer use in schools	Retired
Herman A. Witkin	Cog. Psych***	Perception & field dependence	Deceased
Jean Lave	Soc. Anthrop.	Cognition in practice	Active
Jerome Kagan	Dev. Psych	Individual differences	Retired
John Dewey	Gen. Ed	Experience, thought, & philosophy of ed	Deceased
John R. Anderson	Cog. Psych	Cognitive Psychology	Active
John Sweller	Ed Psych	Cognitive Psychology	Retired
Larry Cuban	Gen. Ed	Technology in the classroom	Retired
M. David Merrill	IDT	ID Theory	Retired
Macromedia	N/A	Computer software	N/A
Richard E. Mayer	Ed Psych	Multimedia Learning	Active
Rita Dunn	IDT*	Learning Styles	Deceased
Robert D. Tennyson	Ed Psych	Concept acquisition	Active
Robert M. Gagné	IDT	ID & conditions of learning	Deceased
Stephen D. Brookfield	Adult Ed***	Critical thinking & Self directed learning	Active
Thomas M. Duffy	IDT	Constructivist Learning environments & tech.	Retired
Vincent Tinto	Higher Ed***	Dropouts from Higher Education	Active
William Winn	Ed Psych	Educational virtual reality	Deceased
Wolff-Michael Roth	Science Ed	Situating cognition & Communities	Active
Zhongmin (James) Li	IDT	ID expert systems & Transactional shells	Active

*Four or more members of a panel (of seven IDT experts) did not know what field these scholars were in.
***Not only was the above criterion met, but in addition, two or fewer panel experts agreed on what field these scholars were in.

Education. Hence, topics of Level 2 scholars also varied more, from "Self-efficacy" to "Dropouts from Higher Education." Also, while nearly all Level 1 scholars were active at their associated institutions and none had passed away, only about half of all Level 2 scholars were still active in the field (58.6%) and a significant number were retired or deceased (20.7% each).

The next step to answer the second research question ("Who influenced today's most influential scholars?") was to analyze the references of the Level 2 scholars. This oldest generation of scholars (henceforth Level 3), was even more diverse in background than Level 2. The name, field, topic of interest, and current activity status of each of these scholars is given (see Table 5).

This third level of the genealogy was the most diverse in terms of which fields were represented. These scholars came from many fields, including several types of psychology, computer science, and education. Similar to the Level 2 group, about half were still active academically (meaning that they still work and publish from a University or other research institution), and some had passed away.

Question Three: "What Ideas Were Most Influential in the Scholars' Relationships?"

After identifying those scholars who were most influential in the field of IDT and those who influenced them, it was important to represent the actual relationships and the ideas that were most influential within and amongst scholars, in order to understand the potential streams of influence on the IDT field.

Because of the large amount of data necessary to answer this question, I categorized the data by Level 1 scholar and split up the answer into 10 figures. Each figure shows the genealogy of one Level 1 scholar and two generations of influencers. These figures are presented in order from the most influential IDT scholar, D. Randy Garrison, to the tenth most influential IDT

Table 5

Level 3 Scholars: The Scholars Who Influenced the Scholars Who Influenced Today's Top IDT Scholars

Scholar	Field	Topic	Activity
Alan B. Knox	Adult Ed***	Adult learning	Active
Albert Bandura	Soc. Psych	Aspects of self & Social learning	Active
Alexander (Sandy) W. Astin	Higher Ed***	Student development	Retired
Alexander J. Romiszowski	Ed Tech	Designing Instructional Systems	Active
Allen M. Tough	Adult Ed***	Adult learning	Retired
Allen Newell	Cog. Psych	Cognitive psychology	Deceased
Alvin F. Zander	Social Psych***	Social dynamics of groups	Unknown
Barbara Y. White	Learning Sci.	"ThinkerTools: Causal models, conceptual change, & science education"	Active
Barry J. Zimmerman	Ed Psych	Self-regulation in learning	Active
Brian H. Ross	Cog. Psych	Memory	Active
Bruno Latour	Sociology	Science & society	Retired
Burrhus F. Skinner	Ed Psych	Behaviorism	Deceased
Charles M. Reigeluth	IDT	ID & Elaboration Theory	Active
Claude S. Fischer	Soc. Psych***	Social networks	Active
David Ausubel	Ed Psych	Ed psych	Deceased
David E. Rumelhart	Cog. Psych	Cognitive psychology	Deceased
David N. Perkins	Cog. Sci.	Cognition	Active
David R. Olson	Clinical Psych***	Cognition & literacy	Active
Denver Public Schools	Gen. Ed	Education	N/A
Dist. of Columbia Board of Ed.	Gen. Ed	Education	N/A
Ernie Pascarella	Higher Ed***	Predicting college performance	Active
Fred G. Paas	Ed Psych	Cognitive load	Active
Gary E. Price	Ed Psych***	Learning styles	Retired
Gavriel Salomon	Ed Psych	Effects of technology on cognition	Retired
Guus Schreiber	Comp. Sci.***	"A Principled Approach to Knowledge-Based System Development"	Active
Harold H. Kelley	Soc. Psych	Social dynamics of groups	Deceased
Herbert J. Klausmeier	Ed Psych***	Concepts	Retired
Herman Witkin	Differential Psych*	Cognition & Personality	Deceased
James E. Rumbaugh	Comp. Sci.***	Object-Oriented Modeling & Design	Active
Jean Girard	Unknown***	"Intelligent assistance for web-based telelearning"	Unknown
Jean Lave	Social Anthropology	Learning in everyday life	Active
Jeroen van Merriënboer	IDT	Cognitive load & Computer programming	Active
John (Jack) Rankine Goody	Anthropology***	Learning in primitive cultures	Retired
John D. Bransford	Ed Psych	Ed Psych & Problem solving	Active
John R. Anderson	Cog. Sci.	Cognitive psychology	Active
John Seely Brown	Unknown**	Situated cognition	Active
John Sweller	Ed Psych	Cognition	Retired
Jürgen Habermas	Philosophy	Sociology	Retired

(continued)

Table 5 (continued)

Scholar	Field	Topic	Activity
Karen S. Louis	Gen. Ed*	Educational reform	Active
Larry Cuban	Gen. Ed	Educational reform (technology)	Retired
Leon Festinger	Soc. Psych	Social dynamics of groups	Deceased
Leslie J. Briggs	IDT	ID, retention, & superior students	Deceased
Linda M. Harasim	Ed Tech*	Online social & educational networks	Active
Lynne Reder	Cog. Psych*	Cognitive psychology	Active
M. David Merrill	IDT	ID, ID theory, & Learner control	Retired
Margaret McLaughlin	Special Ed***	Educational reform	Active
Margaret Riel	Ed Tech***	Digital learning communities	Active
Marie Carbo	Literacy***	Individual differences & reading	Active
Marilyn C. Salzman	User Experience***	Learning in virtual worlds	Active
Merlin C. Wittroc	Ed Psych*	Generative learning & Ed psych	Deceased
Michael Fullan	Gen. Ed***	Educational reform	Retired
Michael J. Spector	IDT	Automating instructional design concepts & issues	Active
Michael P. Lynch	Soc. Studies of Science***	Representation & Sociology	Active
Michelene T.H. Chi	Ed Psych***	Problem solving	Active
Mitchel Resnick	Ed Tech	Digital learning tools & strategies	Active
Nan Lin	Sociology***	Social resources	Active
Nat. Ed. Assoc.	Gen. Ed	Elementary & Secondary Ed	N/A
New York City Board of Ed.	Gen. Ed	Education	N/A
Paul Chandler	Cog. Psych*	Cognitive load	Active
Pavel Curtis	Computer Sci.***	Social virtual realities	Retired
Philip S. Holzman	Neuro Psych***	Leveling & sharpening	Deceased
Rand J. Spiro	Cog. Sci.	Cognitive flexibility	Active
Raymond B. Cattell	Differential Psych	Personality	Deceased
Richard E. Mayer	IDT	Multimedia learning	Active
Riley W. Gardner	Differential Psych*	Cognitive controls, styles & structures	Deceased
Robert A. Nisbet	Sociology***	Social communities	Deceased
Robert M. Gagné	IDT	Learning & ID	Deceased
Roger C. Schank	Cog. Psych	Applying cog. science & tech. to real learning problems	Active
Ronald S. Burt	Sociology & Strategy***	Social networks	Active
Roxana Moreno	Ed Psych	Multimedia learning	Active
Roy D. Pea	Learning Sci.	Using computers for cognitive development	Active
Seymour Papert	Ed Tech	Digital learning & Situating constructivism	Retired
Sheizaf Rafaeli	Computer-mediated communication***	Interaction with the media	Active
Shirley A. Griggs	Ed Psych***	Learning styles	Retired
Slava Kalyuga	Cog. Sci.*	Learner experience & instruction	Active
Solomon E. Asch	Soc. Psych***	Social psych & Space orientation	Deceased
Starr R. Hiltz	Computer-mediated communication***	Virtual classrooms	Retired
Stephen A. Karp	Sociology***	Field dependence & Alcoholism	Unknown

Table 5 (continued)

Scholar	Field	Topic	Activity
Sylvia Scribner	Literacy***	Cognition	Deceased
T.D. Carraher	Learning Sci.*	Learning in natural environments	Unknown
Thomas W. Malone	Unknown***	"Making learning fun: A taxonomy of intrinsic motivation for learning"	Unknown
US Dpt. of Ed. Nat. Ctr for Ed. Stats	Gen. Ed	Educational statistics	N/A
Wayne C. Wilcox	Unknown***	Learner characteristics & isolation of statements	Unknown
Wilbur S. Jackman	Science Ed.***	Nature study	Deceased
Willem J. Pelgrum	International comparative ed. assessments***	Use of computers	Retired
William Bricken	Computer Sci.***	Learning with virtual reality	Active
William T. Harris	Gen. Ed***	Schools	Deceased
Merlin C. Wittroc	Ed Psych*	Generative learning & Ed psych	Deceased

*Four or more members of a panel (of seven IDT experts) did not know what field these scholars were in, off hand.
**Two or less members of the panel agreed on the field from which these scholars came from.
***Four or more members of the panel did not know what field these scholars came from, AND two or less panel experts agreed on what field these scholars were in.

scholar, Jeroen van Merriënboer. All Level 1 scholars had several ideas of influence that impacted their work.

D. Randy Garrison. As was the case with nearly all scholars in this analysis, Garrison cited himself more than anyone else. Of course it is true that scholars meaningfully build on their own work. However, that was not the focus of my study. Therefore, the common phenomenon of a scholar citing himself or herself was not considered a legitimate genealogical development. Therefore, although Garrison cited himself 61 times, he was excluded from the list of his own influencers. Besides that, Garrison cited Dewey 18 times, Brookfield 12 times, and Gunawardena 10 times. These contributors influenced Garrison with a number of different but related topics including thought and critical thinking, social presence, and computer conferencing (see Figure 4).

M. David Merrill. M. David Merrill's name emerged in this analysis more than that of any other scholar. He cited scholars who cited him, but other scholars also cited him who he did not cite. Merrill's main topics were *ID,* and *ID theory*, and for the most part, his influencers studied very similar topics. In fact, in three out of four cases, Merrill appears to have been a key influencer to his own influencers, indicating possible concurrent professional relationships. In addition, Merrill's Level 2 influencers sometimes cited the same Level 3 scholars as each other. For example, two of Merrill's Level 2 influencers (Reigeluth and Gagné) cited Ausubel. The remaining Level 2 influencer was Gagné himself. Thus, Merrill's genealogy appears to be the tightest knit of any of the top 10 Level 1 scholars (see Figure 5).

Level 1	Level 2	Level 3
DR Garrison (Distance ed)	1. J Dewey (Experience, thought, & philosophy of ed)	1. WT Harris (Schools)
		2. WS Jackman (Nature study)
		2. Nat. Ed. Assoc. (Elementary & Secondary Ed)
	2. SD Brookfield (Critical thinking & Self directed learning)	1. AB Knox (Adult learning)
		2. J Habermas (Sociology)
		2. AM Tough (Adult learning)
	3. Z Gunawardena (Social presence & computer conferencing)	1. LM Harasim (Online social & educational networks)
		1. SR Hiltz (Virtual classrooms)
		1. S Rafaeli (Interaction with the media)

Figure 4. Academic Genealogy of Influence for D. Randy Garrison.
Note: Garrison cited Dewey, Brookfield, and Gunawardena. Dewey cited Harris, Jackman, and the National Education Association, and so forth.

Level 1	Level 2	Level 3
MD Merrill (Theories & principles of ID)	1. CM Reigeluth (ID theory)	1. MD Merrill (ID, ID theory, & learner control)
		2. RM Gagné (Learning & ID)
		3. DP Ausubel (Ed Psych)
	2. RM Gagné (ID & conditions of learning)	1. JR Anderson (Cognitive Psychology)
		2. LJ Briggs (ID, retention, & superior students)
		3. DP Ausubel (Advance organizers and retention)
	3. Z Li (ID expert systems & transactional shells)	1. MD Merrill (ID & ID theory)
		2. CM Reigeluth (ID & Elaboration Theory)
		3. RM Gagné (Instruction & learning)
	3. RD Tennyson (Concept acquisition)	1. RM Gagné (ID & learning)
		2. MD Merrill (ID & concepts)
		3. HJ Klausmeier (Concepts)

Figure 5. Academic Genealogy of Influence for M. David Merrill.
Note: It is interesting to note that Merrill's third and fourth influencers tied for the number of times that he cited them, thus there were four listed rather than only three. This happened three times on the Level 2, and numerous times on Level 3.

David H. Jonassan. Most of Jonassen's top influencers seem to represent cognitive or differential psychology. As was generally the case, the contributing influencers' topics flowed naturally into the topics of those who cited them from Level 3 to Level 2 to level 1. Still, it is interesting to note that Jonassen's academic genealogy of influence jumped immediately into the deep end of psychology, where Dunn, Witkin, and Kagan probably had very different end-goals than those of IDT, where Jonassen studied. However, despite the fact that these scientists had very different fields than Jonassen, the results of their research still had a great effect on his research (see Figure 6).

Level 1	Level 2	Level 3
DH Jonassen (Constructivism & computers)	1. G Salomon (Facilitating cognition with technology)	1. DR Olson (Cognition & literacy)
		2. RD Pea (Using computers for cognitive development)
		3. DN Perkins (Cognition)
	2. R Dunn (Learning styles)	1. GE Price (Learning styles)
		2. M Carbo (Individual differences & reading)
		3. SA Griggs (Learning styles)
	3. HA Witkin (Perception & field dependence)	1. SA Karp (Field dependence & alcoholism)
		2. SE Asch (Social psych & space orientation)
		3. RB Cattell (Personality)
	3. J Kagan (Individual diff.s in conceptualization, reflection, & cog.)	1. RW Gardner (Cognitive controls, styles & structures)
		2. PS Holzman (Leveling & sharpening)
		3. HA Witkin (Cognition, personality, & psychological differentiation)

Figure 6. Academic Genealogy of Influence for David H. Jonassen.
Note: Two of Jonassen's Level 2 scholars (Witkin and Kagan) tied for third most frequently cited. This is why there are four Level 2 scholars instead of just three.

Sasha A. Barab. In Barab's academic genealogy of influence, there were strong contributions from social learning and sociology. Bransford, Lave, Brown, Latour, and Carraher have all been at the forefront moving toward a more socialized understanding of learning. Barab appears to have been deeply affected by their work, some directly (e.g., by Jean Lave), and some indirectly (e.g., by Carraher). (see Figure 7.)

Level 1	Level 2	Level 3
SA Barab (Virtual learning communities)	1. J Lave (Cognition in practice)	1. S Scribner (Cognition)
		2. TD Carraher (Learning in natural environments)
		2. J Goody (Learning in primitive cultures)
		2. B Latour (Sociology)
	2. W-M Roth (Situating cognition & communities)	1. B Latour (Science & society)
		2. M Lynch (Representation & Sociology)
		3. J Lave (Learning in everyday life)
	3. TM Duffy (Constructivist learning environments & tech.)	1. RJ Spiro (Cognitive flexibility)
		2. MD Merrill (Instructional Design)
		3. JS Brown (Situated cognition)
		3. JD Bransford (Ed Psych & problem solving)

Figure 7. Academic Genealogy of Influence for Sasha A. Barab.

Michele D. Dickey. Dickey's most influential works were published in Journals with Educational Technology orientations. Jonassen springs up in her genealogy of influence, showing links between her work and constructivism. Dickey and her contributors researched various aspects of virtual worlds. On Level 3, scholars contributed ideas from the distributed cognition movement, the cognitive movement, and ideas from digital learning (see Figure 8).

Roxana Moreno. Moreno's Level 2 influencers were of very similar research interests and Sweller appears on Level 2 and on Level 3, indicating that Moreno was influenced by Sweller in multiple ways. "Macromedia" was not a scholar, but rather represented documentation

Level 1	Level 2	Level 3
MD Dickey (Learning in virtual worlds)	1. DH Jonassen (Constructivist learning with technology)	1. RC Schank (Applying cog. science & tech. to real learning problems)
		2. G Salomon (Effects of technology on cognition)
		3. DN Perkins (Creative/distributed cog. & tech.)
	2. W Winn (Educational virtual reality)	1. G Salomon (Cognition)
		2. W Bricken (Learning with virtual reality)
		2. RM Gagné (Learning & ID)
	3. A Bruckman (Constructivist collaborative virtual learning)	1. P Curtis (Social virtual realities)
		2. M Resnick (Digital learning tools & strategies)
		2. S Papert (Digital learning & situating constructivism)
	3. C Dede (Learning in virtual worlds)	1. B White (ThinkerTools: causal models, conceptual change, & science education)
		2. TW Malone (Making learning fun: A taxonomy of intrinsic motivation for learning)
		2. M Salzman (Learning in virtual worlds)

Figure 8. Academic Genealogy of Influence for Michele D. Dickey.

from a software company, and as such, was not influenced by other scholars in a way that was able to be traced. Still, it is interesting that Macromedia came up in the top three with 9 citations, while Mayer had 51, and Sweller had 12. From these numbers it appears that Mayer had a much larger influence on Moreno than did Sweller and Macromedia combined (see Figure 9).

Robert Koper. Of Koper's direct influencers, both Reigeluth and Merrill wrote heavily in ID theory while virtually all of Paquette's contributions were cited in Koper's book "Learning design: A handbook on modelling and delivering networked education and training." This is a clear case of project oriented influence. Some scholars may be influenced throughout a long stretch of their career (on many projects) by the same contributors. However, in this book that Koper wrote, he was heavily influenced by a different scholar than normal (Paquette in this

Level 1	Level 2	Level 3
R Moreno (Interactive multimedia learning environments)	1. RE Mayer (Multimedia learning)	1. MC Wittrock (Generative learning & Ed psych)
		2. J Sweller (Cognition)
		3. R Moreno (Multimedia learning)
	2. J Sweller (Cognitive Psychology)	1. JJG van Merriënboer (Teaching complex cog. skills (i.e. computer programming))
		2. M Chi (Problem solving)
		3. P Chandler (ID, cognitive load, & computers)
		3. FG Paas (Cognitive load)
		3. B Ross (Memory)
	3. Macromedia (Computer software)	n/a

Figure 9. Academic Genealogy of Influence for Roxana Moreno.

situation) who had more expertise on that particular topic. Therefore, sometimes the trends of citation may be project oriented, instead of career oriented (see Figure 10).

Peg A. Ertmer. One of Ertmer's level 2 scholars, H. J. Becker, has an interesting relationship with his level 3 influences: they are all ranked number one. There are a few reasons for this. First, Becker was not cited very much. Ertmer only cited Becker 7 times in her top ten works from the Ritzhaupt list (Ritzhaupt, Sessums, and Johnson, 2011). Second, among the works for which Ertmer cited Becker, there were only four unique works. Third, there were only a total of 62 scholars cited across those four reference lists (while some other scholars cited well over a thousand scholars in one work). Therefore, Becker's most cited scholars were important, but they were not as distinct because they were only cited twice each, and so many tied for the first rank. This may signify a limitation of the method (see Figure 11).

Level 1	Level 2	Level 3
R Koper (Modeling learning & lifelong learning)	1. CM Reigeluth (ID Theory)	1. MD Merrill (ID, ID theory, & learning control)
		2. RM Gagné (Learning & ID)
		3. DP Ausubel (Ed Psych)
	1. MD Merrill (ID Theory)	1. CM Reigeluth (ID, ID theories, & ID models)
		2. RM Gagné (Learning & ID)
		3. WC Wilcox (Learner characteristics & isolation of statements)
	2. G Paquette (E-learning, modeling, & objects)	1. MD Merrill (Instructional transaction shells & knowledge objects)
		2. AJ Romiszowski (Designing instructional systems)
		3. J Girard (Intelligent assistance for web-based telelearning)
		3. J Rumbaugh (Object-oriented modeling & design)
		3. G Schreiber (A principled approach to knowledge-based system development)
		3. JM Spector (Automating instructional design concepts & issues)

Figure 10. Academic Genealogy of Influence for Robert Koper.

Level 1	Level 2	Level 3
PA Ertmer (Technology integration & the expert learner)	1. DH Schunk (Self-efficacy & self-regulation)	1. A Bandura (Aspects of self & social learning)
		2. BF Skinner (Behaviorism)
		3. BJ Zimmerman (Self regulation in learning)
	3. L Cuban (Technology in the classroom)	1. Dist. of Columbia Board of Ed. (Education)
		2. Denver Public Schools (Education)
		2. New York City Board of Ed. (Education)
	2. HJ Becker (Computer use in schools)	1. L Cuban (Educational reform & technology)
		1. M Fullan (Educational reform)
		1. K Louis (Educational reform)
		1. M McLaughlin (Educational reform)
		1. WJ Pelgrum (Use of computers)
		1. M Riel (Digital learning communities)

Figure 11. Academic Genealogy of Influence for Peg A. Ertmer.

Alfred P. Rovai. The theme of Rovai's Level 2 influencers seems to be "community,"

including Wellman and McMillan who wrote about community, and Tinto, who wrote about

people who fell away from the community. Wellman's and McMillan's Level 3 scholars

followed social themes, which appear to have led directly to their writings on community.

Tinto's Level 3 influencers diverge into different realms (see Figure 12).

Level 1	Level 2	Level 3
AP Rovai (Building distance learning communities)	1. B Wellman (Network communities)	1. R Burt (Social networks)
		1. C Fischer (Social networks)
		2. N Lin (Social resources)
	2. DW McMillan (Sense of community)	1. L Festinger (Social dynamics of groups)
		1. HH Kelley (Social dynamics of groups)
		1. RA Nisbet (Social communities)
		1. A Zander (Social dynamics of groups)
	3. V Tinto (Dropouts from Higher Education)	1. ET Pascarella (Predicting college performance)
		2. AW Astin (Student development)
		3. US Dpt. of Ed. Nat. Ctr for Ed. Stats (Educational statistics)

Figure 12. Academic Genealogy of Influence for Alfred P. Rovai.

Jeroen J. G. van Merriënboer. van Merriënboer's Level 2 scholars all discussed aspects

of cognition, which was largely the case with his Level 3 scholars as well. Cognitive load was

also a major theme throughout the three generations. In fact, this was one of van Merriënboer's

major topics and he cited two scholars who often cited him (Paas and Sweller), indicating the

type of working relationship noted in Merrill's work (see Figure 13).

Level 1	Level 2	Level 3
JJG van Merriënboer (Complex learning, cog. load, & programmed instr.)	1. F Paas (Cognitive load in complex learning)	1. J Sweller (Cognition & learning)
		2. JJG van Merriënboer (Cognitive load & computer programming)
		3. S Kalyuga (Learner experience & instruction)
	2. JR Anderson (Cognitive Psychology)	1. A Newell (Cognitive Psychology)
		2. LM Reder (Cognitive Psychology)
		3. DE Rumelhart (Cognitive Psychology)
	3. J Sweller (Cognitive load/architecture, & problem solving)	1. JJG van Merriënboer (Complex cognitive skills (e.g. computer programming))
		2. RE Mayer (Multimedia learning)
		3. P Chandler (Cognitive load)

Figure 13. Academic Genealogy of Influence for Jeroen J. G. van Merriënboer.

Summary

This chapter introduced the most influential scholars in Instructional Design and Technology (Level 1) and revealed their primary scholarly influences (Level 2) and the influences of those influences (Level 3). We also know the discipline that each of these scholars came from and the topics that were most significant in these relationships. In the Discussion chapter, we discuss salient themes and their possible implications.

Chapter 5: Discussion

While the data presented thus far is useful to understand who has influenced current trends in IDT, it does little to highlight trends across researchers in the three levels of influence. To better understand the relationships among the presented data, this discussion presents several visuals that present or summarize the data in ways that highlight particular trends.

The first of these visuals are network diagrams, which show the structural relationships among the levels of scholars. These relationships reveal several important points: first, the major topics of each genealogical level; second, the relations among the major network groups; third, the strong influence of M. David Merrill; fourth, general trends within each genealogy; and fifth, the two major findings of this study, which are diversity and the prevalence of psychology in the IDT field. Other visuals help to highlight further aspects of this research, such as the fields represented by the scholars and the familiarity of the panelists with the scholars.

This chapter also contextualizes the research within the existing body of IDT literature, discusses general limitations to the research, and highlights several conclusions and implications for the IDT field.

Evaluation of Network Diagrams

To summarize results and facilitate discussion, I created two network diagrams with an identical underlying structure (see Figures 14 and 15). They both show all the scholars in the analysis, the connections between them, the directionality of influence, and the scholars' most influential topic.

Development. In the first diagram (Figure 14), the color coding also clearly shows Level 1 (the red boxes), Level 2 (the orange boxes), and Level 3 (the yellow boxes). Like Figure 14, Figure 15 shows all the scholars that emerged in the data-gathering process. Each scholar's topic
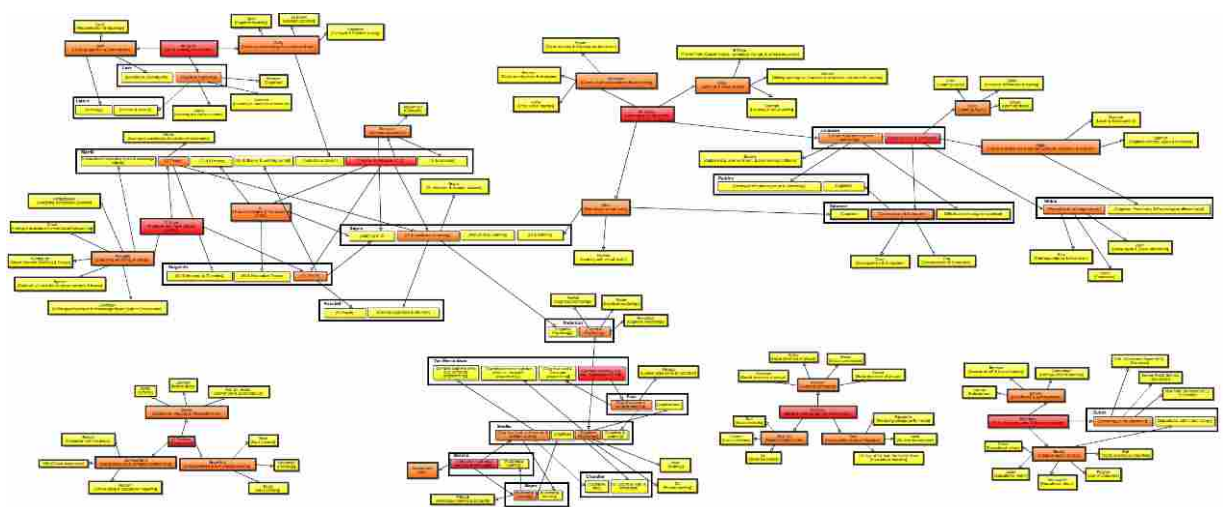
Figure 14. Who's who in IDT - A Network Diagram. To view the full size of this document, see http://www.gliffy.com/pubdoc/3185175/L.png. To clarify, each of the large white boxes (in which two or more colored boxes appear) show one scholar's topics. Multiple boxes were necessary to show the different topics that were cited by different scholars in the diagram.
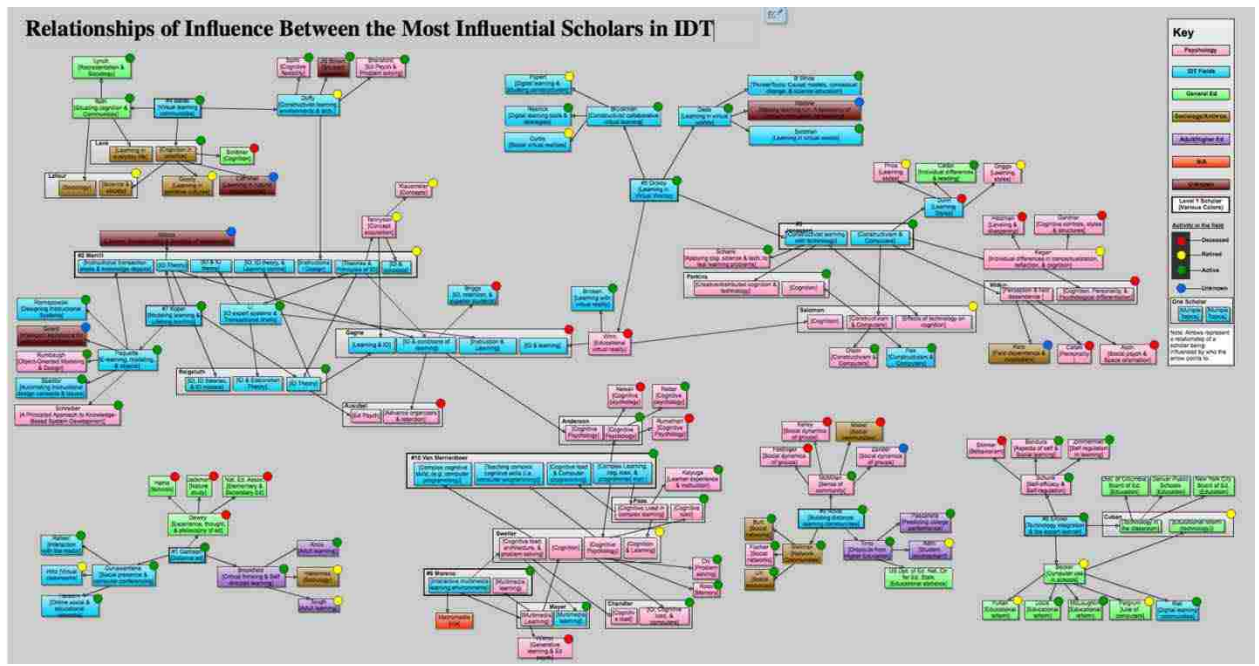
Figure 15. Who's who in IDT - A Network Diagram (Revised). To view the full size diagram, see http://www.gliffy.com/pubdoc/3317578/L.png. To clarify, each of the large white boxes in which two or more colored boxes appear show one scholar's topics. Multiple boxes were necessary to show the different topics that were cited by different scholars in the diagram. One advantage of these long boxes is that they call attention to those scholars who came up more than once in the analysis, denoting more influence.

appears under his or her name in the box. However, four enhancements were made. First, the arrangement of the boxes was improved to decrease eyeball fatigue. Second, instead of color coding the Levels, I delineated the Level 1 scholars by a thick border (versus a thin border). Third, Figure 15 shows the five aggregated fields (discussed in section "Examination of Fields Represented by Scholars) by color coding. Fourth, I labeled each scholar with a badge (large colored dot) that indicates whether the scholar is still active in the field (green dot), retired (yellow dot), or deceased (red dot).

Together, these diagrams answer the original three research questions in a contextual connected visual format. Readers can quickly see who the top 10 scholars are in the field, who influenced them, and the significant topics in these relationships. They can easily start to see trends in what fields IDT came from and the current activity of the scholars from which it descended (which provides contextual clues about the age of the field).

Major themes. Interpretation of this data yielded five significant areas of interest: first, the major topics observed within each level in the genealogy; second, the major groups in the network and how they relate; third, Merrill's position and influence in the diagram; fourth, the general trends between Level 1 scholars and the Level 3 scholars in their academic genealogies of influence; and fifth, the two key take-aways—the diversity of the field, and the significant role of psychology in the formation of IDT's current most influential ideas.

Major topics of each genealogical level. Each level in the genealogy had major topics that stood out. Level 1 scholars fell into four distinct groups: (a) distance education, anchored by Garrison and Rovai, (b) ID theories and principles, anchored by Merrill, (c) learning with technology, represented by Jonassen, Barab, Moreno, and Ertmer, and (d) learning, represented by Koper and van Merriënboer. Level 2's big ideas were cognitive psychology, technology, and

learning. Major topics on Level 3 included ID, education, educational psychology, cognition, technology, sociology, and many others. The sheer number of ideas was greater in the older generations, progressively. This shows that the IDT field diverges more than it converges and that it was born of many diverse backgrounds, rather than just a few such as education and psychology.

Relations of major network groups. The diagram shows three major "continents" and three small, isolated "islands." The first major continent (in the upper left) includes Barab, Merrill, and Koper. The second large continent includes Dickey and Jonassen. The third is composed of van Merriënboer and Moreno. These three continents were attached to one another by single connectors, which is less connection than was expected. Gagné, Anderson, Jonassen, and Winn were the major connectors between these large groups. The small islands had no connectors. They were the genealogies of Garrison, Rovai, and Ertmer. Contrary to the author's expectation, the large continents did not represent the same distinct groups discussed in the previous paragraph. Rather, the Level 1 categories were spread fairly evenly across the various clusters of the entire diagram. In this way the diagram was much less connected and cohesive than I expected.

Merrill's influence. Merrill seemed to be the most influential scholar in relation to the other scholars in the analysis. He emerged eight times in the analysis (followed by Gagné, who came up seven times). Merrill was also the only scholar who appeared on all three levels. Fourteen scholars appeared on two levels, but the rest appeared only once. The scholars that appeared more often seemed more influential, because they influenced more scholars among those that emerged in the analysis. Other scholars that influenced a large number of scholars were Gagné (he influenced six other scholars), Reigeluth (influenced four others), and Sweller

(influenced four others). These three seem to be the other major hubs in the diagram. Still, it was interesting that Merrill had direct citation interaction with only two other Level 1 scholars' genealogies. If Merrill is one of the all-time pillars of IDT, and his professional career is mostly over, we might have expected there to be more interaction with the other scholars' genealogies.

General trends in the genealogies. Most of the time, the topics of "contributing scholars" flowed logically from the original author's own area of emphasis. For instance, Ertmer's major topics included "the expert learner," and one of her contributing scholars was Schunk, who discussed self-efficacy and self-regulation. Sometimes the contributing scholars were even contemporaries with the one citing them. One example of this is the trio of Gagné, Merrill, and Reigeluth. Chronologically, Gagné came first, Merrill came next, and Reigeluth came last. However, they seem to cite one another intensely. Zhongmin Li also cited these three, and others cited two of the three (i.e., Koper, Tennyson). Therefore one reason that contributing scholars fit so well with those they influenced may be because many of them collaborated on the same works. Perhaps a more exhaustive and complex analysis that incorporated multiple authors per work would reveal how much co-authorship collaboration has occurred between the authors.[1]

Diversity and psychology. Most importantly, the IDT field is diverse, more diverse than we give it credit for in the standard definitions of the field. For example, psychology is actually a major part of our field. In fact, psychology was the field from which three of the Level 1 scholars cited most, it had a vast impact on three others, and it was strongly present in three other Level 1 scholar's genealogies. Garrison was the only Level 1 scholar who was not obviously influenced by psychology in the network diagrams.

Limitations. The extent to which this sample is truly representative of the field is unknown. The results in this paper (including Figures 14 and 15) do not represent the entire IDT

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[1] Only first authors were considered in all stages of the analysis.

field. They are a limited representation of a part of the field. Further, where there are lines drawn in the network diagram, we know there is a relationship, but where there are not lines drawn, we do not know whether there is a relationship or whether there is no relationship. It is possible that, had the analysis included the top four or five influencers for each scholar the overall picture would have appeared to be more connected. Another way to check this would be to analyze the academic genealogies of influence for the top 20 or 50 scholars in IDT, instead of just the top 10.

Examination of Fields Represented by Scholars

In the following paragraphs I discuss the fields that scholars represented in this analysis. In Level 1, the scholars all represented a field closely related to IDT, which I later called "IDT Fields" for simplicity. It was with this original intent that the scholars were chosen (for their "IDT-ness"). In Level 2, the scholars came from a number of fields that are still related but more distantly. Level 3 brought even more diversity to the genealogy. This trend shows that the further back that the IDT genealogy is tracked, the more it diverges. Certainly IDT is a very diverse field, and the fields which make it up are deserving of some thought.

There was so much diversity that in order to compare the three levels, I had to aggregate the names of fields into groups in order to analyze them. Figure 16 shows these aggregations.

Level 1. The only aggregated category that appeared in Level 1 was the "IDT Fields" category. This was by design. The scholars in Level 1 were specifically picked as the most influential scholars in IDT. Therefore, I broke up these categories into more meaningful distinctions, just for Level 1 (see Figure 17). Otherwise Level 1 would be just a large dot representing only 100% "IDT Fields."

Aggregated Field Categories				
Gen. Ed	IDT Fields	Psychology	Sociology/ Anthrop	Adult/Higher Ed
Special Ed	Dist. Ed	Clinical Psych	Sociology	Adult Ed
Literacty	IDT	Cog. Psych	Soc. & Strategy	Higher Ed
Science Ed	Learning Sci.	Cog. Sci.	Anthropology	
Soc. Studies of Sci.	Ed Tech.	Differential Psych	Philosophy	
International comparative ed. assessments	Computer-mediated Communication	Neuro Psych		
	User Experience	Soc. Psych		
	Computer Science	Social Psych		
		Ed Psych		

Figure 16. The Fields Aggregated Under Each Category for Analysis
Note: The numerous fields involved in Levels 2 and 3 were aggregated to offer more efficient analysis.
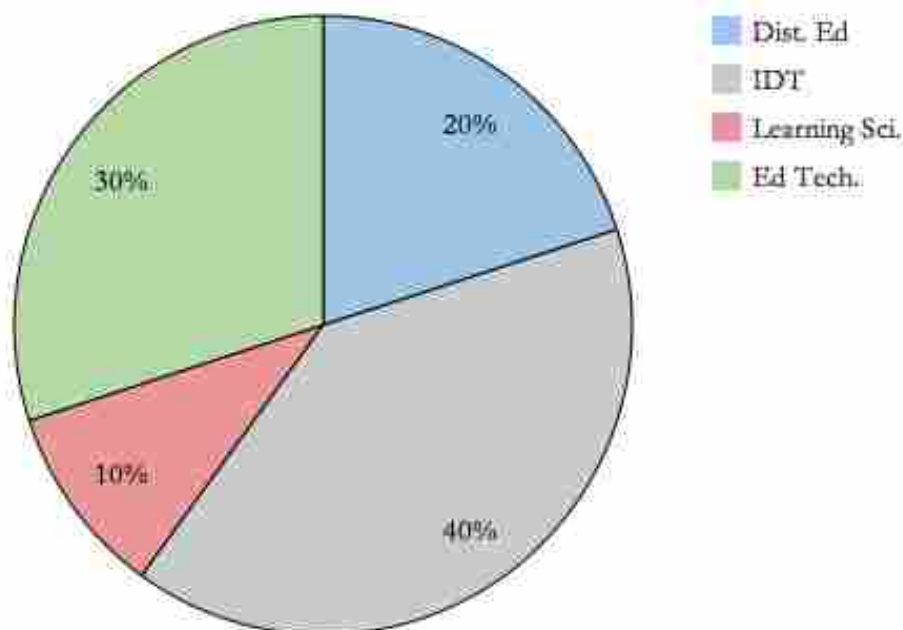
Figure 17. The fields/disciplines in which Level 1 Scholars were found.

The limitation of placing people in well-defined boxes is that they normally do not fit very well. Thus, many IDT scholars publish in Educational Technology outlets, many Learning Science scholars probably teach Instructional Design courses, and many Distance Education professors teach in IDT departments. For the members of the IDT field, this means that we are not as uniform and similar minded as we might have imagined.

Level 2. Traveling back just one generation in the IDT genealogy shows great divergence as many fields appear to have directly influenced today's top IDT scholars (see Figure 18). The largest percentage of these fields was psychology, which (as shown in Figure 16) includes a host of different areas of psychology. IDT was still a major player. The other groups were much smaller but significant together, making up about a third of the total. The label "N/A" was unique to Level 2, because *Macromedia* was the only contributor that was not a person. Therefore, I did not assign it a "field."
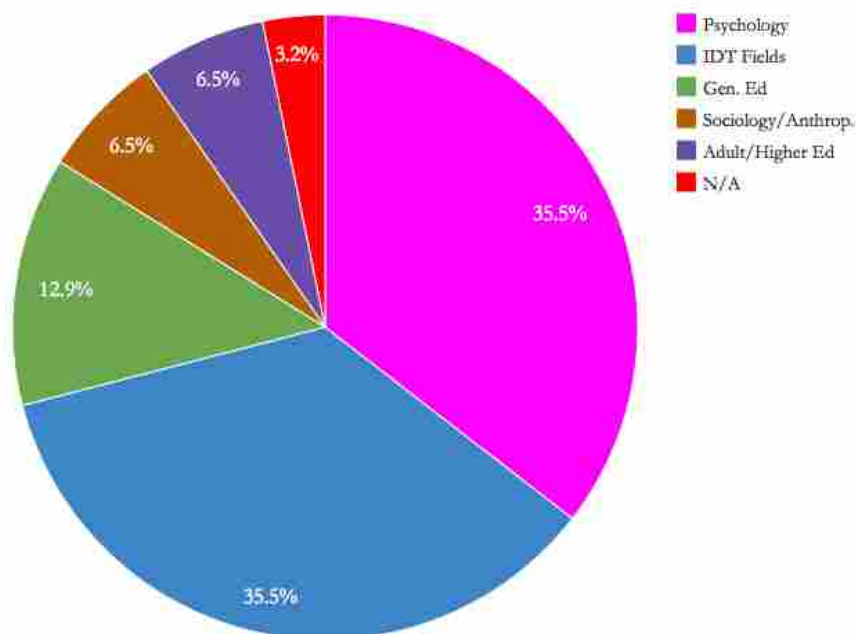
Figure 18. The fields/disciplines in which Level 2 Scholars were found.

Level 3. Traveling back another generation showed even more divergence away from IDT than did the trip from Level 1 to Level 2 (see Figure 19). Level 3 did not have any "N/A" contributors, but it did have one new category that the other two levels did not have. This new category was called "Unknown." One scholar in this category was John Seely Brown. He was categorized in this way because six panel members had different ideas on what field he should be placed in. The rest of the scholars in this category are unified by an opposite result. Sadly, this small handful of scholars on Level 3 are already completely forgotten or foriegn among many modern IDT scholars (i.e., none of the seven panel members knew what field they were in). Scholars in this category had no professional website, no *Wikipedia* entry, no *Google* results: no tracks. This is a sign that the IDT field diverges so rapidly that modern IDTers are totally unaware of some of their own roots.
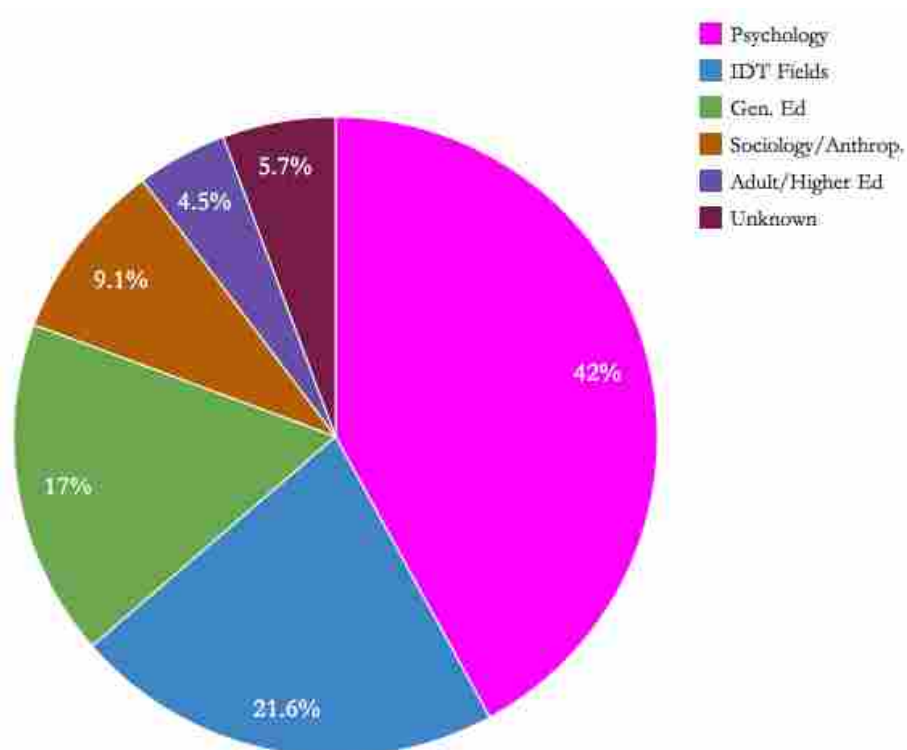
Figure 19. The fields/disciplines in which Level 3 Scholars were found.

Assessment of Panelists' Familiarity with Scholars

This section discusses more particularly how well the panel of seven IDT experts knew the scholars that emerged in this research. It presents a set of three pie charts and discusses each one in the context of this study.

For each scholar in the analysis, there were four possible codes to categorize each of the panel's collective responses. These classifications were strategically created in order to show significantly distinct groups. They are as follows: (a) four of the seven panel members did not know what field the scholar was in; (b) two or fewer panel members agreed on the field of the scholar; (c) four panel members did not know what field the scholar was in AND two or fewer panel members agreed on the field (this category included cases when no one knew what field the scholar was in); and (d) at least three of the seven panel members agreed on the field the scholar was in. It may seem odd to the reader that this fourth category was not designed to signify a majority. However, for this data, it was significant when three or more panel members did agree, because it happened less and less often with each progressive level. Further, it was far rarer for four or more of the panel members to know a scholar well enough to place him or her in a field *and* also to agree on a field. Therefore, a consensus of three out of the seven panel members constituted a significant enough number to justify a separate category.

Level 1. One surprising result (shown in Figure 20) was that two of the top 10 most influential scholars in IDT were not known to many modern IDT experts (4 or more panel members did *not* know what field these two scholars were in). These two scholars were Michele D. Dickey (ranked number five in the top 10), and Alfred P. Rovai (number nine of the top 10). It is interesting that these influential scholars were not better known by their supposed peers. This may suggest that the IDT field is more diverse than we thought. Certainly these scholars are

influential, but perhaps only within certain circles of which not all modern IDT scholars are a part. This repeating theme that the IDT field is diverse shows that the leaders of the field are continually bringing in fresh ideas. These fresh ideas renew and sustain the field.
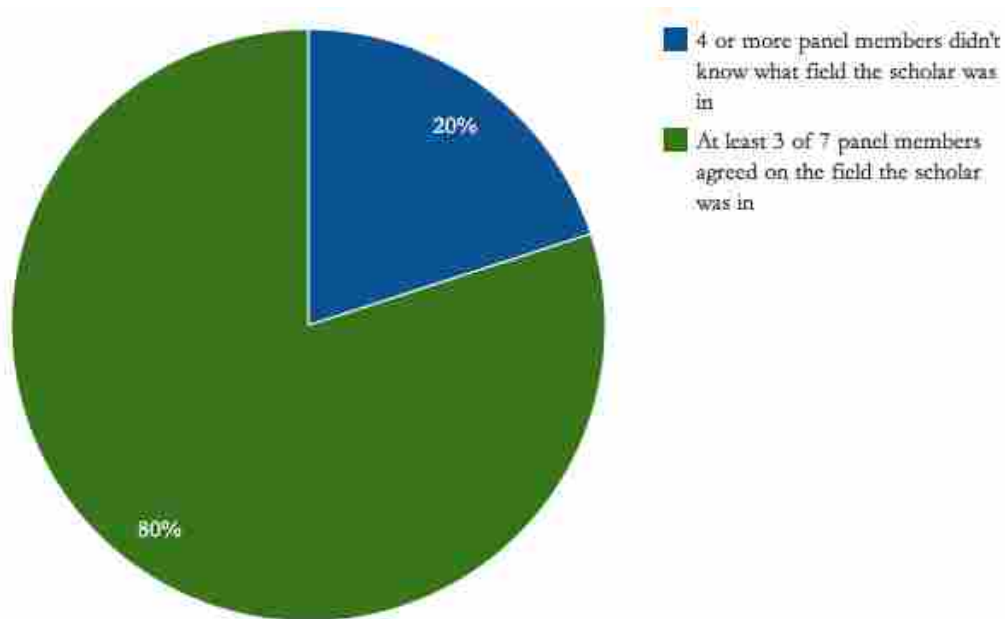
Figure 20. A panel of seven expert's familiarity with the Level 1 scholars.

Level 2. On Level 2 the number of scholars who were known and agreed upon was even less (see Figure 21). One possible reason for this may have been simply that the scholars in the analysis are not around anymore. Recall from Table 4 that in Level 2, there were over a third of the scholars who were either retired or deceased. In other words, a good portion of these scholars are not actively publishing in the field anymore. This would help explain why they are not better known.

Level 3. As shown in Figure 22, the number of scholars who were known and agreed upon by at least three of the seven panel members was less than half of the total. The increasing
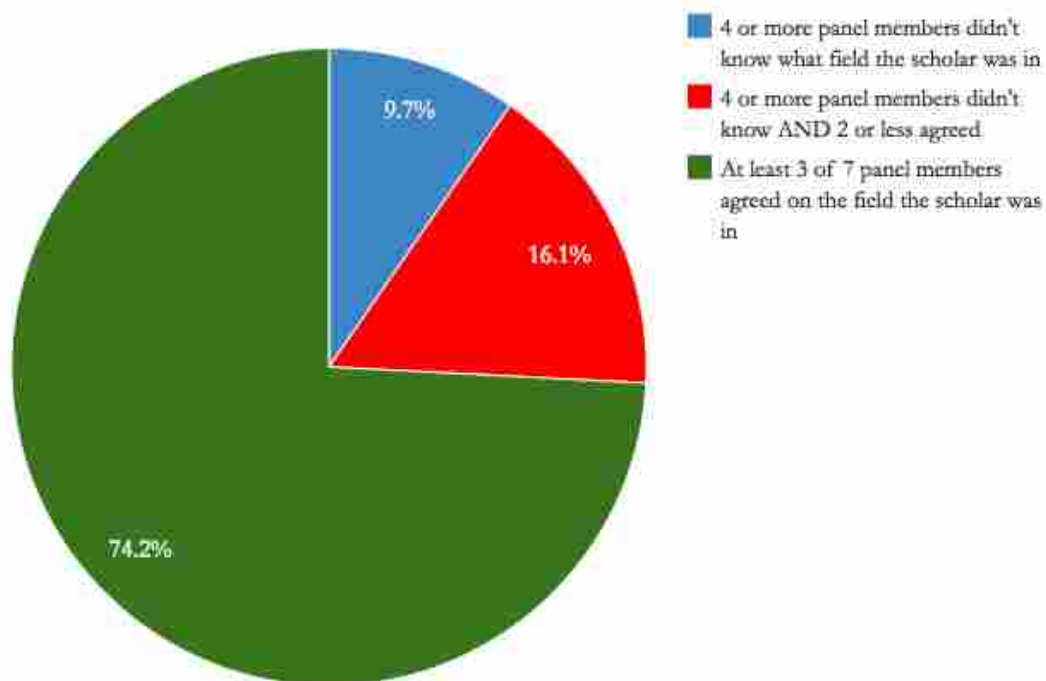
Figure 21. A panel of seven experts' familiarity with the Level 2 scholars.

ratio of scholars who were unknown to the panel of seven IDT experts may evidence a separation

between today's active researchers and the foundations of the IDT field. Recall from figure 17

that only 21.6% of the Level 3 scholars hailed from an IDT field. This may be another reason

that the IDT panel members did not know many of the Level 3 scholars (over four-fifths of them

were outside one of the "IDT fields"). Again, the idea that Level 2 scholars are citing people who

are unfamiliar to today's modern scholars is not bad. I actually see it as an advantage to the field,

because it shows that the Level 2 scholars are innovative.

Legend:
- 4 or more panel members didn't know what field the scholar was in
- 2 or less panel members agreed
- 4 or more panel members didn't know AND 2 or less agreed
- At least 3 of 7 panel members agreed on the field the scholar was in

11.4%

45.5%

42%
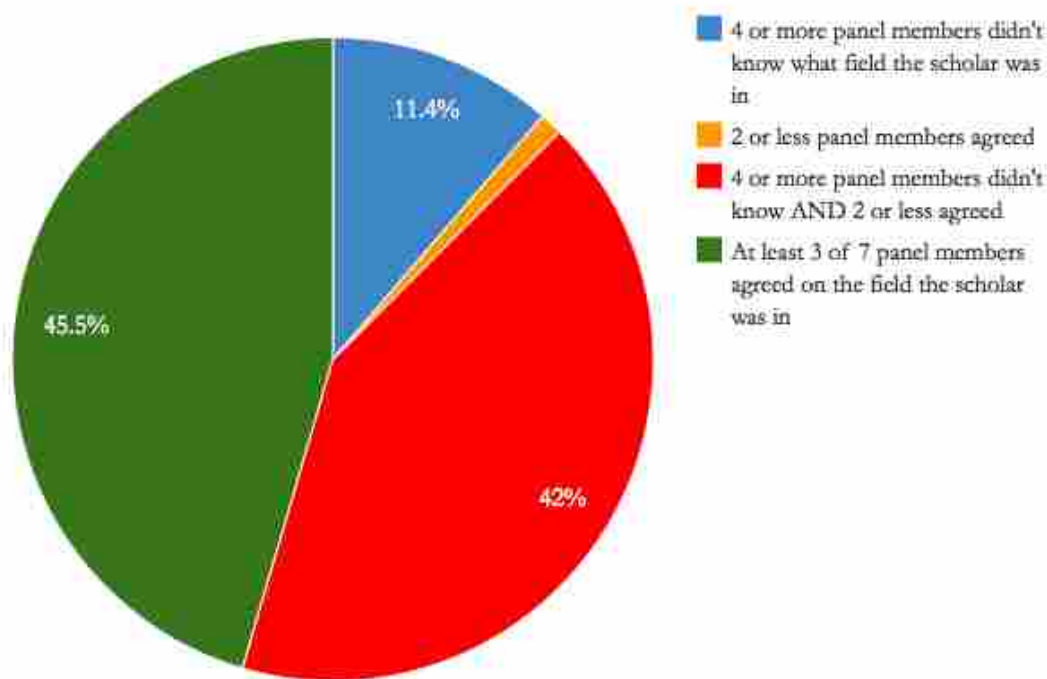
Figure 22. A panel of seven experts' familiarity with the Level 3 scholars.

Contextualization Within IDT Literature

In this section, the results of this research are discussed in the context of existing IDT literature. The author is not aware of any analysis like this, that goes back through three or more generations in an academic genealogy *of influence*. Therefore, these results are compared to the the IDT literature that was analyzed in the literature review.

Recall Table 1, included again below.

I returned to the raw data that were used to create this table, and examined the 174 names that those nine authors mentioned (remember, these were only counted when there was a name, a topic or event, and a year or decade given in the text). I then compared those 174 names to the 116 names that my citation analysis brought forth. I found that there were only 17 common

Table 1

Number of Scholarly Activities Reported by Nine Authors of Foundations and Historical Works

Author	Yr of work	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	Tot. Citations
Shepherd	2008	1	0	0	0	0	0	0	0	2	3	3	9
Reiser	2007	2	1	2	4	7	11	20	10	6	6	1	70
Driscoll	2007	0	0	0	1	0	0	2	1	2	16	4	26
Shrock	1995	0	1	5	1	1	4	5	1	0	0	n/a	18
Johnson	1989	0	0	0	0	0	0	0	1	9	n/a	n/a	10
Dick	1987	0	0	0	0	0	5	18	8	0	n/a	n/a	31
Meierhenry	1980	0	0	0	0	0	2	7	1	n/a	n/a	n/a	10
Baker	1973	2	1	1	0	1	1	2	2	n/a	n/a	n/a	10
Allen	1971	0	0	1	0	2	6	12	6	n/a	n/a	n/a	27
Tot. Per Yr		5	3	9	6	11	29	66	30	19	25	8	

names between my citation analysis and those nine works. Scholars that came up the most (i.e., five or more times) among the nine works I examined were: Gagné, Briggs, Glaser, Hoban, Lumsdaine, Skinner, and Dick. Of those seven names, only Gagné, Briggs, and Skinner appeared in my analysis. It is interesting to note that although Gagné came up in my analysis several times (and he was the most commonly mentioned scholar across all the works), Skinner and Briggs only came up once in my analysis. Overall, this comparison shows the great diversity among accounts of the field. This matches what was discovered in the original literature review: there is a great disparity between accounts of IDT's history.

Indeed, we are a diverse group, split a thousand ways by a thousand different paradigms. Even the names by which departments in this field identify themselves are diverse (e.g., Instructional Psychology and Technology; Learning Sciences; Educational Technology, Teaching and Learning; Instructional Systems Technology; Learning, Design and Technology etc.). Reiser (2007b) wrote a chapter called "What field did you say you were in?" in which he discussed the difficulties of nailing down a single definition of IDT: "throughout the history of the field the thinking and actions of a substantial number of professionals in the field have not been, and likely never will be, captured by a single definition" (p. 3). Concerning the definition

of the field *Educational Technology*, Gentry (1995) stated, "meaning depends considerably on what part of the elephant is being touched, and by whom!" (p. 4). Therefore, if the field is so difficult to define or even to name, it must be somewhat heterogeneous. This heterogeneity can be a good thing for the field, because it implies that the field is bringing in ideas from diverse realms and using them to innovate new solutions to problems in the 21st century.

General Limitations to the Research

There are three limitations with this research that all have to do with scope. First, if instead of visually mapping out just the top three influencers for each scholar, I mapped out *all* the connections for all the scholars, we might see a far more connected picture. Second, many scholars who are perceived as very influential in the field are not actually included in the analysis. Third, co-authorship is not considered in this study.

The first limitation is the most important. After evaluating the network diagram that was produced using the data from this research, it was apparent that if all the relationships were shown (instead of just the relationships between the three most cited influencers), I would be looking at a far more connected field. There were names such as "Bandura," which only appears in the diagram once, on the third level (meaning it only had one arrow associated with it). In contrast, Bandura was a very commonly cited name across all 119 scholars in the analysis, but he only emerged as one of a scholar's top three influencers only once. This phenomenon occurred in numerous cases of this analysis. If I had visually mapped out all 100,000 (or so) citations that were analyzed, I would likely have found a far more connected field. This one limitation is perhaps the greatest because it means that the entire presentation of data could be extremely misleading.

The second limitation is related to the first. It also regards what we cannot see. There are many well-known researchers, such as Reeves, Richey, Seels, Driscoll and Hannafin who did not appear in the results. To be clear, Reiser was ranked number 14 in the first step of the analysis, missing the top ten list by just four places, and Reeves was number 23. However, Hannafin, Driscoll, and Seels were not even in the top 60. It is important to emphasize that the academic genealogy of influence presented here is certainly not all-inclusive. However, it would be nice to know how these big names stars fit in. Further research is necessary, to include a starting list on Level 1 with as many as 100 or more names, instead of merely 10, as this study included.

The third limitation also regards scope and as with the other two, it serves as a justification for future research. There may be hidden effects for when a scholar frequently cited another scholar with whom he or she had collaborated on earlier works. In this case the citation more closely resembles self citation, and should be regarded somewhat differently than a citation to a work in which the citing scholar did not participate. In order to gain a systematic understanding of the prevalence of this phenomenon, further research is in order.

Conclusions

This research has filled some holes in the literature. It exposed the most influential scholars in IDT. It has revealed, through examination of the citations in those scholars' most critical works, who contributed most to their development. Also discussed were the ideas that were most important in these relationships. Previous to this research there was no systematic connected network that showed how the scholars of IDT relate to one another. Now that one exists, it can be expanded and improved.

The two key take-aways from this research are as follows. First, the IDT field is very diverse. In fact, I would call IDT a meta-field, because it incorporates several fields that are

difficult to distinguish between (e.g., Educational Technology and IDT). Second, psychology has contributed more to the IDT field than it is given credit for in many names and definitions of the field.

IDT: A diverse meta-field. Starting in Level 1, this diversity was illuminated. The IDT expert panel decided on four distinct sub-fields with which to associate the top 10 influencers in IDT: Learning Science, Distance Education, Educational Technology, and Instructional Design and Technology. Learning Scientists would probably argue that they are a very separate discipline than IDT. However, because they commonly publish in IDT journals and sometimes are most cited within those journals (i.e., Barab), they fall under the IDT umbrella.

In Levels 2 and 3, there came three more fields that were easily swept under the IDT rug. They were Computer-mediated Communication, User Experience, and Computer Science. While Computer Science is certainly a different field than IDT, for the purposes of this analysis it is more like IDT than any of the alternatives (i.e., Psychology, Adult/Higher Education, General Education, and Sociology/Anthropology). It is easy to see that collating fields together is sometimes easier than dividing them apart. What this principally exposes, though, is that IDT a meta-field, one that relies on content and ideas from other areas to which it applies its ideas. Perhaps this is why an undergraduate degree in IDT does not exist; it would appear that, without a discipline to apply its practices to, IDT would lose its relevance. In this light, then, it would appear that the diversity of the field is not only expected, but advantageous. The greater the variety of fields relied upon by IDT researchers, the greater the reach of the field and the greater the likelihood of incorporating ideas that transcend the limits of a single discipline. As in the case of genetics and economics regularly introducing such diversity ought to serve more to strengthen than to weaken the field.

Psychology: The unnamed component of the IDT field. Knowing that psychologists constituted 36% of Level 2 and 42% of Level 3 raises the question: "Is psychology included in definitions of the field?" On the AECT website, the definition of Instructional Technology is given, with no mention of psychology:

"The definition of instructional technology prepared by the AECT

Definitions and Terminology Committee is as follows:

Instructional Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning... The words Instructional Technology in the definition mean a discipline devoted to techniques or ways to make learning more efficient based on theory but theory in its broadest sense, not just scientific theory. ... Theory consists of concepts, constructs, principles, and propositions that serve as the body of knowledge. Practice is the application of that knowledge to solve problems. Practice can also contribute to the knowledge base through information gained from experience. ... Of design, development, utilization, management, and evaluation ... refer to both areas of the knowledge base and to functions performed by professionals in the field. ... Processes are a series of operations or activities directed towards a particular result. ... Resources are sources of support for learning, including support systems and instructional materials and environments. ... The purpose of instructional technology is to affect and effect learning (Seels & Richey, 1994, pp. 1-9).

This definition is clearly grounded in the knowledge base of the field of instructional technology" (AECT, 2001)

And recall Reiser's definition (2007a), which was used to frame the context of this paper, also with no mention of psychology:

> The field of instructional design and technology (also known as instructional technology) encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation, and management of instructional and noninstructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace. Professionals in the field of instructional design and technology often use systematic instructional design procedures and employ instructional media to accomplish their goals. Moreover, in recent years, they have paid increasing attention to noninstructional solutions to some performance problems. Research and theory related to each of the aforementioned areas is also an important part of the field. (p. 18)

Others defined the field with just one sentence (e.g., Gentry, 1995, p. 12, Spector, 2012, p. 10), and of course with such brevity the foundations of the field were not mentioned. These one sentence definitions do not provide evidence either way whether researchers in the field of IDT are aware of its foundations, or what they believe those origins are. It is, however, easier to see that in the two longer definitions that were quoted, there is far more space (and thus opportunity) to include something, *anything,* about psychology, and there is no mention of it.

Over the years there has been a paucity of evidence within *definitions* of the IDT field, regarding the inclusion of psychology, whether definitions were long or short. Outside of the definitions of the field, the IDT literature certainly claims psychology as one of the main foundations (Allen, 1971; Dick, 1987; Driscoll, 2007; Gustafson and Tillman, 1991, p. 6.; Meierhenry, 1980; Reiser, 2007a; Shepherd, 2007; Spector, 2012, pp. 71-74). Therefore, there is

a conflict between the literature that describes the foundations of the IDT field and the literature that defines the field.

If psychology is a main foundation of the field, why is it not included in definitions of the field? Perhaps it is because it is forgotten, or unfamiliar to IDT professionals who create the definitions. Perhaps it is too difficult to apply what we know about Instructional Psychology to a definition of Instructional Design and Technology. Perhaps it is simply not seen as a relevant component of what is done in the IDT field. However, this research suggests that psychology is a major component of the currently leading influences in IDT.

Implications

For students and professionals entering the field. As students and professionals enter the field of IDT, they should be aware that just because definitions of the field (and most departmental names), do not reflect the influence and function of psychology in IDT, it does not mean it is not there. IDT is a diverse field, and psychology deserves more attention than it currently receives. Of those Level 2 scholars who were most cited by the most influential scholars in the field of IDT (the Level 1 scholars), more than a third were found in the realms of psychology. Therefore, students and professionals entering the field of IDT should not only be aware that psychology is a part of our field, they should study and practice its principles and applications. In order to be prepared to contribute to this field, researchers and practitioners need a firm understanding of how principles of psychology affect (or should affect) what they do.

For mature professionals in the field. Mature professionals in the field of IDT should take note of the heavy influence of psychology in so much of what is studied and written in the IDT literature. It is a significant consideration for the most influential scholars in the field, and it should be a significant consideration for every serious researcher and practitioner in the field.

Psychology and its ideas in large part made our field, and these ideas continue to affect the way

IDT is researched and studied. Leaving them out leaves a big black hole. Therefore professionals

in the field should reconsider how they they represent the field. This includes how they name

their departments, how they define what they do, and how they do what they do.

      For the IDT field itself. The field is represented in part by its name, in part by its official

definitions, and in part by those working in it, producing scholarly works and practical products.

Recognizing its roots and its functional components would help to inform the way instruction is

designed and researched. Therefore, further consideration should be given to the field's diversity,

to include at least the effect that psychology has had and should continue to have on the work we

do in IDT.

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APPENDIX A - WHICH AUTHORS MENTION WHICH SCHOLARS (RAW DATA)

Referenced Scholar(s)	Title of Document	Content	Year
Edison, Thomas (1900s)	A brief history of instructional technology and the ideas affecting it	educational film	1900
Bobbit, Charters, Burk (early 1900s)	A history of instructional design and technology	Objectives	1900
Burk (early 1900s)	A history of instructional design and technology	Objectives	1900
Charters, Burk (early 1900s)	A history of instructional design and technology	Objectives	1900
Thorndike, Woodworth	The Technology of Instructional Development	transfer of training	1901
Woodworth	The Technology of Instructional Development	transfer of training	1901
Thorndike	The Technology of Instructional Development	Principles of teaching (book)	1906
Keystone View (Co) 1908	A history of instructional design and technology	Visual Education	1908
Thorndike	The Technology of Instructional Development	Programmed instruction	1912
Edison, Thomas (1913)	A history of instructional design and technology	technocentrism	1913
Fanklin Bobbitt, 1918	A brief history of instructional development	Social efficiency	1918
Burk,1920s	A brief history of instructional development	Self instructional materials and prespecified objectives	1920
Parkhurst, 1920s	A brief history of instructional development	Dalton Plan: contract learning	1920
Thorndike, 1920s	A brief history of instructional development	Socially useful goals and ed. measurement	1920
Ward & Burk,1920s	A brief history of instructional development	Self instructional materials and prespecified objectives	1920
Washburn, 1920s	A brief history of instructional development	Winnetka Plan: diagnostic placement tests	1920
McCluskey, 1920s	A history of instructional	audiovisual instrucion	1920

	design and technology		
Lashley & Watson	Instructional Media Research: Past, Present, and Future	conceptualization of research variables	1922
Watson	Instructional Media Research: Past, Present, and Future	conceptualization of research variables	1922
National Education Association, 1923	A history of instructional design and technology	Founded the Dpt of Visual Instruction (later became AECT)	1923
Pressey, 1925	A brief history of instructional development	Testing machine	1925
Washburn	The Technology of Instructional Development	Individually paced curriculum	1929
Tyler, 1933 (1930s)	A brief history of instructional development	Behavioral objectives and formative evaluation	1930
Morgan, 1932	A history of instructional design and technology	Editor of pubs for National Ed. Assoc.	1932
Tyler, 1932	A history of instructional design and technology	Criterion Referenced Tests	1932
Tyler, 1934	A history of instructional design and technology	Behavioral Objectives	1934
Hoban, and Zissman (1937)	A history of instructional design and technology	wrote book: Visualizing the Curriculum	1937
Hoban, Hoban, and Zissman (1937)	A history of instructional design and technology	wrote book: Visualizing the Curriculum	1937
Zissman (1937)	A history of instructional design and technology	wrote book: Visualizing the Curriculum	1937
Skinner, 1938, 1969, 1987	Psychological Foundations of Instructional Design (in Reiser's book)	Behaviorism	1938
Division of Visual Aids for War Training, 1941-1945	A brief history of instructional development	457 sound motion pictures, 432 silent films, and 457 instructors' manuals	1941
Briggs, (WWII)	A history of instructional design and technology	WWII R&D	1941
Division of Visual Aids for War Training, 1941-1945	A history of instructional design and technology	Oversaw production of 457 training films	1941
John Flanagan, (WWII)	A history of instructional design and technology	WWII R&D	1941

Miller, (WWII)	A history of instructional design and technology	Task Analysis Methodology	1941
Robert Gagne, (WWII)	A history of instructional design and technology	WWII R&D	1941
Dale, Edgar 1946	A history of instructional design and technology	Cone of Experience	1946
Gibson	Instructional Media Research: Past, Present, and Future	Motion Picture Testing and Research	1947
Skinner	The Technology of Instructional Development	flexibility of operant conditioning (Walden II)	1948
Shannon & Weaver, 1949	A history of instructional design and technology	Communication Process model	1949
Weaver, 1949	A history of instructional design and technology	Communication Process model	1949
Hovland, Lumsdaine & Sheffield	Instructional Media Research: Past, Present, and Future	Experiments on Mass Communication	1949
Lumsdaine & Sheffield	Instructional Media Research: Past, Present, and Future	Experiments on Mass Communication	1949
Sheffield	Instructional Media Research: Past, Present, and Future	Experiments on Mass Communication	1949
Skinner, 1950s	A brief history of instructional development	Programmed Instruction Movement	1950
U.S. Airforce, 1950s	A brief history of instructional development	Task Analysis	1950
C. R. Carpenter, 1940-50s	A history of instructional design and technology	Formative Eval	1950
IBM, 1950s	A history of instructional design and technology	First Computer Assisted Instruction (CAI)	1950
Lumsdaine, 1940-50s	A history of instructional design and technology	Formative Eval	1950
Mark May, 1940-50s	A history of instructional design and technology	Formative Eval	1950
Hoban, van Ormer	Instructional Media Research: Past, Present, and Future	Instr. film research	1950

van Ormer	Instructional Media Research: Past, Present, and Future	Instr. film research	1950
Dale, Edgar	Instructional Theory: From Behaviorism to Humanism to Synergism	Cone of Experience	1950
Dale, Hoban	Instructional Theory: From Behaviorism to Humanism to Synergism	Communication Theory	1950
Hoban	Instructional Theory: From Behaviorism to Humanism to Synergism	Communication Theory	1950
Flanagan, 1951	A history of instructional design and technology	Criterion-ref vs Norm-ref tests	1951
Dale, 1953	A history of instructional design and technology	Audiovisual movement (emphasized process aspect of communication)	1953
Carpenter	Instructional Media Research: Past, Present, and Future	Instructional Film Research Program	1953
Greenhill, 1956)	Instructional Media Research: Past, Present, and Future	Instructional Film Research Program	1953
Hovland, Janis & Kelley	Instructional Media Research: Past, Present, and Future	attitude and communication	1953
Janis & Kelley	Instructional Media Research: Past, Present, and Future	attitude and communication	1953
Kelley	Instructional Media Research: Past, Present, and Future	attitude and communication	1953
Beals & Hoijer	The Technology of Instructional Development	curriculum activities persist as anthropological "rites of convocation"	1953
Hoijer	The Technology of Instructional Development	curriculum activities persist as anthropological "rites of convocation"	1953
Flanagan, 1954	A brief history of instructional development	Critical incident technique	1954
Finn, 1954	A history of instructional design and technology	Audiovisual movement (emphasized process aspect of communication)	1954
Carpenter	Instructional Media	Instructional variables in Univ. setting	1955

	Research: Past, Present, and Future		
Greenhill	Instructional Media Research: Past, Present, and Future	Instructional variables in Univ. setting	1955
Bloom, 1956	A brief history of instructional development	Taxonomy of Ed Objectives	1956
Finn	A History of Instructional Design and Its Impact on Educational Psychology	Systems approach	1956
Hoban	A History of Instructional Design and Its Impact on Educational Psychology	Systems approach	1956
Bloom, 1956	A history of instructional design and technology	Taxonomy of Ed. Objectives	1956
Carpenter & Greenhill, 1956	A history of instructional design and technology	Audiovisual research	1956
Greenhill	A history of instructional design and technology	Audiovisual research	1956
Kanner	Instructional Media Research: Past, Present, and Future	TV in the Army	1957
Skinner	A History of Instructional Design and Its Impact on Educational Psychology	Programmed instruction	1958
Skinner	A History of Instructional Design and Its Impact on Educational Psychology	Teaching machines	1958
Lumsdaine, 1958	A history of instructional design and technology	Audiovisual research	1958
May & Lumsdaine, 1958	A history of instructional design and technology	Audiovisual research	1958
Skinner, 1958	A history of instructional design and technology	Programmed Instruction	1958
Lumsdaine	Instructional Media Research: Past, Present, and Future	Factors & measurement of ed. film	1958
May & Lumsdaine	Instructional Media Research: Past, Present, and Future	Factors & measurement of ed. film	1958

Melton	A History of Instructional Design and Its Impact on Educational Psychology	Match learning task characteristics to those of media (not compare media to media)	1959
Finn & Arthur Lumsdaine, 1960s	A brief history of instructional development	From instructional products to instructional messages	1960
Glaser, 1960s	A brief history of instructional development	Coined term "Criterion Referenced Measures"	1960
Glaser, 1960s?	A brief history of instructional development	Gap between ed research and ed practice	1960
Lumsdaine	A brief history of instructional development	From instructional products to instructional messages	1960
Flanagan, 1960s	A History of Instructional Design and Its Impact on Educational Psychology	Project PLAN	1960
Glaser	A History of Instructional Design and Its Impact on Educational Psychology	Individually Prescribed Instruction (IPI)	1960
Atkinson, 1960s	A history of instructional design and technology	Adaptive teaching machines	1960
Gagne, 1960s	A history of instructional design and technology	Learning Hierarchies	1960
Glaser	A history of instructional design and technology	Programmed Instruction	1960
Lumsdaine & Glaser, 1960	A history of instructional design and technology	Programmed Instruction	1960
Pask, 1960s	A history of instructional design and technology	Adaptive teaching machines	1960
Suppes, 1960s	A history of instructional design and technology	Adaptive teaching machines	1960
Carnegie Commission on Educational Television	Instructional Theory: From Behaviorism to Humanism to Synergism	*Public Television: A Program for Action*	1960
Crowder	Instructional Theory: From Behaviorism to Humanism to Synergism	branching programs	1960
Keller	Instructional Theory: From Behaviorism to Humanism to Synergism	behavioristic Personalized System of Instruction	1960
Postlethwait	Instructional Theory: From Behaviorism to	highly individualized botany course	1960

	Humanism to Synergism		
Skinner	Instructional Theory: From Behaviorism to Humanism to Synergism	Programmed instruction (PI)	1960
Skinner	Instructional Theory: From Behaviorism to Humanism to Synergism	teaching machines	1960
Lumsdaine, 1961	A history of instructional design and technology	Audiovisual research	1961
Gropper and Lumsdaine	Instructional Media Research: Past, Present, and Future	Student Response in Programed Instruction	1961
Lumsdaine	Instructional Media Research: Past, Present, and Future	Student Response in Programed Instruction	1961
Lumsdaine	Instructional Media Research: Past, Present, and Future	Student Response in Programed Instruction	1961
Holland & Skinner, 1961	Psychological Foundations of Instructional Design (in Reiser's book)	Linear Programmed instruction	1961
Skinner	Psychological Foundations of Instructional Design (in Reiser's book)	Linear Programmed instruction	1961
Holland & Skinner	The Technology of Instructional Development	Programmed instruction	1961
Skinner	The Technology of Instructional Development	Programmed instruction	1961
Glaser, 1962	A brief history of instructional development	Coined term "Instructional System"	1962
Miller, 1962	A brief history of instructional development	Detailed task analysis procedures	1962
Gagné	A History of Instructional Design and Its Impact on Educational Psychology	Psychological Principles in System Development (book)	1962
Gagné	A History of Instructional Design and Its Impact on Educational Psychology	Hierarchical analysis	1962

Gagné	A History of Instructional Design and Its Impact on Educational Psychology	Applied psychological principles to system dev.	1962
Mager	A History of Instructional Design and Its Impact on Educational Psychology	behavioral objectives	1962
Miller	A History of Instructional Design and Its Impact on Educational Psychology	Task analysis	1962
Ebel, 1962	A history of instructional design and technology	Criterion-ref vs Norm-ref tests	1962
Gagné, 1962b	A history of instructional design and technology	Psychological Principles in System Development	1962
Gagné, 1962b	A history of instructional design and technology	Process models	1962
Glaser, 1962, 1965	A history of instructional design and technology	Process models	1962
Carroll	A History of Instructional Design and Its Impact on Educational Psychology	Model of School Learning	1963
Cronbach	A History of Instructional Design and Its Impact on Educational Psychology	evaluation	1963
Glaser	A History of Instructional Design and Its Impact on Educational Psychology	Criterion-ref testing	1963
Glaser	A History of Instructional Design and Its Impact on Educational Psychology	objective-referenced testing	1963
Berlo, 1963	A history of instructional design and technology	(As a "communication man") Emphasized process aspect of communication	1963
Cronbach, 1963	A history of instructional design and technology	Formative vs summative evaluation	1963
Glaser, 1963	A history of instructional design and technology	Coined term: "Criterion-ref test"	1963
Lumsdaine, 1963	A history of instructional design and technology	Eliciting overt student response during instructional films	1963
Lumsdaine	Instructional Media Research: Past, Present,	"evaluative" comparisons	1963

	and Future		
Lumsdaine	Instructional Media Research: Past, Present, and Future	Design of mediated instruction	1963
Berlo	Instructional Theory: From Behaviorism to Humanism to Synergism	shifted attention from the medium to the learner	1963
Silvern, 1964	A history of instructional design and technology	Process models	1964
Gagné, 1965	A brief history of instructional development	The Conditions of Learning (book)	1965
Gagné	A History of Instructional Design and Its Impact on Educational Psychology	The Conditions of Learning (book)	1965
Glaser	A History of Instructional Design and Its Impact on Educational Psychology	Applied the system concept directly to design and development process	1965
Gagné, 1965b	A history of instructional design and technology	Conditions of Learning (book)	1965
Gagné	Instructional Media Research: Past, Present, and Future	The Conditions of Learning (book)	1965
Goodlad, Von Stoephasius, and Klein	The Technology of Instructional Development	Abundant flaws in 1950s curriculum dev. programs	1966
Klein	The Technology of Instructional Development	Abundant flaws in 1950s curriculum dev. programs	1966
Von Stoephasius	The Technology of Instructional Development	Abundant flaws in 1950s curriculum dev. programs	1966
Scriven	A History of Instructional Design and Its Impact on Educational Psychology	formative evaluation	1967
Gumpert, 1967	A history of instructional design and technology	Instructional television	1967
Markle, 1967	A history of instructional design and technology	Prescribed sum/form evaluation procedures	1967
Scriven, 1967	A history of instructional design and technology	Coined terms: Formative/Summative eval	1967
Taylor, 1967	A history of instructional design and technology	Instructional television	1967

Briggs, Campeau, Gagne, and May	Instructional Media Research: Past, Present, and Future	Review of instructional media	1967
Campeau, Gagne, and May	Instructional Media Research: Past, Present, and Future	Review of instructional media	1967
Gagné	Instructional Media Research: Past, Present, and Future	individual differences	1967
Gagné, and May	Instructional Media Research: Past, Present, and Future	Review of instructional media	1967
Lang	Instructional Media Research: Past, Present, and Future	Translate research into practice with PI	1967
May	Instructional Media Research: Past, Present, and Future	Review of instructional media	1967
Banathy	A History of Instructional Design and Its Impact on Educational Psychology	Systems approach	1968
Banathy	A History of Instructional Design and Its Impact on Educational Psychology	Instructional Systems (book)	1968
Keller	A History of Instructional Design and Its Impact on Educational Psychology	Personalized System of Instruction (PSI)	1968
Briggs	Instructional Media Research: Past, Present, and Future	Sequencing of inst. in relat. to hierarchies of competence	1968
Snow and Soloman	Instructional Media Research: Past, Present, and Future	Learner aptitudes	1968
Soloman	Instructional Media Research: Past, Present, and Future	Learner aptitudes	1968
Atkinson & Shriffin, 1968	Psychological Foundations of Instructional Design (in Reiser's book)	Multistage, multistore theory of memory	1968
Shriffin	Psychological Foundations of	Multistage, multistore theory of memory	1968

	Instructional Design (in Reiser's book)		
Mahan & Ritts	A History of Instructional Design and Its Impact on Educational Psychology	Self paced courses	1969
Moore, Mahan & Ritts	A History of Instructional Design and Its Impact on Educational Psychology	Self paced courses	1969
Ritts	A History of Instructional Design and Its Impact on Educational Psychology	Self paced courses	1969
Gagne and Rohwer	Instructional Media Research: Past, Present, and Future	Instructional psychology	1969
Rohwer	Instructional Media Research: Past, Present, and Future	Instructional psychology	1969
Heinich, 1970	A History of Instructional Design and Its Impact on Educational Psychology	Systems approach	1970
Gordon, 1970	A history of instructional design and technology	Instructional television	1970
Heinich, 1970	A history of instructional design and technology	instruction = teachers	1970
Allen	Instructional Media Research: Past, Present, and Future	Trends in instructional technology	1970
Briggs	Instructional Media Research: Past, Present, and Future	Handbook of procedures for the design of instruction	1970
Briggs	Instructional Media Research: Past, Present, and Future	Instructional development	1970
Frase	Instructional Media Research: Past, Present, and Future	Boundary conditions for mathemagenic behaviors	1970
Rothkopf	Instructional Media Research: Past, Present, and Future	Mathemagenic activities	1970
Salomon	Instructional Media Research: Past, Present,	A cognitive-functionalist view of research on media	1970

	and Future		
Maslow	Instructional Theory: From Behaviorism to Humanism to Synergism	needs of individuals over those of institutions or society	1970
Rogers, Abraham Maslow	Instructional Theory: From Behaviorism to Humanism to Synergism	needs of individuals over those of institutions or society	1970
Eisner	The Technology of Instructional Development	A guidebook to alter widespread practice	1970
Walker	The Technology of Instructional Development	Curriculum development: a search for a common platform, rather than a technically oriented procedure	1970
Bloom	A History of Instructional Design and Its Impact on Educational Psychology	mastery learning	1971
Kaufman, 1972	A brief history of instructional development	Needs Assessment	1972
Dick & Gallagher	A History of Instructional Design and Its Impact on Educational Psychology	computer managed instruction	1972
Gallagher	A History of Instructional Design and Its Impact on Educational Psychology	computer managed instruction	1972
Dickie	A history of instructional design and technology	Focus on characteristics of media	1973
Levie & Dickie, 1973	A history of instructional design and technology	Focus on characteristics of media	1973
Briggs, Gagné	The foundations of Instructional Design	Systematic Design approach, instructional events	1974
Gagné	The foundations of Instructional Design	Systematic Design approach, instructional events	1974
Branson et al., 1975	A History of Instructional Design and Its Impact on Educational Psychology	Instructional Systems Development (ISD) model	1975
Branson et al., 1975	A History of Instructional Design and Its Impact on Educational Psychology	Job analysis and summative evaluation	1975
Branson et al., 1975	A history of instructional design and technology	Process models	1975
Gaff, 1975	A history of instructional	Instr. improvement centers	1975

	design and technology		
Tyler, 1975b	A history of instructional design and technology	Instructional television	1975
Mager, 1977	A history of instructional design and technology	ID emmerging in industry	1977
Schramm, 1977	A history of instructional design and technology	Media comparison studies	1977
Kulhavy, 1977	Psychological Foundations of Instructional Design (in Reiser's book)	Linear programmed instruction was boring and kids were peeking	1977
Carey	A History of Instructional Design and Its Impact on Educational Psychology	Dick and Carey model	1978
Dick and Carey	A History of Instructional Design and Its Impact on Educational Psychology	Dick and Carey model	1978
Merrill	A History of Instructional Design and Its Impact on Educational Psychology	Task analysis (learner's cognitive steps)	1978
English	A History of Instructional Design and Its Impact on Educational Psychology	Needs Assessment	1979
Kaufman & English	A History of Instructional Design and Its Impact on Educational Psychology	Needs Assessment	1979
Blakely, 1979	A history of instructional design and technology	Instructional television	1979
Partridge & Tennyson, 1979	A history of instructional design and technology	Graduate programs in ID	1979
Tennyson	A history of instructional design and technology	Graduate programs in ID	1979
Ely	A history of instructional design and technology	ID text books for teachers	1980
Gerlach & Ely, 1980	A history of instructional design and technology	ID text books for teachers	1980
Hezel, 1980	A history of instructional design and technology	Instructional television	1980
Low, 1980	A history of instructional design and technology	Cog psych applied to ID	1980

Briggs, 1980	Psychological Foundations of Instructional Design (in Reiser's book)	Gagne's Theory of Instruction	1980
Andrews and Goodson; Dick	The foundations of Instructional Design	Generic ID process has about ten steps, as shown (p. 13) (which are fluid and flexible, McCombs)	1980
Dick	The foundations of Instructional Design	Generic ID process has about ten steps, as shown (p. 13) (which are fluid and flexible, McCombs)	1980
Goodson; Dick	The foundations of Instructional Design	Generic ID process has about ten steps, as shown (p. 13) (which are fluid and flexible, McCombs)	1980
McCombs; Andrews and Goodson; Dick	The foundations of Instructional Design	Generic ID process has about ten steps, as shown (p. 13) (which are fluid and flexible, McCombs)	1980
Salomon	The foundations of Instructional Design	Mediums have unique symbol mapping systems	1981
Gagne, 1982	A history of instructional design and technology	Cog psych applied to ID	1982
Silber, 1982	A history of instructional design and technology	Graduate programs in ID	1982
Clark (1983)	A brief history of instructional technology and the ideas affecting it	Media will never influence ed.	1983
Gagne	A History of Instructional Design and Its Impact on Educational Psychology	systematic and practical approach to selecting mediums	1983
Reiser & Gagne	A History of Instructional Design and Its Impact on Educational Psychology	systematic and practical approach to selecting mediums	1983
Scandura	A History of Instructional Design and Its Impact on Educational Psychology	Task analysis (learner's cognitive steps)	1983
Clark, 1983, 1994	A history of instructional design and technology	Focus on instructional methods (rather than media)	1983
Gagne	A history of instructional design and technology	Def of "instructional media"???	1983
Higgins, 1983	A history of instructional design and technology	ID text books for teachers	1983

Miles, 1983	A history of instructional design and technology	ID emmerging in industry	1983
Reiser & Gagne, 1983	A history of instructional design and technology	Def of "instructional media"???	1983
Sullivan & Higgins, 1983	A history of instructional design and technology	ID text books for teachers	1983
Bratton, 1984	A history of instructional design and technology	Instr. improvement centers	1984
Dick, 1984	A history of instructional design and technology	Graduate programs in ID	1984
Gustafson & Bratton, 1984	A history of instructional design and technology	Instr. improvement centers	1984
Mager, 1984	A history of instructional design and technology	Behavioral Objectives of Programmed instruction	1984
Redfield & Dick, 1984	A history of instructional design and technology	Graduate programs in ID	1984
Driscoll	The foundations of Instructional Design	ID has too many variables to obtain definite research findings	1984
Gagne	A History of Instructional Design and Its Impact on Educational Psychology	Nine events of instruction (bridged behavioristic and cognitive approaches)	1985
Gagne, 1985	A history of instructional design and technology	Nine Events of Instruction (book)	1985
Gagne, 1972, 1985	Psychological Foundations of Instructional Design (in Reiser's book)	Gagne's Theory of Instruction	1985
Morariu	The foundations of Instructional Design	Messages and learner thought processes are structured through the medium	1985
Scheffler	The foundations of Instructional Design	Theories of ID are practical	1985
Chadwick, 1986	A history of instructional design and technology	ID in South Korea, Liberia, and Indonesia	1986
Ely & Plomp, 1986	A history of instructional design and technology	ID in international arena	1986
McCombs, 1986	A history of instructional design and technology	ID in military	1986
Plomp, 1986	A history of instructional	ID in international arena	1986

	design and technology		
Gooler	The foundations of Instructional Design	World-wide distribution of instruction through a learning network	1986
Reeves	The foundations of Instructional Design	Recommends qualitative methods to study ID	1986
Richey	The foundations of Instructional Design	ID: science as a process and pragmatism	1986
Schiffman	The foundations of Instructional Design	ID is derived from a single discipline, and thus narrow in perspective	1986
Papert (1987)	A brief history of instructional technology and the ideas affecting it	technocentrism	1987
Dick, 1987	A history of instructional design and technology	Computer based instruction	1987
Divesta & Rieber, 1987	A history of instructional design and technology	Cog psych applied to ID	1987
Finch, 1987	A history of instructional design and technology	ID in military	1987
Rieber, 1987	A history of instructional design and technology	Cog psych applied to ID	1987
Bonner, 1988	A history of instructional design and technology	Cog psych applied to ID	1988
Spady, 1988	A history of instructional design and technology	ID in public schools	1988
Bowsher, 1989	A history of instructional design and technology	ID emmerging in industry	1989
Diamond, 1989	A history of instructional design and technology	ID in Higher ed.	1989
Dick & Reiser, 1989	A history of instructional design and technology	ID text books for teachers	1989
Galagan, 1989	A history of instructional design and technology	ID emmerging in industry	1989
Li, 1989	A history of instructional design and technology	Computers as ID tools	1989
Merrill & Li, 1989	A history of instructional design and technology	Computers as ID tools	1989
Moore, 1989	A history of instructional design and technology	Interactive capabilities of agents involved in instruction	1989

Morgan, 1989	A history of instructional design and technology	ID in South Korea, Liberia, and Indonesia	1989
Morgan, 1989	A history of instructional design and technology	ID in international arena	1989
Reiser, 1989	A history of instructional design and technology	ID text books for teachers	1989
CTGV, 1990	A brief history of instructional technology and the ideas affecting it	Distributed Cognition	1990
Chevalier, 1990	A history of instructional design and technology	ID in military	1990
Jones, 1990a, 1990b	A history of instructional design and technology	Need for new models of ID to accommodate interactivity of micro-computers	1990
Li, & Jones, 1990a, 1990b	A history of instructional design and technology	Need for new models of ID to accommodate interactivity of micro-computers	1990
Merrill, Li, & Jones, 1990a, 1990b	A history of instructional design and technology	Need for new models of ID to accommodate interactivity of micro-computers	1990
Gagne and Merrill, 1990	Psychological Foundations of Instructional Design (in Reiser's book)	Enterprise Schema in preparation for ID	1990
Merrill, 1990	Psychological Foundations of Instructional Design (in Reiser's book)	Enterprise Schema in preparation for ID	1990
Saxe, 1990	Psychological Foundations of Instructional Design (in Reiser's book)	Situated learning theory: Brazilian candy selling kids	1990
The Cognition and Technology Group at Vanderbilt (CTGV), 1990	Psychological Foundations of Instructional Design (in Reiser's book)	Anchored instruction	1990
Cognition & Technology Group at Vanderbilt, 1991	Psychological Foundations of Instructional Design (in Reiser's book)	Constructivism focuses on "high-level, complex learning goals"	1991
Tripp, 1993	Psychological Foundations of	Anchored instruction critic: observers as observers rather than participants	1993

	Instructional Design (in Reiser's book)		
Clark, 1983, 1994	A history of instructional design and technology	Media comparison studies	1994
Kozma, 1991, 1994	A history of instructional design and technology	How media influence learning	1994
Bereiter (1994, 1996a,b)	Psychological Foundations of Instructional Design (in Reiser's book)	Computer-Supported International Learning Environment	1994
Scardamalia & Bereiter (1994, 1996a,b)	Psychological Foundations of Instructional Design (in Reiser's book)	Computer-Supported International Learning Environment	1994
Hooper & Rieber, 1995)	A brief history of instructional technology and the ideas affecting it	Def. of Tech.	1995
Hooper & Rieber, 1995)	A brief history of instructional technology and the ideas affecting it	idea technologies versus product technologies	1995
Rieber, 1995)	A brief history of instructional technology and the ideas affecting it	Def. of Tech.	1995
Rieber, 1995)	A brief history of instructional technology and the ideas affecting it	idea technologies versus product technologies	1995
Shrock, 1995	A history of instructional design and technology	Computer based instruction	1995
Dick, 1996	A history of instructional design and technology	Constructivist Influence on ID	1996
Gagne & Medsker, 1996	Psychological Foundations of Instructional Design (in Reiser's book)	Gagne's Theory of Instruction	1996
Medsker, 1996	Psychological Foundations of Instructional Design (in Reiser's book)	Gagne's Theory of Instruction	1996
Kirshner & Whitson, 1997	Psychological Foundations of Instructional Design (in Reiser's book)	Situated cognition	1997

Lave, 1997	Psychological Foundations of Instructional Design (in Reiser's book)	Situated Learning theory: integrating knowing and doing	1997
Lemke, 1997	Psychological Foundations of Instructional Design (in Reiser's book)	You have to factor out community in order to understand individual learing	1997
Lemke, 1997	Psychological Foundations of Instructional Design (in Reiser's book)	Social learning theory: meaningful action in a cultural cultural system	1997
Whitson, 1997	Psychological Foundations of Instructional Design (in Reiser's book)	Situated cognition	1997
Sweller, et al, 1998	Psychological Foundations of Instructional Design (in Reiser's book)	Automation	1998
Sweller, et al, 1998	Psychological Foundations of Instructional Design (in Reiser's book)	Cognitive load theory	1998
Sweller, et al, 1998	Psychological Foundations of Instructional Design (in Reiser's book)	Minimizing split attention affect by integrating explanations within diagrams	1998
Wenger, 1998	Psychological Foundations of Instructional Design (in Reiser's book)	Def learning as participation	1998
Bransford, 1999	Psychological Foundations of Instructional Design (in Reiser's book)	Anchored instruction with cycles of increasing participation	1999
Brophy, & Bransford, 1999	Psychological Foundations of Instructional Design (in Reiser's book)	Anchored instruction with cycles of increasing participation	1999
Lin, Brophy, & Bransford, 1999	Psychological Foundations of Instructional Design (in Reiser's book)	Anchored instruction with cycles of increasing participation	1999

Shwartz, Lin, Brophy, & Bransford, 1999	Psychological Foundations of Instructional Design (in Reiser's book)	Anchored instruction with cycles of increasing participation	1999
Diamond, 2001	A brief history of instructional technology and the ideas affecting it	Distributed Cognition	2001
Halverson, & Diamond, 2001	A brief history of instructional technology and the ideas affecting it	Distributed Cognition	2001
Spillane, Halverson, & Diamond, 2001	A brief history of instructional technology and the ideas affecting it	Distributed Cognition	2001
Commission of IT (Reiser, 2002a)	A brief history of instructional technology and the ideas affecting it	1970 Def of IT	2002
Kester, 2003	Psychological Foundations of Instructional Design (in Reiser's book)	4C/ID model	2003
Kirschner, & Kester, 2003	Psychological Foundations of Instructional Design (in Reiser's book)	4C/ID model	2003
Mayer & Moreno, 2003	Psychological Foundations of Instructional Design (in Reiser's book)	multimedia instruction and split attention	2003
Moreno, 2003	Psychological Foundations of Instructional Design (in Reiser's book)	multimedia instruction and split attention	2003
van Merrienboer, Kirschner, & Kester, 2003	Psychological Foundations of Instructional Design (in Reiser's book)	4C/ID model	2003
Branch, personal communication, June 8, 2004)	A brief history of instructional technology and the ideas affecting it	Def. of Instr. Tech.	2004
Kim, 2004	A history of instructional design and technology	Use of noninstructional solutions and emphasis on business results	2004
Sugrue & Kim, 2004	A history of instructional design and technology	Use of noninstructional solutions and emphasis on business results	2004

Driscoll, 2005	Psychological Foundations of Instructional Design (in Reiser's book)	Def of learning	2005
Driscoll, 2005	Psychological Foundations of Instructional Design (in Reiser's book)	Information processing model	2005

APPENDIX B - LIST OF LEVEL 1 SCHOLARS

1. DR Garrison
2. MD Merrill
3. DH Jonassen
4. SA Barab
5. MD Dickey
6. R Moreno
7. R Koper
8. PA Ertmer
9. AP Rovai
10. JJG van Merriënboer
11. S Bennett
12. JW Strijbos
13. CP Lim
14. RA Reiser
15. K Swan
16. MD Roblyer
17. G Zurita
18. WJ Pelgrum
19. HM Selim
20. B De Wever
21. AL Baylor
22. CH Tu
23. TC Reeves
24. GJ Hwang
25. H Kanuka