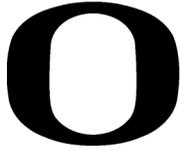


Presented to the Interdisciplinary Studies Program:



UNIVERSITY OF OREGON
APPLIED INFORMATION MANAGEMENT

Applied Information Management
and the Graduate School of the
University of Oregon
in partial fulfillment of the
requirement for the degree of
Master of Science

Utilizing Web 2.0
Collaborative Learning
Tools to Enhance
Computer-Supported
Collaborative Learning
(CSCL) and Improve the
Online Learning Experience

CAPSTONE REPORT

Eric J. Herr
Web Services Manager
VTM Group

University of Oregon
Applied Information
Management
Program

February 2012

Continuing Education
1277 University of Oregon
Eugene, OR 97403-1277
(800) 824-2714

Approved by

Dr. Linda F. Ettinger
Senior Academic Director, AIM Program

**Utilizing Web 2.0 Collaborative Learning Tools to Enhance Computer-Supported
Collaborative Learning (CSCL) and Improve the Online Learning Experience**

Eric J. Herr

VTM Group

Abstract

This annotated bibliography demonstrates that Web 2.0 tools (wikis and blogs) support a paradigm shift in asynchronous online education from instructor-driven to learner-driven knowledge sharing. Designers of computer-supported collaborative learning (CSCL) environments must work with instructors to build learning management systems in which students participate in the learning process. Consistent and positive interaction between learners and instructors motivates performance through a sense of community, social interaction and recognition, and is a strong predictor of success.

Keywords: online education; computer-supported collaborative learning (CSCL); eLearning; distance learning; collaboration technology; online learning; online pedagogy; interactive learning; online interaction.

Table of Contents

Abstract.....	3
Table of Contents.....	4
Introduction.....	7
Problem.....	7
Purpose.....	10
Audience.....	11
Significance.....	12
Delimitations.....	13
Research Questions.....	14
Reading and Organization Plan Preview.....	15
Definitions.....	17
Research Parameters.....	20
Search Strategy.....	20
Evaluation Criteria.....	23
Reading and Organization Plan.....	24
Annotated Bibliography.....	28
Theme 1: Collaborative Tools for Asynchronous e-Learning.....	29
Theme 2: How Online Interactions Impact Success in the E-Learning Environment..	36
Theme 3: Web 2.0 Technology Integration in e-Learning Applications.....	62
Theme 4: Changes in Educational Pedagogy through the integration of CSCL.....	78
Conclusion.....	98
Impact of collaborative learning tools.....	98

Interaction in an online educational environment.....	100
Web 2.0 technology in the online learning environment.....	101
The paradigm shift in pedagogy.	103
References.....	107
Appendix A - References Sorted by Key Content Area	116
References Pertaining to Blogs.....	116
References Pertaining to CSCL and LMS	116
References Pertaining to CSCL Design.....	117
References Pertaining to Interaction.....	118
References Pertaining to Online Pedagogy	121
References Pertaining to Statistical Data or Definitions	122
References Pertaining to Web 2.0.....	122
References Pertaining to Wikis.....	124

Introduction

Problem

Distance education. The field of distance education (DE) describes teaching methods and technologies utilized to deliver course content that is distributed to students who are not located in the same physical space (Tallent-Runnels et al., 2006). There are two primary distance education methods and associated information technologies, (a) synchronous and (b) asynchronous (Bernard et al., 2004). This study addresses asynchronous learning, defined in this study as online learning (Allen, Seaman & Garret, 2007; Dabbagh & Bannan-Ritland, 2005; Guri-Rosenelt, 2009), and associated technologies defined in this study as collaborative learning tools (Hsieh & Cho, 2011).

A dramatic evolution in distance education has occurred over the past decade as online, computer-based technology has advanced (Beldarrain, 2006; Soller, Martínez, Jermann & Muehlenbrock, 2005). The number of students enrolled in at least one online course rose from fewer than 10 % of total enrollment in 2002 to nearly 31 % of total enrollment in 2010 (Allen & Seaman, 2011), the most recent year for which data is available. The 6.1 million students enrolled in an online course attend public, private non-profit and private for-profit institutions (Allan & Seaman, 2011).

Interaction and online learning. A study by Bernard, Abrami, Borokhovski, Wade, Tamim, Surkes and Bethel (2009) concludes that increasing interaction with the course material, with the instructor, and with peers all have a benefit on the distance learning experience. Also, while today's undergraduates still seek face-to-face contact with fellow students and faculty, their daily use of technology enables interaction with course content in ways that are very different from previous generations (Oblinger & Oblinger, 2005). For example, today's students

access social web applications like YouTube and Twitter every day (Casquero et al., 2010b). Using Web 2.0 tools as part of online course design can promote social interaction in the educational experience (Casquero et al., 2010b). These more socially engineered web tools, driven by Web 2.0 technologies, are putting an emphasis on interaction with content and how we learn rather than what we learn (Brown & Adler, 2008).

Second-generation communication tools. The increase in online course enrollment, coupled with changes in student expectations related to the presentation of course content, provides a new pedagogical context for designers of computer-supported learning applications who must integrate tools to foster both interaction and collaboration (Beldarrain, 2006; Soller, Martínez, Jermann, & Muehlenbrock, 2005). First-generation asynchronous communication tools including email, discussion boards, and chats are now augmented in the online education community with second-generation communication tools, (also known as Web 2.0 tools) including wikis, blogs, social media sites and enhanced file sharing (Anderson, 2007; Glassman & Kang, 2011). These second-generation tools hold great potential to alter and grow the way interaction and collaboration are fostered between students and faculty in an asynchronous online distance learning environment (Godwin-Jones, 2003; Huang & Nakazawa, 2010).

Technology integration. Student learning (also known as e-learning in the online context (Karrer, 2007)) is positively impacted when interaction is embedded into distance education courses (Bernard et al., 2009). Abrami et al. (2011) state that “the true meaning of *technology integration* [is] when the use of technology is not separate from the content to be learned but embedded in it” (p. 98). According to Beldarrain (2006), student demand for greater control over the distance learning experience is prompting deliberate integration of more interactive tools in learning management systems (LMS). *Interactive learning tools* refers to technology that

requires human feedback, e.g., forums, chats, and e-mail (Hernandez, Montaner, Sese & Urquizu, 2011) and whiteboards and video conferencing (Hsieh & Cho, 2011). An LMS (e.g. Blackboard, Moodle, OpenClass) “facilitates e-learning by supporting teaching and learning activities and the administration and communication associated with them” (Klobas & McGill, 2010, p. 115). According to Cho, Cheng and Lai (2009), self-paced, self-directed e-learning tools that incorporate interactive technology can motivate today’s e-learners and present information in a format that is perceptually easier to process.

CSCL. Computer-supported collaborative learning (CSCL) “is emerging as a dynamic, interdisciplinary, and international field of research focused on how technology can facilitate the sharing and creation of knowledge and expertise through peer interaction and group learning processes” (Resta & Laferrière, 2007, p.67). Walker (in Abedin, Daneshgar & D’Ambra, 2011) states “that students with a strong sense of community are more likely to continue and succeed in their CSCL experience than those who feel separated from the cohort.” Resta and Laferrière (2007) designate enhanced learning processes, collaborative learning, and group cognition as elements of the emerging paradigm of CSCL. The new e-learning model is one in which CSCL curriculum is moving from content-centric to learner-centric, where the focus is on how learning occurs rather than what is learned (Lim, So & Tam, 2010). The way students interact and share information is being modeled on social applications (e.g. Flickr and YouTube); the aspect of interaction is central to the paradigm shift in CSCL (Casquero, Portillo, Ovelar, Benito & Romo, 2010a).

Understanding how students perceive their e-learning environment and how they interface with the web-based tools is critical for those who develop and deliver distance education (Smart & Cappel, 2006). This understanding, according to Beldarrain (2006) means

that “educational institutions must reflect on how their distance education program currently utilizes technology and how new, cutting-edge computer-mediated communications (CMC) may enhance the learning” (p.144). He continues by stating that “distance education leaders are in a position to blaze new paths for online distance learning, especially by integrating synchronous technology tools into current courses that are totally asynchronous” (p. 144). As stated by Huang and Nakazawa (2010), the “interactions between peers and instructors in online learning are essential for learners to attain desired learning outcomes while gaining satisfactory learning experience” (p.235).

Purpose

The purpose of this annotated bibliography is to describe selected Web 2.0 technologies as they are used to support interaction and collaboration when embedded within computer-supported collaborative learning (CSCL) in higher education (Beldarrain, 2003; Glassman & Kang, 2011; Godwin-Jones, 2003; Halic et al., 2010; Huang & Nakazawa, 2010; Resta & Laferrière, 2007; Soller et al., 2005). Examples selected from the literature demonstrate how these technologies facilitate increased collaboration and interaction between students and faculty in an online, web-based distance learning environment (Abdous & Yen, 2010; Abrami et al., 2011; Tallent-Runnels et al., 2006; Tremblay, 2006). The goal is to examine how education application developers can utilize Web 2.0 collaborative learning tools to enhance computer-supported collaborative learning (CSCL) to improve the online learning experience by (a) fostering interaction (Casquero et al., 2010b), (b) facilitating sharing (Resta & Laferrière, 2007), and (c) increasing satisfaction (Abedin et al., 2011).

Casquero et al. (2010b) believe that integrating Web 2.0 technologies in computer-supported collaborative learning (CSCL) is critical to fostering more effective interaction

between students and faculty in an online, post-secondary educational environment. Glassman and Kang (2011) state that “Web 2.0 applications take education, perhaps for the first time, beyond the metaphors of page and print to a wholly new relationship between human thinking and information” (p.94). For example, one of the most promising and widely available tools in the Web 2.0 environment is the blog (Godwin-Jones, 2003). Blogs are advantageous for online learning and instruction, providing users with the ability to integrate text, video, images, graphs, web links and other technology enhancements in a single platform (Byington, 2011). Blogs differ from other web-based environments by presenting user input data in reverse chronological order and retaining an archive of past posts for reference by the reader (Viegas, 2006). Further, most blogs have an interactive component allowing others to comment on the primary entry (Halic et al., 2010). One benefit of this interaction is that the “blog’s archive is readily accessible to instructors as a source of information about student learning, providing a basis for ongoing feedback and redesign of learning activities” (Halic et al., 2010, p. 207).

Audience

The study is designed to meet the needs of two primary groups: (a) distance education practitioners in higher education including administrators (Ansah, Neill & Newton, 2011); and (b) education application developers who develop collaborative learning applications tools. The position of an education application developer is described as an individual who “supports and leads the use of current and emerging technology in the teaching and scholarly work of the faculty, including the development of academic software and technology tools, and the management and distribution of digital assets such as mobile apps” (University of North Carolina, Chapel Hill, 2011). Developers also assist faculty and staff in exploring ideas that will enhance teaching, learning, and scholarly work by designing and implementing custom solutions.

Collaborative learning applications provide opportunities for increased interaction between learners, learners and instructors, and the learning content beyond the traditional face-to-face learning environment (Arbaugh & Benbunan-Fich, 2007; Huang & Nakazawa, 2010). Examples of educational collaboration applications in use today include Moodle (Elias, 2010), Blackboard (Kelly, Baxter & Anderson, 2010) and OpenClass (Fischman, 2011). Practitioners and developers of online learning tools must understand how CSCL has changed and evolved and how the next generation of e-learners expects to interact and participate in the virtual classroom (Smart & Cappel, 2006).

Significance

Economic aspects. The demand for collaboration-based learning products in the United States exceeded \$4 billion dollars in 2010 (Adkins, 2011). The expenditure on collaborative tools in higher education grew by 14.9% (Adkins, 2011). Most recently, according to Casquero et al. (2010b) “we have seen how Web 2.0 technologies (social software, cloud-computing, web mash-ups, ubiquitous computing, etc.) have changed the way we develop and use applications, create and consume information, and feel the ownership of technology” (p. 2). This sense of ownership is becoming more prevalent as students are entering the online learning experience with expectations about building their own collaborative learning environment (Casquero et al., 2010a).

Pedagogical aspects. The collaborative learning environment is strongest when there are high levels of peer-to-peer and learner-to-instructor interaction (Hsieh & Cho, 2011; Huang & Nakazawa, 2010). Remote access to portals and cumbersome login procedures once commonplace in eLearning 1.0 are being replaced by Web 2.0 tools that make interaction and collaboration easier and only a URL away (Lim, So & Tan, 2009).

The paradigm shift in computer-supported collaborative learning (CSCL) requires that DE practitioners and education application developers understand the importance of the social component in the academic and emotional success on learners and educators in an online course. Gikandi, Morrow and Davis (2011) state that “sustained meaningful interactions and collaboration among the individual learner, peers and the teacher as learning community with a shared purpose can enhance opportunities for ongoing and adequate learner support. This can ultimately foster meaningful engagement and deep learning in online higher education” (p. 2334). Properly integrating Web 2.0 tools in CSCL for the delivery and participation in online learning is critical to supporting the growth of the students (Abedin et al., 2011).

Delimitations

Time frame. The publication dates of literature used in this annotated bibliography span the time period from 2003 to 2011. This time frame sufficiently brackets the current condition of the web and contemporary online education. Though the term Web 2.0 was coined as early as 1999 by Darcy DiNucci in her article “Fragmented Future”, the ubiquitous use of many of its technologies did not follow until several years later. The advent of wikis and blogs at the beginning of the 21st century along with the emergence of relevant social media (e.g. MySpace 2003, Facebook and Flickr 2004, YouTube 2005) define the starting point of user controlled content on the World Wide Web and the revolution of expectation about what online educational delivery should look like. This date range also aligns well with the Babson Research Groups survey (2011), which shows that online enrollment in at least one course rose from 9.6% to 31.3% of all post-secondary students between 2002 and 2010.

Selection criteria. Literature used in this annotated bibliography is retrieved from academic or scholarly databases including Education Resource Information Center (ERIC), The

Sloan Consortium (Sloan-C), EBSCO Host, Google Scholar, and University of Oregon databases and journals; Academic Search Primer, JSTOR, Project Muse, and World of Science. The search is conducted within the context of higher education inclusive of public, private not-for-profit and private for-profit institutions. Emphasis is given to journal articles and further refined to use only peer-reviewed references. Books by renowned authors or frequently referenced in reviewed journal articles are also considered. Though the date range is from 2003-2011, inclusive, higher relevance is granted to articles concerning e-learning that are published within the past three years. Referenced material is clustered to further assist in review (see Appendix A).

Audience. The annotated bibliography is focused on practitioners of online post-secondary education and developers of online education software (e.g. learning management systems). The purpose is to highlight the importance of collaborative tools that enhance peer-to-peer and learner-to-instructor interaction through the Web 2.0 technologies as a way to increase online interaction, collaboration, and student and faculty satisfaction.

Research Questions

Main question. Which Web 2.0 collaborative learning tools have the greatest potential to improve the computer-supported collaborative learning (CSCL) experience, specifically in relation to improved interaction, collaboration and student satisfaction?

Sub-questions.

1. Why is interaction so critical to success in online education
(Arbaugh & Benbunan-Fich, 2007; Hsieh & Cho, 2011; Klobas & McGill, 2010)?
2. What is computer-supported collaborative learning (CSCL)
(Resta & Laferrière, 2007, p.67)?

3. How do wikis and blogs support interaction and collaboration in online learning (Casquero et al., 2010b; Glassman & Kang 2011; Halic et al., 2010)?
4. How can the current approach to CSCL design include Web 2.0 tools to emphasize participant interaction (Casquero et al., 2010b; Glassman & Kang, 2011)?
5. How do wikis and blogs facilitate sharing and foster online collaboration (Resta & Laferrière, 2007)?
6. How do Web 2.0 online applications increase student satisfaction (Abedin et al., 2011)?

Reading and Organization Plan Preview

Literature selected for this annotated bibliography is reviewed in advance of a thorough reading with consideration for the main and sub-questions presented (see Research Questions). The process of reading and evaluating the literature includes skimming for keywords and key phrases (see Search Strategy); assessing relevancy and quality using criteria outlined by Bell (2009); coding the literature using the steps of conceptual analysis (Busch et al., 2005); and sorting and prioritizing based upon the research questions.

Coding terms and phrases, developed in direct relationship to concepts presented in the research questions and the themes, include: (a) interaction in online education (Arbaugh & Benbunan-Fich, 2007; Hsieh & Cho, 2011; Klobas & McGill, 2010); (b) Web 2.0 tools support of interaction and collaboration in online learning (Casquero et al., 2010b; Glassman & Kang 2011; Halic et al., 2010; Resta & Laferrière, 2007); (c) how CSCL design can include Web 2.0 tools to emphasize participant interaction (Casquero et al., 2010b; Glassman & Kang, 2011); and (d) how Web 2.0 online applications increase student satisfaction (Abedin et al., 2011). The results of the coding process of the peer-reviewed journal articles, web content, and books

included in the annotated bibliography are organized thematically (University of North Carolina, n.d.) and presented in the Annotated Bibliography and Conclusions sections of this paper.

Definitions

Definitions of words within technology and the web are particularly susceptible to neologism (Paradowski, 2010). Distance education, online learning and e-learning are often used interchangeably though subtle differences can be conferred upon each by various authors and, in fact, the term e-learning was presented by Rekkendal and Qvist-Eriksen (2003) (as cited in Abrami et al., 2004) to expand upon the standard definition of distance education to include computers and computer networks. The definitions provided and cited in this annotated bibliography provide clarity and context for the way terms are used in this study.

Blog “is a text-based online environment which allows for embedding links to other online resources, and in which the author's posts appear in reverse chronological order” (Halic et al., 2010).

Collaborative learning is a place where “learners, enrolled in a common unit of study for training, continuing professional development, or the pursuit of an academic degree, will work together online to solve complex problems and complete authentic tasks” (Reeves, Herrington & Oliver, 2004, p. 53).

Collaborative learning tools include computer or online learning programs that promote interaction between instructors and students by electronically facilitated learning. The online communication between students and instructors is handled through e-mail, blogs, chats, document sharing, or video conferencing (Hsieh & Cho, 2011).

Computer-supported collaborative learning (CSCL) “is emerging as a dynamic, interdisciplinary, and international field of research focused on how technology can facilitate the sharing and creation of knowledge and expertise through peer interaction and group learning processes” (Resta & Laferrière, 2007, p.67).

Distance education “is formalized instructional learning where the time/geographic situation constrains learning by not affording in-person contact between student and instructor” (King, Young, Drivere-Richmond & Schrader, 2001, p. 10).

E-learning 1.0 is training delivered in a synchronous manner through the web or electronically in an asynchronous model where course content prescribed to a traditional training model and often managed through a learning management system (LMS) (Karrer, 2007).

E-learning 2.0 is a collaborative learning model where content can be created by anyone at any time. Learning is interacting with, contributing to, and expanding upon content in a collaborative environment (Karrer, 2007).

Flexible learning views students as active participants in the educational process and may be delivered via electronic means including CD-Rom, websites and the Internet (Drennan, Kennedy & Pisarski, 2005).

Hypertext is text in one online location that directs the user to another, potentially disparate, online location (Glassman & Kang, 2011).

Interactive learning exists in an integrated learning environment where Web resources are combined with a mixture of multimedia resources including audio, images, video and hypertext (Muirhead & Juwah, 2004).

Mash-up brings together a variety of Web 2.0 tools (e.g. wikis, blogs, discussion boards, etc.) into a single space to enhance the learning process (Casquero et al., 2010a).

Online classes are classes that are delivered entirely on the Internet (Abrami et al., 2011).

Online learning refers to a form of distance education primarily conducted through web-based ICT (Guri-Rosenelt, 2009). Dabbagh and Bannan-Ritland (2005) define online learning as “distance learning environments that use Internet and/or web-based technologies to support the

teaching and learning process” (p. 15). Consistent with these definitions, Allen, Seaman, and Garret (2007) define online learning as a form of e-learning that is enabled by web-based technologies, does not require the teacher and the learner to be available at the same time and place, and constitutes 80% or more learning/teaching activities conducted through web-based ICT. It is also is learning that transpires in full or in part over the Internet using Internet-based instructional applications (US Department of Education, 2009).

Online pedagogy requires the delivery information with social and emotional interaction between learner and instructor while overcoming the “social distance barrier” established by the Internet and technology (McFarlane, 2011).

Web 2.0 is a new information infrastructure built around users where participation through tools such as blogs, wikis, social networks, mashups, tagging and content sharing is emphasized (Brown, & Adler, 2008).

Wiki is derived from the Hawaiian term for quick – wiki wiki. It was originally designed to facilitate the sharing of lines of code from programming but has expanded to be a highly collaborative tool for web based information sharing (Godwin-Jones, 2003).

Research Parameters

The design of this paper qualifies as an annotated bibliography (Engle, Blumenthal & Cosgrave, 2011). It contains multiple articles that are cited, evaluated and annotated in support of the primary research question and sub-questions with the purpose to “inform the reader of the relevance, accuracy, and quality of the sources cited” (Engle et al., 2011). The research process to review the literature is divided into three main steps including (a) establishing a search strategy, (b) developing evaluation criteria, and (c) executing a reading and organization plan.

Gathering, evaluating and organizing literature that addresses the research questions that focus on how the integration of Web 2.0 tools and technologies in computer-supported collaborative learning tools can enhance e-learning interaction and student satisfaction is an iterative process. The search strategy uses key words and phrases that are identified as core to the subject matter or that gain relevance due to frequency and relevancy of similarly cited work. The evaluation of the literature identifies the articles and books, which meet a specific threshold of value to this paper based upon criteria outlined by Bell (2009). The reading and organization plan is the final step in the analysis, coding and presentation of works included in the annotated bibliography.

Search Strategy

The search for literature to support this annotated bibliography is conducted in five databases: University of Oregon Libraries, Google Scholar, Multnomah County Library, Sloan-C and Educational Resource Information Center (ERIC). Based upon the ever changing landscape of technology and collaboration application in distance education (DE) and computer-supported collaborative learning (CSCL), peer-reviewed articles are selected and analyzed based upon publication dates between 2003 and 2011 with emphasis granted to journal articles published

since 2005 when wikis and blogs became more prevalent. Priority is also given to articles that are published in recognized journals (Creswell, 2009). Further emphasis is given to articles that are referenced in multiple scholarly papers. Additional searches are run and supporting documentation is pulled from databases as required and phrases in the search are based upon terminology associated with online course study and applications used for sharing information in an online setting. The researcher's work and educational experience build the basis for these keywords. Additional words and phrases are identified using Google Adwords' keyword tool and keywords in use in cited articles.

Preliminary Search Terms

- Online education
- Collaboration
- Collaboration software/collaboration tools
- E-learning
- Distance education
- Online instruction
- Virtual technology

Articles and text results in the preliminary search lead to additional search terms and databases including Sloan-C, Education Research Complete, ProQuest, Science Direct, and JISC. Additional search terms are included in the refined search.

Refined Search Terms

- Education collaboration
- Online collaboration
- Distance learning

- Collaboration technology
- Distance learning challenges
- Collaborative learning/collaborative learning tool
- Computer-mediated communication
- Online learning
- Online pedagogy
- Learning effectiveness
- Wiki
- Web 2.0
- Cooperative learning
- Interactive learning
- CSCL
- Online interaction

All research material that shows evident or potential value and that fits within the delimitations established for this study is saved into Zotero and stored in a custom-built directory structure, identifying the search term used and the database against which the search was run. Journal articles that are not available as full text online are requested through the Interlibrary Loan Service (ILLiad) and books are requested through Summit for delivery to the University of Oregon-UO Portland Library. These requested documents are reviewed as they become available.

Search Result Directory Sample

1. Database (ERIC)
 - 1.1. Search (“Online Education”)

1.1.1. Results

- A comparison between paper-based and online learning in higher education. (Emerson & MacKay, 2011).
- Blackboard as an online learning environment: What do teacher education students and staff think (Heirdsfield, Walker, Tambyah & Beutel, 2011)?
- Interaction in distance education and online learning: Using evidence and theory to improve practice (Abrami, Bernard, Bures, Borokhovski & Tamim, 2011).

Evaluation Criteria

The documents in this annotated bibliography are evaluated based upon the authority and objectivity of the author and the quality, coverage and currency of the work (Bell, 2009). Relevance of document content is also a key factor in evaluation. Documents may meet the required threshold in several areas but are not mandated to meet all (Bell, 2009).

Authority. Evaluation of an author's authority is based upon the credentials of the author including (a) degree earned, (b) previous and current institutional affiliations, (c) position relative to field of study, and (d) previous writings. Authority is also based on author's reputation among peers; citation or mention of the work by others in papers or published text. Consideration is also given to the publisher of the article and affiliation of the author to ascertain if there may be bias or sponsorship.

Objectivity. A referenced work is given greater credence when there is clear objectivity. Validation of objectivity is based upon (a) a clear statement of purpose for writing the article, (b) a freedom from bias on the part of the author(s), (c) the author presents any affiliation to the content of the article, and (d) the material is well researched and is reasonable in any assumptions or conclusions.

Quality. Document quality focuses on elements of writing. Referenced documents meet a quality standard by (a) being well structured, (b) free from grammatical and editing errors, (c) well formatted with labels, titles and appropriate graphics, and (d) complete and accurate as shown through strong citation and referencing, well designed methodology, and free from questionable assumptions.

Coverage. A document cannot be properly verified if it stands alone on a subject matter. Coverage of subject matter is important in the validation of works used in this annotated bibliography. Articles are given greater authority if they (a) continue the research or review the works of others, (b) support and update existing findings, and (c) fill in information that may have been missing from other sources.

Currency. Documents used in this annotated bibliography must be current to have validity. Technology has advanced substantially in the past ten years and information written prior to that time is too dated to support current trends in computer-supported collaborative learning. Articles for this paper have been written or published in the past eight years. Articles published prior to 2003 may be used in supporting context if they are highly cited or referenced in other documents references in this annotated bibliography.

Reading and Organization Plan

Reading plan. The reading plan is designed to facilitate identification of key concepts as noted in the research questions in relation to three primary topics: (a) Web 2.0 technologies impact on interaction in education (Casquero et al., 2010b; Glassman & Kang, 2011; Halic et al., 2010), (b) the pedagogy of computer-supported collaborative learning (Resta & Laferrière, 2007), and (c) increasing student satisfaction in an eLearning environment (Abedin et al., 2011).

Literature is coded following the guidelines presented by Busch et al. (2005) in an eight-step conceptual analysis process:

1. Determine the Level of Analysis. Coding of the selected literature proceeds using both single words, such as *e-Learning*, *distance learning*, and *online learning*, and phrases, such as *computer-supported collaborative learning*.
2. Determine the Quantity of Concepts. A set of concepts is framed in relation to each of the research sub-questions. Concepts include: (a) interaction in online education (Arbaugh & Benbunan-Fich, 2007; Hsieh & Cho, 2011; Klobas & McGill, 2010); (b) Web 2.0 tools support of interaction and collaboration in online learning (Casquero et al., 2010b; Glassman & Kang, 2011; Halic et al., 2010; Resta & Laferrière, 2007); (c) how CSCL design can include Web 2.0 tools to emphasize participant interaction (Casquero et al., 2010b; Glassman & Kang, 2011); and (d) how Web 2.0 online applications increase student satisfaction (Abedin et al., 2011).
3. Determine if coding is concerned with Existence (Occurrence) or Frequency of Concept. The selected literature is thoroughly read to identify the occurrences of the key words and phrases. The context around these occurrences provides meaning and concepts that further inform the research questions.
4. Determine Concept Distinction. General matching of forms of words or similar phrases is used (e.g. terms that have variations, such as “eLearning”, “e-learning” and “electronic learning”).
5. Determine Text Coding Rules. A set of translation rules is established to aid when coding key terms and concepts as they are presented in the literature to ensure

consistency across all documents (e.g. concepts that have variations, such as “online learning”, “distance learning”, and “eLearning”).

6. Irrelevant Text Management. Text deemed irrelevant is ignored.
7. Code the Text. Coding of vetted literature is conducted by scanning for terms and phrases as noted above and the occurrences are highlighted and the literature is sorted into one or more categories based upon the research questions.
8. Analyze Results. Coding results are then transferred to a spreadsheet for analysis. Highly referenced and cited literature that meets a threshold of compliance with the evaluation criteria is ranked highest as presented in the Annotated Bibliography section of this document as described below in the Organization Plan. Information is further analyzed for description in the Conclusions section.

Organization plan. Upon completion of the deep reading, coding, and literature analysis, the data for this annotated bibliography is organized thematically (University of North Carolina, n.d.). The purpose is to address the key research questions and show a correlation between enhanced interaction by students and faculty who have access to Web 2.0 tools in a computer-supported collaboration learning environment and a more satisfying and enriching learning experience when online interaction is present. While chronology must be considered an important component of the literature reviewed due to the highly technical nature of the subject and the rapid advancements in online services, four themes are developed to address the primary concepts in this study: (a) collaborative learning tools in an asynchronous online learning environment (Halic, Lee, Paulus & Spence, 2010; Reeves, Herrington & Oliver, 2004; Severance, Hardin & Whyte, 2008); (b) the impact of interaction in an online environment to the success of students and faculty (Abedin, Daneshgar & D’Ambra, 2011; Bernard et al., 2009;

Hsieh & Cho, 2011; Huang & Nakazawa, 2010; Smart & Cappel, 2006); (c) the integration of Web 2.0 technology in online learning applications (Byington, 2011; Casquero et al., 2010a; Casquero et al., 2010b; Su & Beaumont, 2010); and (d) the paradigm shift to online pedagogy by computer-supported collaborative learning (Abrami et al., 2011; Al-Khatib, 2011; Beldarrain, 2006; Lim, So & Tan, 2010).

Annotated Bibliography

The purpose of this annotated bibliography is to describe selected Web 2.0 technologies as they are used to support interaction and collaboration when embedded within computer-supported collaborative learning (CSCL) in higher education (Beldarrain, 2003; Glassman & Kang, 2011; Godwin-Jones, 2003; Halic et al., 2010; Huang & Nakazawa, 2010; Resta & Laferrière, 2007; Soller et al., 2005). The Annotated Bibliography section of the paper contains key references that apply to one or more of the research questions of this study. The information is presented *thematically* (University of North Carolina, n.d.). The four primary themes into which this literature is organized include: (a) collaborative learning tools in an asynchronous online learning environment; (b) the impact of interaction in an online environment to the success of students and faculty; (c) the integration of Web 2.0 technology in online learning applications; and (d) the paradigm shift on online pedagogy by computer-supported collaborative learning.

Theme 1: Collaborative Tools for Asynchronous e-Learning

Halic, O., Lee, D., Paulus, T. & Spence, M. (2010). To blog or not to blog: Student perceptions of blog effectiveness for learning in a college-level course. *Internet and Higher Education*, 13(4), 206-213. doi: [10.1016/j.iheduc.2010.04.001](https://doi.org/10.1016/j.iheduc.2010.04.001)

Abstract. Blogs have the potential to increase reflection, sense of community and collaboration in undergraduate classrooms. Studies of their effectiveness are still limited. The purpose of this study was to investigate whether the use of blogs in a large lecture class would enhance students' perceived learning. Students in an undergraduate nutrition course were required to engage in blog conversations over the course of the semester to promote reflective learning. Sixty-seven undergraduates responded to a survey with dimensions on perceived learning and sense of community. A sense of community and computer expertise were identified as significant predictors of perceived learning, when controlled for age, gender, and previous blogging experience. While a majority of the students reported that blogging enhanced their learning and led them to think about course concepts outside the classroom, fewer perceived value in peer comments. Implications for integrating blogging into undergraduate classrooms are discussed.

Summary. This study focuses on students' perceived learning through the use of a blog for interaction in an educational setting. While the primary content of the course is delivered through traditional face-to-face lectures, students were asked to submit one post (original content) and one response to another student's posts each week over nine weeks. The study assumes that the engagement and responsive nature inherent in the asynchronous interaction of blogging would enhance *perceived learning, sense of community, and collaborative constructivism* or the presence of cognitive, social and

teaching interaction. In investigating the merits of a blog as a collaborative tool in an e-learning environment, it was found that faculty mediated blogs do more to enhance the educational experience of the learner than do cohort mediated blogs. In general, blogs are found to be a valuable collaboration tool in the asynchronous, online learning environment. A weakness of this study is that there is a response rate of only 43% which is a marginal representation upon which to draw significant conclusions.

Credibility. Olivia Halic is a fourth year doctoral candidate at the University of Tennessee, Knoxville. Her peer-reviewed articles have been published in several journals including: *Internet and Higher Education* (2010); *International Education* (2009); *International Journal of Teaching and Learning in Higher Education* (2009); and *Proceedings of the 9th International Conference on Computer Supported Collaborative Learning* (2009). Debra Lee is a third year doctoral candidate at the University of Tennessee specializing in Instructional Technology and Adult Education. Trena Paulus is an Associate Professor at the University of Tennessee, Knoxville and received her PhD in Instructional Systems Technology and Computer-mediated Communication from Indiana University in Bloomington. Marsha Spence received her PhD in Human Ecology (Nutrition) from the University of Tennessee where she is Research Assistant Professor. *The Internet and Higher Education* is an international, interdisciplinary, peer-reviewed journal, published quarterly, and is focused on addressing contemporary and future developments related to learning, teaching, and administration in online, post-secondary settings.

Reeves, T. C., Herrington, J. & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research & Development*, 52(4), 53-65.

Abstract. Although important, traditional basic-to-applied research methods have provided an insufficient basis for advancing the design and implementation of innovative collaborative learning environments. It is proposed that more progress may be accomplished through development research or design research. Development research protocols require intensive and long-term collaboration among researchers and practitioners. In this article, we propose guidelines for implementing development research models more widely, and conclude with a prescription for an online collaborative learning research agenda for the next five to ten years.

Summary. This research article focuses on the design of collaboration tools and their impact on online education. It envisions an online collaborative learning environment where learners will engage in productive teamwork, in-depth collaboration and even build bonds of friendship. The research finds that nearly one-third of leaders in the academic community believe that online education will be superior to face-to-face education and another third believe that learning outcomes will be equal to or better in the online environment. This has prompted many instructors to adjust their instructional approach for the online learning environment though they struggle without significant pedagogical support. Understanding how to use technology in the online educational setting is a challenge for instructors who simply view it as a vehicle for delivering course content. Understanding that technology can now be integrated into the online learning experience and that computer-supported collaboration is a tool to enhance the educational

process requires that faculty who are willing to adopt new technologies work with designers to develop powerful, online, collaborative environments.

Credibility. Thomas Reeves is Professor Emeritus of Educational Psychology and Instructional Technology at the University of Georgia. He received his PhD in Instructional Design, Development, & Evaluation from Syracuse University. He is a former Fulbright Lecturer, a former editor of the *Journal of Interactive Learning Research*, has published two books, numerous book chapters, journal articles and proceedings on the subject of online collaboration technology and interaction. Jan Herrington is a professor of education at Murdoch University in Perth, Australia. She has authored or co-authored seven books and 14 papers with a focus on the promotion and support of the effective use of educational technologies in learning in schools and universities. In 2002 Dr. Herrington was a Fulbright Scholar at the University of Georgia. She is currently Chair of the Executive Committee of the EdMedia World Conference on Educational Media and Technology. Ron Oliver is Pro-Vice-Chancellor (Teaching and Learning) at Edith Cowan University in Perth, Western Australia. Previously he was Associate Dean of Learning and Teaching in the Faculty of Education and Arts at ECU and Professor of Interactive Multimedia. *Educational Technology Research and Development* is the only scholarly journal in the field focusing entirely on research and development in educational technology. The Research Section assigns highest priority in reviewing manuscripts to rigorous original quantitative, qualitative, or mixed methods studies on topics relating to applications of technology or instructional design in educational settings. Manuscripts undergo a blind review process involving a panel of three reviewers with initial outcomes usually provided within two months.

Severance, C., Hardin, J. & Whyte, A. (2008). The coming functionality mash-up in personal learning environments. *Interactive Learning Environments*, 16(1), 47-62. doi:

[10.1080/10494820701772694](https://doi.org/10.1080/10494820701772694)

Abstract. Current Virtual Learning Environments (VLEs) are focused very much on meeting the needs of the institution in providing a basic, common technology platform for teaching and learning. However monolithic VLEs are too hard to customize at the individual user level, and evolve far too slowly to meet teaching and learning of users who want their teaching and learning environments to be under their personal control. This paper explores how the concept of the Personal Learning Environment has influenced developments with learning technology, within the context of emerging social software, and examines a range of developments with existing VLEs that move them in the personalized direction. It contrasts the issues involved in bespoke extensions to VLEs as opposed to the incorporation of existing tools (mash-ups), and suggest that the latter approach offers the best hope to escape the bonds of a single VLE product by allowing teachers and learners to simply aggregate whatever tools and capabilities they desire from the Internet to use in their learning. Real progress is being made on several fronts, including the provision of interfaces to social software systems that support the building of applications that can be organized around a personal or group context, and in the development of specifications for learning tool interoperability.

Summary. This article addresses the challenge facing many institutions with regard to their virtual learning environment (VLE). These monolithic applications were originally designed to support the framework and pedagogy of online learning from a content driven perspective. As Web 2.0 tools and applications traction and evolve individuals are

now more familiar with creating their own content and customizing the way their data is managed. This change in perception as to what a computer-supported collaborative learning (CSCL) environment should look like and how it should perform is driving a new trend towards personal learning environments (PLEs). In a PLE the instructor and the learner select the tools they want to use for the online learning experience. By infusing the traditional VLE with personal tools such as blogs, wikis, social media links, and really simple syndication (RSS) feeds, the individual user can create their own mash-up of the tools they want to use to access information, share knowledge, and create new content.

Credibility. Dr. Severance is a Clinical Assistant Professor at the University of Michigan School of Information. He received Master's Degree in Computer Science from Michigan State University and his PhD in Computer Science also from Michigan State University. He is currently involved in online collaboration systems for teaching and learning as well as e-Research. Most recently he was executive director of the Sakai Foundation and chief architect of the Sakai Project at the University of Michigan. He is also a co-investigator on the National Science Foundation National Middleware Initiative. Joseph Hardin is the CEO and Mujo Research where he leads investigations into the social dimensions of open technologies. He was formerly the Director of the Collaborative Technologies Laboratory in the Duderstadt Center, and a Clinical Assistant Professor in the School of Information, at the University of Michigan, Ann Arbor. Anthony Whyte is the Project Lead at the Sakai Foundation which encourages community-building between academic institutions, non-profits and commercial organizations by developing and facilitating collaboration, development and effective practices. Mr. Whyte received his master's degree in History

from Princeton University (New Jersey). *Interactive Learning Environments* publishes peer-reviewed articles on all aspects of the design and use of interactive learning environments including environments that support individual learners through to environments that support collaboration amongst groups of learners or co-workers. Relevant domains include education and training at all levels, life-long learning and knowledge sharing. Relevant topics for articles include: adaptive systems, learning theory, pedagogy and learning design, and the use of learning content management systems.

Theme 2: How Online Interactions Impact Success in the E-Learning Environment

Abdous, M. & Yen, C. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *Internet and Higher Education*, 13(4), 248-257. doi: [10.1016/j.iheduc.2010.04.005](https://doi.org/10.1016/j.iheduc.2010.04.005)

Abstract. This study was conducted to assess the predictive relationships among delivery mode (DM), self-perceived learner-to-teacher interaction, self-rated computer skill, prior distance learning experience, and learners' satisfaction and outcomes. The results indicated no predictive utility of delivery mode for self-perceived learner-to-teacher interaction. On the other hand, the results supported the validity of self-perceived learner-to-teacher interaction as a predictor for student satisfaction and learning outcomes (measured by course final grades). To a lesser extent, self-rated computer skills and the number of distance learning courses taken played a weak role in learning outcomes and students' satisfaction. Overall, findings from the study support prior research that has reported the importance of learner-to-teacher interaction in learning outcomes and satisfaction of distance education students.

Summary. This study addresses three different delivery methods of course content. All three methods (face-to-face, satellite broadcasting, and live video streaming) are synchronous and eliminate the negative connotations associated with asynchronous online learning (verbal and non-verbal cues). Literature referenced in this article provides a substantial history indicating that interaction in an educational setting (face-to-face or online) is positively related to student learning and satisfaction. Some cited works expand the findings to also include increased satisfaction among instructors who have greater interaction with students in their courses. While few studies have investigated the value

of one delivery method over another with perceived interaction between instructors and learners, this study concludes that all of the synchronous methods of delivery present equal success in providing satisfaction and learning value to the students. The study finds that though there is a diversity of delivery modes and approaches, it is clear that learner-to-teacher interaction is positively related to learner outcome and satisfaction. The study concludes by recommending that future research should focus on the dynamics and patterns of interaction so that effective course design, resulting in better interaction, can be implemented.

Credibility. Dr. M'hammed Abdous is the acting Director of the Center for Learning Technologies at Old Dominion University (Norfolk, Virginia) where he teaches Advanced Instructional Design, Web Development for Educators, Educational Applications of Technologies, and Distributed Learning Trends. He received his PhD in school administration and planning from the University of Laval (Quebec City, Quebec, Canada). Cherng-Jyh Yen is an assistant professor at the Darden College of Education at Old Dominion University. He received his PhD in educational research from the University of Virginia (Charlottesville). Both Drs. Abdous and Yen have had numerous articles published in respected journals including *Internet and Higher Education*, *Journal of Educational Computing Research*, *The Journal of Interactive Online Learning*, and *International Journal on E-Learning* to name a few. *Internet and Higher Education* is an international, interdisciplinary, peer-reviewed journal, published quarterly, and is focused on addressing contemporary and future developments related to learning, teaching, and administration in online, post-secondary settings.

Abedin, B., Daneshgar, F. & D'Ambra, J. (2011). Enhancing non-task sociability of asynchronous CSCL environments. *Computers & Education*, 57(4), 2535-2547. doi: [10.1016/j.compedu.2011.06.002](https://doi.org/10.1016/j.compedu.2011.06.002)

Abstract. While from a technological perspective Computer Supported Collaborative Learning (CSCL) systems have been improved considerably, previous studies have shown that the social aspect of the CSCL is often neglected or assumed to happen automatically by simply creating such virtual learning environments. By distinguishing between students' non-task social interactions from on-task interactions, and through a content analysis, this paper demonstrates that non-task interactions do occur frequently in CSCL environments. The findings from the survey revealed that the sense of cohesion and awareness about others significantly impact the non-task sociability of CSCL. Furthermore, the study demonstrates that the perception of self-representation and perception of compatibility affect the sense of cohesion and awareness about others and indirectly contribute to the perceived non-pedagogical sociability of the environment.

Summary. Abedin, Daneshgar and D'Ambra (2011) present a paper that emphasizes the sociological component of online communities. This component is often ignored or neglected in computer-supported collaborative learning (CSCL) because it is assumed that the social interaction will occur naturally in an online educational setting. Learner isolation and a lack of social interaction with others have been identified as two major hindrances to CSCL effectiveness. The paper divides the academic or pedagogical component of CSCL and the non-academic or social component of CSCL into two groups; on-task and non-task, respectively, and stresses the importance of incorporating the non-task related components into CSCL tools to provide a sense of community and

social identity. Abedin, Daneshgar and D'Ambra (2011) build a study around this assessment to evaluate interaction patterns and examine different communication styles among participants in online communities. Findings from this paper identify that students perceive the CSCL environment as social when they feel connected to others and the activities of others. This sense of social connectedness builds satisfaction and contributes to success in the online educational experience.

Credibility. Dr. Adbedin received his PhD in information systems from the University of New South Wales (Australia). He is currently a doctoral lecturer in the Department of Accounting and Corporate Governance at Macquarie University in Sydney, Australia. He has published one book and numerous journal articles and conference papers. Dr. Daneshgar received his PhD in information systems from University of Technology (Australia). He serves as a senior lecturer at the Australia School of Business at the University of New South Wales (UNSW). His publications are in the dozens including refereed articles, journal articles, and book chapters. John D'Ambra is an Associate Professor in the School of Information Systems, Technology and Management at the University of New South Wales. Until recently he was Academic Director of the Master of Business and Technology program in the Australian School of Business, UNSW. In addition to his numerous publications he has been recognized with the following awards: Top Competitive Paper, Mass Communication, National Communication Association Conference, 2008, San Diego, CA; and the Rudolph J. Joenk, Jr. Award for Best Paper in the 2009 IEEE Transactions on Professional Communication. *Computers & Education* is an established journal that serves as a technically-based, interdisciplinary forum for communication in the use of all forms of computing in the socially and technologically

significant area of application design and development. Contributions are published to serve as a reference standard against which state-of-the-art technologies can be assessed.

Arbaugh, J. B. & Benbunan-Fich, R. (2007). The importance of participant interaction in online environments. *Decision Support Systems*, 43(3), 853-865. doi:

[10.1016/j.dss.2006.12.013](https://doi.org/10.1016/j.dss.2006.12.013)

Abstract. An emerging body of research suggests that participant interaction is one of the strongest predictors of success in online environments. However, studies about the effects of participant interaction in a large sample of multiple online environments are rather limited. Using hierarchical modeling techniques, we examine a sample of 40 online MBA courses to determine whether learner–instructor, learner–learner, or learner–system interaction is most significantly related to online course outcomes. Our findings suggest that while collaborative environments were associated with higher levels of learner–learner and learner–system interaction, only learner–instructor and learner–system interaction were significantly associated with increased perceived learning.

Summary. Positive online course outcomes have been attributed to collaborative activities that provide learners with an opportunity for increased social presence and a strong sense of online community. This study evaluates three types of interaction: (a) learner-instructor (LI), (b) learner-learner (LL), and (c) learner-system (LS) to identify which, if any, have the most significant effect on social presence and sense of community in the online e-learning environment. In outlining the interaction systems, Arbaugh and Benbunan-Fich (2007) state that in an asynchronous environment where learners are typically separated by time and space, the online learning environment should provide opportunities for meaningful interaction between the participants (both instructors and learners) and the learning environment itself. To identify whether LI, LL or LS interaction provided the greatest impact, Arbaugh and Benbunan-Fich sampled 40 class

sections in an online MBA program over a two-year period. Each section had between 9 and 35 students. The results show that there is a direct correlation between participant interaction and a successful online environment and that learner-instructor and learner-system have a much higher impact on perceived learning by the students and the learner-learner interaction did not have a significant impact. The authors also conclude that the design of the virtual learning environment is critical because if students are not satisfied with the online course experience they could opt out of the online learning.

Credibility. J. B. Arbaugh is the Curwood Endowed Professor and a Professor of Strategy and Project Management at the University of Wisconsin, Oshkosh. He is an Associate Editor of Academy of Management Learning and Education. Raquel Benbunan-Fich is an Associate Professor at the SCIS Department in the Zicklin School of Business, Baruch College, City University of New York. She received her PhD in Management Information Systems from Rutgers University – Graduate School of Management. Her research interests include educational applications of computer-mediated communication systems, Asynchronous Learning Networks, evaluation of Web-based systems and e-commerce. *Decision Support Systems* is a professional journal that welcomes contributions on the concepts and operational basis for DSSs, techniques for implementing and evaluating DSSs, DSS experiences, and related studies. Manuscripts may explore artificial intelligence, cognitive science, computer supported cooperative work, data base management, decision theory, economics, linguistics, management science, mathematical modeling, operations management psychology, user interface management systems, and others. The common thread of articles published in the journal is their relevance to theoretical, technical DSS issues.

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, A., Tamim, R., Surkes, M. A. &

Bethel, E. C. (2009). A meta-analysis of three interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243–1289. doi:

[10.3102/0034654309333844v1](https://doi.org/10.3102/0034654309333844v1)

Abstract. This meta-analysis of the experimental literature of distance education (DE) compares different types of interaction treatments (ITs) with other DE instructional treatments. ITs are the instructional and/or media conditions designed into DE courses, which are intended to facilitate student–student (SS), student–teacher (ST), or student–content (SC) interactions. Seventy-four studies that contained at least one IT are included in the meta-analysis, which yield 74 achievement effects. A strong association is found between strength and achievement for asynchronous DE courses compared to courses containing mediated synchronous or face-to-face interaction. The results are interpreted in terms of increased cognitive engagement that is presumed to be promoted by strengthening interaction treatments in DE courses.

Summary. This study explores how different interaction treatments in distance education affect the achievement outcome of the students in the course. The meta-analysis involves specific questions that pertain to the instructional conditions which impact interaction between different students (SS), students and the teachers (ST), and students and the content of the course (SC). For example, an interaction treatment can be (a) discussion boards, (b) wikis, or (c) chat rooms. The study assigns weighted averages to the types of interaction and the respective impact of each, and the value of each interaction when used in combination with one another. The study concludes that building interaction treatments (IT) into distance education (DE) course design positively impacts student

learning by promoting increased interaction between students, between students and faculty or between students and the course content. The study also posits that while increasing the quantity of interaction has an impact on the learning and satisfaction of the students, the quality of the interaction may have a greater impact. Quality of interaction was not a subject of this study so the hypothesis is inconclusive.

Credibility. Robert Bernard is a professor of education at Concordia University (Montreal, Quebec, Canada) and received his PhD from University of Washington. He has numerous peer-reviewed articles which have been published and has been recognized internationally for his contribution to research. Philip Abrami received his PhD in Social Psychology from the University of Manitoba. He is a research chair at Concordia and is the Director of the Centre for the Study of Learning and Performance. He has published dozens of book chapters and journal articles in the leading educational and psychology journals. Eugene Borokhovski is the systematic review projects coordinator at the Centre for the Study of Learning and Performance at Concordia University. He holds a PhD in experimental psychology. The *Review of Educational Research* is published quarterly and features critical reviews of research literature focused on education. Reviews include conceptualizations, interpretations, and syntheses of literature and scholarly work in a field broadly relevant to education and educational research.

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L...Huang, B.

(2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, 74(3), 379-439. doi: [10.3102/00346543074003379](https://doi.org/10.3102/00346543074003379)

Abstract. A meta-analysis of the comparative distance education (DE) literature between 1985 and 2002 was conducted. In total, 232 studies containing 688 independent achievement, attitude, and retention outcomes were analyzed. Overall results indicated effect sizes of essentially zero on all three measures and wide variability. This suggests that many applications of DE outperform their classroom counterparts and that many perform more poorly. Dividing achievement outcomes into synchronous and asynchronous forms of DE produced a somewhat different impression. In general, mean achievement effect sizes for synchronous applications favored classroom instruction, while effect sizes for asynchronous applications favored DE. However, significant heterogeneity remained in each subset.

Summary. The study by Bernard et al. (2004) is a review and analysis of comparative studies of distance education (DE) between 1985 and 2002. The primary questions address: (a) overall, is interactive DE effective, (b) how the results are impacted by synchronous and asynchronous conditions of DE, (c) what conditions contribute to more effective DE, and (d) how the use of media and pedagogical features influence student learning. The study concludes that DE is effective and can provide a more positive learning experience over classroom learning provided interaction and community are imbedded into media used for the distance learning. Additionally, there is a slight uptick in the performance of students who learn within an asynchronous environment over those

who study in a synchronous environment. It is thought that the additional time afforded by an asynchronous setting may allow students to be more thoughtful and prepared in their answers and interaction. Designing tools for DE delivery where technology and pedagogy are imbedded with social components contribute to a more effective distance learning experience.

Credibility. Dr. Bernard, a professor of educational technology at Concordia University (Montreal, Quebec, Canada), received his PhD in educational communications from University of Washington (Seattle) and is published in *Review of Educational Research*, *Journal of Computing in Higher Education*, and *Distance Education*. Dr. Abrami is a Professor and Research Chair at Concordia University and received his PhD in Social Psychology from the University of Manitoba (Canada). Dr. Yiping Lou is an Associate Professor of Instructional Technology in the College of Education at the University of South Florida. She received her PhD in educational technology from Concordia University (Canada). *The Review of Educational Research* publishes critical, integrative reviews of research literature bearing on education. The articles include conceptualizations, interpretations, and syntheses of literature and scholarly work in a field broadly relevant to education and educational research.

Hernandez, B., Montaner, T., Sese, F. J. & Urquizu, P. (2011). The role of social motivations in e-learning: How do they affect usage and success of ICT interactive tools? *Computers in Human Behavior*, 27(6), 2224-2232. doi: [10.1016/j.chb.2011.07.001](https://doi.org/10.1016/j.chb.2011.07.001)

Abstract. There is an increasing interest among educational institutions and private organizations to understand the role of ICT interactive tools (e.g. forums, blogs, chats, blackboards, newsgroups) in the successful implementation of an e-learning system. In this study, we offer a social perspective in the study of e-learning, and posit that individuals' actions are socially embedded. Therefore, we attempt to identify social motivations that underlie learners' attitudes and usage behavior of ICT interactive tools. We propose a comprehensive conceptual framework that identifies two groups of social motivations: (1) anticipated reciprocal relationships and (2) anticipated extrinsic rewards. The empirical test of the framework in a university setting reveals that both types of social motivations significantly influence learners' attitudes. Specifically, social influence and altruism, both of which relate to reciprocal relationships, and recognition by the instructor, which refers to extrinsic rewards and personal benefits, exert a strong positive effect on attitudes toward and usage of ICT interactive tools. The usage leads to improved intentions to continue using these technologies in the future.

Summary. This study focuses on the social motivations of students in an e-learning environment and how interactive technologies (blogs, chats, newsgroups, blackboards, etc.) of information and communication technology (ICT) can be successfully implemented to support and foster these motivations. An online survey was distributed to 450 e-learning students and a total of 181 responses were obtained. The study found that (a) social influences, i.e., those that influence a person's behavior based upon their

perception of how they believe others want them to behave, and (b) altruism, behavior that leads to positive recognition from others, were the two primary social motivations that formed users' attitudes about the technologies. Interestingly, the study did not find that sense of community was a major contributor. The recommendation is that the design of e-learning systems should provide flexible ways for learners to provide altruistic assistance to others (file sharing, information sharing, and guidance). Encouraging the social motivations that result in a positive attitude about the ICT will increase satisfaction and ongoing success with the e-learning tool.

Credibility. Hernandez, Montaner, Sese and Urquizu are all professors in the department of marketing at the University of Zaragoza in Spain. *Computers in Human Behavior* is a scholarly journal dedicated to examining the use of computers from a psychological perspective and is directed to a professional audience. The journal publishes original theoretical works, research reports, literature reviews, software reviews, book reviews and announcements are published. The journal addresses both the use of computers in psychology, psychiatry and related disciplines as well as the psychological impact of computer use on individuals, groups and society. This is a journal directed to a professional audience.

Hsieh, P. J. & Cho, V. (2011). Comparing e-learning tools' success: The case of instructor-student interactive vs. self-paced tools. *Computers & Education*, 57(3), 2025-2038. doi: [10.1016/j.compedu.2011.05.002](https://doi.org/10.1016/j.compedu.2011.05.002)

Abstract. E-Learning tools have profoundly transformed modern pedagogical approaches. Vendors provide different types of systems, such as self-paced (SP) and instructor-student interactive (ISI) e-Learning tools. Although both types of tools represent promising solutions to facilitate the learning process, it is important to theoretically identify a framework to evaluate the success of these tools and assess whether one type of tool is more effective than another. Toward this end, we (1) propose a model to evaluate e-Learning tools' success by extending and contextualizing Seddon's information systems (IS) success model for the e-Learning environment and (2) formulate four hypotheses to predict the differences in the success factors between SP and ISI tools. We test the model and hypotheses using data from 783 students across seven higher education institutions in Hong Kong. The results support the proposed e-Learning tool success model and three of the four hypotheses. ISI tools outperform SP tools in terms of system quality, perceived usefulness, satisfaction, and learning outcome.

Summary. The study focuses on comparing two types of e-learning tools; (a) self-paced (SP) which are those tools downloaded to a local system or accessed online where a student is self-directed in when and where they interact with the system and complete the prescribed tasks; and (b) instructor-student interactive (ISI) which are primarily online based courses where the work is assigned and students are expected to complete the work in a pre-prescribed time frame, submit the work and receive instructor feedback. The different tools are evaluated on four criteria: (a) information quality, (b) perceived

usefulness, (c) learning outcomes, and (d) learner satisfaction. A questionnaire was distributed to 100 randomly selected higher education students in Hong Kong. In evaluating the results, under all four criteria, ISI outperformed SP e-learning tools. Key variables that favored the ISI model included natural language use, social cues, individualized feedback, elaborated information, support from human instructors, and social construction between students and instructors.

Credibility. Po-An Hsieh is an Associate Professor of MIS in the Department of Management and Marketing and the Deputy Director of the Doctor of Management Program at the Hong Kong Polytechnic University. He is also a Research Associate in the Center of Process Innovation at the Georgia State University and serves as an Associate Editor for *MIS Quarterly*. He received his PhD from the Computer Information Systems Department at Georgia State University, an MBA and MS dual degree from Robert H. Smith School of Business, University of Maryland, College Park, and BS in Industrial Engineering from Tsinghua University. His research works have been accepted by such premier journals as *MIS Quarterly*, *Management Science*, *Information Systems Research*, and *European Journal of Information Systems*. Vincent Cho is an Associate Professor in the Department of Management and Marketing at the Hong Kong Polytechnic University. He received his PhD from Hong Kong University of Science and Technology, an MS degree from University of New South Wales (Australia), and a BS degree from University of Hong Kong. Dr. Cho has over 30 publications to his credit. *Computers & Education* is a refereed journal that serves as a technically-based, interdisciplinary forum for communication in the use of all forms of computing in the socially and technologically significant area of application design and development. Contributions are

published to serve as a reference standard against which state-of-the-art technologies can be assessed.

Huang, W. H. D. & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments*, 18(3), 233-244. doi: [10.1080/10494820.2010.500520](https://doi.org/10.1080/10494820.2010.500520)

Abstract. As Web 2.0 emerging technologies are gaining momentum in higher education, educators as well as students are finding new ways to integrate them for teaching and learning. Technologies such as blogs, wikis and multimedia-sharing utilities have been used to teach various subject matters. This trend not only creates new opportunities for us to afford collaborative learning processes but also generates research inquiries that demand that we empirically examine those technologies' pedagogical impact against existing theoretical frameworks. This exploratory mixed-method case study, situated in a 10-week online graduate level course, investigated the perceived interaction levels between learner–learner and learner–instructor in using PBwiki (a hosted free wiki space) for weekly reading assignments. This case study concluded that educators should remove all communication modalities external to the Wiki environments to provide authentic Wiki-collaboration experiences for learners.

Summary. This study evaluates the impact of interaction between learners and instructors in an online educational setting on improved learning quality. It specifically evaluates how wikis can contribute to this improved learning by providing a medium in which learners can interact with others to learn in a collaborative manner. The authors of the study developed a list of questions to encourage the participants to provide qualitative responses to the impact of the wiki on their satisfaction of online learning. The study also uses the responses to the questions to evaluate the interactive nature of the wiki and the differences found between student-instructor interaction and student-student interaction.

The study concludes that wikis enable collaborative learning for students. It also identifies that students should be encouraged to actively participate in the wiki environment to develop learners' competencies in contributing to the wiki, reviewing the work of others, and reflecting on the entire community's contributions. Quality of wiki interaction is a component of the study that the authors identify for future study.

Credibility. Dr. Wen-Hao David Huang received his PhD in Educational Technology from Purdue University and holds a joint appointment to the Department of Human Resource Education and the Department of Educational Psychology at the University of Illinois and Urbana-Champaign. His research focus includes Web 2.0 emerging technologies and their impact on teaching, learning, education, and knowledge management. Dr. Kazuaki Nakazawa received his PhD from the Department of Linguistics at Purdue University and is an assistant professor to the Department of Foreign Languages and Applied Linguistics at Yuan Ze University in Taiwan. Founded in 1990, *Interactive Learning Environments* publishes peer-reviewed articles on all aspects of the design and use of interactive learning environments in the broadest sense, encompassing environments that support individual learners through to environments that support collaboration amongst groups of learners or co-workers.

Klobas, J. & McGill, T. (2010). The role of involvement in learning management system success. *Journal of Computing in Higher Education*, 22(2), 114-134. doi:

[10.1007/s12528-010-9032-5](https://doi.org/10.1007/s12528-010-9032-5)

Abstract. Learning management systems (LMS) have been adopted by the majority of higher education institutions and research that explores the factors that influence the success of LMS is needed. This paper investigates the roles of student and instructor involvement in LMS success, using the DeLone and McLean (2003) model of information systems success as a framework. Data were gathered by online questionnaire from students enrolled in an Australian university. Involvement was found to be important to LMS success. Student involvement was shown to have a significant effect on the benefits to students of LMS use. The more involved a student is with the LMS site for a course offering, the stronger the benefits they report obtaining from use. On the other hand, student involvement did not have an effect on LMS use. Instructor involvement was found to guide appropriate use, both in terms of the nature of use and the extent of use. Furthermore, instructor involvement was shown to contribute to student benefits by affecting information quality which affects the benefits students receive from use.

Summary. In this study, Klobas and McGill explore factors which contribute to the success of learning management systems (LMS). Involvement by both students and instructors is shown to have significant impact on different aspects of an LMS' success. Student involvement increases effectiveness and productivity while instructor interaction with the LMS promotes a positive perception by students and they associate the LMS as an effective e-learning tool. A higher rate of interaction with the LMS on the part of the

students or the instructors creates a richer environment and increases satisfaction of both the students and the instructors. The paper concludes that involvement is important to LMS success and that there is a broader set of influences on information system success. Not only is the interaction important but the way in which the LMS is used is also important to study as educators and developers look at the best way to develop successful information systems for the e-learning environment.

Credibility. Jane Klobas is Professorial Fellow in information management at The University of Western Australia Business School and the Alberto Dondena Fellow at the Dondena Centre for Research on Social Dynamics at Bocconi University in Milan, Italy. She has a PhD in psychology and an MBA from The University of Western Australia.

Tanya McGill is an Associate Professor in Information Technology at Murdoch University in Western Australia. She has a PhD from Murdoch University. Her major research interests include information technology education and end user computing.

Journal of Computing in Higher Education (JCHE) publishes original research, literature reviews, implementation and evaluation studies, and theoretical, conceptual, and policy papers that contribute to the understanding of issues, problems, and research associated with instructional technologies and educational environments. JCHE publishes well-documented articles and provides a comprehensive source of information on instructional technology integration. JCHE is written for a professional audience.

O'Neill, S., Scott, M. & Conboy, K. (2011). A delphi study on collaborative learning in distance education: The faculty perspective. *British Journal of Educational Technology*, 42(6), 939-949.

Abstract. This paper focuses on the factors that influence collaborative learning in distance education. Distance education has been around for many years and the use of collaborative learning techniques in distance education is becoming increasingly popular. Several studies have demonstrated the superiority of collaborative learning over traditional modes of learning and it has been identified as a potential solution to some of the weaknesses of traditional distance education courses. There are a rapidly growing number of technologies in use today and educators and practitioners face an increasingly difficult challenge to successfully implement collaborative learning in distance education; precipitated not only from technical advances but also from wider social and organizational concerns. To the best of our knowledge, this study is the first to investigate the factors that influence collaborative learning in distance education, by eliciting the opinions of an expert panel using a Delphi survey. The aim was to produce an integrated list of the most important implementation factors and to investigate the role that technology is perceived to contribute.

Summary. As technology has advanced so has the effectiveness of distance education (DE). One element in contemporary DE that was not available in the early years of correspondence courses (the first DE) is the ability to work collaboratively with peers and instructors on course projects. Discussion boards, chats, wikis, blogs, document repositories and video streams are all technologies that allow individuals to share ideas, information and documentation. This is even more prevalent today as social networking

is integrated into many aspects of a student's life. Faculty view these technologies as critical to enhancing collaboration among cohorts and realize that not only the delivery methods (media) need to be available but also that course content and structure (pedagogy) is critical in building an effective collaborative, distance education learning environment. The most important factors in promoting collaborative learning in a DE environment are identified as (a) instructional design (pedagogy), (b) involvement of varied teaching styles, (c) encouraging and nurturing the learning community, and (d) accessible technology to all participants.

Credibility. Susan O'Neill is a graduate student in information systems at National University of Ireland (Galway). Dr. Scott is a lecturer in information systems at the National University of Ireland (Galway). He has a PhD in Systems Analysis and Communication and is published in many peer-reviewed journals. Dr. Kieran Conboy is a lecturer in information systems at the National University of Ireland Galway. His research focuses on agile systems development approaches as well as agility across other disciplines. Conboy is currently the Head of Research for the School of Business & Economics. Kieran's lecturing activities focus primarily on the areas of IS Innovation, IS Project Management, IS Strategy and IS Research Methods to undergraduate, postgraduate and MBA audiences. *The British Journal of Educational Technology* is a peer-reviewed journal covering the developments in educational technology world-wide. It is written for professionals and academics in the fields of education, training and information technology. Articles cover a broad range of topics in education and training, concentrating on the theory, applications and development of educational technology and communications.

Resta, P. & Laferrière, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review*, 19, 65-83. doi: [10.1007/s10648-007-9042-7](https://doi.org/10.1007/s10648-007-9042-7)

Abstract. This paper reviews the research conducted in the last 20 years on the application of technology in support of collaborative learning in higher education. The review focuses primarily on studies that use Internet-based technologies and social interaction analysis. The review provides six sets of observations/recommendations regarding methodology, empirical evidence, and research gaps and issues that may help focus future research in this emerging field of study.

Summary. The focus of this paper is on how social interaction, collaboration and cooperation for learning are supported by computer-supported collaborative learning tools. This review of research includes theoretical research, peer-reviewed case studies, and design research and experiments. It identifies that specific analytical models are used by researchers when assessing the potential for a specific technology to support collaborative learning which diminishes the multiple factors including context, peer and instructor interaction, and pedagogy that may also impact collaborative learning in an online environment. The paper provides six specific recommendations including: that (a) researchers should conduct evidence-based research with details on the demographics of the studies' subjects and the size of the surveys; (b) future computer-supported collaborative learning (CSCL) studies should focus on the unique nature of online learning and less on comparisons to face-to-face learning; (c) researchers should apply what they know about face-to-face collaborative learning in their analysis of online learning in a CSCL environment; (d) research is needed on the characteristics of the new wave of students that use Web 2.0 tools as part of their everyday lives; (e) research is

needed into the design elements of CSCL software to identify how they promote or hinder interaction between students and instructors; and (f) research is needed on how CSCL is currently being implemented in higher education to identify the best methods and environments for a successful adoption of the technology.

Credibility. Dr. Paul Resta is a professor of Curriculum and Instruction at the University of Texas at Austin. Resta holds the Ruth Knight Milliken Centennial Professorship in the Department of Curriculum and Instruction and serves as director of the Learning Technology Center in the College of Education. In 2001, He received the U.S. Distance Learning Association's Award for Excellence in Teaching in Higher Education. His course also received the National Distance Learning Course Award from the University Continuing Education Association. Thérèse Laferrière received her PhD in humanistic education from Boston University. She is a professor of pedagogy at the University of Laval in Quebec City, Quebec, Canada. Since January 2010, she has been the director of the Centre for Research and Intervention on Academic Achievement.

Smart, K. & Cappel, J. (2006). Students' perception of online learning: A comparative study. *Journal of Information Technology Education*, 5, 201-219.

Abstract. In search of better, more cost effective ways to deliver instruction and training, universities and corporations have expanded their use of e-learning. Although several studies suggest that online education and blended instruction (a “blend” of online and traditional approaches) can be as effective as traditional classroom models, few studies have focused on learner satisfaction with online instruction, particularly in the transition to online learning from traditional approaches. This study examines students' perceptions of integrating online components in two undergraduate business courses where students completed online learning modules prior to class discussion. The results indicate that participants in an elective course rated the online modules significantly better than those in a required course. Overall, participants in the elective course rated the online modules marginally positive while those in the required course rated them marginally negative.

Summary. This comparative study explores and examines the level of satisfaction and perceived value of integrating online learning components into higher education courses. The study explores existing literature to highlight the value of online learning when (a) students are actively involved in the learning; (b) the assignments reflect real-life experiences; and (c) critical thinking is generated based upon activities and assignments that require reflection. The literature reviewed for this study identifies learner motivation as a key component to overall performance of the student involved. The methodology of this study takes two online courses offered at a mid-west university (one elective and one required) and evaluates the responses of those students after they have a chance to work and interact in a team environment. Assignments were completed in a virtual

environment and a final, real-life work scenario was simulated by the teams to culminate the course. The study finds that students new to an online learning environment struggled more than those who had experienced virtual learning and teams previously. It also concludes that with the rise in e-learning, more and more students are going to be exposed to and involved in online learning courses. Though satisfaction in the required course was less than in the elective course, this same response may be true in a face-to-face learning scenario and thus no conclusion can be drawn. It is important however, that as online learning increases, the strategies used to enhance teaching in a virtual environment be evaluated and modified to promote active involvement by the students in knowledge sharing and creation and this increases satisfaction and success.

Credibility. Dr. Smart is the department chair of Business Information Systems at Central Michigan University. His research and publications focus on user-centered design. He holds degrees from the University of Utah, Utah State University, and the University of Florida. Dr. Cappel received his PhD in Business Computer Information Systems from the University of North Texas. He is currently a professor of Business Information Systems at Central Michigan University. This article is cited by other individuals of authority in the field and is published in a peer-reviewed journal. The academically peer-refereed *Journal of Information Technology Education: Research* is focused on research addressing the intersection of education and Information Technology.

Theme 3: Web 2.0 Technology Integration in e-Learning Applications

Byington, T. (2011). Communities of practice: Using blogs to increase collaboration.

Intervention in School and Clinic, 46(5), 280-291. doi: [10.1177/1053451210395384](https://doi.org/10.1177/1053451210395384)

Abstract. A community of practice provides a forum for professionals to exchange ideas and discuss concerns related to the profession. Within this forum, technology can eliminate many of the constraints face-to-face communities of practice encounter by providing a convenient and highly interactive environment. A description of how to set up an online community of practice using blogs is described. Blogging can support professional learning by giving teachers a platform for interacting and collaborating with other professionals.

Summary. This article focuses on the integration of Web 2.0 tools into the learning environment to increase collaboration. The primary tool in the study is the blog. Byington identifies the blog as tool to break down distance barriers and promote collaboration between student peers, instructors and students, and instructor peers. The convenience of participating in a blog fosters high levels of collaboration and removes some of the hindrances that are experienced in a face-to-face environment. The asynchronous nature of the blog allows participants to be reflective in their responses and comments.

Credibility. Teresa Byington is an Assistant Professor/Area Extension Specialist in early childhood education at the University of Nevada (Reno) Cooperative Extension. The focus of her doctoral studies is autism and developmental disabilities. Her research interests include professional development, mentoring of early childhood interventionists, and obesity prevention. *Intervention in School and Clinic* is a peer-reviewed, practitioner-oriented journal designed to provide practical, research-based ideas to educators who

work with students with severe learning disabilities and emotional/behavioral problems.

Emphasis is placed on providing strategies and techniques that can be easily implemented in school or clinic settings and that address the multifaceted needs of students with severe learning disabilities and emotional/behavioral problems. Specifically, articles should target curricular, instructional, social, behavioral, assessment, and vocational strategies and techniques and have direct application to the classroom setting.

Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010a). iPLE Network: An integrated eLearning 2.0 architecture from a university's perspective. *Interactive Learning Environments*, 18(3), 293-308. doi: [10.1080/10494820.2010.500553](https://doi.org/10.1080/10494820.2010.500553)

Abstract. Universities can offer eLearning 2.0 tools and services to learners while obtaining clear benefits from releasing the control over some learning content. This means a shift from the institution centered and monolithic model of traditional virtual learning environments (VLEs) to a more heterogeneous and open model. This article tries to plot an architecture to be put in practice by universities to give learners the control of their learning processes by using eLearning 2.0. We propose an institutionally powered personal learning environment (iPLE) that constitutes our vision of how Web 2.0 tools (blogs, wikis, starting pages), services (del.icio.us, Flickr, YouTube) and people arrangement and data sharing (social networking, learn-streaming) could be applied in an integrated manner to learning processes.

Summary. This article looks at way to integrate Web 2.0 technologies more effectively into the e-learning process. The current challenge is that many of the learning management systems (LMS) are designed in a rigid fashion and require the learners to utilize specific school-based portals and tools to achieve results that they are already getting through other publicly available sources. The authors propose moving from the institution based virtual learning environment (VLE) to a personal learning environment (PLE). The PLE is a learner-centered environment that embeds every tool, service, content, and person involved in the digital part of the learning process. This technology mash-up supports the importance of a learner-controlled system where the learner-centered approach of environmental design is considered a part of the learning outcome.

The next step proposed by Casquero et al. is to push an element of this back to the institution and create an institutionally powered PLE (iPLE) where there is a merge between personal and institutional interests. The iPLE becomes a baseline framework that is provided to each institutional member. Each individual then develops their own groups, networks, tools and models where they can carry out learning experiences for educational purposes. The argument is made that learning can be improved if there can be integration between the social software, cloud-computing, and web mash-ups and the institutional environment. The challenge lies in making the iPLE express and manage the institutional goals and required interactive networks while allowing the user to define their own social networks that emerge through the creation of new relations with other inside the institution as well as those outside the virtual ivy-covered walls. This conceptual architecture has not been developed or implemented on any grand scale but it provides a vision for developers of computer-supported collaborative learning tools to strive toward.

Credibility. Oskar Casquero is an assistant professor in the Department of Systems Engineering and Automatics at the University of the Basque Country, Spain. His research interests include personal learning environments, architecture of information systems, and social network analysis. Javier Portillo is an associate professor in the Department of Systems Engineering and Automatics at the University of the Basque Country, Spain. His research interests include personal learning environments, architecture of information systems, and social network analysis. Ramón Ovelar is a researcher in e-learning and a faculty trainer in ICT at the Virtual Campus at the University of the Basque Country, Spain. His main research area is focused on virtual communities for sharing knowledge and drivers to stimulate participation in virtual communities. Manuel Benito works as

associate professor in the Department of Research Methods and Education Diagnosis at the University of the Basque Country, Spain. He is the Assistant Director of the Virtual Campus at the same university. His main research interests focus on training methodology for teachers in ICT and e-learning quality evaluation. *Interactive Learning Environments* publishes peer-reviewed articles on all aspects of the design and use of interactive learning environments in the broadest sense, encompassing environments that support individual learners through to environments that support collaboration amongst groups of learners or co-workers.

Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010b). Strategy approach for eLearning 2.0 deployment in Universities. *Digital Education Review*, 18, 1-8.

Abstract. The institutionally powered Personal Learning Environment (iPLE) constitutes our vision of how Web 2.0 technologies, people arrangement and data sharing could be applied for delivering open, flexible, distributed and learner-centered learning environments to university members. Based on the iPLE, this paper explores a strategy approach that universities could follow in order to deploy eLearning 2.0 tools and services. With that aim in mind, we review the patterns that Web 2.0 has successfully applied, and have been proved to encourage people to interact and to share information. Then, we present an eLearning 2.0 provisioning strategy based on iPLEs. Finally, we explain how this strategy can help translating Web 2.0 patterns to learning, and positioning universities as eLearning 2.0 providers.

Summary. Casquero, Portillo, Ovelar, Romo and Benito (2010) explore how Web 2.0 technology has evolved and changed the way distance learning is conducted and make recommendations for the best methods of implementing these technologies in higher education institutions. Web 2.0 technologies (social software, cloud-computing, web-mashups, wikis, blogs, etc.) impact the way we create and consume information. The pedagogical shift means that much of the learning is becoming user centric and specific. End users bring together a collection of distributed applications with simple interfaces to meet their unique needs. While institutions still need to have a controlled interest in the learning management system (LMS) tools that are used, Casquero et al. argue that moving from the monolithic virtual learning environment (VLE) to a more user-centric personal learning environment (PLE) with an institutional framework (iPLE), schools can

provide learning with the basic foundation of an LMS and permit the learners to add widgets that meet their specific needs around social interaction, collaboration and community building. The authors state that “an iPLE is a personalized environment with tools, services and learning resources suited to learning, so that when adjusted to the needs and tastes of the user, it ends up becoming an indispensable element in their daily work” (Casquero et al., 2010, p. 5). Through the iPLE learners are provided with Web 2.0 technologies within the institution’s LMS but can also build their own learning environment by adding additional Web 2.0 tools in support of their specific learning needs and requests.

Credibility. Oskar Casquero is an assistant professor in the Department of Systems Engineering and Automatics at the University of the Basque Country, Spain. His research interests include personal learning environments, architecture of information systems, and social network analysis. Javier Portillo is an associate professor in the Department of Systems Engineering and Automatics at the University of the Basque Country, Spain. His research interests include personal learning environments, architecture of information systems, and social network analysis. Ramón Ovelar is a researcher in e-learning and a faculty trainer in ICT at the Virtual Campus at the University of the Basque Country, Spain. His main research area is focused on virtual communities for sharing knowledge and drivers to stimulate participation in virtual communities. Manuel Benito works as associate professor in the Department of Research Methods and Education Diagnosis at the University of the Basque Country, Spain. He is the Assistant Director of the Virtual Campus at the same university. His main research interests focus on training methodology for teachers in ICT and e-learning quality evaluation. *Digital Education*

Review is an open, peer-reviewed journal. It is designed as a space for dialogue and reflection about the impact of information and communication technology ICT in education and new forms of teaching and learning in digital environments.

Cho, V., Cheng, E. & Lai, J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers and Education*, 53(2), 216-227. doi: [10.1016/j.compedu.2009.01.014](https://doi.org/10.1016/j.compedu.2009.01.014)

Abstract. While past studies on user-interface design focused on a particular system or application using the experimental approach, we propose a theoretical model to assess the impact of perceived user-interface design (PUID) on continued usage intention (CUI) of self-paced e-learning tools in general. We argue that the impact of PUID is mediated by two variables, namely perceived functionality (PF) and perceived system support (PSS), which influence perceived usefulness (PU) and perceived ease of use (PEOU), respectively. We empirically validated the model using data collected from a survey administered to university students in Hong Kong. We found that most hypotheses are valid and PUID is an important antecedent of CUI of a self-paced e-learning tool. We also showed that PU and user satisfaction (USat) are two essential predictors of CUI. However, the impact of PEOU on CUI is indirect via PU as a mediator. Our findings enrich the theory on the continued usage of technology, and provide e-learning developers with managerial insights on how to entice learners to continue using their e-learning tools.

Summary. This study reviews existing literature and examines survey responses from university students in Hong Kong who were voluntarily using e-learning tools as a part of their education. Cho, Cheng and Lai (2009) investigate the role and importance of perceived user-interface design (PUID) to the continued usage of e-learning tools. Prior research identifies that a good user-interface increases the learner's motivation and, conversely, a poor interface design impairs the student's overall motivation and their

learning performance. “Interactivity between the student and the interface has been considered as the most important aspect in recent studies on how to improve the quality of education through e-learning” (Cho, Cheng & Lai, 2009, p. 217). The research finds that PUID is critical to a user’s continued usage of the e-learning tool and that developers need to be cognoscente of designing a friendly and well structure layout with features that simplify learning and application access.

Credibility. Dr. Vincent Cho specializes in research on e-commerce technology adoption and health care information system adoption. He is an associate professor in the department of management and marketing at Hong Kong Polytechnic University and his research papers are published in various international journals including *Information & Management*, *Journal of Computer information Systems*, *Expert Systems*, *Knowledge and Information Systems*, and *Journal of Computational Intelligence in Finance*. Dr. Edwin Cheng is the Dean of the Logistics and Maritime Studies department and Hong Kong University. He received his PhD in Operations Research from Cambridge University (United Kingdom) and his ScD also from Cambridge University. Dr. Cheng is the recipient of numerous awards and honors for his contributions to engineering and operations and is recognized for his substantial and sustained contributions to scientific knowledge. *Computers and Education* is an established technically-based, interdisciplinary forum for communication in the use of all forms of computing in a socially and technologically significant area of application. The journal publishes definitive contributions to serve as a reference standard against which the current state-of-the-art can be assessed.

Glassman, M. & Kang, M. J. (2011). The logic of wikis: The possibilities of the Web 2.0

classroom. *International Journal of Computer-Supported Collaborative Learning*, 6(1), 93-112. doi: [10.1007/s11412-011-9107-y](https://doi.org/10.1007/s11412-011-9107-y)

Abstract. The emergence of Web 2.0 and some of its ascendant tools such as blogs and wikis have the potential to dramatically change education, both in how we conceptualize and operationalize processes and strategies. We argue in this paper that it is a change that has been over a century in coming. The promise of the Web 2.0 is similar to ideas proposed by Pragmatists such as Charles Peirce and John Dewey. Peirce proposed the logic of abduction as critical for the types of unique/progressive thinking that leads to creative problem solving and/or discovery. While logic based in deduction offers outcomes with certainty, logic based in abduction offers potentially valuable insights. Dewey tried to implement progressive education in the classrooms. Dewey's ideas, while influential, were often misunderstood, or considered too idealistic and/or unworkable in the traditional classrooms. Logics based in abduction required that different major premises and hypotheses for problem solving be held simultaneously and over time. This type of scenario is often times difficult if not impossible in education based on direct interactions. Hypertext, especially as capture through emerging tools of Web 2.0, may offer the technologies that enable the type of information based networks within the education process that promote abduction and the democratic classroom as Dewey envisioned.

Summary. This paper focuses on how to integrate Web 2.0 technologies such as blogs and wikis into today's e-learning environment and change the way we look at learning. Glassman and Kang explore how data is now controlled by the users and how this

promotes collective intelligence in the online community. In this environment information is continuous rather than linear. Information is not passed from instructor to student in an A to B relationship; rather a *web* of information is woven as hyperlinks are inserted, data is remixed, and the learners become architects of their own learning environment. Through this collective learning process, the paper posits, greater knowledge transfer can occur which results in higher level of satisfaction. Glassman and Kang conclude by stating that the evolutionary nature of information is best addressed through use of web-based tools and that Web 2.0 tools can and will fundamentally change the way we think about information and the processes of teaching and learning.

Credibility. Michael Glassman is an Associate Professor of Human Development at The Ohio State University. He received his PhD in psychology from The City University of New York. His articles have been published in noted journals including *American Psychologist*, *Human Development*, and *The Journal for the Theory of Social Behavior*. Dr. Min Ju Kang is an Assistant Professor of Child and Adolescent Development at the College of Human Ecology at Yonsei University (Korea). *The International Journal of Computer-Supported Collaborative Learning* is a professional, peer-reviewed, academic journal reflecting the interests of the international CSCL community. The primary aim of the journal is to promote a deeper understanding of the nature, theory and practice of the uses of computer-supported collaborative learning. A main focus is on how people learn in the context of collaborative activity and how to design the technological settings for collaboration.

Godwin-Jones, R. (2003). Emerging technologies: Blogs and wikis: Environments for on-line collaboration. *Language, Learning & Technology*, 7(2). Retrieved from

<http://llt.msu.edu/vol7num2/pdf/emerging.pdf>

Abstract. Language professionals have embraced the world of collaborative opportunities the Internet has introduced. Many tools – e-mail, discussion forums, chat – are by now familiar to many language teachers. Recent innovations – blogs, wikis, and RSS feeds – may be less familiar but offer powerful opportunities for online collaboration for both language professionals and learners. The underlying technology of the new tools is XML ("extensible markup language") which separates content from formatting, encourages use of meta-data, and enables machine processing of Internet documents. The latter is key in the ability to link automatically disparate documents of interest to individuals or groups. The new collaborative opportunities this enables have led some to consider the growing importance of XML as the signal of the arrival of the second-generation Web.

Summary. Godwin-Jones explores new asynchronous tools that have emerged from the Web 2.0 transition. He specifically focuses on blogs and wikis in his analysis of how they are well suited to the on-line collaboration environment. The paper recognizes that these tools are similar in purpose to the discussion forums which facilitate group exchanges and maintain logs of who is contributing and when. A greater value of blogs and wikis comes from their user-based creation. Where forums are typically directed by the instructor, blogs and wikis can be owned, created and maintained by the learner. Blogs can be used as an on-line journal for students where they can upload and link files and other sites. Instructors and cohorts can then comment on what they have read. While

blogs can serve as environments for project-based learning, their structure dictates that all information is chronologically ordered. Wikis are not subject to the same structural rigidity and are more useful in the educational environment where input from many sources in an asynchronous environment can be shared. Godwin-Jones (2003) states that while “blogs can be highly personal, wikis are intensely collaborative” (p. 15). Wikis are designed to become a shared repository of knowledge. The content and quality of the knowledge will increase over time. Integrating these Web 2.0 technologies into the online learning environment support collaboration, interaction and satisfaction.

Credibility. Dr. Godwin-Jones is a professor of foreign languages at Virginia Commonwealth University. He received his PhD from the University of Illinois-Champaign/Urbana. He is published in multiple journals and is a contributor to several books and book chapters. *Language Learning & Technology* is a fully refereed journal with an editorial board of scholars in the fields of second language acquisition and computer-assisted language learning. The journal seeks to disseminate research to foreign and second language educators in the US and around the world on issues related to technology and second language education.

Su, F. & Beaumont, C. (2010). Evaluating the use of a wiki for collaborative learning.

Innovation in Education and Teaching International, 47(4), 417-431. doi:

[10.1080/14703297.2010.518428](https://doi.org/10.1080/14703297.2010.518428)

Abstract. A wiki is able to provide a learning environment which is closely aligned with the social-constructivist approach and is more natural than many tools where open collaboration and the exchange of ideas are important. Indicators of the learning benefits were determined by qualitative analysis of students' wiki contributions. Students' perceptions were captured through interviews and questionnaires at the start and end of the project, thereby providing indicators of their motivation towards this method of learning. Our results suggest that a wiki can promote effective collaborative learning and confidence in formative self and peer assessment by facilitating rapid feedback, vicarious learning through observing others' contributions and easy navigation and tracking facilities.

Summary. Evidence identifies wikis as having a strong impact on learning in the online environment. Wikis help create a dynamic, collaborative learning environment encouraging open discussions, the exchange of ideas, sharing of knowledge, and active participation. This empirical research study was designed to gather students' impressions and experiences in using a wiki and to (a) identify the benefits and issues of using a wiki; (b) explore the extent to which a wiki has facilitated online learning; and (c) identify the basic principles of good practice. It was determined that the wiki effectively assisted in (a) the development of students as critical learners, (b) gave them greater autonomy to build their own learning process and become involved in the learning of others, and (c)

enabled tracking by the cohorts and their instructors of what was being posted and by whom to ensure the infringements were addressed quickly.

Credibility. Feng Su is a research fellow and a lecturer in education at Liverpool Hope University. Educational technologies and cross-cultural learning are his primary research interests. Chris Beaumont is the Associate Director of the business school at Edge Hill University. Mr. Beaumont received his Masters of Science in System Design from University of Manchester. His primary research interests are pedagogical research and using artificial intelligence in the learning process. His written contributions include two books and several journal articles and conference proceedings. *Innovations in Education and Teaching International* (IETI), is the peer-reviewed journal of the Staff and Educational Development Association (SEDA). Contributions to the Journal aim to promote innovation and good practice in higher education through staff and educational development and subject-related practices.

Theme 4: Changes in Educational Pedagogy through the integration of CSCL**Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E. & Tamim, R. M. (2011).**

Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23(2-3), 82-103. doi: [10.1007/s12528-011-9043-x](https://doi.org/10.1007/s12528-011-9043-x)

Abstract. In a recent meta-analysis of distance and online learning, Bernard et al. (2009) quantitatively verified the importance of three types of interaction: among students, between the instructor and students, and between students and course content. In this paper we explore these findings further, discuss methodological issues in research and suggest how these results may foster instructional improvement. We highlight several evidence-based approaches that may be useful in the next generation of distance and online learning. These include principles and applications stemming from the theories of self-regulation and multimedia learning, research-based motivational principles and collaborative learning principles. We also discuss the pedagogical challenges inherent in distance and online learning that need to be considered in instructional design and software development.

Summary. In this paper Abrami et al. (2011) evaluate past research into the effectiveness of distance education (DE) and online learning (OL) and make recommendations for increased integration of interaction components in the design of computer-supported collaborative learning (CSCL) tools. Existing research indicates that DE is an effective alternative to classroom instruction and that recent advances in technology further expand the ability of students to succeed in learning in an online environment. From a pedagogical perspective, an instructor's use of cooperative learning strategies can

influence how much students learn when working in groups using technology. Designing interaction treatments to promote interaction with the content of the course, the course instructor, or with class cohorts will positively impact student learning and “the next generation of interactive distance education should be better designed to facilitate interactions that are more targeted, intentional and engaging” (Abrami et al., 2011, p. 87). The authors of this paper draw four key recommendations, stating that CSCL systems should be designed to: (a) stimulate higher levels of interest and intrinsic motivation, (b) encourage participation in a context where knowledge is valued and used to motivate students, (c) ensure interactions occur allowing individuals to encourage and facilitate each other’s efforts to accomplish the group’s goals, and (d) pay attention to the ease of use as an overall design objective.

Credibility. Dr. Abrami is a Professor and Research Chair at Concordia University (Montreal, Quebec, Canada) and received his PhD in Social Psychology from the University of Manitoba (Canada). Dr. Bernard, a professor of educational technology at Concordia University received his PhD in educational communications from University of Washington (Seattle) and is published in *Review of Educational Research*, *Journal of Computing in Higher Education*, and *Distance Education*. Dr. Bures is an assistant professor at Bishop's University (Lennoxville, Quebec, Canada). She is also a faculty member of the Centre for the Study of Learning and Performance research center in Montreal. Dr. Bures received her PhD from Concordia University (Canada). *Journal of Computing in Higher Education* (JCHE) publishes original research, literature reviews, implementation and evaluation studies, and theoretical, conceptual, and policy papers that contribute to the understanding of issues, problems, and research associated with

instructional technologies and educational environments. JCHE publishes well-documented articles and provides a comprehensive source of information on instructional technology integration. JCHE is written for a professional audience.

Al-Khatib, H. (2011). Technology enhanced learning: Virtual realities; concrete results - case study on the impact of TEL on learning. *European Journal of Open, Distance and E-Learning, 1*. Retrieved from

<http://www.eurodl.org/?p=archives&year=2011&halfyear=1&article=423>

Abstract. Technology Enhanced Learning is a feature of 21st century education.

Innovations in ICT have provided unbound access to information in support of the learning process (APTEL, 2010; Allert et al, 2002; Baldry et al, 2006; Frustenberg et al, 2001; Sarkis, 2010). LMS has been extensively put to use in universities and educational institutions to facilitate the management of learning at more than one frontier (Weber et al, 2001; Kraemer et al, 2001). The second wave of computer mediated communication (CMC) made continuous communication possible and unrestricted to space or time (Simon et al, 2002; Nejdil et al, 2002). With this surge, brought about by advances in technology, concerns relating to "pouring resources into unpredictable venture" (Baldry et al, 2000; Sykes et al, 2008), necessitated a review of the educational experience and outcome (Jonassen et al, 2003; Richards, 2004; Kress, 2003, Barab et al, 2004) to assess the direct impact of technology enhanced learning on learners. The study examines the outcome of pedagogic practices in the digital age, in pre and post technology supported applications (Al-Khatib, 2009). The aim is to identify quantitative and qualitative indicators that relate to applying technology enhanced learning.

Summary. This study looks at how the evolution of online learning tools has changed the paradigm of pedagogy in e-learning. The transformation in technology has led to the birth of the *prosumer*; a learner that both produces and consumes in the learning process. This new category of individual is actively engaged in reviewing peer work, commenting on

what they see and receiving feedback from others. This interchange of qualitative assessments improves the performance of all members of the group. The primary pedagogical advantages were identified as the users' ability (a) to take on new roles in their learning process, (b) to be actively involved, and (c) to assume new responsibility around being an authentic partner to their cohorts. The technology driven initiatives have a positive effect on the *prosumer* and the participation increases and the pedagogical concepts are shifted to a learner driven process.

Credibility. Hayat Al-Khatib is Associate Professor at the Arab Open University (Lebanon). She received her PhD from the University of London. Al-Khatib is member of the British Association of Applied Linguists, the Research Support Group at the University of London, and the Association of Professors of English and Translation at Arab Universities. She is currently Head of the English program at Arab Open University (Lebanon), editor at the Linguistics Journal Editorial Board, and editor-in-chief of CALR linguistic journal. *European Journal of Open, Distance and E-Learning* (EURODL) is supported by European Distance and E-learning Network (EDEN). This peer-reviewed journal presents information about open, distance and e-learning as well as new dimensions of technology-enhanced learning and contributes to the Open Content movement.

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27, 139-153. doi:

[10.1080/01587910600789498](https://doi.org/10.1080/01587910600789498)

Abstract. Current trends in the field of distance education indicate a shift in pedagogical perspectives and theoretical frameworks, with student interaction at the heart of learner-centered constructivist environments. The purpose of this article is to explore the benefits of using emerging technology tools such as wikis, blogs, and podcasts to foster student interaction in online learning. It also reviews social software applications such as Writeboard™, InstaColl™, and Imeem™. Although emerging technologies offer a vast range of opportunities for promoting collaboration in both synchronous and asynchronous learning environments, distance education programs around the globe face challenges that may limit or deter implementation of these technologies. This article probes the influence of technology on theory and the possible implications this influence affords.

Summary. This paper examines the advances in technology and how they have changed the ways in which online education is delivered and the simultaneous effects on the pedagogy behind distance education. Designers and educators are exploring the opportunities they have to promote interaction and collaboration among learners as they also rethink the pedagogical practices used in the new distance education environment. At the forefront of this Web 2.0 technology are blogs, wikis and podcasts. All three can be used alone or can be integrated with other applications and tools to create an interactive learning environment and research has shown that they provide students with a feeling of connectedness to the learning community. Wikis have the greatest potential to alter the pedagogical framework of education. The ability to collaborate, comment,

edit and approve the work of others creates a learner-centered knowledge share. As students contribute to courses by adding their own projects and discoveries, they build up the knowledge repository. “This contribution-oriented pedagogy allows students to use and reuse what others have produced as part of their learning process” (Beldarrain, 2006, p. 148). As technology continues to advance, educators are going to be looking at way they can most effectively pass on information and knowledge to learners. While the CSCL tools evolve to integrate newer technologies so must the pedagogies change to be adaptable and to underscore the self-learning that occurs.

Credibility. Dr. Yoany Beldarrain is an international speaker, accomplished author, consultant, and cyber educator with over 18 years of experience in K-12 and adult curriculum and instruction, instructional design, online teaching, as well as administrative educational leadership and faculty training. She is a professor in the Instructional Technology Management department in the College of Professional and Continuing Studies at La Salle University (Philadelphia). Dr. Beldarrain completed a PhD in Instructional Design for Online Learning from Capella University, an MS in Educational Leadership from Nova Southeastern University, and a BS in Elementary Education from Florida International University. *Distance Education* is a peer-reviewed journal of the Open and Distance Learning Association of Australia, Inc. It publishes research and scholarly material in the fields of open, distance and flexible education. *Distance Education* was one of the first journals published to focus exclusively on this area of educational practice, and today it remains a primary source of original and scholarly work in the field.

Gikandi, J. W., Morrow, D. & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57, 2333-2351.

Abstract. As online and blended learning has become commonplace educational strategy in higher education, educators need to re-conceptualize fundamental issues of teaching, learning and assessment in non-traditional spaces. These issues include concepts such as validity and reliability of assessment in online environments in relation to serving the intended purposes, as well as understanding how formative assessment functions within online and blended learning. The benefits identified include improvement of learner engagement and centrality in the process as key actors, including the development of a learning community. The key findings are that effective online formative assessment can foster a learner and assessment centered focus through formative feedback and enhanced learner engagement with valuable learning experiences. Ongoing authentic assessment activities and interactive formative feedback were identified as important characteristics that can address threats to validity and reliability within the context of online formative assessment.

Summary. The primary focus of this paper is how to effectively incorporate learning assessment into an online educational environment with significant attention given to the factors of successful online learning including learner interaction and collaboration. Implementing learning assessment in the online learning environment can generate new pedagogical strategies in which “sustained meaningful interaction and collaboration among the individual learner, peers and the teacher as learning community with a shared purpose can enhance opportunities for ongoing and adequate learner support” (Gikandi et al., 2011, p. 2334). Meaningful learning experiences can also arise from formative online

assessments. Assessments provide learners and instructors with feedback to inform decisions about online settings which can be designed to enhance learning processes. “Engaged learning provides the learners with opportunities to be active, creative and critical as well as being creators of their own perspective and identity” (Gikandi et al., 2011, p. 2342). The authors propose that assessments should be closely aligned with teaching and learning in an effort to mold how learning and assessments occur. A closer alignment between the two will offer a pedagogical strategy that supports diverse learning and fosters equitable education.

Credibility. Joyce Wangui Gikandi is a PhD student conducting research on formative assessment in online learning environments. She is a researcher at the University of Canterbury (New Zealand). Dr. Donna Morrow is a senior lecturer and the University of Canterbury. She received her EdD from Giffith University (Australia) and her MA in Education from North Carolina State University (USA). Dr. Morrow has multiple journal publications to her credit with a focus on eLearning and pedagogy. Dr. Niki Davis is the University of Canterbury Professor of e-Learning and Director of the College of Education e-Learning Lab. She is recognized internationally as a leading expert in information and communication technologies in teacher education. Dr. Davis is President of the Distance Education Association of New Zealand and leads New Zealand Collaborative Action & Research Network. *Computers and Education* is an established technically-based, interdisciplinary forum for communication in the use of all forms of computing in a socially and technologically significant area of application. The journal publishes definitive contributions to serve as a reference standard against which the current state-of-the-art can be assessed.

Halverson, R. & Smith, A. (2009). How new technologies have (and have not) changed teaching and learning in schools. *Journal of Computing in Teacher Education*, 26(2), 49.

Abstract. Information technologies have reshaped teaching and learning in schools, but often not in ways anticipated by technology proponents. This paper proposes a contrast between technologies for learning and technologies for learners to explain how technologies influence teaching and learning in and out of schools. Schools have made significant use of assessment and instructional technologies that help promote learning for all students, whereas technologies for learners, such as mobile devices, video games, and social networking sites, are typically excluded from school contexts. The paper considers how these contrasting models of technology use will come to shape schools and learning in a pluralistic society.

Summary. This paper compares and contrasts Technology for Learning which is designed to meet particular academic goals and is instructor directed, and Technology for Learners, which allows the user to select or frame the learning goals and is client directed. Early adoption of computer technology in the 1990s was new and novel to education and technology was framed to fit a traditional model of education where knowledge is passed from instructor to learner. The recent evolution of Web 2.0 tools has changed the paradigm; tools like blogs, wikis and social media sites have transformed the way in which learners learn and the pedagogy of instructors in the digital age. Schools tend to promote and support technology for learning. The institutional view is that schools should define learning goals and develop structures to guide students. A greater adoption of the *technology for learners* model can be seen as information resources grow and are more readily available for information retrieval, browsing, incidental learning,

and participation. Goal-oriented instruction is still a valuable model but a change in pedagogical practices must occur as more and more students who utilize computer-supported collaborative learning as their main method to acquire knowledge are demanding the ability to have a client-centered learning system.

Credibility. Richard Halverson is an associate professor in educational leadership and policy analysis at the University of Wisconsin-Madison and co-director of the Educational Research and Development Group at the Wisconsin Institute for Discover. He received his PhD from Northwestern University in Learning Sciences after 10 years experience as a school teacher and administrator. He is a founding member of the University of Wisconsin Learning Sciences program and the Games, Learning, and Society Research Group. Annette Smith has more than 20 years experience in K-12 education and is currently the technology director for Westosha School District in Wisconsin. She received her PhD in Educational Leadership and Policy Analysis from the University of Wisconsin-Madison and has served as president of the Wisconsin Educational Media and Technology Association. The *Journal of Computing in Teacher Education* contains refereed articles on pre-service and in-service training, research in computer education and certification issues, and reviews of training materials and texts. The quarterly journal provides a forum for sharing information among departments, schools, and colleges of education who are confronting the issues of providing computer and technology education.

Heirdsfield, A., Walker, S., Tambyah, M. & Beutel, D. (2011). Blackboard as an online learning environment: What do teacher education students and staff think? *Australian Journal of Teacher Education*, 36(7), 1-16.

Abstract. As online learning environments now have an established presence in higher education we need to ask the question: How effective are these environments for student learning? Online environments can provide a different type of learning experience than traditional face-to-face contexts (for on-campus students) or print-based materials (for distance learners). This article identifies teacher education student and staff perceptions of teaching and learning using the online learning management system, Blackboard. Perceptions of staff and students are compared and implications for teacher education staff interested in providing high quality learning environments within an online space are discussed.

Summary. Blackboard is the learning management system (LMS) under evaluation in this specific paper but the research investigates the effectiveness of computer-supported collaborative learning (CSCL), student and staff perceptions, and the resulting implications for instructors wanting to promote and teach in an online learning environment. Information gathered in this study can be transferred to other CSCL systems. An initial concern is that while technology provides an opportunity to reshape education, the traditional model of instructor generated content which is passed on to the learner is still entrenched and may hinder “exploring more innovative pedagogic approaches to learning” (Heirdsfield, Walker, Tambyah & Beutel, 2011, p. 2). This limitation to innovative pedagogies is attributable to a lack of teacher motivation and time in learning new technologies. Heirdsfield, Walker, Tambyah and Beutel (2011) cite

Ellis, Ginns and Piggott (2009) when identifying four types of interactivity that can occur when using an LMS: learner-content, learner-instructor, learner-learner, and learner-interface. These interactions are a critical component of the CSCL experience in that they allow for asynchronous collaboration, instructor interaction, and social integration – all of which are considered important factors in online learning. Framing the pedagogy around changes in the instructional paradigm is necessary to obtain the benefits associated with an LMS. The Web 2.0 tools imbedded in LMS like Blackboard are foundational to the interactions seen as critical to supporting successful online learning. Wikis allow the users to share learning during group projects. Discussion forums provide social interaction between learners. Video and audio streaming saves time and increases learner-content interaction. Consensus among the instructors and the learners is that LMS such as Blackboard are more than a repository of learning resources in that they provide a vehicle to enhance online learning. Heirdsfield, Walker, Tambyah and Beutel (2011) see the potential but conclude by stating that to be successful, “staff need training, support and encouragement if they are to move towards more interactive and innovative pedagogies online” (p. 10).

Credibility. Dr. Ann Heirdsfield is a lecturer and a member of the faculty of education at Queensland University of Technology (Australia) where she received both her PhD and her MEd. Dr. Susan Walker is a senior research fellow, and an associate professor at Queensland University of Technology (QUT). Dr. Walker received her PhD from QUT. Mallihai Tambyah is a social science educator who lectures in the School of Cultural and Language Studies in Education at QUT. Currently she is a PhD candidate and lectures in the area of middle and secondary school social education curriculum studies. Ms.

Tambyah has a Master of Arts (History) from Duke University (USA), and has taught for several years as a secondary History/SOSE and English teacher in Queensland. Dr. Denise Beutel is a senior lecturer at QUT. She received her EdD from QUT and has recently completed a research study into the nature of pedagogic teacher-student interaction. The *Australian Journal of Teacher Education* is peer reviewed, free access and published six times a year by Edith Cowan University. The Journal is indexed by the Australian Education Index and ERIC. The purpose of the *Australian Journal of Teacher Education* is to enhance the quality of teacher education through the publication of research reports, learned points of view and commentaries.

Lim, W., So, H. & Tan, S. (2010). E-Learning 2.0 and new literacies: Are social practices lagging behind. *Interactive Learning Environments*, 18(3), 203-218. doi:

[10.1080/10494820.2010.500507](https://doi.org/10.1080/10494820.2010.500507)

Abstract. While the growing prevalence of Web 2.0 in education opens up exciting opportunities for universities to explore expansive, new literacies practices, concomitantly, it presents unique challenges. Many universities are changing from a content delivery paradigm of eLearning 1.0 to a learner-focused paradigm of eLearning 2.0. In this article, we first articulate the paradigmatic differences between eLearning 1.0 and eLearning 2.0 based on technological, social and epistemological dimensions on which we make the case that current social practices of learning in many universities are not keeping up with the possibilities afforded by the Web 2.0 tools. To illustrate our argument, we draw upon our observations of a course in which tertiary students exhibited a traditional, divide-and-conquer disposition while using wikis. There is little in-depth collaboration leading to higher order meaning making or knowledge building among these students. From these observations, we contend that to realize eLearning 2.0, there is a need to change the social-technological infrastructure in universities, and we discuss the various dimensions in which these changes could be implemented.

Summary. Web 2.0 technologies have changed the dynamics of online education. A paradigm shift has occurred in the transition from eLearning 1.0 which is content driven to eLearning 2.0 which is user focused, social, and participatory. Web 2.0 tools empower users with the ability to design, contribute, modify and obtain content as they work collaboratively and interactively with peers and instructors. A challenge to the eLearning 2.0 is proper application. Many embrace the technologies built into computer-supported

collaborative learning environments but do not properly implement the technologies. Lim, So and Tan (2010) cite Moore (2007) when they state “when Web 2.0 tools are *added*, instead of being *integrated* into the current learning situations of distance learning, they will yield minimal benefits” (p. 205). The paper acknowledges that many of the learning management systems (LMS) used today were designed to deliver content making it difficult to customize these tools to meet specific needs. Teachers are forced into a delivery-centered pedagogy for teaching and learning. “In the emerging Web 2.0 eLearning paradigm, the focus of learning shifts from content-centric to learner-centric, and from *what* we are learning to *how* we are learning” (Lim, So & Tan, 2010, p. 207). The eLearning 2.0 environment allows learners to create, modify and distribute information through blogs, wikis, mash-ups and social media. This also opens up new forms of interaction where learners are able to share their experiences, knowledge and discoveries with other students. The paradigm shift from eLearning 1.0 to eLearning 2.0 also requires that technological innovation and pedagogical practices continue to evolve in support of the new learning model in an online community.

Credibility. Wei-Ying Lim is a lecturer at the National Institute of Education (Singapore) where she has research interests in the sustainability of educational reforms, communities of practice, and socio-cultural notions of learning and identities. She is currently pursuing a PhD in the area of teacher identities, using concepts from discourse/conversation analysis and ethnomethodology. Dr. Hyo-Jeong So is currently an assistant professor in the Learning Sciences and Technologies Academic Group at the National Institute of Education, Nanyang Technological University (Singapore). Her research interests include computer-supported collaborative learning (CSCL), technology

integration in K-12 classrooms, teachers' epistemological beliefs about teaching and learning, and seamless mobile learning. Associate professor Seng-Chee Tan is currently heading the Learning Sciences and Technologies Academic Group at the National Institute of Education, Nanyang Technological University (Singapore). His research interests include knowledge building, computer-supported collaborative learning (CSCL), and ICT leadership in schools. *Interactive Learning Environments* publishes peer-reviewed articles on all aspects of the design and use of interactive learning environments in the broadest sense, encompassing environments that support individual learners through to environments that support collaboration amongst groups of learners or co-workers.

Soller, A., Martínez, A., Jermann, P. & Muehlenbrock, M. (2005). From mirroring to guiding: A review of state of the art technology for supporting collaborative learning.

International Journal of Artificial Intelligence in Education, 15(4), 261-290.

Abstract. We review a representative selection of systems that support the management of collaborative learning interaction, and characterize them within a simple classification framework. The framework distinguishes between mirroring systems, which display basic actions to collaborators, metacognitive tools, which represent the state of interaction via a set of key indicators, and coaching systems, which offer advice based on an interpretation of those indicators. The reviewed systems are further characterized by the type of interaction data they assimilate, the processes they use for deriving higher-level data representations, the variables or indicators that characterize these representations, and the type of feedback they provide to students and teachers. This overview of technological capabilities is designed to lay the groundwork for further research into which technological solutions are appropriate for which learning situations.

Summary. The study evaluates metacognitive effect on online collaborative learning. Exploring how learners perceive information and building models in support of this cognition provides instructors with a greater insight into how computer-supportive collaborative learning implemented into the online learning environment. While other studies have examined the effectiveness of different tools on computer-supported collaborative learning (CSCL), Soller et al. (2005) recognize that students' prior knowledge, motivation, roles, language, behavior and group dynamics are all factors which affect the perceived value of collaborative learning tools. This article looks at the collaborative management cycle as a model used to create a functional-based computer

representation of how the different cognitive and metacognitive activities can predict and support the group learning process. Through this model different aspects of the learning group can be changed to identify key components that can lead to higher satisfaction and productivity by the participants. The changes in this cycle are typically instituted by the instructor to bring the learning process back into line if there are disruptions to the cycle. This pedagogical approach to correcting the collaboration management cycle is used to maintain a desired state of interaction. A review of representative systems that support collaborative learning is also addressed in this study including systems that (a) reflect action, (b) monitor the state of interaction, (c) display high-level indicators, (d) internally compare the current state to a model of productive interaction, (e) offer advice, (f) advise social aspects of interaction, and (g) advise social and task oriented aspects of interaction. These systems are used to monitor, evaluate and report on the cognitive and metacognitive activities of the participants in an unbiased way and allow for more accurate responses to changes in the collaboration management cycle.

Credibility. Amy Soller holds a PhD in Intelligence Systems from the University of Pittsburgh and is a member of the research staff at the Institute for Defense Analysis where she performs high-level analysis on distributed collaboration technology.

Additionally she has been published numerous times in peer-reviewed journals.

Alejandra Martinez is a professor of computer science at the University of Valladolid (Spain), Patrick Jermann is a fellow at École Polytechnique Fédérale de Lausanne (Switzerland), and Martin Muehlenbrock holds a PhD in computer science from the Department of Mathematics and Computer Science from the University of Duisburg (Germany). All authors are highly published and cited by other experts in the field. The

International Journal of Artificial Intelligence in Education (IJAIED) is the official journal of the International AIED Society. IJAIED publishes papers concerned with the application of artificial intelligence techniques and concepts to the design of systems that support learning.

Conclusion

This annotated bibliography addresses four key concepts to successful eLearning: (a) the impact of collaborative learning tools in an asynchronous online learning environment; (b) the impact of interaction in an online environment to the success of students and faculty; (c) the value of integrating Web 2.0 technology in online learning applications; and (d) the paradigm shift that must occur to pedagogy to support online learning. The primary purpose of this paper is to examine and summarize recent research to provide developers of learning management systems (LMS) with an understanding of these concepts and to provide the framework by which developers can utilize Web 2.0 collaborative learning tools to enhance computer-supported collaborative learning (CSCL) thereby improving the online learning experience. A secondary goal is to provide instructors of online courses with information about pedagogical changes that will improve learner satisfaction, increase course content interaction and support student retention. While CSCL has been around for many years, the advances in consumer technology, the increased availability of high speed bandwidth, and the advent of Web 2.0 technologies (blogs, wikis, social networking, etc.) have taken eLearning to a new level of interaction and learner-based content creation. Understanding these changes and actively addressing them is critical to stay current in today's online learning marketplace.

Impact of collaborative learning tools. Collaborative learning tools provide a new paradigm in the asynchronous online learning environments. It is through these portals that e-learners are able to increase interaction with peers, instructors and course content (Bernard et al., 2009; Bethel, 2009; Brown & Adler, 2008; Oblinger & Oblinger, 2005). Building effective collaborative learning tools that are integrated within the learning environment, rather than added on, is critical (Arbaugh & Benbunan-Fich, 2007; Lim, So & Tan, 2010). It is through integration

that greater participation takes place and an effective eLearning environment is constructed. This effectiveness has been identified when students feel supported by their instructors, which enhances the learners' experience and outcome (Hsieh & Cho, 2011). Hsieh and Cho (2011) state that effective eLearning tools improve learning satisfaction and assessment, which is a measure of learning outcome. O'Neill, Scott and Conboy (2011) state that "the most important factors in promoting collaborative learning in a DE environment are identified as (a) instructional design (pedagogy), (b) involvement of varied teaching styles, (c) encouraging and nurturing the learning community, and (d) accessible technology to all participants" (p. 939).

Interactive, collaborative learning tools in the asynchronous online community facilitate social construction between learners and between learners and instructors as they distribute information, combine knowledge and share comments and opinions with others in the community (Hernandez et al., 2011; Hsieh & Cho, 2011). Further, social presence and an enhanced sense of the online community are promoted by collaborative activities (Arbaugh & Benbunan-Fich, 2007). Designing online tools that allow students and instructors to collaborate in ways that are familiar and intuitive promotes interaction. Satisfaction with the collaborative portal is vital in the virtual learning environment (VLE); forcing individuals to interface with an organization-based tool that is unfamiliar reduces involvement and leads to a VLE that is underutilized, reduces satisfaction, and degrades student and faculty performance (Arbaugh & Benbunan-Fich, 2007; Casquero et al., 2010a). Building an online collaboration tool that is intuitive or familiar and does not box the user in by adopting an inflexible platform is a key component that any designer or developer of a learner management system (LMS) can implement to increase user satisfaction.

Interaction in an online educational environment. Interaction is shown to be the single most influential component in successful online education (Arbaugh & Benbunan-Fich, 2007; Beldarrain, 2006; Casquero et al., 2010b; Heirdsfield et al., 2011; Hsieh & Cho, 2011; Klobas & McGill, 2010). There are two primary interactions; learner-learner and learner-instructor. Within these interactive groups there are two types of interaction, educational and social. It is a natural human need to interact with others and this is particularly true in an educational setting where a sense of belonging to a greater community fosters positive impressions of the course, the instructor, peers and self. Social interaction is strongly linked to online learning enjoyment and effectiveness (Heirdsfield et al., 2011). Arbaugh and Benbunan-Fich (2007) find that an increased social presence in the online community is directly associated with a more positive outcome in online courses and that it is important to augment the lack of face-to-face interactions through the addition of social activities in the online environment. Online learning environments that foster a sense of community, social interaction and recognition by peers and instructors are shown to have the strongest performance motivators because they create a sense of shared meaning (Hernandez et al., 2011; Hsieh & Cho, 2011).

While the social component is important, the studies reviewed in the annotated bibliography show that instructor involvement in the online learning environment is even more important. The ability for learners and instructors to bridge time and space through asynchronous interaction via the learning management system (LMS) provides the instructor with insight into specific needs of students (Hsieh & Cho, 2011). A high rate of instructor involvement provides extensive benefits including: (a) learners receiving higher quality information (Klobas & McGill, 2010); (b) positive student impressions of the course (Arbaugh & Benbunan-Fich, 2007; Klobas

& McGill, 2010); and (c) enhanced feedback with improves the learners' performance (Hsieh & Cho, 2011).

Consistent and positive interaction in the online educational community between cohort or learners and instructors is one of the strongest predictors of a successful outcome. Sustained, meaningful engagement between cohorts of students and teachers in a learning community can enhance opportunities for learner support and is a strong predictor of positive outcomes in the online environment (Al-Khatib, 2011; Arbaugh & Benbunan-Fich, 2007; Gikandi, Morrow & Davis, 2011). Designers need to consider how best to facilitate and promote interaction and involvement in order to create a successful LMS (Klobas & McGill, 2010). Student involvement has significant benefit to the learner and to their cohorts, and those who are more engaged report higher satisfaction with the learning environment and have an increased perception of learning (Arbaugh & Benbunan-Fich, 2007; Klobas & McGill, 2010). For this reason, LMS designers must create online learning systems that provide an environment for instructional interaction between participants (Al-Khatib, 2011; Arbaugh & Benbunan-Fich, 2007).

Web 2.0 technology in the online learning environment. The evolution of online learning and learning management systems is experiencing a metamorphosis with the integration of Web 2.0 tools as conduits to collaboration. The two most prominent tools are blogs and wikis, which offer a platform that promotes discovery in a problem-centered system through the sharing of ideas and the transfer of knowledge (Glassman & Kang, 2011). Studies show that: (a) learning is improved as Web 2.0 tools are integrated into online learning applications (Casquero et al., 2010a), (b) the adoption of Web 2.0 tools leads to life-long learning (Casquero et al., 2010b), and (c) wikis provide a collaborative learning environment that facilitates open dialog and the sharing of ideas (Su & Beaumont, 2010). A wiki is a simple, flexible and open website that

allows all visitors to easily edit and create pages providing higher education with a new way of offering online collaboration (Su & Beaumont, 2010). Wikis afford dynamic interaction in peer-to-peer and peer-to-facilitator exchanges, enhancing the learning experience by providing an interface that allows open participation (Beldarrain, 2010; Casquero et al., 2010b; Godwin-Jones, 2003). Open participation is intrinsic in the design of wikis, which allow anyone to author, edit and cite information (Glassman & Kang, 2011; Huang & Nakazawa, 2010).

Su & Beaumont (2010) see wikis as the single most important Web 2.0 tool due to the capacity a wiki has to (a) add to the contribution of learners, (b) provide a rich learning environment, (c) facilitate the development of the students as critical learners, and (d) promote higher standards among instructors. The accessibility of hypertext (text in one online location that directs the user to another, potentially disparate, online location) is available to all users (Glassman & Kang, 2011). Utilizing links from wikis or blogs, content and information can be associated in ways that were not possible 10 years ago. The learner can now direct fellow students and even the instructor to a source of additional information. There have been concerns raised about information credibility with a more open platform of dissemination but Su & Beaumont (2010) argue that the very process around how users build and contribute to wikis provides an historical component that attributes each entry to a specific author which can later be analyzed for ethic infractions. Collaboration in an eLearning setting is made richer with the introduction of Web 2.0 tools and technologies. Learners and instructors are able to bring a rich array of resources together in a mash-up of wikis, blogs, discussion boards, and social networking applications. The design of an institutional personal learning environment (iPLE) (Casquero et al., 2010a) marries the best of existing learning management systems with Web 2.0 tools. A core of the LMS is used to provide the foundational institutional content and the learners

and instructors can associate and link to the Web 2.0 tools they feel are best for their specific needs. Designers need to focus on building technology agnostic platforms upon which these technologies can be paired together.

The paradigm shift in pedagogy. A paradigm shift is occurring in the way we learn and share information; the model in which knowledge is transferred from instructor to student is being replaced by a learner-centric model (Beldarrain, 2006; Casquero et al., 2010a; Casquero et al. 2010b; Lim, So & Tan, 2010). Web 2.0 allows users to build and design their own mash-up and create a personal learning environment (PLE) that brings together a variety of Web 2.0 tools into a single space to enhance the learning process (Casquero et al., 2010a). Web 2.0 technologies are decentralized and emphasize the participatory aspects of education (Lim, So & Tan, 2010). It is through these tools that individuals can control their own environment, determine how they want to interact with data and knowledge transfer, and share with others in their cohort through open dialogue and collaboration.

While Web 2.0 tools and technologies have seen enormous growth in the number of users over the past five years, the adoption of these elements into the online academic world has been slower. Even in the areas of eLearning where wikis and blogs have been implemented, instructors frequently see these tools as a new method for sharing their curriculum, or simply another conduit by which they can pass knowledge to the learner (Beldarrain, 2006; Glassman & Kang, 2011; Godwin-Jones, 2003; Huang & Nakazawa, 2010; Resta & Laferrière, 2007; Severance, Hardin & Whyte, 2008; Su & Beaumont, 2010). For any future learning management system to be effective there must be a change in the pedagogy of online education; instructors must begin to view Web 2.0 tools as more than a means, but as a method (Brown & Adler, 2008; Glassman & Kang, 2011; Halverson & Smith, 2009; Heirdsfield et al., 2011; Lim, So & Tan,

2010). It is not as much what we learn but how we learn. Al-Khatib (2011) posits that we are seeing the evolution of *prosumers*, which refers to learners who are both producers and consumers in the educational process.

This request for a new approach to pedagogy is being driven more by learners than instructors (Al-Khatib, 2011). One of the pedagogic advantages is the “learners' ability to embrace new roles in charting their path of learning and in actively engaging with learning process” (Al-Khatib, 2011, p. 15). Su and Beaumont (2010) see wikis as having a tremendous impact on pedagogy as they evolve the capacity for learners and instructors to exchange ideas and encourage both self-assessment and peer-assessment. Instructors must view learners as more than recipients of knowledge and expand the definition to include builders of knowledge (Lim, So & Tan, 2010).

The traditional view of delivery-centered education has shaped technologies to fit the old pedagogies, and developers are still building new learning management systems and virtual learning environments to perpetuate the existing pedagogy (Heirdsfield et al., 2011). This is ineffective and both technological innovation and pedagogical practices need to change to build a learner-driven environment (Lim, So & Tan, 2010). In this new paradigm, teachers need to be facilitators and create a space for experimentation while designers need to work with the learners and instructors to select goals and build technologies to guide the users towards these goals (Halverson & Smith, 2009). Klobas and McGill (2010) attribute the lack of educational innovation to poor engagement with the learning management system while Lim, So and Tan (2010) believe that there is simply a lack of recognition in the potential of emerging technologies and learning.

Whatever the reason for the poor adoption of Web 2.0 technologies into the teaching methods of online instructors, learners are actively involved in their own construction of knowledge (Su & Beaumont, 2010). Learners realize the educational benefits of some of the new technological initiatives and they argue that instructors must integrate the technology with their courses to enable participants to have a better learning environment (Arbaugh & Benbunan-Fich, 2007). The good news is that technical infrastructures and pedagogical initiatives are gaining momentum as research shows the benefits of technology-enhanced education (Al-Khatib, 2011). The integration of Web 2.0 tools into the learning management system will propel the users from eLearning 1.0 to eLearning 2.0 which will help make learning a learner-centered, proactive process (Casquero, 2010b).

Today's e-learners are looking for a more experiential and interactive curriculum; they seek an experience where they can participate and create (Al-Khatib, 2011; Severance, Hardin & Whyte, 2008; Smart & Cappel, 2006). How designers and instructors adapt and adopt the tools available through Web 2.0 technologies will determine if their specific instance of a learning management system or a course will be successful (Casquero et al., 2010b; Halverson & Smith, 2009; Reeves, Herrington & Oliver, 2004). Building a platform that supports both the instructor's need for a foundational interface with which he/she can design and present course materials through hyperlinks, and have constructive dialogue while also designing this same platform to meet the learners' needs to share their own thoughts and ideas in a self-moderated blog is a challenge. Abrami et al. (2011) identify that "CSCL systems should be designed to: (a) stimulate higher levels of interest and intrinsic motivation, (b) encourage participation in a context where knowledge is valued and used to motivate students, (c) ensure interactions occur allowing individuals to encourage and facilitate each other's efforts to accomplish the group's

goals, and (d) pay attention to the ease of use as an overall design objective” (p. 82). It is imperative that designers recognize that collaboration is more than participation in a discussion board; collaboration is creation and contribution to a wider body of knowledge, driven by the individuals who add to the whole. By focusing on the learner-centric approach to eLearning application developers can provide the framework upon which all the other tools can reside.

References

- Abdous, M. & Yen, C. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *Internet and Higher Education*, 13(4), 248-257. doi: [10.1016/j.iheduc.2010.04.005](https://doi.org/10.1016/j.iheduc.2010.04.005)
- Abedin, B., Daneshgar, F. & D'Ambra, J. (2011). Enhancing non-task sociability of asynchronous CSCL environments. *Computers & Education*, 57(4), 2535-2547. doi: [10.1016/j.compedu.2011.06.002](https://doi.org/10.1016/j.compedu.2011.06.002)
- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E. & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23, 82-103. doi: [10.1007/s12528-011-9043-x](https://doi.org/10.1007/s12528-011-9043-x)
- Adkins, S. (2011). *The US collaboration-based learning market: 2010-2015 forecast and analysis*. Ambient Insight. Retrieved from <http://www.ambientinsight.com/Resources/Documents/AmbientInsight-2010-2015-US-Collaboration-based-Learning-Market-Executive-Overview.pdf>
- Al-Khatib, H. (2011). Technology enhanced learning: Virtual realities; concrete results - case study on the impact of TEL on learning. *European Journal of Open, Distance and E-Learning*, 1. Retrieved from <http://www.eurodl.org/?p=archives&year=2011&halfyear=1&article=423>
- Allen, I. E., Seaman, J., & Garret, R. (2007). *Blending in. The extent and promise of blended education in the United States*. Retrieved from The Sloan Consortium website: http://www.sloanconsortium.org/publications/survey/pdf/Blending_In.pdf

- Allen, I. E. & Seaman, A. (2011). *Going the distance: Online education in the United States, 2011*. Retrieved from Babson Survey Research Group website:
http://sloanconsortium.org/publications/survey/going_distance_2011
- Anderson, P. (2007). *What is web 2.0? Ideas, technologies and implications for education*. Bristol, England: JISC Technology and Standards Watch (TechWatch). Retrieved from
<http://www.jisc.ac.uk/publications/reports/2007/twweb2.aspx>
- Ansah, A., Neill, P. & Newton, J. (2011). Who's on first in distance education? *Online Journal of Distance Learning Administration*, 4(1). Retrieved from
http://www.westga.edu/~distance/ojdl/spring141/ansah_neill_newton141.html
- Arbaugh, J. B. & Benbunan-Fich, R. (2007). The importance of participant interaction in online environments. *Decision Support Systems*, 43(3), 853-865. doi: [10.1016/j.dss.2006.12.013](https://doi.org/10.1016/j.dss.2006.12.013)
- Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27, 139-153. doi:
[10.1080/01587910600789498](https://doi.org/10.1080/01587910600789498)
- Bell, C. (2009). Critical evaluation on information sources. Retrieved from
<http://libweb.uoregon.edu/guides/findarticles/credibility.html>
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, A., Tamim, R., Surkes, M. A. & Bethel, E. C. (2009). A meta-analysis of three interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243–1289. doi: [10.3102/0034654309333844v1](https://doi.org/10.3102/0034654309333844v1)
- Bernard, R. M. et al. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, 74(3), 379-439. doi: [10.3102/00346543074003379](https://doi.org/10.3102/00346543074003379)

- Bolliger, D. U. & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning*, 3(1), 61-67.
- Brown, J. S. & Adler, R. P. (2008). Minds on fire: Open education, the long tail, and learning 2.0. *Educause Review*, January/February 2008, 16-32. Retrieved from <http://net.educause.edu/ir/library/pdf/ERM0811.pdf>
- Busch, C., De Maret, P. S., Flynn, T., Kellum, R., Le, S., Meyers, B., Saunders, M., White, R. & Palmquist, M. (2005). *Content Analysis*. Writing@CSU. Colorado State University Department of English. Retrieved from <http://writing.colostate.edu/guides/research/content/>
- Byington, T. (2011). Communities of practice: Using blogs to increase collaboration. *Intervention in Schools and Clinics*, 46(5), 280-291. doi: [10.1177/1053451210395384](https://doi.org/10.1177/1053451210395384)
- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010a). iPLE Network: An integrated eLearning 2.0 architecture from a university's perspective. *Interactive Learning Environments*, 18(3), 293-308. doi: [10.1080/10494820.2010.500553](https://doi.org/10.1080/10494820.2010.500553)
- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010b). Strategy approach for eLearning 2.0 deployment in Universities. *Digital Education Review*, 18, 1-8.
- Cho, V., Cheng, E. & Lai, J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers and Education*, 53(2), 216-227. doi: [10.1016/j.compedu.2009.01.014](https://doi.org/10.1016/j.compedu.2009.01.014)
- Dabbagh, N., & Bannan-Ritland, B. (2005). *Online learning: Concepts, strategies and application*. Upper Saddle River, New Jersey: Pearson Prentice Hall

- De Wever, B., Van Keer, H., Schellens, T. & Valcke, M. (2011). Assessing collaboration in a wiki: The reliability of university students' peer assessment. *Internet and Higher Education*, 14(4), 201-206. doi: [10.1016/j.iheduc.2011.07.003](https://doi.org/10.1016/j.iheduc.2011.07.003)
- Drennan, J., Kennedy, J. & Pisarski, A. (2005). Factors affecting student attitudes toward flexible online learning in management education. *The Journal of Educational Research*, 98(6), 331-338.
- Elias, T. (2010). Universal instructional design principles for Moodle. *International Review of Research in Open and Distance Learning*, 11(2), 110-124.
- Emerson, L. & MacKay, B. (2011). A comparison between paper-based and online learning in higher education. *British Journal of Education Technology*, 42(5), 727-735. doi: [10.1111/j.1467-8535.2010.01081.x](https://doi.org/10.1111/j.1467-8535.2010.01081.x)
- Engle, M., Blumenthal, A. & Cosgrave, T. (2011). How to prepare an annotated bibliography. Retrieved from <http://olinuris.library.cornell.edu/ref/research/skill28.htm>
- Fischman, J. (2011). Pearson and Google jump into learning management with free system. *Chronicle of Higher Education*, 58(9), A23.
- Gikandi, J. W., Morrow, D. & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57, 2333-2351.
- Glassman, M. & Kang, M. J. (2011). The logic of wikis: The possibilities of the Web 2.0 classroom. *International Journal of Computer-Supported Collaborative Learning*, 6(1), 93-112. doi: [10.1007/s11412-011-9107-y](https://doi.org/10.1007/s11412-011-9107-y)
- Godwin-Jones, R. (2003). Emerging technologies: Blogs and wikis: Environments for on-line collaboration. *Language, Learning & Technology*, 7(2). Retrieved from <http://global.factiva.com.libproxy.uoregon.edu/ha/default.aspx>

- Guri-Rosenelt, S. (2009). *Digital technologies in higher Education: sweeping expectations and actual effects*. New York: Nova Science Publishers Inc.
- Halic, O., Lee, D., Paulus, T. & Spence, M. (2010). To blog or not to blog: Student perceptions of blog effectiveness for learning in a college-level course. *Internet and Higher Education*, 13(4), 206-213. doi: [10.1016/j.iheduc.2010.04.001](https://doi.org/10.1016/j.iheduc.2010.04.001)
- Halverson, R. & Smith, A. (2009). How new technologies have (and have not) changed teaching and learning in schools. *Journal of Computing in Teacher Education*, 26(2), 49.
- Heirdsfield, A., Walker, S., Tambyah, M. & Beutel, D. (2011). Blackboard as an online learning environment: What do teacher education students and staff think? *Australian Journal of Teacher Education*, 36(7), 1-16.
- Hernandez, B., Montaner, T., Sese, F. J. & Urquizu, P. (2011). The role of social motivations in e-learning: How do they affect usage and success of ICT interactive tools? *Computers in Human Behavior*, 27(6), 2224-2232. doi: [10.1016/j.chb.2011.07.001](https://doi.org/10.1016/j.chb.2011.07.001)
- Hsieh, P. J. & Cho, V. (2011). Comparing e-learning tools' success: The case of instructor-student interactive vs. self-paced tools. *Computers & Education*, 57(3), 2025-2038. doi: [10.1016/j.compedu.2011.05.002](https://doi.org/10.1016/j.compedu.2011.05.002)
- Huang, W. H. D. & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments*, 18(3), 233-244. doi: [10.1080/10494820.2010.500520](https://doi.org/10.1080/10494820.2010.500520)
- Johnson, E. S., Humphrey, M. J. & Allred, K. W. (2009). Online learning and mentors: Addressing the shortage of rural special educators through technology and collaboration. *Rural Special Education Quarterly*, 28(2), 17-21.

- Karakostas, A. & Demetriadis, S. (2011). Adaptation patterns as a conceptual tool for designing the adaptive operation of CSCL systems. *Educational Technology Research & Development*, 59(3), 327-349. doi: [10.1007/s11423-010-9162-5](https://doi.org/10.1007/s11423-010-9162-5)
- Karrer, T. (2007). Understanding e-learning 2.0. *Learning Circuits*, 2007. Retrieved from: http://www.astd.org/LC/2007/0707_karrer.htm
- Kelly, D., Baxter, J. & Anderson, A. (2010). Engaging first-year students through online collaborative assessments. *Journal of Computer Assisted Learning*, 26(6), 535-548.
- King, F.B., Young, M.F., Drivere-Richmond, K. & Schrader, P.G. (2001). Defining distance learning and distance education. *AACE Journal*, 9(1), 1-14. Retrieved from <http://www.editlib.org/p/17786>
- Kirschner, P., Strijbos, J.-W., Kreijns, K., & Beers, P. J. (2004). Designing electronic collaborative learning environments. *Educational Technology Research and Development*, 52(3), 47-66.
- Klobas, J. & McGill, T. (2010). The role of involvement in learning management system success. *Journal of Computing in Higher Education*, 22(2), 114-134. doi: [10.1007/s12528-010-9032-5](https://doi.org/10.1007/s12528-010-9032-5)
- Lim, W., So, H. & Tan, S. (2010). ELearning 2.0 and new literacies: Are social practices lagging behind. *Interactive Learning Environments*, 18(3), 203-218. doi: [10.1080/10494820.2010.500507](https://doi.org/10.1080/10494820.2010.500507)
- McFarlane, D. (2011). A comparison of organizational structure and pedagogical approach: Online versus face-to-face. *Journal of Educators Online*, 8(1). Retrieved from <http://www.eric.ed.gov/PDFS/EJ917871.pdf>

Muirhead, B., & Juwah, C. (2004). Interactivity in computer-mediated college and university education: A recent review of the literature. *Educational Technology & Society* 7(1).

Oblinger, D. & Oblinger, J. (Eds.). (2005). *Educating the Net generation*. Washington DC: Educause. Retrieved from <http://www.educause.edu/educatingthenetgen>

O'Neill, S., Scott, M. & Conboy, K. (2011). A delphi study on collaborative learning in distance education: The faculty perspective. *British Journal of Educational Technology*, 42(6), 939-949.

Paradowski, M. B. (2010). A complexity science perspective on language spread. *Proceedings of ISCA Tutorial and Research Workshop on Experimental Linguistics, Athens, Greece*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1638873

Prinsen, F., Volman, M. L. L. & Terwel, J. (2007). The influence of learner characteristics on degree and type of participation in a CSCL environment. *British Journal of Educational Technology*, 38(6), 1037-1055. doi: [10.1111/j.1467-8535.2006.00692.x](https://doi.org/10.1111/j.1467-8535.2006.00692.x)

Realff, M., Ludovice, P., Guzdial, M., Morley, T., & Sukel, K. (2000). Computer supported collaborative learning for curriculum integration. *Computers & Chemical Engineering*, 24(2-7), 1473-1479. doi: [10.1016/S0098-1354\(00\)00538-X](https://doi.org/10.1016/S0098-1354(00)00538-X)

Reeves, T. C., Herrington, J. & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research & Development*, 52(4), 53-65.

Resta, P. & Laferrière, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review*, 19, 65-83. doi: [10.1007/s10648-007-9042-7](https://doi.org/10.1007/s10648-007-9042-7)

Salisbury, W. D., Pearson, R. A., Miller, D. W. & Marett, L. K. (2002). The limits of Information: A cautionary tale about one course delivery experience in the distance education environment. *e-Service Journal*, 1(2), 65-81.

- Severance, C., Hardin, J. & Whyte, A. (2008). The coming functionality mash-up in personal learning environments. *Interactive Learning Environments*, 16(1), 47-62. doi: [10.1080/10494820701772694](https://doi.org/10.1080/10494820701772694)
- Smart, K. & Cappel, J. (2006). Students' perception of online learning: A comparative study. *Journal of Information Technology Education*, 5, 201-219.
- Soller, A., Martínez, A., Jermann, P. & Muehlenbrock, M. (2005). From mirroring to guiding: A review of state of the art technology for supporting collaborative learning. *International Journal of Artificial Intelligence in Education*, 15(4), 261-290.
- Su, F. & Beaumont, C. (2010). Evaluating the use of a wiki for collaborative learning. *Innovation in Education and Teaching International*, 47(4), 417-431. doi: [10.1080/14703297.2010.518428](https://doi.org/10.1080/14703297.2010.518428)
- Tallent-Runnels, M., Thomas, J., Lan, W., Cooper, S., Ahern, T., Shaw, S. & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research*, 76(1), 93-135. doi: [10.3102/00346543076001093](https://doi.org/10.3102/00346543076001093)
- Tremblay, R. (2006). "Best Practices" and collaborative software in online teaching. *International Review of Research in Open and Distance Learning*, 7(1). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/309/513>
- University of North Carolina (2011). Educational Application Developer job posting. Retrieved from <http://www.careerbuilder.com/JobSeeker/ApplyOnline/ExternalLinkApply.aspx?useframes=True&IPath=EXIND&companyname=UNC+Eshelman+School+of+Pharmacy&JobDID=J3H3C46KZTL0QR7VPXS&aourl=http://jobs.unc.edu%2f2501924>

U.S Department of Education, Office of Planning, Evaluation and Policy Development. (2009).

Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. D.C: Washington.

Viegas, F. B. (2006). Bloggers' expectations of privacy and accountability: An initial survey.

Journal of Computer-Mediated Communication, 10(3) Published Online: 23 Jun 2006.

Retrieved from <http://jcmc.indiana.edu/vol10/issue3/viegas.html>

Wasilik, O. & Bolliger, D. U. (2009). Faculty satisfaction in the online environment: An institutional study. *The Internet and Higher Education*, 12(3-4), 173-178.

Appendix A - References Sorted by Key Content Area

References Pertaining to Blogs

- Byington, T. (2011). Communities of practice: Using blogs to increase collaboration. *Intervention in Schools and Clinics*, 46(5), 280-291. doi: [10.1177/1053451210395384](https://doi.org/10.1177/1053451210395384)
- Godwin-Jones, R. (2003). Emerging technologies: Blogs and wikis: Environments for on-line collaboration. *Language, Learning & Technology*, 7(2). Retrieved from <http://global.factiva.com.libproxy.uoregon.edu/ha/default.aspx>
- Halic, O., Lee, D., Paulus, T. & Spence, M. (2010). To blog or not to blog: Student perceptions of blog effectiveness for learning in a college-level course. *Internet and Higher Education*, 13(4), 206-213. doi: [10.1016/j.iheduc.2010.04.001](https://doi.org/10.1016/j.iheduc.2010.04.001)
- Viegas, F. B. (2006). Bloggers' expectations of privacy and accountability: An initial survey. *Journal of Computer-Mediated Communication*, 10(3). Published Online: 23 Jun 2006. Retrieved from <http://jcmc.indiana.edu/vol10/issue3/viegas.html>

References Pertaining to CSCL and LMS

- Al-Khatib, H. (2011). Technology enhanced learning: Virtual realities; concrete results - case study on the impact of TEL on learning. *European Journal of Open, Distance and E-Learning*, 1. Retrieved from <http://www.eurodl.org/?p=archives&year=2011&halfyear=1&article=426>
- Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, A., Tamim, R., Surkes, M. A. & Bethel, E. C. (2009). A meta-analysis of three interaction treatments in distance education. *Review of Educational Research*, 79(3), 1243–1289. doi: [10.3102/0034654309333844v1](https://doi.org/10.3102/0034654309333844v1)

- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010a). iPLE Network: An integrated eLearning 2.0 architecture from a university's perspective. *Interactive Learning Environments*, 18(3), 293-308. doi: [10.1080/10494820.2010.500553](https://doi.org/10.1080/10494820.2010.500553)
- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010b). Strategy approach for eLearning 2.0 deployment in Universities. *Digital Education Review*, 18, 1-8.
- Heirdsfield, A., Walker, S., Tambyah, M. & Beutel, D. (2011). Blackboard as an online learning environment: What do teacher education students and staff think? *Australian Journal of Teacher Education*, 36(7), 1-16.
- Klobas, J. & McGill, T. (2010). The role of involvement in learning management system success. *Journal of Computing in Higher Education*, 22(2), 114-134. doi: [10.1007/s12528-010-9032-5](https://doi.org/10.1007/s12528-010-9032-5)
- Prinsen, F., Volman, M. L. L. & Terwel, J. (2007). The influence of learner characteristics on degree and type of participation in a CSCL environment. *British Journal of Educational Technology*, 38(6), 1037-1055. doi: [10.1111/j.1467-8535.2006.00692.x](https://doi.org/10.1111/j.1467-8535.2006.00692.x)

References Pertaining to CSCL Design

- Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27, 139-153. doi: [10.1080/01587910600789498](https://doi.org/10.1080/01587910600789498)
- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010a). iPLE Network: An integrated eLearning 2.0 architecture from a university's perspective. *Interactive Learning Environments*, 18(3), 293-308. doi: [10.1080/10494820.2010.500553](https://doi.org/10.1080/10494820.2010.500553)
- Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010b). Strategy approach for eLearning 2.0 deployment in Universities. *Digital Education Review*, 18, 1-8.

Cho, V., Cheng, E. & Lai, J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers and Education*, 53(2), 216-227.

doi: [10.1016/j.compedu.2009.01.014](https://doi.org/10.1016/j.compedu.2009.01.014)

Elias, T. (2010). Universal instructional design principles for Moodle. *International Review of Research in Open and Distance Learning*, 11(2), 110-124.

Fischman, J. (2011). Pearson and Google jump into learning management with free system.

Chronicle of Higher Education, 58(9), A23.

O'Neill, S., Scott, M. & Conboy, K. (2011). A delphi study on collaborative learning in distance education: The faculty perspective. *British Journal of Educational Technology*, 42(6), 939-949.

Reeves, T. C., Herrington, J. & Oliver, R. (2004). A development research agenda for online collaborative learning. *Educational Technology Research & Development*, 52(4), 53-65.

References Pertaining to Interaction

Abdous, M. & Yen, C. (2010). A predictive study of learner satisfaction and outcomes in face-to-face, satellite broadcast, and live video-streaming learning environments. *Internet and Higher Education*, 13(4), 248-257. doi: [10.1016/j.iheduc.2010.04.005](https://doi.org/10.1016/j.iheduc.2010.04.005)

Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E. & Tamim, R. M. (2011).

Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23, 82-103. doi:

[10.1007/s12528-011-9043-x](https://doi.org/10.1007/s12528-011-9043-x)

Arbaugh, J. B. & Benbunan-Fich, R. (2007). The importance of participant interaction in online environments. *Decision Support Systems*, 43(3), 853-865. doi: [10.1016/j.dss.2006.12.013](https://doi.org/10.1016/j.dss.2006.12.013)

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27, 139-153. doi:

[10.1080/01587910600789498](https://doi.org/10.1080/01587910600789498)

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, A., Tamim, R., Surkes, M. A. & Bethel, E. C. (2009). A meta-analysis of three interaction treatments in distance education.

Review of Educational Research, 79(3), 1243–1289. doi: [10.3102/0034654309333844v1](https://doi.org/10.3102/0034654309333844v1)

Bolliger, D. U. & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning*, 3(1), 61-67.

Emerson, L. & MacKay, B. (2011). A comparison between paper-based and online learning in higher education. *British Journal of Education Technology*, 42(5), 727-735. doi:

[10.1111/j.1467-8535.2010.01081.x](https://doi.org/10.1111/j.1467-8535.2010.01081.x)

Halic, O., Lee, D., Paulus, T. & Spence, M. (2010). To blog or not to blog: Student perceptions of blog effectiveness for learning in a college-level course. *Internet and Higher Education*, 13(4), 206-213. doi: [10.1016/j.iheduc.2010.04.001](https://doi.org/10.1016/j.iheduc.2010.04.001)

Hernandez, B., Montaner, T., Sese, F. J. & Urquizu, P. (2011). The role of social motivations in e-learning: How do they affect usage and success of ICT interactive tools? *Computers in Human Behavior*, 27(6), 2224-2232. doi: [10.1016/j.chb.2011.07.001](https://doi.org/10.1016/j.chb.2011.07.001)

Hsieh, P. J. & Cho, V. (2011). Comparing e-learning tools' success: The case of instructor-student interactive vs. self-paced tools. *Computers & Education*, 57(3), 2025-2038. doi:

[10.1016/j.compedu.2011.05.002](https://doi.org/10.1016/j.compedu.2011.05.002)

Huang, W. H. D. & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments*, 18(3), 233-244.

doi: [10.1080/10494820.2010.500520](https://doi.org/10.1080/10494820.2010.500520)

- Kelly, D., Baxter, J. & Anderson, A. (2010). Engaging first-year students through online collaborative assessments. *Journal of Computer Assisted Learning*, 26(6), 535-548.
- Klobas, J. & McGill, T. (2010). The role of involvement in learning management system success. *Journal of Computing in Higher Education*, 22(2), 114-134. doi: [10.1007/s12528-010-9032-5](https://doi.org/10.1007/s12528-010-9032-5)
- Lim, W., So, H. & Tan, S. (2010). ELearning 2.0 and new literacies: are social practices lagging behind. *Interactive Learning Environments*, 18(3), 203-218. doi: [10.1080/10494820.2010.500507](https://doi.org/10.1080/10494820.2010.500507)
- O'Neill, S., Scott, M. & Conboy, K. (2011). A delphi study on collaborative learning in distance education: The faculty perspective. *British Journal of Educational Technology*, 42(6), 939-949.
- Prinsen, F., Volman, M. L. L. & Terwel, J. (2007). The influence of learner characteristics on degree and type of participation in a CSCL environment. *British Journal of Educational Technology*, 38(6), 1037-1055. doi: [10.1111/j.1467-8535.2006.00692.x](https://doi.org/10.1111/j.1467-8535.2006.00692.x)
- Resta, P. & Laferrière, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review*, 19, 65-83. doi: [10.1007/s10648-007-9042-7](https://doi.org/10.1007/s10648-007-9042-7)
- Smart, K. & Cappel, J. (2006). Students' perception of online learning: A comparative study. *Journal of Information Technology Education*, 5, 201-219.
- Soller, A., Martínez, A., Jermann, P. & Muehlenbrock, M. (2005). From mirroring to guiding: A review of state of the art technology for supporting collaborative learning. *International Journal of Artificial Intelligence in Education*, 15(4), 261-290.

References Pertaining to Online Pedagogy

- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E. & Tamim, R. M. (2011). Interaction in distance education and online learning: Using evidence and theory to improve practice. *Journal of Computing in Higher Education*, 23, 82-103. doi: [10.1007/s12528-011-9043-x](https://doi.org/10.1007/s12528-011-9043-x)
- Cho, V., Cheng, E. & Lai, J. (2009). The role of perceived user-interface design in continued usage intention of self-paced e-learning tools. *Computers and Education*, 53(2), 216-227. doi: [10.1016/j.compedu.2009.01.014](https://doi.org/10.1016/j.compedu.2009.01.014)
- Drennan, J., Kennedy, J. & Pisarski, A. (2005). Factors affecting student attitudes toward flexible online learning in management education. *The Journal of Educational Research*, 98(6), 331-338.
- Gikandi, J. W., Morrow, D. & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education*, 57, 2333-2351.
- Halverson, R. & Smith, A. (2009). How new technologies have (and have not) changed teaching and learning in schools. *Journal of Computing in Teacher Education*, 26(2), 49.
- Tallent-Runnels, M., Thomas, J., Lan, W., Cooper, S., Ahern, T., Shaw, S. & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research*, 76(1), 93-135. doi: [10.3102/00346543076001093](https://doi.org/10.3102/00346543076001093)
- Tremblay, R. (2006). "Best Practices" and collaborative software in online teaching. *International Review of Research in Open and Distance Learning*, 7(1). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/309/513>
- Wasilik, O. & Bolliger, D. U. (2009). Faculty satisfaction in the online environment: An institutional study. *The Internet and Higher Education*, 12(3-4), 173-178.

References Pertaining to Statistical Data or Definitions

Allen, I. E. & Seaman, A. (2011). *Going the distance: Online education in the United States,*

2011. Retrieved from Babson Survey Research Group website:

http://sloanconsortium.org/publications/survey/going_distance_2011

University of North Carolina (2011). Educational Application Developer job posting. Retrieved from:

http://www.careerbuilder.com/JobSeeker/ApplyOnline/ExternalLinkApply.aspx?useframes=True&IPath=EXIND&companyname=UNC+Eshelman+School+of+Pharmacy&Job_DID=J3H3C46KZTL0QR7VPXS&aourl=http://jobs.unc.edu%2f2501924

References Pertaining to Web 2.0

Anderson, P. (2007). *What is web 2.0? Ideas, technologies and implications for education.*

Bristol, England: JISC Technology and Standards Watch (TechWatch). Retrieved from

<http://www.jisc.ac.uk/publications/reports/2007/twweb2.aspx>

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education*, 27, 139-153. doi:

[10.1080/01587910600789498](https://doi.org/10.1080/01587910600789498)

Casquero, O., Portillo, J., Ovelar, R., Romo, J. & Benito, M. (2010a). iPLE Network: An

integrated eLearning 2.0 architecture from a university's perspective. *Interactive*

Learning Environments, 18(3), 293-308. doi: [10.1080/10494820.2010.500553](https://doi.org/10.1080/10494820.2010.500553)

Glassman, M. & Kang, M. J. (2011). The logic of wikis: The possibilities of the Web 2.0

classroom. *International Journal of Computer-Supported Collaborative Learning*, 6(1),

93-112. doi: [10.1007/s11412-011-9107-y](https://doi.org/10.1007/s11412-011-9107-y)

- Hernandez, B., Montaner, T., Sese, F. J. & Urquizu, P. (2011). The role of social motivations in e-learning: How do they affect usage and success of ICT interactive tools? *Computers in Human Behavior*, 27(6), 2224-2232. doi: [10.1016/j.chb.2011.07.001](https://doi.org/10.1016/j.chb.2011.07.001)
- Huang, W. H. D. & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments*, 18(3), 233-244. doi: [10.1080/10494820.2010.500520](https://doi.org/10.1080/10494820.2010.500520)
- Lim, W., So, H. & Tan, S. (2010). ELearning 2.0 and new literacies: are social practices lagging behind. *Interactive Learning Environments*, 18(3), 203-218. doi: [10.1080/10494820.2010.500507](https://doi.org/10.1080/10494820.2010.500507)
- Oblinger, D. & Oblinger, J. (Eds.). (2005). *Educating the net generation*. Washington DC: Educause. Retrieved from <http://www.educause.edu/educatingthenetgen>
- Tremblay, R. (2006). "Best Practices" and collaborative software in online teaching. *International Review of Research in Open and Distance Learning*, 7(1). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/309/513>

References Pertaining to Wikis

- Glassman, M. & Kang, M. J. (2011). The logic of wikis: The possibilities of the Web 2.0 classroom. *International Journal of Computer-Supported Collaborative Learning*, 6(1), 93-112. doi: [10.1007/s11412-011-9107-y](https://doi.org/10.1007/s11412-011-9107-y)
- Godwin-Jones, R. (2003). Emerging technologies: Blogs and wikis: Environments for on-line collaboration. *Language, Learning & Technology*, 7(2). Retrieved from <http://global.factiva.com.libproxy.uoregon.edu/ha/default.aspx>
- Huang, W. H. D. & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments*, 18(3), 233-244. doi: [10.1080/10494820.2010.500520](https://doi.org/10.1080/10494820.2010.500520)
- Lim, W., So, H. & Tan, S. (2010). ELearning 2.0 and new literacies: are social practices lagging behind. *Interactive Learning Environments*, 18(3), 203-218. doi: [10.1080/10494820.2010.500507](https://doi.org/10.1080/10494820.2010.500507)
- Su, F. & Beaumont, C. (2010). Evaluating the use of a wiki for collaborative learning. *Innovation in Education and Teaching International*, 47(4), 417-431. doi: [10.1080/14703297.2010.518428](https://doi.org/10.1080/14703297.2010.518428)