

# Examining the Roles of Blended Learning Approaches in Computer-Supported Collaborative Learning (CSCL) Environments: A Delphi Study

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## ABSTRACT

In this study, a Delphi method was used to identify and predict the roles of blended learning approaches in computer-supported collaborative learning (CSCL) environments. The Delphi panel consisted of experts in online learning from different geographic regions of the world. This study discusses findings related to (a) pros and cons of blended learning approaches in CSCL; (b) blended learning for collaboration in various contexts including the narrative accounts of blended learning approaches in CSCL given by the Delphi panelist; and (c) the future of blended learning in CSCL, via three-phases of online survey questions. Implications for design issues and future research into blended learning and CSCL are also included.

## Keywords

Blended learning, Computer-supported collaborative learning, e-learning, Delphi study

## Introduction

During the past decade, there has been a significant movement toward online and blended formats of learning. This is apparent across educational sectors including K-12 schools as well as adult learning in higher education, the military, government settings, and corporate training environments. One large-scale survey in 2006 showed this increasing acceptance of e-learning practices in higher education. In that study, approximately twenty percent of US higher education students had taken at least one online course. At the same time, however, people across educational sectors have increasingly expressed concerns about the quality and cost-effectiveness of e-learning solutions (Seaman, 2009). For instance, many students who take online courses never complete them (Tyler-Smith, 2006). Faculty members also face new challenges related to the increasing time for course preparation and interaction with students.

Still, many educators suggest that there are positive impacts of e-learning related to changes in pedagogical practices. Unfortunately, despite the increasing adoption of learning technologies, pedagogical changes in online learning have been slow. In fact, many online courses focus on content delivery and tutorial-based instruction. Simply turning classroom lectures into online learning formats does not necessarily provide students with the opportunities for rich interactions arising from engagement in activities that make learning experiences meaningful. Instead, it is important to have deep understandings of *how people learn* as well as *what new technology can provide* for the successful design of technology-integrated learning environments (Bransford, Brown, & Cocking, 2002).

With some concerns and associated dissatisfactions with e-learning approaches, people have searched for other instructional delivery solutions. The term *blended learning*, combining face-to-face and online learning, has been discussed as a promising alternative to traditional instruction and training. While there is a steady movement toward blended learning approaches in education and training sectors, there are myriad questions that need to be examined before fully accepting any promises suggested by blended learning experts. For instance, is blended learning really an effective and efficient approach? What are potential disadvantages of blended learning? How would blended learning change our learning environments? These and other questions must be asked. Towards this end, this study examines the roles of blended learning in higher education. Specifically, this study focuses on blended learning approaches in computer supported collaborative learning (CSCL) environments.

## Blended Learning: From Delivery Technology to Learning Technology

Generally, blended learning is defined as learning systems combining face-to-face instruction with technology-mediated instruction (Bonk & Graham, 2006). While there is no doubt that blended learning approaches are increasingly implemented in several learning settings, the emphasis in blended learning so far has been mostly

related to the delivery aspects of technology which concerns access to instruction and information. In fact, relatively little attention has been paid to learning design technology, selecting appropriate modes of interaction, and designing activities based on robust learning theories. Despite the difficulty of choosing the right combination of interaction modes, most companies and universities tend to select instructional delivery methods based on a single criterion—availability.

What is promising, however, in the current trends of blended learning research is the shift of focus from delivery-centered technology to learning technology coupled with pedagogical considerations. The frameworks suggested by Osguthorpe and Graham (2003) and Graham (2006) are particularly useful demonstrating the application of pedagogical approaches in deciding what is blended and what the goals of blending are. Beyond the simple combination of face-to-face and online instruction, they argue that there are different types and levels of mixing in blended learning: activity level blending, course-level blending, and program-level blending. At the activity and course levels, blended learning can be used to design learning activities, interactions among students, and interactions between or with instructors. Program-level blends tend to be more administratively than pedagogically driven. It is further suggested that blended learning environments vary widely according to the following goals: pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness, and ease of revision. Some recent research appears to emphasize the complex and dynamic nature of blending learning experiences situated in contexts of learning, learners, and activities. For example, Boyle (2005) examined how to improve a blended learning course from pedagogical design perspectives, and argued that “blended courses that are developed to solve different problems should take different forms, as it is the nature of the problem that determines the form of the blend” (p.222).

## **Computer-Supported Collaborative Learning: Face-to-Face, Online, or Both?**

Koschmann (2002) defines CSCL as “a field centrally concerned with meaning and practices of *meaning-making* in the context of *joint activity* and the ways in which these practices are mediated through designed artifacts” (p.18, emphasis added). Two critical elements in CSCL as the name suggests are collaborative learning and computer-support. In addition, Koschmann suggests that CSCL is concerned with collaborative-meaning making processes that go beyond information sharing among multiple people. Technology such as computers can play a critical role to support or mediate the interactive process of collaborative meaning making in the context of joint activities involving multiple users and multiple modes of interaction. In several contexts, CSCL means blended learning experiences through the mediation of technology rather than being completely online or face-to-face (e.g., Clouder et al., 2006; Koschmann et al., 2005; Michinov & Michinov, 2008; Suthers, 2006).

An important question in blended learning when it is situated in CSCL environments, then, is how to coordinate the two modes of communication (i.e., face-to-face and online) to better support collaboration. In other words, it is important to bring the continuity of learning experiences across multiple time and space to create more holistic and integrated learning experiences. For instance, Ellis, Goodyear, Prosser and O’Hara (2006) argue that blending face-to-face and online discussion has become an important part of the learning experiences for university students, and that it is important to examine how students perceive, approach, and learn from across these two different contexts. In discussion blended learning approaches in CSCL contexts, it is important to know that CSCL does not aim to replace face-to-face interaction, but rather enhances it by providing more resources for learning. Suthers (2006) argues that if we try to replicate face-to-face interaction through the medium of online technology, the goal seems to fail due to the complexity of temporal and spatial factors associated with human interaction. Instead of replication of face-to-face types of interaction, we need to understand what tasks and learning activities online interaction can be better achieved than face-to-face learning. So (2009) echoes the importance of learning experiences integrating online and face-to-face interaction by arguing that there is a need to design CSCL tools to support the effective integration of online and face to-face communication so that critical discourse episodes in face-to-face discussions are not lost and continue to develop online.

## **The Present Study**

This study was designed to examine both the current practices and the future of blended learning approaches in computer supported collaborative learning (CSCL) environments. Toward this goal, this research study used a Web-

based Delphi method to capture the judgment of recognized experts in the field of online learning. The Delphi technique is “a method for the systematic solicitation and collection of judgments on a particular topic through a set of carefully designed sequential questionnaires interspersed with summarized information and feedback of opinions derived from earlier responses” (Delbecq, Van de Ven, & Gustafson, 1975, p. 10). The Delphi technique has been considered as a time- and cost-efficient method to obtain opinions from experts without physically bringing them together for a face-to-face meeting. In addition to flexibility and efficiency, one of the major advantages of the Delphi technique is anonymity which removes common biases occurring in face-to-face group settings (Listone & Turoff, 1975). Delphi study is a method to overcome implicit weaknesses in group communication, such as confrontation, argumentation, or dominance by a few individuals. To minimize such limitations, individuals, who are anonymous and independent, are free to express their own ideas without direct communication with each other. Instead of discussing or debating among individuals, consensus on a certain issue is achieved through a carefully designed series of surveys, facilitated by the researchers conducting the study.

In the area of learning technology, several studies used the Delphi method to (a) identify current practices and perceived obstacles (e.g., Brescia & Miller, ; Buss, 2001; Herring, 2004; Kramer, Walker, & Brill, 2007; Williams, Boone, & Kingsley, 2004), (b) draw consensus on ill-defined problems or constructs (e.g., Brill, Bishop, & Walker, 2006; Soo & Bonk, 1998; Yang, 2000), and (c) forecast future events and trends (e.g., Holden & Wedman, 1993; Pollard & Pollard, 2004-2005). A Delphi study, therefore, was deemed useful in better understanding the uses and implications of blended learning in a collaborative framework.

## Methods

### Research Design

In the present study, the Delphi technique was used in an online environment to enable researchers to recruit experts from all over the world. The Web-based survey tool used for this particular study was SurveyShare (see <http://www.surveymshare.com/>). A Web-based Delphi technique has been used to overcome limitations in Delphi process using paper-based surveys. We used the steps suggested by Wilhelm (2001) to conduct three rounds of information and consensus gathering as shown in Figure 1.

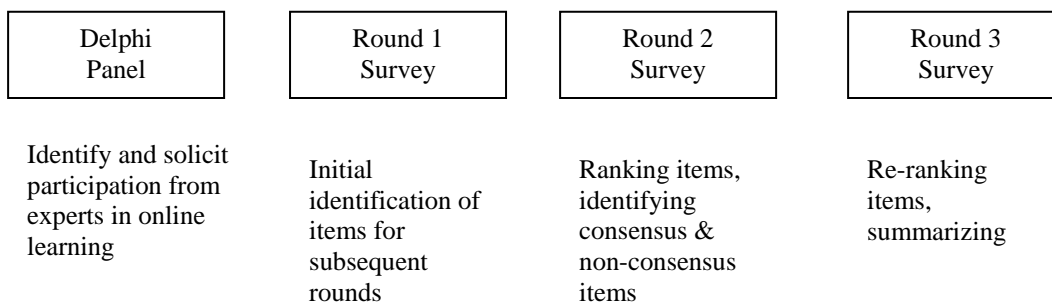


Figure 1: The Delphi study process

### Selection of the Delphi Panel Members

Thirty-two experts who had contributed chapters to the *Handbook of Blended Learning* (Bonk & Graham, 2006) were identified as possible members for the Delphi panel. Twelve of them participated in Round 1, though a few others who attempted to complete the survey but did not finish it, were kept in the pool for subsequent rounds. In Round 1, a total of 12 experts responded, thereby giving a response rate of 38%. There are 5 males and 7 females, mostly from university settings. We asked the Round 1 panelists to recommend experts, and two more participants were included in Round 2 (n=14). The Round 2 panel includes 4 from North America, 2 from Europe, 4 from Asia, and 4 from other countries. Since the expertise of the Delphi panelist is considered to be the most important feature

for selection, we asked the panel members to indicate their expertise level of blended learning and CSCL. Thirteen members indicated a high level of expertise in blended learning, and 11 members for CSCL. Again in Round 3, we asked the Delphi panelists to recommend experts, and six more participants were added (n=20).

## Procedure and Data Analysis

### Round 1

The main purpose of the first round of this study was to identify various emerging issues of blended learning approaches in supporting CSCL environments, which could serve as the basis for the subsequent rounds. All communication between the researchers and panel members was conducted online so as to allow anonymous and confidential responses. This form of communication was also intended to increase the speed of data collection and analysis for subsequent rounds. In addition to some background information (e.g., gender, age, and occupation), the Round 1 online survey included eight open-ended questions to generate common themes which could serve as the basis for the subsequent rounds of the survey. The eight questions were:

1. In general, how can blended learning strategies facilitate collaborative learning activities?
2. How might blended learning hamper or interfere with online collaborative learning activities?
3. How might blended learning foster collaboration among students in a class?
4. How might blended learning foster collaboration among students located in more than one university or region?
5. How might blended learning foster collaboration among instructors?
6. How might blended learning foster collaboration among students and their instructors or tutors?
7. How might blended learning foster collaboration of students and experts?
8. How might online collaboration within blended learning change or be different in 20 years?

The panel members had approximately two weeks to complete and return their responses. Data was then analyzed to generate a list of statements for subsequent rounds. We identified a total of 38 statements from the collected responses. These statements were used as survey items for Rounds 2 and 3.

### Round 2

The main goal of this round was to build consensus by identifying areas of agreement or disagreement among the Delphi panel members. Each member was asked to evaluate questions according to the perceived importance they placed on each item. As standard with a Delphi approach, they were required to rate each item without knowledge of who submitted responses. As suggested by Clayton (1997), we employed a five-point Likert scale using zero as a mid point. Such a scale contained both positive and negative values thereby allowing respondents and researchers to easily interpret the level of consensus on each item. For instance, a statement with a mean rating of +1 or above indicates strong consensus among panel members. Below is an example of a Delphi item used in the Round 2:

2. How might blended learning hamper or interfere with online collaborative learning activities?  
2.5 There must be a correspondence between face-to-face and online course components:  
Strongly Disagree (-2), Disagree (-1), Undecided (0), Agree (1), Strongly Agree (2)

In addition to indicating agreement or disagreement, participants were asked to perform three additional tasks: (1) to rate their expertise level for each question (0=No expertise, 1=Low expertise, 2=Average expertise, 3=High expertise); (2) to rank the statement that they perceived to be the most important for each question; and (3) to provide a brief explanation for their selection of the most important statement. As recommended by Turoff and Hiltz (1995), we asked respondents to indicate confidence in their judgment so that they would not feel obliged to answer items that they did not have expertise. Collecting both numerical rankings and brief descriptions allowed us to capture richer perspectives on problems under consideration, which is often limited in a conventional format of the Delphi method, mainly relying on quantitative statistics-oriented data (Brill et al., 2006).

Since the main goal of Round 2 was to determine the degree of consensus among the Delphi panel members, descriptive statistics were used to calculate central tendency and variability: (1) *mean* (M) as central tendency; and

(2) *standard deviation* (SD) and *quartile deviation* (QD) as variability. Mean is the average of a five-point Likert scale using zero as a mid point, ranging from Strongly Disagree (-2) to Strongly Agree (2). In this study, quartile deviation was used to determine consensus. Quartile deviation refers to the difference between the 25<sup>th</sup> and 75<sup>th</sup> percentile in a frequency distribution (QD=Q3-Q1). According to the criteria used by Faherty (1979) as well as Holden and Wedman (1993), items that receive a quartile deviation  $\leq .6$  are considered to be high consensus. Items that receive a quartile deviation of greater than .6 but less than or equal to 1.00 indicates moderate consensus. When a quartile deviation is greater than 1.00, items are considered to be low consensus. Generally, through three or more rounds of survey, a mean is expected to increase while standard deviation and quartile deviation are expected to decrease. Frequency counts (*f*) were also calculated to rank items in terms of perceived importance.

### Round 3

The main purpose of Round 3 was to achieve a high consensus. In general, the Delphi rounds are terminated when moderate to high convergence (e.g., QD  $\leq 1.0$ ) is reached among the panel members. According to the suggestion by Yang (2000), the survey items in this round were presented with descriptive statistics (M and SD next to item statements) and frequency distribution of the experts' ratings (expressed by the number of \*) from Round 2. Below is an example of a Delphi item used in the Round 3. This item asks the panel members to re-evaluate whether they agree or disagree that blended learning helps knowledge construction after reviewing the data gathered from Round 2. The number of \* in this item indicates that in Round 2, seven panel members strongly agree with the given statement. This format of presentation allows each panel member to visualize how his rating compares with regard to the group ratings.

1. In general, how can blended learning strategies facilitate collaborative learning activities?
  - 1.4. Blended learning helps knowledge co-construction. (M=1.21, SD=.98)

(-2) Strongly Disagree	0
(-1) Disagree	* 1
(0) Undecided	** 2
(1) Agree	**** 4
(2) Strongly Agree	***** 7

The Delphi panelists who participated in Round 2 were asked to express agreement or disagreement by rating the same items again. Same as the previous round, descriptive measures about central tendency and variability for each item were calculated. In addition to survey items, we asked the panel to provide a story of how they had fostered collaboration in a blended environment in order to collect more qualitative accounts of their experiences and perspectives about blended learning approaches and CSCL:

Provide a story of how you have fostered collaboration in a blended environment (e.g., Students in Curt Bonk's face-to-face class last year conducted collaborative case analyses with students from the Open University in Malaysia within specially designed discussion forums of a learning management system. Students were paired up across institutions- each team consisted of one student from Indiana University and one from the Open University of Malaysia. Instructors as well as peers could comment on their ideas and solutions.

Thirteen participants responded this item, thereby giving 65% of the response rate.

## Results

### Overview of Findings

From the open-ended responses in Round 1, we identified 38 themes for the 8 questions and used them for the subsequent rounds. After the third round, 24 items (69%) achieved a mean in the range of 1 (agree) and 2 (strongly

agree), and 35 items (92%) reached a high consensus ( $QD \leq .5$ ). Three items that could not receive high consensus are:

- Q: Blended learning interfering collaboration
  - Students may feel that there's no need to go online if they can work face-to-face. (QD=1)
  - Students can equate online activities with self-paced work and face-to-face activities with collaboration. (QD=1)
- Q: Blended learning fostering collaboration between students and experts
  - It is easier to get experts. (QD=1)

In order to present data in a more meaningful way, the survey responses are organized into three sections: (1) pros and cons of blended learning approaches in CSCL; (2) blended learning for collaboration in various contexts including the narrative accounts of blended learning approaches in CSCL given by the Delphi panelist; and (3) the future of blended learning in CSCL.

### Pros and Cons of Blended Learning Approaches in CSCL

The first two questions asked about how blended learning approaches could facilitate or hamper collaborative learning activities. As shown in Table 1, the panelist responded that blended learning approaches are useful for communication and knowledge co-construction perspectives. Flexibility and time-efficiency appeared often in their responses as advantages of blended learning approaches. Regarding negative aspects of blended learning, there was a high consensus on the item “there must be a correspondence between face-to-face and online course components”. Thirteen participants ranked this item the most important. The mean of the item “Students can equate online activities with self-paced work and face-to-face activities with collaboration” was below 0, indicating that the majority of the panel members disagreed with this statement. None of the panel members ranked this item as important.

Table 1. Pros and cons of blended learning approaches in CSCL

Rank	Statement	f	M	SD	QD
<i>In general, how can blended learning strategies facilitate collaborative learning activities?</i>					
1	Blended learning supports flexibility and effectiveness in work and communication.	7	1.30	.57	.5
2	Blended learning helps knowledge co-construction.	6	1.10	.97	.5
3	Blended learning provides the time and flexibility for preparation and follow-up and the time-specific stimulus of a face-to-face session to keep students on track.	5	1.05	.62	.5
4	Blended learning helps relationship building.	2	.90	.72	0
5	Blended learning facilitates project management with online technologies.	0	.85	.75	.5
<i>How might blended learning hamper or interfere with online collaborative learning activities?</i>					
1	There must be a correspondence between face-to-face and online course components.	13	1.35	.75	.5
2	It can interfere when the different blended components are not well connected.	4	1.20	.41	0
3	Lack of access and skills to make effective use of the tools are potential barriers.	2	1.00	.80	.5
4	Students may feel that there's no need to go online if they can work face-to-face.	1	.25	1.02	1
5	Students can equate online activities with self-paced work and face-to-face activities with collaboration.	0	-.11	.88	1

Note. SD= -2, D=-1, U=0, A=1, SA=2

## Blended Learning for Collaboration in Various Contexts

Next, we collected the knowledge and opinions held by the Delphi panelist regarding blended learning approaches for collaborative learning in various contexts, including collaboration among students in a class, across different geographical settings, collaboration among instructors, collaboration between students and instructors, and collaboration between students and experts. Table 2 summarizes descriptive measures for these categories. An interesting pattern is found in this set of questions. The majority of the panel members expressed that how blended learning fosters collaboration in various contexts depends on how the course is designed to involve interaction with others, signaling that there was higher consensus on the importance of *design issues* in blended learning and CSCL. Some statements received both low frequencies in ranking and low mean scores, indicating lower importance and higher disagreement. These items include: “Students and instructors can take equivalent roles in the teaching and learning process;” “Students can talk to experts more intensively via online learning;” and “It is easier to get experts.”

Table 2. Blended learning for collaboration in various contexts

Rank	Statement	<i>f</i>	M	SD	QD
<i>How might blended learning foster collaboration among students in a class?</i>					
1	Blended learning can widen access to resources.	6	1.65	.49	.5
1	Online tools can support project management and discussion.	6	1.45	.69	0
2	Students can collaborate online after building a sense of community in a face-to-face context.	4	1.25	.79	.5
2	Online space provides opportunities for students to discuss knowledge and clarify misconceptions.	4	1.20	.41	0
3	Responses can be made either in face-to-face or online environments.	0	1.00	.80	.5
<i>How might blended learning foster collaboration among students located in more than one university or region?</i>					
1	While face-to-face components typically occur within a local university, online collaboration can involve collaboration with students outside an institution.	7	1.25	.44	.5
2	The location of the collaborators does not matter.	6	.85	.75	0
3	The online learning management system (LMS) can be used as a medium to enhance collaboration.	4	1.15	.37	0
4	Online learning results in distributed working on class tasks and reduces travel.	2	.80	.70	.5
<i>How might blended learning foster collaboration among instructors?</i>					
1	It depends on how the learning design involves interactions with others.	12	1.35	.59	.5
2	Instructors in the same department or even across departments can collaborate and learn from each other by sharing resources.	3	1.00	.46	0
2	Blended learning can be used to offer online staff development courses.	3	1.20	.52	.5
3	Blended learning has the potential to develop networks beyond the conference circuit.	1	1.10	.55	.5
3	Blended learning can help instructors maintain their standard curriculum as well as their instructional processes, thereby providing quality controls and learning outcomes assurances.	1	.40	.68	.5
<i>How might blended learning foster collaboration among students and their instructors or tutors?</i>					
1	It depends on how the course is designed.	15	1.70	.47	.5
2	With online technologies, it is possible to have ongoing conversations and collaborations with instructors outside of the traditional learning space.	3	1.45	.51	.5
3	Blended learning can foster open two-way learning and communication.	2	1.11	.57	.5
4	Students and instructors can take equivalent roles in the teaching and learning process.	0	.45	1.05	.5
<i>How might blended learning foster collaboration of students and experts?</i>					
1	It depends on how the learning design involves interactions with others.	13	1.55	.51	.5

2	Students can have instant access to the work of experts, but need to gather, evaluate, and use information in a responsible way.	4	1.30	.57	.5
3	Experts can share their expertise through both online and off-line formats.	2	.90	.45	0
4	Students can talk to experts more intensively via online learning.	0	.65	.99	0
4	It is easier to get experts.	0	.20	.89	1

Note. SD= -2, D=-1, U=0, A=1, SA=2

To further explore design issues of blended learning in CSCL, we asked the Delphi panel members to describe how in practice they had used blended learning approaches to foster collaborative learning in their class (activity or course level) or institutions (program level). Some common themes emerged from the narrative accounts. The most frequently mentioned format of collaborative learning tasks is collaborative writing. That is, students are given a small group task to complete, often in a mandatory participation structure, and a technology medium such as wikis or online discussion forums are used to facilitate the collaborative writing processes. Face-to-face interaction is used for presentation or to continue to work on the group task as shown in the following descriptions:

Students in my course were asked to create a wiki on a topic in pairs; this was then presented to the rest of the class for comments in two forms of a forum and also by encouraging the other class members to add their own ideas. Finally after 2 weeks the original pair wrote up a reflection about the topic for their class assignment. (Panel member #1)

Students in a seminar on design-based research (DBR) on collaborating on the authorship of an edited book about the DBR. The topical outline and writing assignments were worked out face-to-face and the writing is proceeding online with sharing of drafts, etc. (Panel member #2)

Another interesting finding is related to blended learning at the inter-program (residential and distance) and inter-university collaboration (universities in different countries) levels. Three panel members described that their institutions have used blended learning approaches for collaboration across different programs and countries, indicating a macro-level implementation of blended learning.

Students in my blended learning class last year conducted collaborative case analyses with students from the Indiana University...each team consisted of one student from Indiana University and one from the Open University of Malaysia. Instructors as well as peers could comment on their ideas and solutions. (Panel member #14: Inter-University collaboration)

We are researching blended learning across 4 universities: two in Malaysia and two in the UK (Panel member #15: Inter-University collaboration)

Students in an introductory instructional design worked in teams (2 residential and 2 distance students to a team) to complete instructional design projects creating a concept lesson. (Panel member #20: Inter-program collaboration)

Table 3. The future of blended learning in CSCL

Rank	Statement	f	M	SD	QD
	<i>How might online collaboration within blended learning change or be different in 20 years?</i>				
1	There will be no bi-polar classification of online learning and off-line learning. All the learning will be blended learning.	13	1.40	.60	.5
2	More international collaboration will be possible.	2	1.20	.62	.5
2	The technology will change, but the need to collaborate and the basic principles of learning may not.	2	1.15	.49	0
2	Integrated and ubiquitous technologies will provide seamless, fast, and easy access to shared environments.	2	1.11	.57	0
3	Collaborative activities will become more complex, but more resources to support them will be available.	0	1.05	.51	0

Note. SD= -2, D=-1, U=0, A=1, SA=2



## **The Future of Blended Learning in CSCL**

Finally, we asked the Delphi panel member about their projections of the future of blended learning approaches in CSCL environments. As presented in Table 3, all the items in this section reached a high consensus (i.e.,  $QD \leq .6$ ). Of particular note in this section was high consensus on the item “There will be no bi-polar classification of online learning and off-line learning. All the learning will be blended learning.” Thirteen of 19 panel members (68%) ranked this item as of highest importance. This may show the Delphi panel member’s positive view on the pervasiveness of blended learning approaches in higher education. Other statements related to the future of blended learning and CSCL include the potential of international collaboration and ubiquitous learning for seamless experiences.

## **Discussion**

In the area of CSCL, issues of blending face-to-face and online interaction have gained increasing interest and attention recently: how much of interaction should take place in face-to-face or online settings? When should we use online versus face-to-face interaction? How can we integrate two modes of interaction in a seamless way to increase continuity of learning experiences? Ultimately, these questions revolve around how to get the right mix. Anderson (2003) points out that “getting the right mix involves a series of tradeoffs, and knowing how one type of interaction can effectively substitute for another, provides an essential decision making skill in the distance educators’ knowledge base” (p.10).

Recognizing the increasing trend of blended learning approaches in higher education settings, this study aimed to collect the knowledge and opinions held by the experts in the field of online learning regarding the current practices and the future projections of blended learning approaches in the context of CSCL. Experts from North America, Asia Pacific, Europe, and other countries participated in the online Delphi study process anonymously. Through three phases of online survey implementations, we inquired about various aspects of collaborative learning such as collaboration among students, instructors, distance peers, experts, etc. In addition, we asked the Delphi panelist to provide narrative accounts about their application of blended learning approaches in practice in order to overcome the limitation of the traditional Delphi method relying on quantitative measures.

Overall, the Delphi panel members reached a high consensus on the most of the 38 items. In terms of ranking, there were a number of items with high consensus. The participants found agreement related to the importance of the design aspects of blended learning approaches to support collaborative learning. They also felt that deciding when to use human interaction or technology-mediated interaction is a complex decision involving several design considerations. Additionally, most of them expressed that the coordination or correspondence between face-to-face and online interaction is a critical factor affecting collaborative learning processes. In narrative accounts of blended learning approaches implemented in their own contexts of teaching and learning, the Delphi panel members described collaborative writing tasks for small group assignments as valuable. In addition, technology components such as wikis and online discussion forums were often mentioned as a tool to facilitate online interaction. It also appeared that some institutions are implanting blended learning at a somewhat macro level by encouraging collaboration across different programs and institutions. Finally, the Delphi panel projected that there would be no bi-polar classification of online learning and off-line learning as all the learning experiences would soon be blended to some extent. This projection is consistent with the research trend in CSCL which emphasizes the seamless integration of face-to-face and online interaction to create rich intersubjective meaning-making endeavors across various settings and time (e.g., Clouder et al., 2006; Olson & Olson, 2000; Suthers, 2006).

The experts in this Delphi study provided a fairly consistent voice. According to them, blended learning offers unique opportunities for international collaboration, knowledge construction and negotiation, and project management. At the same time, the resources available to students for such interactions and collaborations widen the spectrum of learning. As the experts indicated, blended learning also offers greater flexibility and opportunities for community building among students. Equally important, instructors can share their ideas and course materials more readily with each other.

While there are many advantages to a blended course, blended learning is complex. Instructors new to blended learning will need additional training in what it offers for teaching and learning. They will need examples of

international collaboration, expert feedback and collaboration, resource exploration, successful online conversations and negotiations, and online learning communities. As new technologies emerge, such training will be ongoing during the coming decade. They will need to understand not just what blended learning is, but also the models or frameworks that support it (Bonk & Graham, 2006). Instructors could also benefit from seeing examples of common problems in online or Web supplemented learning environments and possible blended learning solutions.

The forms of learning have splintered in the twenty-first century. People now learn from online discussions, listening to podcasts, attending lectures or online Webinars, reflecting on their blogs, browsing websites, and various forms of online collaboration. As this continues to happen, it will be increasingly difficult to differentiate between face-to-face forms of learning and online ones; instead, they will typically include some of both. To say that a course was “off-line” will be just as much a misnomer as calling another class “online.” Today this overlap between the two areas we typically refer to as blended. It is conceivable that the vast majority of formal as well as informal learning experiences in the future will be blended ones.

So the projection from the experts of this study that there will be no bi-polar classification of online learning and off-line learning and that all learning will, in effect, be blended, seems highly likely. Another alternative is that educators will soon just refer to everything as *learning*, as they used to prior to the emergence of distance and online learning. What is certain is that perceptions of what learning is are changing fast. Terms such as e-learning, online learning, and blended learning may only be temporary concepts that soon evolve or are superseded by other delivery mechanisms.

## Concerns and Future Work

It should be noted that the small panel size of this study limits the generalizability of the results. And even though we modified the Delphi process to collect more qualitative data about the participants’ knowledge and opinions, the survey format itself has many limitations related to the depth of participant responses as well as the constraining value of each question. Therefore, this study intends to provide descriptive overviews of the role of blended learning approaches in CSCL environments expressed by the experts in the field of online learning. Further detailed research is needed to have better understandings of some critical questions identified in the present study: the design issues of blended learning approaches to support CSCL and the ways to create a seamless and effective integration of face-to-face and online interaction.

## Conclusion

Blended learning is clearly a key part of teaching and learning today and will remain so in the near future. Collaboration and international exchanges will undoubtedly be integral to many of these blended learning efforts. As indicated in this research, instructors who understand the advantages of blended learning can enhance the degree and impact of collaboration within their classes as well as between classes around the world. We are in a global educational world which relies on blended learning in many courses, fields, and disciplines. Advances within the field of CSCL, in fact, will hinge on better understanding and use of blended pedagogical approaches. This research sheds a bit of light on where blended learning experts think such approaches are most valued and beneficial today and tomorrow. However, as noted, additional research and pedagogical experimentations are now needed from both the blended learning experts as well as those mores novice to the approach.

## References

- Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *International Review of Research in Open and Distance Learning*, 4(2).
- Bonk, C. J., & Graham, C. R. (Eds.). (2006). *Handbook of blended learning: Global perspectives, local designs*. San Francisco, CA: Pfeiffer Publishing.
- Boyle, T. (2005). A dynamic, systemic method for developing blended learning. *Education, Communication & Information*, 5(3), 221-232.

- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2002). *How people learn: Brain, mind, experience, and school*. Washington, DD: National Academy Press.
- Brescia, W. F., & Miller, M. T. (2006). What's it worth? The perceived benefits of instructional blogging. *Electronic Journal for the Integration of Technology in Education*, 5, 44-52.
- Brill, J. M., Bishop, M. J., & Walker, A. E. (2006). The competencies and characteristics required of an effective project manager: A web-based Delphi study. *Educational Technology Research & Development*, 54(2), 115-140.
- Buss, A. R. (2001). A Delphi study of educational telecollaborative projects: Identifying critical elements and obstacles. *Journal of Educational Computing Research*, 24(3), 235-248.
- Clayton, M. J. (1997). Delphi: A technique to harness expert opinion for critical decision-making tasks in education. *Educational Psychology*, 17(4), 373-386.
- Clouder, L., Dalley, J., Hargreaves, J., Parkes, S., Sellars, J., & Toms, J. (2006). Electronic [re]constitution of groups: Group dynamics from face-to-face to an online setting. *International Journal of Computer-Supported Collaborative Learning*, 1(4), 467-480.
- Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning: A guide to nominal group and Delphi processes*. Glenview, IL: Scott, Foresman & Company.
- Ellis, R. A., Goodyear, P., Prosser, M., & O'Hara, A. (2006). How and what university students learn through online and face-to-face discussion: Conceptions, intentions, and approaches. *Journal of Computer Assisted Learning*, 22, 244-256.
- Faherty, V. (1979). Continuing social work education: Results of a Delphi survey. *Journal of Education for Social Work*, 15(1), 12-19.
- Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3-21). San Francisco, CA: Pfeiffer Publishing.
- Herring, M. C. (2004). Development of constructivist-based distance learning environments: A knowledge base for K-12 teachers. *The Quarterly Review of Distance Education*, 5(4), 231-242.
- Holden, M. C., & Wedman, J. F. (1993). Future issues of computer-mediated communication: The results of a Delphi Study. *Educational Technology Research & Development*, 41(4), 5-24.
- Koschmann, T. (2002). *Dewey's contribution to the foundations of CSCL research*. Paper presented at the Computer Support for Collaborative Learning 2002, Boulder, CO.
- Koschmann, T., Zemel, A., Conlee-Stevens, M., Young, N., Robbs, J., & Barnhart, A. (2005). How do people learn: Member's methods and communicative mediation. In R. Bromme, F. W. Hesse & H. Spada (Eds.), *Barriers and biases in computer-mediated knowledge communication (and how they may be overcome)* (pp. 265-294). Amsterdam: Kluwer Academic Press.
- Kramer, B. S., Walker, A. E., & Brill, J. M. (2007). The underutilization of information and communication technology-assisted collaborative project-based learning among international educators: A Delphi study. *Educational Technology Research & Development*, 55, 527-543.
- Listone, H. A., & Turoff, M. (1975). *The Delphi method techniques and applications*. London: Addison-Wesley.
- Michinov, N., & Michinov, E. (2008). Face-to-face contact at the midpoint of an online collaboration: Its impact on the patterns of participation, interaction, affect, and behavior over time. *Computers & Education*, 50(4), 1540-1557.
- Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction*, 15, 139-178.
- Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *The Quarterly Review of Distance Education*, 4(3), 227-233.
- Pollard, C., & Pollard, R. (2004-2005). Research priorities in educational technology: A Delphi study. *Journal of Research on Technology in Education*, 37(2), 145-160.
- Seaman, J. (2009). Online learning as a strategic asset volume II: The paradox of faculty voices. Retrieved September 16, 2009, from <http://www.aplu.org/NetCommunity/Document.Doc?id=1879>.
- So, H. J. (2009). When groups decide to use asynchronous online discussions: Collaborative learning and social presence under a voluntary participation structure. *Journal of Computer Assisted Learning*, 25(2), 143-160.
- Soo, K. S., & Bonk, C. J. (1998). *Interaction: What does it mean in online distance education?* Paper presented at the Ed-Media & Ed-Telecom 98.
- Suthers, D. D. (2006). Technology affordances for intersubjective meaning making: A research agenda for CSCL. *International Journal of Computer-Supported Collaborative Learning*, 1, 315-337.

Turoff, M., & Hiltz, S. R. (1995). Computer based Delphi processes. In M. Adler & E. Ziglio (Eds.), *Gazing into the oracle: The Delphi method and its application to social policy and public health* (Vol. 55-88). London: Kingsley Publishers.

Tyler-Smith, K. (2006). Early attrition among first time eLearners: A review of factors that contribute to drop-out, withdrawal and non-completion rates of adult learners undertaking eLearning programmes. *MERLOT Journal of Online Learning and Teaching* Retrieved September 16, 2009, from [http://jolt.merlot.org/Vol2\\_No2\\_TylerSmith.htm](http://jolt.merlot.org/Vol2_No2_TylerSmith.htm)

Wilhelm, W. J. (2001). Alchemy of the oracle: The Delphi technique. *The Delta Pi Epsilon Journal*, 43(1), 6-26.

Williams, D. L., Boone, R., & Kingsley, K. L. (2004). Teacher beliefs about educational software: A Delphi study. *Journal of Research on Technology in Education*, 36(3), 213-229.

Yang, Y. N. (2000). *Convergence on the guidelines for designing a Web-based art-teacher education curriculum: A Delphi study*. Paper presented at the Annual meeting of the American Educational Research Association.