

# Designing for an inquiry based approach to blended and online learning

Norman Vaughan<sup>1</sup>

Mount Royal University, Calgary, Alberta, Canada

## Abstract

The purpose of this article is to demonstrate how Garrison, Anderson, and Archer's (2001) Practical Inquiry model can be used to create effective blended and online learning experiences. The article begins with an introduction to inquiry-based learning followed by design strategies and examples of how digital technologies can be used to successfully integrate synchronous and asynchronous opportunities for learning in blended and online courses.

**Key words:** Blended learning, Online learning, Inquiry based approach, Digital technologies.

## Resumo

O objetivo deste artigo é demonstrar como o modelo de Inquirição Prática de Garrison, Anderson e Archer (2001) pode ser usado para criar experiências eficazes de aprendizagem híbridas e a distância. O artigo começa com uma introdução à aprendizagem baseada na investigação, seguida de estratégias de *design* e exemplos de como as tecnologias digitais podem ser usadas para integrar com sucesso as oportunidades síncronas e assíncronas de aprendizagem em cursos híbridos e a distância.

**Palavras-chave:** Aprendizagem híbrida, Aprendizagem online, Modelo de inquirição prática, Tecnologias digitais.

## Introduction

Inquiry-based learning has been described in a variety of forms and contexts (BRUNER, 1961; DEWEY, 1997; VYGOTSKY, 1962). Alberta Education (2004) defines this approach to learning as a

(...) process where students are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge. That knowledge is new to the students and may be used to answer a question, to develop a solution or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action (p. 3).

The Galileo Educational Network (2014) adds that inquiry-based learning is the “study into a worthy question, issue, problem or idea. It is the authentic, real work that that someone in the community might tackle. It is the type of work that those working in the disciplines actually undertake to create or build knowledge” (n.p.). The University of Calgary's (2003) institutional learning plan states that inquiry-based learning is “problem or question driven, typically has a small-group feature,

---

<sup>1</sup> Professor. Mount Royal University, 4825 Mount Royal Gate SW, Calgary, Alberta, Canada, T3E 6K6 403-440-5587. E-mail: nvaughan@mtroyal.ca

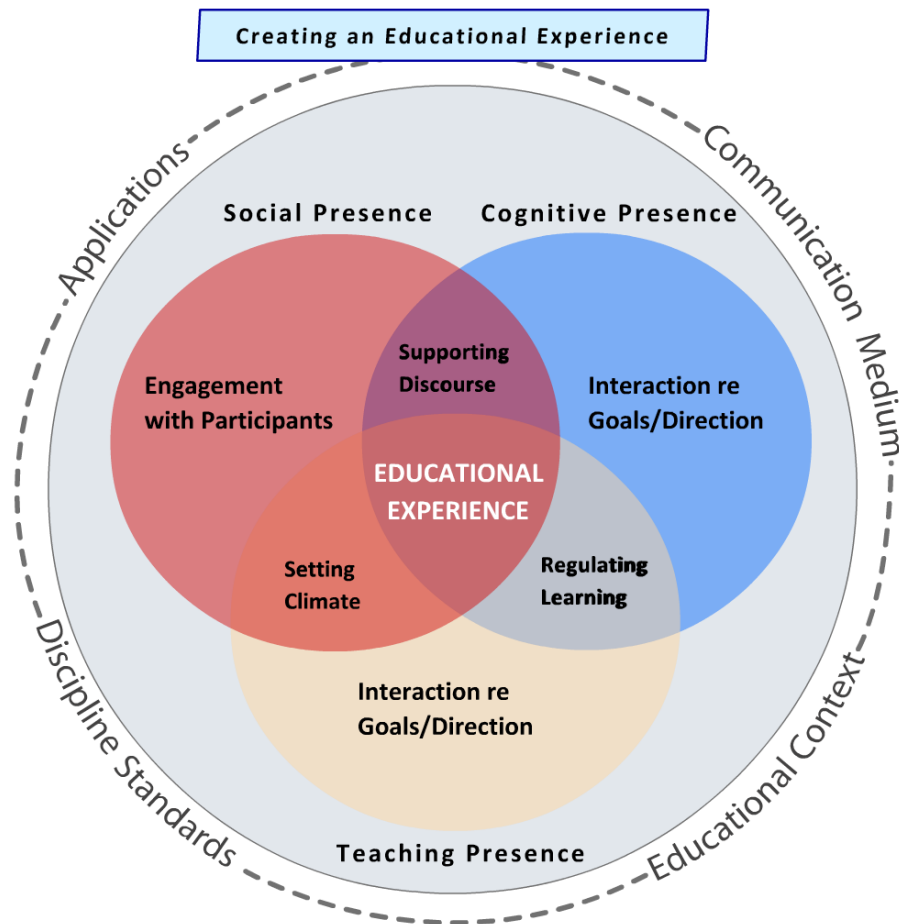
includes critical discourse, is frequently multi-disciplinary, and incorporates research methods such as information gathering and synthesis of ideas” (p.4).

Over the years there has been an ongoing debate about the role of inquiry-based learning in education, especially at it relates to blended and online learning environments. Canada’s province of Alberta recently announced curriculum redesign plans to focus on an inquiry-based approach to learning (ALBERTA EDUCATION, 2014). These redesign plans were met with a diverse range of responses. Some parent groups created petitions and organized protests at the Alberta Legislature specifically with regards to the math curriculum claiming “the new, inquiry-based approach to math is leaving kids confused and unable to grasp basic math concepts” (CBC News, 2014, n.p.). Conversely, others have stated the importance of this curriculum reform “to meet the demands of our fast-changing, technology-driven world. In our global community, we need to prepare students for a future that demands they be critical thinkers, creative problem-solvers, and excellent communicators” (CALGARY BOARD OF EDUCATION, 2014, n.p.).

This discussion about the value of inquiry-based learning also took place throughout the 20<sup>th</sup> century. During the American-Russian space race of the late 1950s and early 1960s there was heated debate about the focus of the United States science curriculum. Many felt that a national curriculum with standardized testing was the solution to improving students’ scientific competencies while Schwab (1962) argued that knowledge does not rest on facts or isolated skills but on principles of inquiry. He demonstrated that “learning a discipline implies coming to understand not only its substantive structure (i.e., facts, concepts, theories), but also its syntax—that is, the questions that guide inquiry, the tools that allow inferences and interconnections, and the actions and principles (rules) that validate knowledge (SCHWAB, 1962, p.4).

Going further back in time, Dewey (1997) also wrote about the importance and the role of inquiry in relationship to experiential learning. His famous quote “If we teach today’s students as we taught yesterday’s, we rob them of tomorrow” (DEWEY, 1916, p.167) still resonates today. In addition, Dewey (1916) emphasized the importance of a community approach to inquiry-based learning in his book entitled *Democracy in Education* and Lipman (1991) coined the term ‘community of inquiry’ to describe a methodology for teaching critical thinking through a social and communal process. Ramsden (1988) indicates that “a community of inquiry provides the environment in which students can take responsibility and control of their learning through negotiating meaning, diagnosing misconceptions, and challenging accepted beliefs – essential ingredients for deep and meaningful learning outcomes” (Cited in GARRISON; ANDERSON, 2003, p.27).

Garrison, Anderson, and Archer (2000) created a community of inquiry model as a conceptual framework to identify the elements that are crucial pre-requisites for a successful higher educational experience within a computer mediated conferencing environment. The authors indicate this model can be applied to all educational experiences and thus, the potential exists to use this framework in blended and online educational contexts. Figure 1 illustrates the three core elements of this framework: a social, teaching and cognitive presence.



**Figure 1.** Community of inquiry framework

The sphere of social presence refers to the “ability of participants in a community of inquiry to project themselves socially and emotionally as ‘real’ people (i.e., their full personality), through the medium of communication being used” (GARRISON et al., 2000, p. 94). The element of teaching presence includes the “design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (ANDERSON; ROURKE; GARRISON; ARCHER, 2001, p.1). Cognitive presence is “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry” (GARRISON; ANDERSON; ARCHER, 2001, p.11).

In addition, Garrison et al. (2001) have developed a Practical Inquiry Model (PI) to guide the development of cognitive presence within an educational experience. The four phases of cognitive presence represented in this model are illustrated in Table 1.

**Table 1.** Practical inquiry phases

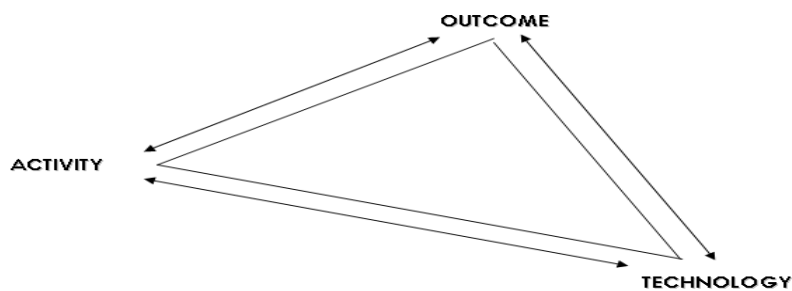
Description	Category/Phase	Indicators
The extent to which students are able to construct and confirm meaning through sustained reflection, discourse, and application within a critical community of inquiry.	1. Triggering event	1. Inciting curiosity and defining key questions or issues for investigation
	2. Exploration	2. Exchanging and exploring perspectives and information resources with other learners
	3. Integration	3. Connecting ideas through reflection
	4. Resolution/application	4. Applying new ideas and/or defending solutions

This PI Model can be used as a blue print for designing, facilitating, and directing a blended or online learning experience.

### Inquiry through Blended and Online Learning Experiences

The key to designing a successful blended and online educational experiences is the intentional integration of synchronous and asynchronous learning opportunities. This can briefly be described as creating meaningful connections before, during, and after a synchronous learning experience. Ehrmann (2002) created a triad model to emphasize this alignment between learning outcomes, activities, and use of digital technologies to support a learning experience (Figure 2).

**Figure 2.** Triad model for aligning learning outcomes, activities, and the use of technology



This model has been modified by the author to reflect the importance of also aligning the students’ learning experience before, during, and after a synchronous event, which could be facilitated by either a face-to-face or webinar session (Table 2).

**Table 2.** Modified Triad Approach for Blended and Online Learning

Learning Outcomes	Assessment Activities	Before a Synchronous Session	During a Synchronous Session	After a Synchronous Session	Tools
What do you want your students to know when they have finished your course (e.g. key learning outcomes – knowledge, skills and attitudes)?	How will you and your students know if they have achieved these learning outcomes (e.g. opportunities for self, peer and instructor assessment)?	How will you help students determine what prior knowledge and experience they have with the assessment activity?	How will students synchronously interact and engage with the assessment activity?	What portion of this assessment activity will require “reflective time” for interaction and communication?	What tools could be used to help organize, facilitate, and direct these assessment activities?

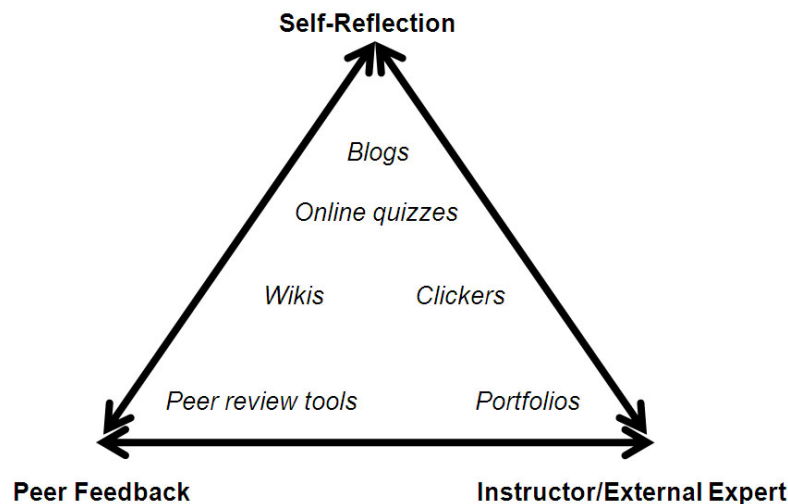
### Learning Outcomes

In the educational research literature, there are extensive references to McTighe & Wiggins (2004) backwards design of curriculum framework where they emphasize starting the planning process by identifying what you want your students to know when they have finished the course experience (e.g. key learning outcomes – knowledge, skills and attitudes). There are a number of online tools for developing meaningful course or program learning outcomes such as the Arizona State University (2015) *Objectives Builder* (<https://teachonline.asu.edu/objectives-builder/>) and Iowa State University’s (2015) *A Model of Learning Objectives* (<http://www.celt.iastate.edu/teaching-resources/effective-practice/revised-blooms-taxonomy/>).

For example, when redesigning an introductory education course the focus is often on helping students to learn to communicate effectively, using the language and concepts of teaching and learning.

### Assessment Activities

Once, the learning outcomes have been established for an educational experience it is important than to design and develop assessment activities that will provide students with the necessary feedback to achieve the required knowledge, skills, and attributes for the course or program. Too often assessment is solely directed by the teacher where in a community of inquiry this responsibility should be shared between students and teachers in order to create a 360 degree feedback loop that combines self-reflection, peer feedback, and teacher/expert assessment through the use of digital technologies (Figure 3).

**Figure 3.** Using digital technologies to support a 360 degree approach to assessment

For example, students can use rubrics, blogs, and online quizzes to provide themselves with self-reflection and feedback on their course assignments. Students can receive further feedback on their course work from their peers through the use of digital technologies such as wikis and clickers. Finally, instructors and in some cases external experts can review students' work in an ePortfolio and use video technologies to observe student performance, diagnose student misconceptions, and provide additional formative assessment feedback.

An international call for a greater focus on assessment *for* learning, rather than on assessment for *just* measurement and accountability of student performance is well documented in the educational research literature (YEH, 2009). The use of digital technologies to support an increased focus on formative assessment practices may lead to Hattie's (2009) vision of a visible teaching and learning framework where "teachers SEE learning through the eyes of their students and students SEE themselves as their own teachers" (p.238).

### Before a Synchronous Session

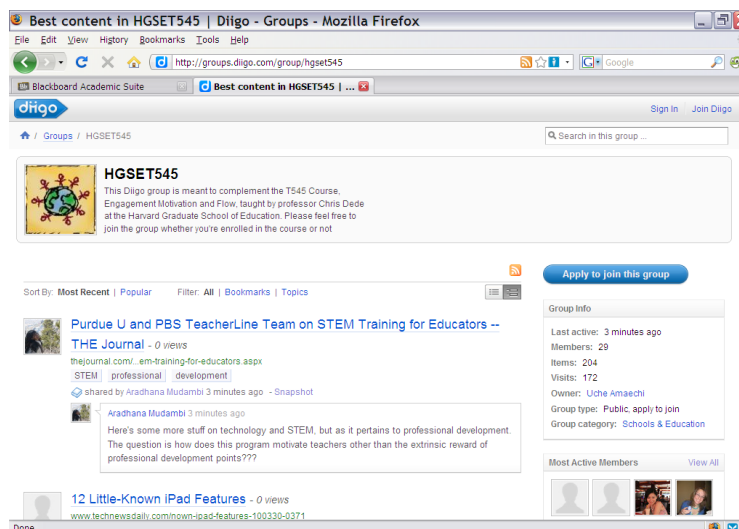
Teachers often complain that students are not prepared to participate in face-to-face classes or webinars. Conversely, students state that pre-class activities are usually boring and not connected to everyday life. The challenge then is to design meaningful learning activities that create a "triggering event" for students. Ausebel (1978) describes these as anchoring events that stimulate connections with students' prior knowledge as well as acting as an advance organizer for the synchronous session. From a teacher's perspective, the use of digital technologies to support these pre-class activities can be used to determine the extent of students' prior knowledge or experience with a concept, topic or issue. Table 3 provides an overview for designing pre-class activities that support an inquiry-based approach to learning.

**Table 3.** Design considerations for pre-class activities

Nature of Inquiry	Learning Activities	Digital Technologies
Student <ul style="list-style-type: none"> <li>• Create a <i>triggering event</i></li> <li>• Advanced organizer</li> <li>• Stimulate connections</li> </ul>	a) Reading/Writing Pre-reading assignment or activity on a specified topic or issue Followed by a self assessment quiz, survey or discussion forum	i) Communication Announcement sent to students via an RSS feed through a Social Networking Tool (i.e. <i>Facebook</i> ) or News Aggregator Application (i.e. <i>Bloglines</i> )
Teacher Determine students' prior knowledge or experience with concepts, topics or issues	b) Listening/Writing Auditory/visual presentation of information Followed by a self assessment quiz, survey or discussion forum activity	ii) Posting or linking to pre-reading assignments Social Bookmarking Tools (i.e. <i>Del.icio.us</i> , <i>Edtags</i> )  iii) Digital learning objects Podcasts (i.e. <i>Podomatic</i> ) <i>MS PowerPoints</i> (i.e. <i>Slideshare</i> ) Videos (i.e. <i>YouTube</i> )  iv) Self assessment quizzes Assessment tools (i.e. <i>Moodle</i> )  v) Anonymous surveys Survey Tools (i.e. <i>getfast.ca</i> )  vi) Discussion Forum Pre-class online discussion regarding questions and issue related to the required reading (i.e. <i>Facebook</i> , <i>Ning</i> )

Pre-class activities

Rather than having a pre-determined reading list, at the beginning of each course, a teacher can assign student groups to find resources related to specific course concepts or issues. These resources can then be shared and annotated by using a social bookmarking tool such as *diigo.com* (Figure 4).

**Figure 4.** Course reading list in *diigo*

Social media sharing tools can also be used by both teachers and students to create, post and share digital learning objects before a class session. For example, teachers can use podcasts (e.g., *Podomatic*), narrated *MS PowerPoint* presentations (e.g., *Slideshare*, *Adobe Presenter*) or video (e.g., *YouTube*) to communicate course concepts, scenarios and case studies with students before class time. The advantages of using these types of learning objects are that they allow students to listen and view course-related material outside of class time, at their own pace, and as often as required to gain understanding (see Figure 5).

**Figure 5.** Narrated problem solving exercise in *Adobe Presenter*

The screenshot displays a narrated problem-solving exercise in Adobe Presenter. The main content area shows a slide titled "Step 3" with the instruction "Expand the Following Expression:  $(x + 1)^3$ ". The slide illustrates the expansion process in three steps:

- Step 1:  $(x + 1)(x + 1)(x + 1) = (x^2 + x + x + 1)(x + 1)$
- Step 2:  $(x^2 + 2x + 1)(x + 1) = x^3 + x^2 + 2x^2 + 2x + x + 1$
- Step 3:  $x^3 + 3x^2 + 3x + 1$

The slide also includes a sidebar titled "Problem Solving" with a table listing the steps and their durations:

Outline	Thumb	Notes	Search
Algebra			
Expand			
Step 1			
Step 2			
Step 3			

The slide footer indicates "Page 6 of 6" and a progress bar showing "00:19 / 00:19" and "0 Minutes 9 Seconds Remaining".

Despite the ability to easily access relevant learning material there still exists the common challenge of getting students to meaningfully engage in pre-class activities. Novak, Patterson, Gavrin, and Christian (1999) have used a survey or quiz tool to create triggering events for students in advance of a synchronous session. They have coined the term Just-in-Time Teaching (JiTT) to describe the process of getting students to read a web-based article and then respond to an online survey or quiz, shortly before a class. The teacher then reviews the student submissions 'just in time' to adjust the subsequent class session in order to address the students' needs, identified by the survey or quiz results. A typical survey or quiz consists of four concept-based questions with the final question asking students: "What did you not understand about the required reading and what would you like me [the teacher] to focus on within the next synchronous session?"



### During a Synchronous Session

Unfortunately, class time or online webinars are often used to transmit information to students rather than to engage them in opportunities to co-create knowledge with their peers, teachers, and external experts. The challenge for teachers is to create synchronous opportunities to “listen rather than just talk to their students” in order to understand their learning needs and goals (FINKEL, 2000). Table 4 summarizes some design consideration for synchronous learning activities.

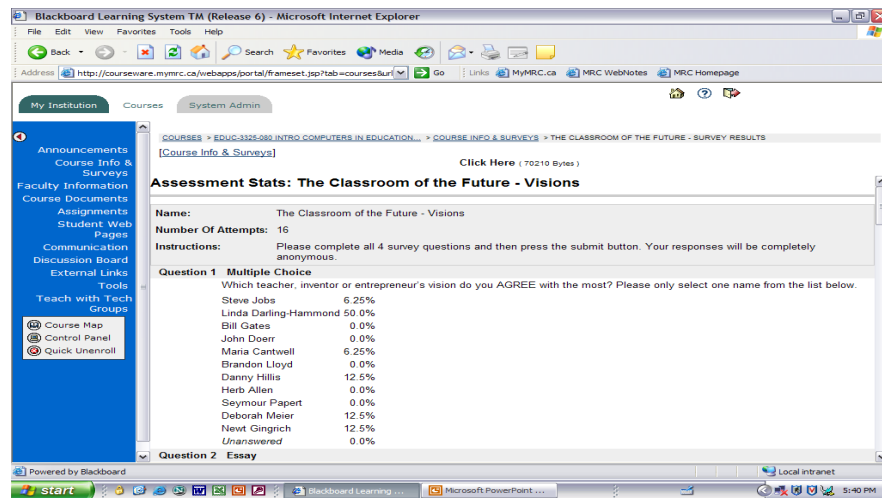
**Table 4.** Design considerations for synchronous class activities

Nature of Inquiry	Learning Activities	Digital Technologies
Defining the <i>triggering events</i> (key questions) Beginning to <i>explore</i> the questions	a) Talking/Listening Dialogue with teacher and fellow learners about the specified issue or topic Mini-lecture and/or tutorial to address the results of the pre-class quiz or survey Large or small group discussion or activity Case study Initiation of an individual or group project	i) Displaying quiz or survey results Online – display in the VOIP application (i.e. <i>Adobe Connect</i> ) Classroom – computer projection or overhead  ii) Conducting in-class quizzes and surveys to promote dialogue and small group work Online – survey tool and break-out room features in a VOIP application (i.e. <i>Blackboard Collaborate</i> ) Classroom - Personal response systems (clickers) and think, pair, share activities  iii) Displaying digital learning objects and resources Online/classroom – using social media sharing sites (i.e. <i>Flickr, Slideshare, YouTube</i> ) and repositories such as <i>merlot.org</i>  iv) Displaying assignments Online/classroom – course blogs or wikis can be used to post assignment handouts, tutorials, resources and links to examples of previous student work

During class activities

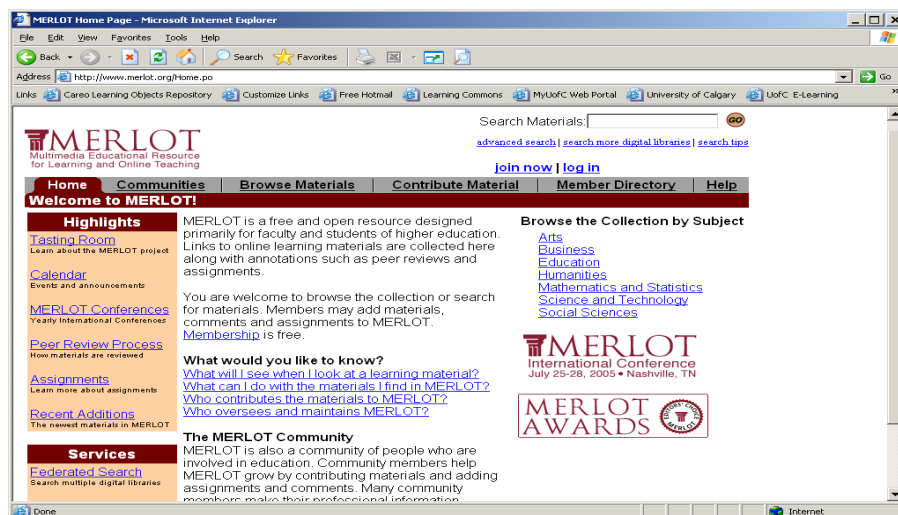
The key to commencing a synchronous session is by creating clear links to the pre-class activities. For example, if students were required to complete a pre-quiz or survey it is important to share and discuss the results at the start of the session (Figure 6).

**Figure 6.** Results from a pre-class survey



The results from these pre-class surveys or quizzes usually help to illuminate challenges or issues that students are having with course concepts. These are often referred to as threshold concepts, which “may be considered to be akin to passing through a portal or conceptual gateway that opens up previously inaccessible ways of thinking about something” (MEYER; LAND, 2005, p.373). Digital learning objects can sometimes be used to describe and explain threshold course concepts during a synchronous session. Individuals or groups of students can be assigned the task of creating images, short podcasts, or *YouTube* video clips about key terms, definitions or concepts related to the course. These resources can then be posted to the course web site or linked to a learning object repository such as the *Multimedia Educational Resource for Learning and Online Teaching (MERLOT)* site (Figure 7).

**Figure 7.** Multimedia Educational Resource for Learning and Online Teaching (MERLOT)



The learning objects linked to MERLOT are categorized by discipline and many of these objects have also been peer reviewed by user communities with suggestions on how to use these digital resources in course assignments.

In addition, students often struggle with the requirements and assessment criteria for course assignments. This can be overcome by gaining permission to use previous student work. During the synchronous session this work can be displayed and students can practice applying the assessment rubric to these assignments. In a previous study, students emphasized the importance of having the opportunity to co-construct the language of the assessment rubric during class time with the teacher as well as having the ability to add one their own unique grading components or criteria (e.g., creativity) to the rubric (VAUGHAN, 2013). From their perspective, this led to a sense of student empowerment and control with the course assignment.

A number of teachers have been using digital technologies to incorporate more formative assessment activities during synchronous sessions. One of the most common techniques is the use of web polling (e.g. electronic voting) or personal response systems (e.g., clickers) in face-to-face classrooms. Crouch and Mazur (2001) describe how web polling or clickers can be used to support a form of peer instruction. The process begins with the teacher posing a question or problem. The students initially work individually toward a solution and ‘vote’ on what they believe is the correct answer by selecting the desired numbered or lettered response on their clicker. The results are then projected for the entire class to view. For a good question, there is usually a broad range of responses. Students are then required to compare and discuss their solutions with the person next to them in the classroom in order to come to a consensus. Another ‘vote’ is taken but this time only one response or clicker per group can be utilized. In most circumstances, the range of responses decreases and usually centers around the correct answer. As an alternative to this process, teachers can have groups of students generate the quiz questions in advance of the synchronous session.

### **After a Synchronous Session**

A major challenge for students and teachers is the concept of “homework”. For many students, these types of assignments are a form of discipline and regurgitation rather than a rich learning experience. The key to success is to design authentic learning activities that build on the energy and momentum of the synchronous sessions and allow students to explore and investigate questions and topics that are personally relevant and meaningful to them. Table 5 provides an initial framework for designing these types of activities.

**Table 5.** Design considerations for learning activities after a synchronous session

Nature of Inquiry	Learning Activities	Tools
Further <i>exploration</i> towards <i>tentative integration</i> with the ability to connect theory to practice application	a) Reading/Writing Anonymous class exit survey What did you learn from the class session? What are you still unclear about? Online discussion with student moderation	i) Anonymous surveys • Survey tools (i.e. <i>getfast.ca</i> )  ii) Communication Announcement section of a course blog or wiki for student “to do” list Group email for the student “to do” list Email for individual student questions or clarification (try to put common questions into a Frequently Asked Questions discussion forum)
	b) Talking/Listening + Reading/Writing Individual or group project work, case studies	Online discussion forums in social networking systems (i.e. <i>Facebook</i> ) to facilitate student moderated discussions VOIP and Virtual Worlds (i.e. <i>Blackboard Collaborate</i> , <i>Second Life</i> ) for synchronous working sessions among student groups
	<i>Preparation for next class</i> a) Reading/Writing Pre-class reading assignment or activity on a specified topic or issue Followed by a self assessment quiz, survey or discussion forum	iii) Individual and Group Project Work Study groups within social networking systems (i.e. <i>MySpace</i> , <i>Ning</i> ) Blogs for reflective journaling (i.e. <i>Blogger</i> ) Wikis for collaborative writing projects (i.e. <i>Google Docs</i> ) Mashup tools for data analysis and representation of collaborative projects (i.e. <i>Intel’s Mash Maker</i> , <i>Wordle</i> )

The process begins at the end of a synchronous session with a brief online exit survey. Students are asked to identify their “key learning take-away” from the synchronous session and conversely, their “muddiest point or unanswered question”. Sharing the results from this type of survey helps students make connections between the theoretical and practical applications of the course (Angelo & Cross, 1993). It also acts as a stimulus for individual or group project work.

**Blogs**

There are a variety of digital technologies that can be used to support project work. For example, blogs can be used for self-reflection and peer review. In their blogs, students can self-reflect about course assignments. The purpose of these entries is to have students intentionally reflect about what they learned through the process of completing the assessment activity and how they could apply this learning to their future course studies or careers. The following questions can be used to guide this activity (Figure 8):

1. What did you learn in the process of completing this assignment?
2. How will you apply what you learned from this assignment to the next class assignment, other courses and/or your career?

**Figure 8.** Self-Reflections on a Course Assignment

spreadsheet reflection ...  
March 11th, 2010

**Reflection Questions:**

**1. What did you learn in the process of completing this assignment?**

I learned I am actually pretty good at not leaving an assignment until the last minute; sometimes it feels like my m.o. for life will be a perpetual procrastinator. However, I found it really easy to add to this assignment on a regular basis; I also improved on making sure I not only included everything I wanted to, but that I had everything that was required. This is definitely a good thing because losing really easy marks is something I have been known for since grade school; oh well, better learn the lesson late than never!

**2. How will you apply what you learned from this assignment to the next class assignment, other courses and/or your career?**

I just plan to continue to work on assignments on a regular basis; I definitely seem to lose sight of what is most important when it comes to projects in general, and I always tend to sell myself short because I run out of time. I think this learning experience will be very valuable because it will have a significant influence on how I

- spreadsheet reflection ...
- webquest reflection ...
- web-portfolio reflection ...
- group workshop reflection ...
- end of semester reflection ...
- powerpoint/photostory reflection ...
- web portfolio assignment ...
- lesson plan reflection ...
- beginning of semester reflection ...

**CATEGORIES**

- Uncategorized

• March 2010  
• February 2010  
• January 2010

- WordPress.com
- WordPress.org
- Register
- Login
- WordPress
- XHTML

Blogs can also be used to support a peer review process. Students can post drafts of course assignments to their blogs and then their peers can review these documents and post comments to the author's blog (Figure 9). An extension of this activity would be for students to critique research-based manuscripts and then have the authors' of these articles review the students' critiques.

**Figure 9.** Peer review of a blog posting of an article critique

Brad's Education Musings - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://bradedmusings.blogspot.com/

**Brad's Education Musings**

SATURDAY, JANUARY 26, 2008

**Article Critique**

Article Critique: Assessing Social presence In Asynchronous Text-based Computer Conferencing

Article by: Rourke, Anderson, Garrison, Archer. (2001)

Critique by: Brad Emery

Article Summary

In this article Rourke et al. (2001), seek to develop and implement a tool for assessing the amount of social presence within a community of learners through the analysis of an asynchronous text based course within a computer-mediated conferencing (CMC) environment. They defined social presence "as the ability of learners to project themselves socially and affectively into a community of inquiry. (p. 2). After outlining the considerable research which focuses on the importance of social presence as a critical component of the learning process, the authors argued that no tool had yet to be developed which directly assesses how much social presence is occurring within CMC based courses. This article then goes on to describe the process by which the authors developed a social presence tool by breaking down the elements into three distinct categories with twelve specific indicators for extrapolating the information. Using the transcripts from two separate CMC graduate-level courses, two of the researchers used the aforementioned tool to create the tool for the

**Post a Comment On: Brad's Education Musings**

**"Article Critique"**

1 Comment • [Show Original Post](#)

**josh said...**

Brad,

I read your critique before I read the actual article on social presence. You did a great job of clearly summarizing the article and its findings. Your ideas were well organized and easy to follow. I think the headings helped to organize your writing and make it easy to follow. Without having read the article I had a solid grasp on the findings. It certainly made reading the article easier to understand.

Your critique raised some important points that about the study. I agree with you that the size of the study seems to be a limiting factor in its applicability beyond this one situation. I wonder if coding the responses would take too long if a larger study was undertaken. It does raise the question of the practicality for teachers to evaluate students on their social presence in larger class environments. This method of evaluation seems quite time consuming.

Guiding questions for this peer review process could include:

1. What did you learn from reviewing this document?
2. What were the strengths (e.g. content, writing style, format and structure) of the document?
3. What constructive advice and/or recommendations could you provide for improving the quality of this document?

## Online discussions

Student moderated online discussions can be used to promote individual reflection and critical dialogue between synchronous sessions in a blended or online course. For example, at the beginning of the course, groups of students (three to five) can self-select a topic that is related to key course concepts and/or issues. Each group is responsible for moderating and summarizing their selected online discussion for a set period of time (often one or two weeks).

Often, institutional learning management systems (LMS) such as *Blackboard* are used to support these discussions. These institutional applications often present collaborative challenges as it can be difficult to have external guests participate in the discussions (e.g., have to get an IT administrator to enroll guests in the LMS) and to provide students with moderator (e.g., teacher) status. Social networking tools such as *Facebook* and *MySpace* can be used to overcome these issues by creating a course group space (Figure 10).

The membership of groups in *Facebook* can be open or controlled by the moderator (e.g., teacher). Anyone who has a *Facebook* account can be invited to become a member and participate in the online discussions. This could include past student members of the course (e.g., alumni), external experts, and even parents. The group discussion forums can be moderated by any member of the group and when a posting is made to the discussion, the person's *Facebook* profile image also appears, helping to create a more immediate sense of community.

In addition, there have been a number of educational research studies conducted over the years that have clearly demonstrated that regardless of the subject matter, students working in small groups tend to learn more of what is taught and retain it longer than when the same content is presented in other instructional formats (BECKMAN, 1990; CHICKERING; GAMSON, 1991; JOHNSON; JOHNSON; SMITH, 1991; MCKEACHIE; PINTRICH; LIN; SMITH, 1986). Studies conducted by the *EDUCAUSE Applied Centre for Research* (SMITH; SALAWAY; BORRESON CARUSO, 2009) and the *Pew Internet & American Life Project* (MADDEN; LENHART; DUGGAN; CORTESI; GASSER, 2013) have indicated that *Facebook* is currently the most popular social networking system in K to 12 education and that a number of students have begun using this application to support virtual study groups. The study group application in *Facebook* allows students to post messages, conduct discussions, and exchange files. The membership of these groups can be open or controlled by the student members. The advantage of using these group areas is that students can support each other, academically and socially, between synchronous sessions. The downside of using *Facebook* is that this application is designed to promote social interaction often rather than to create a learning space

Besides moderating the online discussions it is important that students also create reflective summaries. Garrison, Anderson, and Archer's (2001) Practical Inquiry model can be used to guide the summary process. For example:

- Triggering events – What were the key questions identified this week?
- Exploration – What opportunities and challenges were discussed?
- Integration – What recommendations and conclusions can you draw from the discussion?
- Resolution/Application – How can we apply the “lessons learned” from this discussion to our course assignments and future career plans?
- Key resources (e.g., web sites, articles, books) that we could use to find further information/ideas about this topic?

A collaborative writing application such as *Google Docs* can then be used to make draft notes and a final summary (synthesis and analysis) of the online discussion based on these questions or additional guidelines that are co-created by the students and the course teacher.

### **Synchronous web-based communication and conferencing**

The use of synchronous web-based communication tools (e.g., text messaging, audio, and video) is becoming much more common in higher education. Some teachers are using these applications to replace classrooms sessions (e.g., online blended learning approach) while students are using these tools to support ‘real-time’ collaborative project based work. Many students are now using a combination of applications such as *Skype* and *Google Docs* to collaborate, and co-construct projects and research papers in ‘real time’. Students indicate that it is often difficult to physically get together to complete group projects and that synchronous tools such as *Adobe Connect* allow them to work together, anytime, anywhere they have a computer and a reasonable Internet connection. In addition, these tools also allow them to share desktop applications and to record their sessions in case a group member is absent.

### **Future Trends**

Predicting the future is challenging in any context and potentially even more unproductive in terms of digital technologies and their possible applications. For this reason the focus is on identifiable trends that will most likely continue to significantly shape educational practice related to blended and online learning in the near future.

The first and perhaps most significant trend is the adoption of collaborative approaches to teaching and learning in higher education. This involves much more than simple interaction and sharing of information. Collaboration involves a purposeful partnering of students and teachers to solve relevant problems. It provides an environment to test conceptions and validate personally constructed knowledge.

The second trend is the recognition that through the adoption of digital technologies communities can be created and sustained over time and place. Brown and Adler (2008) suggest that this will lead to “learning 2.0” environments, which go “beyond providing free access to traditional course materials and educational tools

and creates a participatory architecture for supporting communities of learners” (p. 28).

The third trend is the ability of digital technologies to support a diversity of educational purposes, approaches, and audience. This provides students with multiple pathways for success in blended and online courses. While one can identify trends and even principles of practice, the decentralization of the teaching and learning process will inevitably lead to greater diversity and opportunities to learn. This choice of what and how to learn can only be a positive for educators and students.

As opportunities for interaction and collaboration increases through the proliferation of digital technologies, more pressure will be placed on educational institutions to adopt collaborative-constructivist approaches that engage learners in communities of inquiry. Collaborative learning goes beyond passively sharing information. For this reason, digital technologies and learning will have a transformative influence in both formal and informal learning environments.

## Conclusion

The historical ideal of education has been to learn in collaborative communities of inquiry (LIPMAN, 1991). This chapter has demonstrated the potential of the Practical Inquiry model (GARRISON; ANDERSON; ARCHER, 2001), digital technologies, and educational strategies to recapture this vision in higher education. The key is to redesign our blended and online courses for active and collaborative learning experiences that enable students to take responsibility for their learning and validate their understanding through discourse and debate with their peers.

## References

- ALBERTA Education. **Inspired learning**. 2014. Retrieved from: <http://blog.inspiredlearning.ca/>
- ALBERTA Education. **Focus on inquiry: A teacher’s guide to implementing inquiry-based learning**. Edmonton, AB: Government of Alberta, 2004.
- ANDERSON, T.; ROURKE, L.; GARRISON, D. R.; ARCHER, W. Assessing teaching presence in a computer conferencing environment. **Journal of Asynchronous Learning Networks**, 5 (2), 2001, 1-17. Retrieved from: [http://auspace.athabascau.ca/bitstream/2149/725/1/assessing\\_teaching\\_presence.pdf](http://auspace.athabascau.ca/bitstream/2149/725/1/assessing_teaching_presence.pdf)
- ANGELO, T.A; CROSS, K. P. **Classroom assessment techniques: A handbook for college teachers**, 2<sup>nd</sup> edition. San Francisco: Jossey-Bass, 1993.
- AUSEBEL, D. In defense of advance organizers: A reply to the critics. **Review of Educational Research**, 48, 1978, 251-257.
- BECKMAN, M. Collaborative Learning: Preparation for the Workplace and Democracy. **College Teaching**, 38(4), 1990, 128-133.
- BROWN, J. S.; ADLER, R. P. Minds on fire: Open education, the long tail, and learning 2.0. **EDUCAUSE Review**, 2008, 17-32.
- BRUNER, J. S. The act of discovery. **Harvard Educational Review**, 31 (1), 1961, 21–32.
- CALGARY Board of Education. **Join the curriculum conversation**. 2014. Retrieved from: <http://www.cbe.ab.ca/new/news2013-14/20140401-join-the-curriculum-conversation.asp>
- CBC News. **Parents, educators rally against Alberta’s ‘new math’**. 2014. Retrieved from: <http://www.cbc.ca/news/canada/edmonton/parents-educators-rally-against-alberta-s-new-math-1.2608360>
- CHICKERING, A. W.; GAMSON, Z. F (eds.). **Applying the Seven Principles for Good Practice in Undergraduate Education**. New Directions for Teaching and Learning, no.47. 1991. San Francisco: JosseyBass.



- CROUCH, C. H.; MAZUR, E. Peer instruction: Ten years of experience and results. **American Journal of Physics**, 2001, 69(9), 970-977.
- DEWEY, J. **How we think**. New York: Dover Publications, 1997.
- DEWEY, J. **Democracy in education**. New York: Macmillan, 1916.
- EHRMANN, S. C. Improving the outcomes of education: Learning from past mistakes. **EDUCAUSE Review**, January/February, 2002, 54-55. Available online at: <https://net.educause.edu/ir/library/pdf/erm0208.pdf>
- FINKEL, D. **Teaching with your mouth shut**. Portsmouth, NH: Heinemann-Boynton/Cook, 2000.
- GALILEO Educational Network. **What is inquiry?** 2014. Available online at: <http://galileo.org/teachers/designing-learning/articles/what-is-inquiry/>
- GARRISON, D. R.; ANDERSON, T. **E-Learning in the 21st century: A framework for research and practice**. London: Routledge/Falmer, 2003.
- GARRISON, D. R.; ANDERSON, T.; ARCHER, W. Critical thinking, cognitive presence, and computer conferencing in distance education. **American Journal of Distance Education**, 15(1), 2001, 17-23.
- GARRISON, D. R.; ANDERSON, T.; ARCHER, W. Critical inquiry in a text-based environment: Computer conferencing in higher education. **The Internet and Higher Education**, 2(2-3), 2000, 87-105.
- GILMORE, T.; KRANTZ, J.; RAMIREZ, R. Action based modes of inquiry and the host-researcher relationship. **Consultation**, 5.3 (Fall), 1986, 161.
- GOVERNMENT OF ALBERTA. **Curriculum redesign**. 2014. Retrieved from: <https://inspiring.education.alberta.ca/initiative/curriculum-redesign/>
- HATTIE, J. **Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement**. New York: Routledge, 2009.
- JOHNSON, D. W.; JOHNSON, R. T.; SMITH, K. A. **Cooperative Learning: Increasing College Faculty Instructional Productivity**. ASHE-FRIC Higher Education Report No.4. Washington, D.C.: School of Education and Human Development, George Washington University, 1991.
- KANUKA, H. An exploration into facilitating higher levels of learning in a text-based internet learning environment using diverse instructional strategies. **Journal of Computer-Mediated Communication**, 10(3), article 8, 2005. Available online at: <http://jcmc.indiana.edu/vol10/issue3/kanuka.html>
- KIRSCHNER, P. A.; SWELLER, J.; CLARK, R. E. Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. **Educational Psychologist**, 41 (2), 2006, 75-86.
- LIPMAN, M. **Thinking in education**. Cambridge University Press: New York, 1991.
- MADDEN, M.; LENHART, A.; DUGGAN, M.; CORTESI, S.; GASSER, U. Teens and technology 2013. **Pew Internet and American Life Project**. 2013. Available online at: <http://www.pewinternet.org/Reports/2013/Teens-and-Tech.aspx>
- MCKEACHIE, W. J.; PINTRICH, P. R.; LIN, Y.-G.; SMITH, D.A.F. **Teaching and Learning in the College Classroom: A Review of the Research Literature**. Ann Arbor: National Center for Research to Improve Postsecondary Teaching and Learning, University of Michigan, 1986.
- MCTIGHE, J.; WIGGINS, G. **Understanding by design: Professional development workbook**. Alexandria, VA: Association for Supervision & Curriculum Development, 2004.
- MEYER, J.H.F.; LAND, R. Threshold concepts and troublesome knowledge: epistemological considerations and a conceptual framework for teaching and learning, **Higher Education**, 49 (3), 2005, 373-388.
- NOVAK, G. M.; PATTERSON, E.T.; GAVRIN, A.D.; CHRISTIAN, W. **Just-In-Time Teaching: Blending Active Learning with Web Technology**. New Jersey: Prentice Hall Series in Educational Innovation, 1999.
- PATTON, M. Q. **Qualitative evaluation and research methods** (2nd ed.). Newbury Park, CA: Sage Publications, 1990.
- PINE, G. J. **Teacher action research: Building knowledge democracies**. Thousand Oaks, CA: Sage Publications, 2008.
- RAMSDEN, P. Studying learning: Improving teaching. In: RAMSDEN, P. (Ed.), **Improving learning: New perspectives**. London: Kogan Page, 1988.

SCHWAB, J. J. The teaching of science as enquiry. In: SCHWAB, J. J.; BRANDWEIN, P. F. (Eds.), **The teaching of science**. Cambridge, MA: Harvard University Press, 1962, 3-103.

SMITH, S.; SALAWAY, G.; CARUSO, J. **The ECAR Study of Undergraduate Students and Information Technology, 2009—Key Findings**. Boulder, CO: EDUCAUSE Center for Applied Research, 2009.

UNIVERSITY OF CALGARY. **Institutional learning plan**. 2003. Available online at: [http://commons.ucalgary.ca/documents/LP\\_Final\\_Mar03.pdf](http://commons.ucalgary.ca/documents/LP_Final_Mar03.pdf)

VAUGHAN, N. D. Investigating how digital technologies can support a triad-approach to assessment in higher education. **Canadian Journal of Learning and Technology**, 39 (3), 1-22, 2013. Available online at: <http://cjl.csj.ualberta.ca/index.php/cjlt/article/view/688>

VYGOTSKY, L. S. **Thought and language**. Cambridge, MA: MIT Press, 1962.

YEH, S. S. The cost-effectiveness of raising teacher quality. **Educational Research Review**, 4(3), 2009, 220-232.