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(Re)Framing Our Frames: Architectonics, Intertextuality, and the Scholarship of Integration in Online Education

(Re)Cadrer nos cadres : architectonique, intertextualité et les savoirs sur l'éducation dans l'éducation en ligne

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Article abstract

The pandemic of 2020 has renewed interest in technology as an integrative agent in higher education. However, advancements in technology continue to outpace the scholarship of integration in SoTL, even though Ernest Boyer valued it as a continuous area of study. This article calls for a reconsideration of Boyer's appreciation of integration as convergence or intertextuality. Intertextuality and its digital correlate, hypertextuality, operationalize online education. Yet, they are often ignored as models of convergence. This relational paradox signals a need for a discourse and framework that help us to conceptualize the inherently integrative nature of knowledge and online education. To address this deficit, this literature review introduces Peircean architectonics as the paradigm that reframes our understanding of convergence and illuminates its actualization in Terry Anderson's prototype for online education. Architectonic logic enriches this model and provides us with a philosophy of convergence that revalues and advances the scholarship of integration.

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Abstract

The pandemic of 2020 has renewed interest in technology as an integrative agent in higher education. However, advancements in technology continue to outpace the scholarship of integration in the Scholarship of Teaching and Learning (SoTL), even though American educator Ernest Boyer valued it as an area of continuous interdisciplinary inquiry. This thought piece calls for a reconsideration of Boyer's appreciation of integration as convergence or *intertextuality*. Intertextuality and its digital correlate or *hypertextuality* operationalize online education. Yet, they are often ignored as modes of convergence that challenge disciplinarity. This paradox signals a need for a scholarly discourse and framework that can help educators to (re)conceptualize the inherently integrative nature of knowledge and online education. To address this deficit in the SoTL, this meta-synthesis evidences Peircean architectonics as the paradigm that reframes our understanding of convergence and illuminates its actualization in Canadian educator Terry Anderson's prototype for online education theory. Architectonic logic enriches this model and provides online educators with a common discourse and interdisciplinary framework that will advance the scholarship of integration in online education.

Keywords: Architectonics; Digital interdisciplinarity; Intertextuality; Online education theory

Résumé

La pandémie de 2020 a renouvelé l'intérêt pour la technologie en tant qu'agent d'intégration dans l'enseignement supérieur. Cependant, les progrès de la technologie continuent de dépasser les savoirs concernant l'intégration dans l'Avancement des Connaissances en Enseignement et en Apprentissage (SoTL par ses sigles en anglais), même si l'éducateur américain Ernest Boyer l'a appréciée comme un domaine de recherche interdisciplinaire continue. Cet article de réflexion appelle à reconsidérer l'appréciation de Boyer de l'intégration en tant que convergence ou *intertextualité*.

L'intertextualité et son équivalent numérique ou *hypertextualité* rendent opérationnelle l'éducation en ligne. Pourtant, ils sont souvent ignorés en tant que modes de convergence qui remettent en cause la disciplinarité. Ce paradoxe signale le besoin d'un discours et d'un cadre savants qui peuvent aider les éducateurs à (re)conceptualiser la nature intrinsèquement intégrative des connaissances et de l'éducation en ligne. Pour combler ce déficit dans le SoTL, cette méta-synthèse met en évidence l'architectonique de Peircean comme le paradigme qui recadre notre compréhension de la convergence et éclaire son actualisation dans le prototype de l'éducateur Canadien Terry Anderson pour la théorie de l'éducation en ligne. La logique architectonique enrichit ce modèle et fournit aux éducateurs en ligne un discours commun et un cadre interdisciplinaire qui feront progresser les savoirs sur l'intégration dans l'éducation en ligne.

Mots clés : Architectonique ; Interdisciplinarité numérique ; Intertextualité ; Théorie de l'éducation en ligne

Introduction

In the wake of the pandemic of 2020, online education has emerged as a key feature in many academic systems around the world. This seismic shift in the organization of higher education has ignited a renewed interest in technology as an agent for democratic education and integrative teaching and learning (Alexander, 2020; Schwab & Malleret, 2020). However, advancements in technology continue to outpace the scholarship of integration in the Scholarship of Teaching and Learning (SoTL). As a result, the gap widens between educators who see technology as a tool for teaching and learning and those who see it as another vector that reproduces inequality between those with reliable access to advanced digital technology and those without it (Lemke, 2002; Picciano, 2019). The literature in SoTL tends to underplay this technological division and others (Kirkwood & Price, 2013). Unfortunately, we do not find many integrative concepts in the literature that help us to bridge the gaps in our different contexts and frameworks, particularly in online education (Huber & Morreale, 2002; Hutchings, 2000; Webb & Welsh, 2019; Weimer, 2006). Frameworks or *paradigms* are interpretative lenses. A frame constitutes the principles or worldviews that condition our understanding of complex phenomena. In education, frames are important because they serve as conceptual tools that help us to organize experiences and interpret meaning in ways that inform our practices (Goffman, 1986).

Hutchings and Huber (2008) would agree that the lack of framing or *theorizing* in SoTL is one of the tensions running through the field. This problem and its causations have interdisciplinary roots that point us in different directions. For example, the pluralism and flexibility found in the various perspectives and practices operating in SoTL are commendable but also problematic (Hutchings, 2000; Webb & Welsh, 2019). If we continue to encourage scholars from different disciplines to champion their frameworks and practices in SoTL, then we must attend to the conceptual divergences or differences as well as the convergences or interconnections that manifest (Huber & Morreale, 2002). In other words, SoTL welcomes pedagogical perspectives and innovations from across the disciplines with few studies on the commonalities that these areas share and their implications for improving

teaching and learning in academe. Without a coherent integrative discourse to advance this process, our disciplinary concepts simply accumulate in silos and reinforce the academic boundaries and traditional practices that SoTL claims to transfigure (Werder, 2013). The following thought piece further explores this line of inquiry by examining what Boyer (1990) calls *the scholarship of integration*. In doing so, I turn to the philosophical ideas of Charles S. Peirce to reveal what we can learn when we revalue *integration* as the theory and practice of convergence or *intertextuality*. This shift in our conceptualization and worldview is necessary now that online education has emerged as an essential model for teaching and learning after the pandemic of 2020.

Background of the Problem

As the systematic evaluation and public presentation of teaching and learning, SoTL is essentially discipline-based with interdisciplinary pretensions. Scholars such as McKinney (2007) cue this ethos when they claim that "SoTL is very much discipline-based though we now have increasing work across the disciplines" (p. 11). In essence, faculty introduce ideas and pedagogical innovations from a variety of disciplines, and these gestures have come to signify rather than actualize interdisciplinarity in the field. However, this *work* often fails to elaborate or substantiate the discourse of integration that many interdisciplinarians see as a feature in interdisciplinary processes and practices (Klein, 1996, 2005). In fact, Werder (2013) concludes that the discipline-based current in the field still remains strong. She also finds that there is a noticeable gap in the discourse used to spotlight integrative learning in SoTL. In the age of the Internet, the discourse of integration impacts the work of online educators who are also interested in creating democratic spaces and interdisciplinary learning opportunities for students (Landow, 2006). Moreover, scholars and practitioners appear to face competing allegiances when it comes to contemplating the role that disciplinarity and interdisciplinarity should play in SoTL. This discordance evokes a troubling set of questions that have been succinctly articulated by Werder (2013, p. 248): Are we professionally more focused on disciplinarity rather than interdisciplinarity in SoTL? Could it be that we are simply more interested in deepening our allegiance and study of one academic domain rather than synthesizing it with others to improve teaching and learning in higher education? The silence that these questions often produces is at odds with the foundational ideas for the scholarship of integration that were first articulated by pioneering scholars such as Boyer (1987, 1990).

We might imagine Boyer's model of scholarship as a series of separate but intersecting domains or frames that transfigure our understanding of the relationship among teaching, learning, and scholarship in higher education. Boyer's frames are typically noted as the scholarship of discovery, integration, application (or engagement), and teaching and learning. The focus of this inquiry is the scholarship of integration. Boyer (1990) writes, "By integration, we mean making connections across the disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating nonspecialists, too" (p. 18). The author argues that the scholarship of integration is "disciplined work that seeks to interpret, draw together, and bring new insights to bear on original research" (p. 19). This often entails integrating different ideas and research into larger intellectual patterns and traditions. Boyer (1987, 1990) also identifies the connective processes and interactive

practices that allow us to contextualize, interpret, and integrate specialized knowledge in ways that help us to discover important insights. In her brief historical overview of integration, Klein (2005) claims that the term first appeared in studies in psychology by thinkers such as Herbert Spencer and William James. It is important to note that William James acknowledged the substantial role that the philosopher, semiologist, and interdisciplinarian Charles S. Peirce played in advancing his thinking and that of others (see Parker, 1998). Klein (2005) does not expound on Peirce's contributions to education and the theory of integration (more on this below). Nevertheless, Klein does help us to understand the complex relationship between *interdisciplinarity* and *integration* in the learning process. In general, integrated learning is considered a strategy for presenting and relating content. Interdisciplinarity is a way of reframing and repositioning the disciplines in order to enable the integration of content. While interdisciplinarity tends to emanate from the disciplines, integration can emanate from almost anywhere (Dennis, 2020a; Klein, 1996; 2005).

Boyer's work and that of many scholars in SoTL advance the logic of integration as a way to enrich teaching and learning in all fields in higher education. According to Boyer (1990), the scholarship of integration asks us to privilege interdisciplinarity and explore "the boundaries where fields converge" (p. 19). In other words, *convergence* signals the various ways in which foundational technologies such as words, texts, and disciplines allow us to merge or network information in order to inspire transformative change and further opportunities for integrative teaching and learning. However, Boyer's prescient evocation of the term as a proclamation and principle remains underappreciated in SoTL. Weimer (2006) notes that the scholarship of integration is the least examined frame in Boyer's model of scholarship. Huber and Hutchings (2004) underpin this appraisal when they argue that integrative teaching and learning in higher education remain largely unrealized. Ultimately, this problem suggests that the scholarship of integration may resonate more as rhetoric than reality for many scholars and practitioners. However, the integration of knowledge and different practices is an increasingly important skill that teachers must acquire and negotiate, especially in online education (Bernauer & Tomei, 2015). It is only when we learn to think beyond our disciplinary frameworks and silos that we can begin to reimagine the "set of claims, activities, and institutional structures that define and protect knowledge practices" (Klein, 1996, p. 1). Ironically, knowledge-integration is essentially the job that educators expect computer technology to do even though many of us undervalue its integrative logic as a paradigm for our own professional and pedagogical activities (Bernauer & Tomei, 2015).

Chick (2013) reminds us that "there is still pressure, at least in the United States, toward a fairly narrow set of approaches in SoTL that limit the methods accepted as sound" (p. 15). She points out that methods in areas such as the natural and social sciences tend to be viewed more favorably than those associated with the humanities. Chick's assessment evidences the claim that professionalization in SoTL discreetly privileges disciplinarity rather than those forms of interdisciplinarity that model the kinds of integrative work that we need to improve teaching and learning in all areas of higher education. According to Hovland et al. (2015), modeling integration in higher education requires supportive leadership and innovative conceptual frameworks. Surprisingly, conceptual frameworks for online education are the theoretical tools that we continue to lack in SoTL. For example, Kirkwood and

Price (2013) have questioned just how effective technology has been in transforming teaching and learning in higher education. Although interest in technology-enhanced education has increased in SoTL, the authors claim that there are few accounts in the academic literature that evidence the use of scholarly approaches to guide our use of technology in the classroom. For them, the term *scholarly approach* describes the thoughtfulness that educators give to the ideas, concepts, and tools that they use to construct environments and conditions that effectuate teaching and learning. However, in their investigation, Kirkwood and Price (2013) discover that very few studies actually reference relevant theoretical ideas or models that explain how teaching and learning with technology are conceptualized. Thus, they would agree that we are long overdue for a more comprehensive discourse and paradigm for reflecting on the character of integration and how it might inform our thinking about teaching and learning in academic systems where online instruction is now a feature rather than an anomaly in the post-pandemic academy.

Purpose Statement

My goal is to explain how the architectonic philosophy of Charles S. Peirce might offer us the kind of interdisciplinary scholarly framework that we need in SoTL in order to guide our use of technology in academe. Also, I examine how Peircean architectonics recalibrates our understanding of integration as a form of convergence or what many postmodern theorists call *intertextuality*. According to Chandler (2002), intertextuality recognizes that words and texts are always interacting and effectuating new semiotic realities. In this discussion, the concept is also treated as a synonym for integration, reciprocity, and structural unboundedness. Chandler (2002) claims, "Intertextuality blurs the boundaries not only between texts but between texts and the world of lived experience" (p. 205). In this sense, it could also be considered a philosophy of learning that describes the process of meaning-making and exchange between humans and texts (Barthes, 1989; Halliday, 1978; Kristeva, 1986). As such, the combinative processes in intertextuality represent a form of constructivism or *architectonics* (Bakhtin, 1990; Hawkins, 1994). For this study, architectonics is valued as the cross-disciplinary term that scholars use to describe the systematic and constructivist nature of all relations and creations. As an interdisciplinary conceptual tool, architectonics has been used to elucidate ideas in the human, physical, and social sciences. Manchester (2003) suggests that the reason the concept has been influential in so many academic circles is its centrality in characterizing the creation, discourse, and networks that feature in all aspects of life and learning. Dennis (2020b) and Holquist (1990) elaborate this point even more when they characterize architectonics as a meditation on the complex process of creation and construction that enables meaning-making and sense-making in theory as well as practice. Also, Gazoni (2016) recognizes philosophers such as Peirce as one of the first thinkers to exploit the dialogic nature of architectonic processes in the operations of *logical machines* or the ancestors of modern computers. Peirce (1887, 1955) offers us the kind of philosophical perspective that we need in order to reimagine the kinship between integrated learning and intertextuality. More importantly, Peirce's ideas anticipate the *hypertextuality* advanced by digital technology. As the electronic hyperlinks and texts that operationalize computerized devices, hypertextuality extends the logic of convergence and intertextuality into the digital world and online education (Nelson, 1987; Orr, 2003).

To illustrate this point, I will explain Peirce's theory of architectonics and identify the architectonic principles that constitute the conceptual framework that we need in order to understand intertextuality and hypertextuality as figurative equivalents or two modes of convergence that can inform our understanding of teaching and learning with technology. Using this paradigm as an interpretive lens, I will review the model of online education introduced by Anderson (2008) and reveal how the various modalities in his prototype actualize architectonics as a process that is essential to integrative teaching and learning online. More significantly, I reveal how architectonic logic also enriches Anderson's appreciation of *interaction* as an intertextual and hypertextual activity that effectuates online instruction. In the final analysis, the architectonic paradigm that is inspired by Peircean thought and modeled by Anderson's prototype signals the kind of synthesis and framework that we need in order to advance teaching and learning and the democratizing impulse inherent in online education.

Architectonics as Interdisciplinary Paradigm

Throughout his extensive body of work, Peirce (1955) advocates the use of philosophical thought to construct and connect knowledge. He does this by working across disciplines and standing on the shoulders of one of his most important intellectual predecessors, Immanuel Kant. According to Kant (2007), architectonics is the art of constructing systems, particularly systems of knowledge. Systems create the unity that is needed to transform knowing to the rank of science. Peirce (1955) says, "That systems ought to be constructed architectonically has been preached since Kant, but I do not think the full import of the maxim has by any means been apprehended" (p. 316). To help us realize the importance of Kant's contributions to constructivist thinking, Peirce appropriates Kantian architectonics and reverses its positivistic orientation (Parker, 1998). For instance, Peirce's reconsideration of the idea of a system of knowledge or *architectonics* provides us with a unique road map for observing the overlapping dimensions of knowledge or what we simply call *sciences* or academic disciplines today. His classification system for the disciplines contemplates the similarities and differences among them. Unlike Kant, Peirce (1955) privileges the similarities among the disciplines in his classification system.

The most distinguishing feature in Peirce's architectonics is the triadic logic that animates his arrangement of the disciplines. Peirce (1955) writes, "We find the ideas of first, second, third, constant ingredients of our knowledge" (p. 93). He argues that these three conceptions turn up in all interactive systems. In general, *firstness* represents a monadic relation. *Secondness* is a dyadic relation. *Thirdness* is the convergence of monadic and dyadic relations. *Convergence* is a key relation in Peircean architectonics because it characterizes the *synechism* or continuity that is the by-product of integrative forces and processes (Short, 2007). The logic of convergence and continuity is what Peirce uses to inform his understanding of the architectonic relations of all disciplines. As a result, Peirce (1955) claims that there are three disciplinary domains. The disciplines of discovery are first. Second are the disciplines of review. Both represent the theoretical disciplines. The practical disciplines are third. Peirce's triadic classification interrelates the sciences in terms of theory and practice. The discipline of discovery encompasses the three subcategories that are most noteworthy for this discussion (for a more

comprehensive elaboration of Peirce's classification system, see Parker, 1998, and Short, 2007). The three subcategories in the discipline of discovery are mathematics, philosophy, and *idioscopy* or what we know as the physical and human sciences. Mathematics is first among the disciplines of discovery because mathematical reasoning is inherently combinative. It offers us the kind of connective concept that is indispensable to the other sciences. For instance, the term *synechism* or continuity has its roots in mathematical thought and is expressed as thirdness in Peirce's theory of architectonic relations.

For a clearer understanding of Peirce's disciplines of discovery, one might imagine mathematics as the algebra of all relations and the starting point for understanding the interconnected nature of all disciplines (Short, 2007). Philosophy derives its integrative essence from mathematics (synechism), and in turn, they both condition our understanding of the kinship and connections between the physical and human sciences. However, Peirce (1955) also identifies three interrelated subcategories in philosophy: phenomenology, metaphysics, and the *reasoning* or normative sciences. The normative sciences consist of aesthetics, metaphysics, ethics, and logic. Logic is important because it orients us toward the end of thought or action (i.e., pragmatism). More significantly, it is how we integrate and synthesize the knowledge that the disciplines organize and *logical machines* process. Whether observed in humans or machines, Peirce (1887, 1955) imagined logic as simply another name for *semeiotics*. He writes, "Logic, in its general sense, is, as I believe I have shown, only another name for semiotic…or formal, doctrine of signs" (1955, p. 98). Peirce often uses the term *semeiotic* instead of the more commonly used term *semiotic*. Semeiotics is essentially a conceptual tool for reasoning using a triadic understanding of all relations and experiences. Peirce (1955) describes the key components of this reasoning process in relation to his larger architectonic project. In one of his formulations of the sign, Peirce writes, "A sign, or Representamen, is a First which stands in such a genuine triadic relation to a Second, called its Object, as to be capable of determining a Third, called its Interpretant, to assume the same triadic relation to its Object in which it stands itself to the same Object" (pp. 99–100).

For added explanatory value, Witte (1992) asks readers to imagine Peirce's triadic relation and sign system in terms of texts or what Peirce might call an organized set of signs. In his reinterpretation, Witte (1992) substitutes the word *context* for the word *object*. The word *text* replaces the word *sign*. Peirce's term *interpretant* is replaced with the word *intertext*. This reframing extends the logic of Peircean architectonics into the world of texts by illustrating its continuity and convergences at the level of writing. Echoing Peirce, Witte (1992) reports that the relation of a text to its context is reciprocal and the relation of a text to its intertext is no different. As another synonym for integration, *reciprocity* describes a mutual exchange or convergence between different texts or other entities (Watson, 1993). In short, context, text, and intertext are not only reciprocal but nearly inseparable in Peircean thought.

In pioneering the idea of intertextuality as a form of reciprocity, pluralism, and democratic practice in semiotics, Kristeva (1986) further evidences Peircean logic when she claims, "each word (text) is an intersection of word (texts) where at least one other word (text) can be read" (p. 37). When he coined and developed the term *hypertextuality,* Nelson (1987) essentially extends the logic of

intertextuality into the digital world of information technology, thus echoing Peirce's (1887) work on logical machines. For Nelson (1987), hypertext is the non-sequential and multidimensional blocks of texts with branches and links that offer individuals different pathways and connections to information. It is a form of electronic writing that is antifoundational, performative, and best illustrated on a computer screen. More importantly, hypertexts operationalize the Internet and the computerized devices that allow us to navigate its limitless terrain. As a medium with democratic and integrative qualities, hypertextuality is "a fundamentally intertextual system" that values supplementation and change (Landow, 2006, p. 55). In essence, hypertextuality is intertextuality reimagined for a world that rationalizes itself through computerized devices and the vast digital networks that allow us to cross space and time (Orr, 2003). With this in mind, architectonics simply articulates the networking process as it relates to the social construction of texts, (inter)disciplines, and their convergence through *intertextuality* and its digital equivalent or *hypertextuality*. In architectonic thought, these are twin concepts for simultaneity, systematicity, and constructivism (Hawkins, 1994; Holquist, 1990). The theoretical significance of this kinship reorients and *matures* the ideas of thought leaders and theorists in online education (Dennis, 2018, 2020b; Landow, 2006; Orr, 2003; Picciano, 2019).

However, Sharples et al. (2006) are just a few of the critics who have called for a complete revaluation of our philosophical understandings of teaching, learning, and technology in the twenty-first century. Echoing Peirce, Sharples et al. (2006) argue that technology and semiotic interrelations converge and diverge in digitalized networks, thus generating the artefacts at the center of all teaching and learning with computerized devices. The networking capacity that characterizes these domains represents what Lemke (1992) calls the *cornerstone* of how meanings are made in the brave new world of advanced technology. Lemke (1992, 2002) and Sharples et al. (2006) would agree that intertextuality and hypertextuality are critical areas of educational research. This is likely to remain the case as we become increasingly reliant on computer technology for teaching and learning in the future. This focus on texts and technology might explain why interdisciplinary thinkers such as McKeon (1987), Watson (1993), Klein (1996, 2010), Foucault (2010), Hovestadt (2010), and Dennis (2020a, 2020b) have posited the *discourse of architectonics* as a starting point for advancing the integrative logic of intertextuality and interdisciplinarity in higher education. In exploring how intertextuality helps to bridge the gap between interdisciplinarity and the scholarship of integration, Dennis (2020a) introduces the architectonic principles that serve as the kind of paradigm and synthesis that we need to reframe the interrelationship between teaching, learning, and technology.

According to Dennis (2020a), the first guiding principle is that language and dialogue create unity and simultaneity out of differences. The second principle is that all words, texts, genres, and disciplines integrate through semiotic or dialogic processes. As such, intertextuality, hypertextuality, and interdisciplinarity become metaphorical equivalents as contemporary appreciations of architectonics. The third principle recognizes Peircean semiotics or dialogism as a continuum on which intertextuality, hypertextuality, and interdisciplinarity serve as nodes and complementary ways to contemplate the creation and organization of knowledge in cognition and organizations. The last principle recognizes the importance of exigence, context, intertext, and hypertext in determining the proper approach and application of interdisciplinarity for studying the production and management of

knowledge in education and the workplace using digital technology (Dennis, 2020a). To illustrate how architectonics and its related principles are operationalized in higher education, we can turn to the model of online education introduced by Anderson (2008). Not only does Anderson signify the value of an architectonic perspective in learning theory, but he also demonstrates what its modalities look like in terms of teaching and learning online.

Architectonics in Learning Theory

In his study of the relationship between pedagogy and technology, Anderson (2008) presents an interactive model of online education. *Online education* is the term that is used to describe teaching and learning using digital networks that are interconnected by the Internet and computerized devices (Picciano, 2019). Anderson (2008) contextualizes his understanding of online education and technology by first assessing how humans learn. To ground his understanding, he turns to the learning science presented by Bransford et al. (2000). The authors report that a central tenet of modern learning theory is that different learning goals warrant different instructional approaches. Anderson (2008) agrees with this insight. According to him, the work of these writers provides "evidence that effective learning environments are framed with the convergence of four overlapping lenses" (p. 47).

For Bransford et al. (2000), effective learning environments are community-, knowledge-, learner-, and assessment-centered. They use the term *community-centered* to refer to the various features that constitute a community and its contributions to the social nature of learning. This includes the school itself and the extent to which students, teachers, and academic leaders sense that they are connected to the greater community in which they live. Technological advancements actually help to initiate, develop, and sustain communal relations between these entities over time. One of the ways in which knowledge is constructed and reconstructed is through the social interactions that take place in the different contexts and environments in communities. Knowledge is always being transferred among communities, especially in schools. Schools are essentially the primary environments where we expect students to become knowledgeable. Knowledge-centered environments focus attention on the ways in which well-organized content is used to support planning and strategic instruction in education. They also focus on the particular kinds of information and learning activities that help students to understand academic disciplines. Different disciplines establish different worldviews that condition the ways in which knowledge is valued, discussed, and transferred. This may explain why Bransford et al. (2000) determined that knowledge-centered environments tend to emphasize sense-making along with disciplinary thinking. Sense-making or *framing* helps students to rationalize and negotiate the vast bodies of information that they encounter from one learning situation to the next.

The knowledge-centered environment often converges with learner-centered environments. This overlap is also evident when the teacher begins instruction by taking into account that the students may hold preconceptions about the subject matter being introduced. The learning-centered frame creates awareness of the importance of recognizing the particular cognitive preparation and understandings that students bring to the learning context. The teacher makes an effort to comprehend the student's prerequisite knowledge and preconceived notions. Appraising the worldviews and cultural practices that students bring to a learning situation ensures that the learning environment is conducive

to their needs. This appraisal process is significant because it anticipates student assessment. An assessment-centered approach provides an opportunity for teachers to balance the use of formative and summative inquiries to determine what students have or have not learned. According to Bransford et al. (2000), these methods often generate the kind of feedback that motivates students and teachers.

Bransford et al. (2000) insist that the agency in the design of any learning environment rests on the interaction of all four frames of learning and not their compartmentalization. In other words, learning is recognized as an architectonic process that is sustained by words, texts, and contexts circulating in a system of reciprocity (also see Hawkins, 1994). For example, learning environments are leaner-centered when teachers build on the foundations that students bring to a learning context. However, learning environments are also knowledge-centered. In this sense, teachers must develop and organize academic content in ways that inaugurate and develop a student's ability to comprehend and apply disciplinary knowledge. Bransford et al. (2000) report that, in order to determine the effectiveness of instructional processes and activities, the teacher must become assessment-centered. The results and feedback from assessment can lead to the kinds of improvements that are necessary for teachers to be more effective and students to be more successful. Ultimately, the triadic interactions between students, teachers, and content establish a classroom culture that values learning and strengthens the sense of connection that permeates the various communities in which knowledge is continuously constructed, activated, and transformed.

Architectonics in Online Education

With an understanding of effective learning environments as overlapping entities, Anderson (2008) gains the kind of interpretive lens that he needs to imagine how the various dimensions of learning converge in online education. Anderson (2008) suggests that the overlap among the four domains of effective learning mirrors the inherently interactive nature of technology and the Internet. For Anderson (2008), the unique characteristics and affordances of the Internet enhance the learning contexts and interrelations identified by Bransford et al. (2000). Picciano (2019) notes the significance of Anderson's interpretative methods for advancing the idea that interaction and integration are critical components in the development of any theory of online education. He claims that the four frames of learning theory allow Anderson to detail the characteristics and accommodations that the Internet and technology permit with regard to teaching and learning in the classroom and particularly online. Picciano (2019) points out that Anderson also recognizes that these affordances are tied to the Internet's evolution from a text-based environment to one that reflects the interactivity and interrelatedness of all forms of *hypertextuality* and *hypermedia*. Hypermedia expands "the notion of the text in hypertext by including visual information, sound, animation, and other forms of data" (Landow, 2006, p. 3).

Anderson (2008) would agree that hypertext and hypermedia are born of multi-sequential digital links and this networking capacity enables online education. As an architectonic enterprise, electronic links and digitalization interweave a variety of material across space and time. These digital networks also permit us to create, access, and/or follow multiple ideas and patterns in the same body of information on the Internet. They also trace one's present and past endeavors as well as those of others

(Landow, 2006). In other words, digitalization inaugurates concurrence or *simultaneity*, one of the key properties of architectonic logic. Digitalization reminds us that simultaneity is also a feature of all synchronous interactions. This includes the digital networks that condition the various exchanges that Anderson (2008) describes in the processes that he associates with teaching and learning.

It is not surprising to find that reciprocity is recognized as a character in the description of interaction that Anderson (2008) privileges in his study of online education. He defines *interaction* as a reciprocal event that involves at least two objects and two actions. Interaction materializes out of the convergence of objects and events. Anderson (2008) admits, "It is surprisingly difficult to find a clear and precise definition of this multifaceted concept in the education literature" (p. 55). Nevertheless, the definition of interaction that Anderson (2008) settles on is significant because it frames and conditions his description of the six forms of interaction that he says play a critical role in engaging and supporting both teachers and students. In reviewing the six modes of interaction that Anderson (2008) imagines between students, teachers, and content, the reader will find more illustrations of Peirce's triadic logic and the operationalization of intertextuality and hypertextuality.

For example, the six modes of interaction are student-student, student-content, student-teacher, teacher-content, teacher-teacher, and content-content interactions. Student-student interactions are characterized by peer-to-peer interactivities that allow students to investigate, understand, and develop multiple perspectives. Computer technology stimulates this collaborative process. According to Anderson (2008), collaborative work between students promotes cognitive development and the acquisition of critical social skills. More importantly, peer collaborations are essential for the development of effective communities of learning that allow students to evaluate knowledge shared by members of their community as well as formal curricula. When students, as individuals or collaborators, engage the knowledge that organizes and substantiates curricula, they are also participating in what Anderson (2008) calls student-content interactions. This form of interaction is a key component of formal education. However, the Internet makes this somewhat passive event more active for students.

Anderson (2008) notes that interactive content distributed via the Internet can be adapted to address the strengths and weaknesses of students. The customization of content for students provides opportunities for teachers to support the diverse learning needs of students. When this happens, student-content interactions are in concert with student-teacher interactions. Technology and the Internet support student-teacher interactions in a variety of ways. This includes both asynchronous and synchronous communications using a number of different formats, texts, and hyperlinks. Anderson (2008) claims that the flexibility that educational technology allows can offer students greater autonomy. Some of the authority that the teacher holds is distributed to students, allowing them to experience a degree of interdependence as individual and collaborative learners. To further increase student commitment and participation in learning, teachers might focus on the ways in which they negotiate and design learning activities and opportunities using academic content and other bodies of knowledge. Teacher-content interactions are not only ways to continuously monitor and develop course content, but they also inspire dialogue and learning among faculty members. The content that teachers

design and distribute among students is often shared among fellow teachers in a particular subject area or across disciplines.

In many ways, teacher-teacher interactions promote a sense of community and support among faculty. These interactions also sustain professional growth and development initiatives that help to improve the overall quality of the teaching experiences for faculty and the learning experiences for students. Teacher-teacher interactions ultimately form the communities of learning that require students to navigate and negotiate the various academic content areas and discourses that they experience across the academy. Regardless of the academic discipline, content is always textual and interactive. Content-content interactions represent the last educational interactivity that Anderson (2008) describes. As a developing mode, content-content interactions allow disciplines and other bodies of knowledge to merge. Technology simply enhances and quickens these processes through hyperlinks. Advancements in educational technology can facilitate the tracking of content as it is used by teachers and students. It can also help us manage the augmentation and customization of content for individual learning needs. As content interacts with other content, the knowledge of students and teachers is constantly refreshed, expanded, and transformed. In architectonic thought, content-content interactions actualize the logic of *intertextuality*. Academic content is experienced as some form of text, and a text exists only because of exchanges with other texts. Barthes (1989) tells us that texts expand as an effect of combinative operations. As text, content is both the production and reproduction of knowledge. As such, content is an artefact of exchanges that simply model convergence and reciprocity in the learning process.

Anderson (2008) concludes that meaningful learning experiences occur when the appropriate educational interactions are located within the appropriate environments for learning. He claims, "The challenge for teachers and course developers working in an online learning context, therefore, is to construct a learning environment that is simultaneously learner-centered, content-centered, community-centered, and assessment-centered" (p. 66). He admits that there is no best way to design for these kinds of interrelationships, interactions, and outcomes. Anderson (2008) recommends that teachers develop "a repertoire of online learning activities that are adaptable to diverse contextual and student needs" (p. 66). This is exactly what Bernauer and Tomei (2015) attempt to help us to do when they introduce their integrated matrix—which acts as an architectonics of the competencies, learning objectives, and practices that faculty can use to maximize teaching and learning with technology in higher education. In their matrix, Bernauer and Tomei (2015) present the five quadrants that college faculty move through when learning how to use pedagogy and technology more effectively for teaching and learning. For example, the five quandrants are *apprentice integrator*, *pedagogical integrator*, *technological integrator*, *journeyman integrator*, and *master integrator*. The apprentice integrator is an educator who functions at the lower level of Bernauer and Tomei's matrix. Teachers who find themselves at this level typically lack sufficient experience as pedagogues and technologists, and they are often dependent on didactic activities, lectures, and textbooks. In the next quadrant is the pedagogical integrator. Those who operate in this part of the model are usually already skilled and successful instructors. However, they may lack the kind of experiences and abilities that allow them to maximize the use of educational technology in the classroom.

Unlike pedagogical integrators, technological integrators are able to activate the power of educational technologies and their many potentialities. The faculty members who work in this domain are usually more adept and comfortable using computer hardware, software, and related programs. However, they may overuse computers, the Internet, and other programs in order to engage students and relate course content. When instructors fall between the pedagogical and technological quadrants, Bernauer and Tomei (2015) call them *journeyman integrators*. These integrators tend to have a range of experiences and abilities in the areas of pedagogy and technology. Bernauer and Tomei claim that teachers operating in this quadrant are usually on their way to becoming master integrators. Master integrators are those who are at the pinnacle of Bernauer and Tomei's model. They have achieved a high degree of competence and vast experiences as pedagogues and technologists. Educators who reach this quadrant tend to have a library or *repertoire* of instructional methods and skills that they can adapt to meet the different learning needs of students. However, as Kirkwood and Price (2013) suggest above, even master integrators may be unable to identify the relevant theoretical ideas and frameworks that inform their views and practices. In a sense, Bernauer and Tomei (2015) substantiate this point when they report that "college faculty often have their own set of expectations and beliefs based in large measure on little more than how they were taught when they were students" (p. 5).

Conclusion

However, based on the synthesis of the disciplinary scholarship and perspectives above, Gazoni (2016) would agree that Peirce (1955) offers us the kind of compelling scholarly approach and interdisciplinary model that faculty can use to bridge the gap between theory and practice in SoTL. More specifically, Peirce's theory of signs and the interactivity among *firstness*, *secondness*, and *thirdness* serve as a cogent articulation of the ways in which convergence or intertextuality is operationalized in learning theory, online education, and teaching and learning with technology. With deep roots in the Western intellectual tradition, Peircean architectonics advances Boyer's innovation in SoTL, thus enriching our scholarly discourse and helping us to think and communicate across disciplinary boundaries in higher education. In turn, we are better able to reimagine our frameworks in relation to our diverse practices. Also, we can revalue the ways in which intertextuality, hypertextuality, and interdisciplinarity condition our understanding of the integrative capacities that operationalize teaching, learning, and technology. Hopefully, the agency located in architectonics and its coextending principles will renew interest in Boyer's (1990) work on the scholarship of integration as a continuous practice and important area of inquiry for future qualitative research in integrative learning and online education theory.

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