Peer-Reviewed Article

OJED
OPEN JOURNALS IN EDUCATION

ISSN: 2162-3104 Print/ ISSN: 2166-3750 Online
Volume 8, Issue 1 (2019), pp. 117-139

https://ojed.org/jise

(Un)Disciplining Interdisciplinarity: Root Metaphors, Matrices, and the Limits of Psychology in Postmodern Education

Jeremy Dennis
St. Louis Community College, USA

ABSTRACT

In interdisciplinary education, metaphors often provide the epistemological clarity that is lacking in our definitions and theories of interdisciplinarity. The problem is that ineffective and unsubstantiated metaphors proliferate. We lack a root metaphor or shared world view of interdisciplinarity. Is it time that we move away from thinking in terms of metaphors? Some instrumentalists in interdisciplinary studies argue yes and propose a pragmatic constructionist approach for interdisciplinary education. This theoretical study determines that this proposal is incomplete. It reveals that an intertextual view of interdisciplinarity is not only more appropriate, but it integrates the competing theoretical and pedagogical approaches in the field. This article also identifies "the matrix" as the metaphor best positioned to sustain this integration and to bridge the widening gap between disciplines.

Keywords: Activity Theory, Dialogism, Interdisciplinary Theory

INTRODUCTION

Interdisciplinarians tend to turn to the world of metaphors to provide the epistemological clarity that is often lacking in our multi-dimensional definitions and theoretical rationales for interdisciplinarity (Graff, 2015; Jacobs, 2013; Lattuca, 2001; Moran, 2010; Newell, 2013; Nissani, 1997; Ribeiro & Relvas, 2018). However, some metaphors work better than others, and this explains why many of the metaphors for interdisciplinarity are unsustainable. Interdisciplinarity lacks what Pepper (1942) and Botha (2009) call a *root metaphor.* In other words, we do not have a shared world view of interdisciplinarity or its definitions, theories, practices, or assessments. Instead, we have a proliferation of terms and metaphors that do more to confuse than clarify interdisciplinary theory and practice (Newell, 2001). According to Klein (1996), "Interdisciplinary activities and processes cannot be depicted in a single image. The metaphor of a web, a network, and a system are often invoked" (p. 19). More creative metaphors include fish scales (Campbell, 1969) and fractals (Mackey, 2002). Piso (2015) is one of the few writers who examine critiques of metaphors in interdisciplinary studies by scholars such as Veronica Boix Mansilla. Piso (2015) describes how linguistic metaphors can inform our understanding of integration in interdisciplinary studies, but he does not fully consider the theoretical underpinnings of Boix Mansilla's criticisms. What if Piso (2015) had explored his dialogic perspective in the context of Boix Mansilla's critique of metaphors? Would this support or challenge her call for a psychological study of interdisciplinary learning based on constructionist theory? Returning to Boix Mansilla's concerns about the role that metaphors play in interdisciplinarity will provide us with an opportunity to examine these questions in order to determine whether metaphors do more to improve or hinder our understanding of theory and practice in interdisciplinary education.

Boix Mansilla (2010) identifies crossroads, trading zones, and bridges as examples of other metaphors used by interdisciplinarians to explain interdisciplinary intellectual activities. According to Boix Mansilla (2010), "Metaphors have served us well as evocative approximations to interdisciplinary cognition. However, they have proven less productive in their ability to structure strong research agendas or to design empirically grounded programs on interdisciplinary learning and its assessment" (p. 289). She proposes a move away from the "evocative language" of metaphor in order to better illuminate "the phenomenon of interdisciplinary learning in epistemological and cognitive terms" (pp. 288-289). Boix

Mansilla (2010) claims that psychological studies of interdisciplinary learning and cognition are scarce but needed to provide the generative epistemological foundation for interdisciplinary education that she claims we are missing. To advance her case, Boix Mansilla (2010) calls for a pragmatic constructionist view of interdisciplinary education as a way to account for the various activities that we have come to associate with interdisciplinarity, particularly integration (pp. 288-289). The problem is that scholars across the disciplines indicate that her proposal provides an incomplete assessment of learning, interdisciplinarity, and particularly psychology (Berger & Luckmann, 1967; Derrida, 1978; Frodeman, 2014; Klein, 1996; Klempe, 2018; Kvale, 1992; Tennant, 2000; Usher & Edwards, 1994). Shotter (1991) offers a useful synthesis of the major concerns that we have with Boix Mansilla's reliance on what critics see as academic or mainstream psychology's attachment to scientific paradigms (also see Holzman & Morss, 2000). He concludes that cognitive psychology's veneration for scientism has resulted in inadequate explanations of its subject matter. Shotter (1991) claims that "the cognitive approach ignores both the role of social and rhetorical processes in its own creation" (p. 498). Reductive, objective, and empirical formulations for the explication of mental processes can never be completely reliable. Cognitive psychology is better illuminated by metaphors and the tools that effectuate human existence: language and conversation (pp. 501-507). Cognitive abilities must be assessed in terms of what people say and do and not "the myths of the mind." Shotter (1993) agrees that a rhetorical turn in psychology and other disciplines is a significant departure from the instrumental, ahistorical, and reductive conceptualizations of cognitivism that disproportionally influence research, teaching, and learning for instrumentalists in interdisciplinary studies (see examples in Augsburg, 2005; Newell, 2013; Repko & Szostak, 2017).

Boix Mansilla's theory of interdisciplinarity is yet another example of instrumental interdisciplinarity and the shadow it casts over conceptual interdisciplinarity. To navigate interdisciplinarity's complex landscape, Lattuca (2001) develops a typology that helps us to define instrumental and conceptual interdisciplinarity. Though her views are contested among scholars in interdisciplinary studies, Lattuca (2001) claims that the instrumental approach is more practical, methodical, and oriented toward problem-solving and research. The critical or conceptual approach is more theoretical, nonlinear, and oriented toward challenging knowledge structures (pp. 10-12). In her study of the typologies in interdisciplinarity, Klein (2017) describes this distinction as the "fault line" in the current discourse in interdisciplinary studies. Klein's assessment is poignant because it

represents "conflicting energies" that are linked and divided by the kind of hierarchization that substantiates disciplinarity (Foucault, 1995, p. 104). This paradox reaffirms the need for a metaphor in interdisciplinary studies that can help us to bridge the gap between our competing views of interdisciplinarity.

PURPOSE STATEMENT

This discussion makes a case for a dialogic consideration of interdisciplinarity. As a form of dialogue, intertextuality signifies the anti-foundationalism that we associate with metaphors, language, and interdisciplinarity (Derrida, 1997; Farris, 2017; Leitch, 1986). It questions the objectivism that psychology and interdisciplinarity too often adopt or adapt for a scientific veneer (Graff, 2015; Klempe, 2018). I challenge the view that psychological or instrumental interpretations of interdisciplinarity can provide an adequate rationale for an integrative pedagogy in today's digital culture. Ironically, many scholars in interdisciplinary studies support rules and operational theories that inadvertently discipline the complexity and unpredictability that characterize interdisciplinarity as a form of heterogeneous and disruptive thought (see more on this point in Frodeman, 2014; Klein, 2001; Mackey, 2002; Welch, 2018). Not only are these rules and theories metaphors for modernism, but they call attention to the intracontradictions and divisions between those who support critical/conceptual interpretations of interdisciplinarity and those who support instrumental/methodological interpretations. As a consequence, the greatest challenge to interdisciplinarity's future may come from the ideological tensions within its ranks and not criticisms from the outside (Fish, 1989; Graff, 2015; Jacobs, 2013). A root metaphor grounded in an epistemology of texts can help us to bridge the gap in our ranks and the even wider gaps between the human, social, and natural sciences in academe.

To move us toward this goal, I first explain why Boix Mansilla's criteria for a pragmatic constructionist epistemology reproduce the problems that they try to solve with a modernist approach to psychology. Using Jacques Derrida's science of supplementation as a theoretical paradigm and a challenge to the authority of modernism and mainstream psychology, I synthesize the dialogic iterations of his concept in the theories of Julia Kristeva and Roland Barthes. This synthesis not only identifies *intertextuality* as an alternative epistemology for interdisciplinarity, but it also signifies "the matrix" as a trope for intertextuality. Next, I describe how intertextuality as a pedagogy is supported by postmodernism and activity theory. Activity theory is a growing tradition in psychology that integrates

instrumental and conceptual approaches to interdisciplinarity. Finally, I conclude by recommending the matrix as the metaphor best positioned to sustain this integration, thus helping us to develop a new discourse for interdisciplinarity that resonates across the disciplines.

A PRAGMATIC CONSTRUCTIONIST EPISTEMOLOGY

Boix Mansilla (2010) argues that a pragmatic constructionist view of interdisciplinary learning helps to explain the processes and practices in interdisciplinarity. Interdisciplinary learning is described as "a process by which individuals and groups integrate insights and modes of thinking from two or more disciplines or established fields, to advance their fundamental or practical understanding of a subject that stands beyond the scope of a single discipline" (p. 289). Four criteria are required in Boix Mansilla's epistemological framework for interdisciplinary learning. First, in order to account for the multiple forms of disciplinary perspectives, the framework must be pluralist. Second, the framework should be relevant to interdisciplinary learning. Third, the theory has to account for the dynamic movement of knowledge from "less to more accomplished instantiations." Last, the framework must provide a means for knowledge quality assurance and acceptable standards (p. 294). Boix Mansilla (2010) goes on to identify the four core cognitive processes or steps involved in this epistemological blueprint: "establishing purpose; weighing disciplinary insights; building leveraging integrations; and maintaining a critical stance" (p. 298). These processes interact as learning progresses, thus resulting in improved understanding or reflective equilibrium (pp. 299-300). In order to test the capacity of the framework, Boix Mansilla (2010) applies it in the context of two learning examples—one involving a historical monument and the other, the relationship between climate change and water availability.

After review, it appears that Boix Mansilla's theory supports the epistemological position that she wants to challenge. She evaluates how our epistemological assumptions often frame and shape our understanding of interdisciplinarity. Specifically, Boix Mansilla (2010) critiques the ways in which positivism limits our conceptualization of interdisciplinarity. She claims that positivism is reductive. It regards logic, science, and mathematics as sources of objectivity and truth (p. 293). Boix Mansilla (2010) concludes that a more pluralistic epistemological theory—pragmatic constructionism—is needed because it recognizes the multiple knowledge forms and activities that define interdisciplinarity (p. 294). However, some scholars might disagree. According to Frodeman (2014), the four core cognitive processes or steps used to support Boix Mansilla's pragmatic

constructionist paradigm are also positivist (pp. 43-49). Frodeman's critique is strengthened by the fact that Boix Mansilla (2010) uses what critics call *a modernist psychological approach* to support her position. Scholars in postmodern psychology such as Kvale (1992) and Holzman and Morss (2000) describe the important ways that the science of psychology is challenged and enriched by the introduction of postmodern perspectives in academic or mainstream psychology. How would a postmodern perspective enrich our understanding of interdisciplinarity? To answer this question, we need to examine the theoretical underpinnings that support Boix Mansilla's project.

When viewed through a postmodern lens, Boix Mansilla's theory may have more critics than advocates. What Boix Mansilla (2010) creates is a developmental theory of learning wrapped in a recipe for interdisciplinarity. Boix Mansilla's conceptualization of interdisciplinarity is what Klein (2001) calls "a modernist agenda in the midst of postmodern skepticism" (p. 44). Klein (2001) says methodical or process models of interdisciplinarity are common. While such models do have the potential to improve practices, they tend to be prescriptive (p. 51). This assessment also holds true for Boix Mansilla's theory. Ironically, Boix Mansilla (2010) turns to the philosophy of Nelson Goodman and Catherine Elgin to support her theory and to do a job that she probably suspects mainstream psychology cannot do alone, which is rationalize interdisciplinary learning based on cognitive processes (p. 295). In fact, postmodern critiques of psychology question whether psychology is capable of providing an adequate rationale for learning at all (Klempe, 2018, p. 384). According to Lyotard (1984), postmodernism is a reaction to modernism and the Enlightenment ideas on which it rests. Their grand narratives of progress based on reason and positivism failed to deliver what they promised. Lyotard (1984) defines postmodernism as the end of grand narratives of truth and the emergence of a deep suspicion of arguments that claim that rationality and science always lead to objectivity. In fact, truth is determined to be a form of discourse or text that is always unfinished, relational, constructed, and contextual (pp. 37-47). For many theorists, postmodernism describes the culture that represents this world view that Lyotard articulates. However, post-structuralism defines the intellectual movement and methods that we often associate with postmodern thought. It might be better understood as a critical approach that uses language and texts to disrupt all attempts to structure or freeze the multiplicity and heterogeneity that condition our notions of reality (Derrida, 1978, 1997).

In *Postmodernism and Education,* Usher and Edwards (1994) claim that educational theory and practice are founded on "the discourse of

modernity and its self-understandings have been forged by that discourse's basic and implicit assumptions" (p. 2). The authors claim that we need to reexamine our educational theories and practices from a postmodern perspective. Postmodernism is more than a body of pluralistic thought influenced by prolific theorists such as Jacques Derrida. It is a world view that informs practice. "In a sense," write Usher and Edwards (1994), "the postmodern perspective is a confrontation with epistemology and deeply embedded notions of foundations, disciplines, and scientificity" (p. 3). The discipline that Usher and Edwards (1994) evaluate using a postmodern viewpoint is psychology. They specifically focus on its relationship to disciplinary foundations and processes of legitimation in education (pp. 33-55). The authors argue that "psychology contains within itself a powerful tendency that uncritically supports the modernist grand narratives of progress through science, and, indeed, it is in this way that psychology readily becomes a powerful regulatory discourse" (p. 39). By adopting a scientific paradigm in psychology, we produce a modernist discourse that shapes our rationales, techniques, perceptions, attitudes, and academic structures (Holzman & Morss, 2000; Shotter, 1991). Like Boix Mansilla, many educators assume that psychology can describe the processes of the mind and make education appear more scientific. Usher and Edwards (1994) explain what causes us to invest in this belief when they claim that psychology "conditions its self-understanding to regard the natural sciences as the model and standard of scientific endeavor" (p. 39).

However, the authors conclude that psychology loses some of its critical force when it situates itself in a scientific paradigm. Psychology must expand its range of influences. Usher and Edwards (1994) argue that psychology's claim to scientific status is driven by the respectability and validation associated with the hard sciences. They go on to write, "It has needed to be seen as scientific since otherwise it would have had no warrant in a modernist scientific-technological culture" (p. 49). Usher and Edwards (1994) and Klempe (2018) would agree that pedagogy in the age of digitalization demands that psychology (re)consider a postmodern world that is characterized by complexity, hybridity, and continuous knowledge formations. With this perspective in mind, Usher and Edwards (1994) and Farris (2017) reveal the ways in which theorists such as Derrida also serve as postmodern pedagogues who can help us to discover an alternative epistemology that explains interdisciplinary learning. After examining Sigmund Freud's use of writing as a metaphor for describing cognitive processes, Derrida (1978) implies that the psyche is paralogical like writing (pp. 196-231). In fact, writing or *grammatology* is Derrida's master concept for dynamism and meaning-making. Not only does Derrida (1997) challenge

the positivism associated with modernism and mainstream psychology, but his theory of supplementarity provides us with a paradigm for understanding interdisciplinarity, metaphors, matrices, and the intertextual nature of epistemology (Usher & Edwards, 1994, pp. 119-135; Norris, 1987, pp. 65-68, pp.113-117).

DERRIDA AND SUPPLEMENTARITY

In *Of Grammatology,* Derrida (1997) cites C. S. Peirce (1955) as one of the first to describe the supplemental nature of sign systems in the process of communication. As a mathematician, scientist, philosopher, and semiotician, Peirce makes important contributions in several disciplines. He contributes to our contemporary understanding of the conceptual importance of language and mathematics as tools for communication and analysis. According to Parshall (1998), Peirce and his father are powerful influences on James Joseph Sylvester, the mathematician credited with defining the term *matrix* for its use in algebra. In his noted definition of a matrix, Sylvester (1904) writes, "I have in previous papers defined a 'Matrix' as a rectangular array of terms, out of which different systems of determinants may be engendered, as from the womb of a common parent; these cognate determinants being by no means isolated in their relations to one another, but subject to certain simple laws of mutual dependence and simultaneous deperition" (p. 247). Unlike Sylvester, Peirce has interests in many academic areas beyond matrices. He is particularly interested in semiotics. Peirce (as well as Ferdinand de Saussure) is considered one of the fathers of semiotics. Chandler (2002) explains how Peirce's model provides the foundation for semiotics from which structuralism and post-structuralism originate. More importantly, Peirce's conceptualization of the sign as dialogic creates the groundwork for what would later be called *intertextuality* (discussed below) (Chandler, 2002, p. 34). Peirce (1955) develops a three-part model of the sign that consists of representamen (form of the sign), interpretant (sense made of the sign), and object (that to which the sign refers). The interaction of these parts is what he calls *semiosis.* According to Peirce, signs participate in translation and they, like all thinking, are dialogic. He says, "We think only in signs. These mental signs are of mixed nature" (p. 115). Peirce recognizes the translation of signs as a paralogical process, but Derrida also sees it as a *science of supplementarity.*

According to Derrida (1997), the history of truth or *logocentrism* among Western philosophers, intellectuals, and educators has always involved a search for a transcendental signified, more specifically the privileging of the metaphysics of presence over absence and speech over

writing (p. 4). Derrida (1978) claims, “The history of metaphysics, like the history of the West, is the history of these metaphors and metonymies” (p. 279). As a consequence, these metaphors deeply influence the way that we come to rationalize our world in terms of differences, oppositions, and hierarchies. These structures help to control and “center” meaning. By focusing on language as a system of endless signification, Derrida (1978) uses *deconstruction* as a conceptual tool and activity for disrupting these structures. Deconstruction allows us to insert “alternative centers” or supplements so that we can realize new meanings and possibilities that have been hidden or marginalized. Derrida (1978) writes, “in the absence of a center of origin, everything became discourse—provided we can agree on this word—that is to say, a system in which the central signified, the original or transcendental signified, is never absolutely present outside a system of differences” (p. 280). In introducing Derrida’s philosophy (1997), Gayatri Spivak warns that deconstruction is perpetual and conflictual. It can “never be a positive science” (p. lxxxviii). Yet, Derrida argues that there is also a liberatory and pedagogical quality in deconstruction, as it helps us to overcome the disciplinary, theological, epistemological, and metaphysical obstacles that maintain and reproduce the status quo (Farris, 2017; Ulmer, 1985). Derrida insists that all knowledge is underwritten by writing. The interpretive nature of writing compromises anything that we think we may know or believe to be true. Henceforth, writing becomes the metaphor that Derrida uses to represent the structure of supplementarity. He concludes that “if supplementarity is a necessary indefinite process, writing is the supplement par excellence since it marks the point where the supplement proposes itself as supplement of supplement, sign of sign” (p. 281). As a form of writing, texts are figurations that are constantly on the move to the next signifying moment. There is nothing outside the text because everything is a text and all texts are always interrelated. Therefore, the text is the process and product of what we call knowledge (Derrida, 1997, p. 13; Leitch, 1986, p. 53). According to Norris (1987), “Writing, in short, is intertextual through and through” (p. 26).

In using supplementarity as a theoretical frame for explication and analysis, it is important to remember that the term *supplement* operates under two definitions. For Derrida (1997), supplement is both a “substitute” and an “addition” (pp. 144-145). Another fascinating way that he plays on these definitions of supplementarity is through algebra (p. 167). He turns to algebra for its metaphorical and explanatory value in the same way that his predecessors did. Derrida draws attention to the fact that early philosophers such as Leibniz saw reasoning and calculating as the same process, and algebra was synonymous with analysis. Leibniz is quoted as saying, “‘What

we call Algebra, or Analysis, is only a small branch, for it is this science that gives speech to language, letters to speech, numbers to arithmetic, notes to music; it teaches us the secret of stabilizing reasoning'" (cited in Derrida, 1997, p. 78). According to Plotnitsky (2003), algebra is defined by written symbolism, and this symbolism, whether realized in material form or not, represents a form of writing with universal characteristics that Leibniz and Derrida view as a type of philosophical algebra. The operations in algebra, particularly in a matrix, enact the logic of supplementarity. Derrida (1997) argues, "The supplement is always the supplement of a supplement. One wishes to go back from the supplement to the source: one must recognize that there is a supplement at the source. Thus, it is always already algebraic" (p. 304). Like the term *supplement, algebra* has a double meaning for Derrida. It represents an instrument for the technical analysis of various relations between elements, and it represents a philosophy of plurality, difference, and undecidability. The conceptual richness in language and mathematics gives them a philosophical common ground on which they create metaphorical reciprocity. Plotnitsky (2003) writes, "I see 'algebra' as a trope, perhaps the ultimate trope, or concept of formalisation, whether we think of formalizing systems (such as those of mathematics or, via mathematics, physics or other sciences), systems of concepts in logic and philosophy, or language, as in linguistics" (p. 99). Ultimately, the intersection between mathematics and Bakhtinian dialogism allows Julia Kristeva as well as Roland Barthes to blur the lines between structuralism and post-structuralism and appropriate *supplementarity* as *intertextuality.*

KRISTEVA, BARTHES, AND INTERTEXTUALITY

Intertextuality as a concept has a long history in Western thought. In order to help us to navigate the panorama of intertextuality, Worton and Still (1990) distinguish between the enactors of intertextuality and its theorists. The theorist at the center of contemporary notions of the concept is the Russian language philosopher Mikhail Bakhtin. In his complex theory of dialogue, Bakhtin (1986) imagines connections between different people, languages, texts, disciplines, and all differences. In essence, Bakhtin's philosophy of language or dialogism is a meditation on creativity and the interrelations between parts and wholes as well as sameness and difference. The central tenant in dialogism is that meaning is everywhere and in everything. Meaning is constantly being created and recreated through words and language. Bakhtin asserts that the word in language is shared and its processes are always dialogic, creative, and unfinalized. Bakhtin (1990) tells us that we can never know "the technical aspects of creation and

craftsmanship." He writes, "The actual work of creation is experienced, but this experiencing neither leaves nor sees itself" (p. 7). In notes from his later years as a scholar, Bakhtin (1986) makes this assessment about dialogic relations: "These relations are profoundly unique and cannot be reduced to logical, linguistic, psychological, mechanical, or any other natural relations" (p. 124). In dialogism, "each word (each sign) of the text exceeds its boundaries. Any understanding is a correlation of a given text with other texts" (p. 161).

After Bakhtin, Worton and Still agree that Julia Kristeva is the most influential figure in the development of intertextuality as an epistemological concept. Worton and Still (1990) write, "One of the most important, and earliest, interpretations of Bakhtin's work for a western public was by Kristeva" (p. 16). Other theories of intertextuality are mostly indebted to Kristeva's innovation via Bakhtin (see Alfaro's [1996] review of theorists such as Todorov, Culler, Genette, and Riffaterre, who contribute to our understanding of intertextuality). However, Derrida plays an important role in Kristeva's conceptualization of intertextuality. He actually mediates Kristeva's reading of Bakhtin. Alfaro (1996) claims that Derrida provides Kristeva with a view of texts that she does not derive from Bakhtin, and that is the dimension of supplementation. In fact, Alfaro (1996) would agree that the Derridean view of texts as supplementation is "crucial" to our understanding of intertextuality (p. 276).

Like Derrida, Kristeva provides us with more than one interpretation of intertextuality. In her appropriation of Bakhtin, Kristeva (1986) evokes the mathematical applications for which she is famous, then she inserts the word *"text"* into Bakhtin's quote in order to describe textual interrelations. Kristeva (1986) claims that the *"word"* maintains a special status along a horizontal axis (subject-addressee) and a vertical axis (text-context). When the two coincide, they reveal how "each word (text) is an intersection of word (text) where at least one other word (text) can be read" (p. 37). She goes on to use dialogism to argue that "any text is constructed as a mosaic of quotations; any text is the absorption and transformation of another" (p. 37). This transformation of texts creates a foundation for Kristeva's *semiotics.* It is the term that she (re)appropriates to describe the forces at play in language and to transform the subject in her critique of the *psychoanalytics* of Sigmund Freud and Jacques Lacan. Kristeva (1984) designates the terms *symbolic* and *semiotic* to characterize her semiotic process, which in many ways extends Derridean thought. The symbolic relies on a fixed meaning or structure for its signifying power and is analogous to modernism. The semiotic is the opposite of the symbolic and usually experiences the weight of its repression as a consequence. It

underpins postmodernism. For example, the semiotic relies on the heterogeneity in meaning and its capacity to disrupt all hierarchies and oppositions (Kristeva, 1984, pp. 24-25; Payne, 1993). The semiotic is always threatening to change the symbolic. Kristeva (1984) says, "what remodels the symbolic is always the influx of the semiotic" (p. 62). Kristeva's claim that (narrative) texts constitute a "dialogical matrix" is a reminder of her work's indebtedness to structuralism, Bakhtin, and Derrida. The combination of these elements helps her to express one of the earliest articulations of post-structuralism (1986, pp. 34, 46).

In *Revolution in Poetic Language,* Kristeva (1984) explores Bakhtinian and Derridean logic even further. Kristeva's conceptualization of intertextuality gets rebranded as *transposition.* She explains why she abandons the term that she coined. Kristeva (1984) writes, "The term *inter-textuality* denotes this transposition of one (or several) sign system(s) into another; but since this term has often been understood in the banal sense of 'study of sources,' we prefer the term *transposition* because it specifies that the passage from one signifying system to another demands a new articulation of the thetic—of enunciative and denotative positionality" (pp. 59-60). For the most part, the term changes but the general spirit of Kristeva's original conceptualization is basically the same. What must not get lost in Kristeva's revision is her articulation of the pedagogical implications of textual interrelations. The text is representative of the process of intertextuality and its product—the text. Like Bernstein (1990), Kristeva claims that the text is pedagogical, social, and transformational. In other words, the creator of texts is always already reading and writing a new text for others to read and write. Kristeva (1984) says, "In calling the text a practice we must not forget that it is a new practice, radically different from the mechanistic practice of a null and void, atomistic subject who refuses to acknowledge that he is a subject of language" (p. 210).

However, some will ignore Kristeva's advice and continue to see her theoretical achievement as more problematic than promising. Critics often accuse Kristeva of having conflicting applications of intertextuality in her work and a crypto-allegiance to formalism. Kristeva is also accused of (mis)appropriating Bakhtin's ideas and radicalizing them (Alfaro, 1996; Orr, 2003; Payne, 1993). These concerns often cause many of Kristeva's critics to use other definitions of intertextuality, particularly those expressed by her mentor, Roland Barthes. According to Orr (2003), Barthes introduces a definition of intertextuality that not only competes with Kristeva's but grafts from it and sometimes overshadows it (pp. 32-36). Barthes (1989) defines the text as an activity or a form of production where author and reader come together. Texts are continuously producing or "working." A text does not

stop because the process of language knows no cessation and meaning is always becoming (pp. 57-59). Barthes says, "The metaphor of the Text is that of the network" (p. 61). Moran (2010) claims that it is Barthes's appropriation of (cultural) texts that allows him to present a model of interdisciplinarity that reveals how various disciplines can be brought together around texts. More importantly, Barthes recognizes a connection between intertextuality and interdisciplinarity that suggests that the two are symbiotic and figurative equivalents in postmodernism (also see Orr, 2003, pp. 44-48). Barthes (1989) argues, "In order to do interdisciplinary work, it is not enough to take a 'subject' (a theme) and to arrange two or three sciences around it. Interdisciplinary study consists in creating a new object, which belongs to no one. The Text is, I believe, one such object" (p. 72).

Furthermore, Barthes shows us that the connection between intertextuality and interdisciplinary applies not only in post-structuralism but also in structuralism, which is heavily influenced by modernism and mathematics (p. 59). Arguably, one could say that interdisciplinarity and intertextuality live on a continuum for Barthes (1989). This may explain why "the claim to interdisciplinarity is often made on the ground of intertextuality," according to Klein (1996, p. 131). Moran (2010) argues that "Structuralism is interdisciplinary because all kinds of artefacts and phenomena can be interpreted as 'texts': for Barthes, a text is simply a vehicle for the production and dissemination of cultural meaning" (p. 77). Using a structuralist's approach (that he later replaces with a post-structuralist one), Barthes (1990) tests the potential and limit of textual signification and plurality in what he calls "a signifying matrix." Barthes (1990) concludes that the matrix is useful as both a model and metaphor (pp. 59-70). Klein (1996) agrees when she argues, "Matrix structure is another older form of hybrid community. 'Matrix' is both structure and metaphor. The word denotes something that gives form or origin" (p. 23). As a heuristic, the matrix may prove to be a useful tool in helping us to negotiate the various pedagogical approaches and methods available for teaching interdisciplinarity.

ACTIVITY THEORY AND PEDAGOGY

DeZure (2010), Haynes, (2002), Klein, (2002), and Lattuca (2001) all agree that there is no unique pedagogy, strategy, technique, or formula for teaching interdisciplinarity. Haynes (2002) claims that interdisciplinarity requires the use of a host of "powerful pedagogies" and simply cannot be taught with one approach. Klein (2002) says, "Interdisciplinary pedagogy is active, dynamic, and process-oriented. Application of knowledge takes

precedence over acquisition alone, accentuating development of skills of analysis and critical thinking" (p. 13). Newell (2001, 2013) outlines one of the most influential paradigms for practicing interdisciplinarity in the United States. Szostak (2002) and Repko and Szostak (2017) build on the theoretical foundation and best practices that Newell's work provides (Newell & Arvidson, 2018). According to DeZure (2010), technology has made it easier for us to collaborate and access methods and models that can help us to improve interdisciplinary instruction, but more work still needs to be done to fulfill their promise and potential (pp. 375-381).

To assist us, Bernauer and Tomei (2015) have developed the Integrated Readiness Matrix as a way to help academics reflect on their pedagogical philosophies, practices, and shortcomings. According to Bernauer and Tomei (2015), the Integrated Readiness Matrix is a "tool for identifying faculty skills and competencies along two critical dimensions of teaching: pedagogy and technology" (p. 55). This resource characterizes key pedagogical and technological theories, and it identifies some of the practices and frameworks that educators need in order to produce effective learning activities, better assessment strategies, and more competent students. Bernauer and Tomei (2015) insist that faculty must see pedagogy as more than the "art, science, and profession of teaching" (p. 3). Pedagogy is also defined by interdisciplinary relationships or what Bernauer and Tomei (2015) call the "pillars of teaching and learning." The pillars are philosophy, psychology, sociology, history, and leadership (pp. 3-4). Together, these disciplines create the kinds of dialogues that inform our pedagogical choices. According to Bernauer and Tomei (2015), we must go beyond the personalization of pedagogy in order to better integrate our perspectives and meet the learning needs of an increasingly diverse student population.

The theorist and pedagogue Paulo Freire illustrates what intertextuality looks like as an integrative practice or what is commonly called *dialogic pedagogy*. Freire (1990b) claims that since the dialogic process brings together theory and practice, dialogue must not be "reduced to the act of one person's 'depositing' ideas in another, nor can it become a simple exchange of ideas to be 'consumed' by the discussants" (p. 77). A pedagogy rooted in dialogue allows for the emergence and re-invention of knowledge and the development of consciousness, the awakening of critical awareness that grows out of critical learning environments that lead to the transformation of self and society. To demonstrate his point, Freire (1990a) uses a matrix as a tool for practicing intertextuality and fostering changes in student behavior and consciousness. He combines the following strategies and activities: a dialogic matrix, revised content, interdisciplinary teams,

thematic breakdowns, and codification. He says that when the words in a horizontal relationship or dialogic matrix are linked, participants can "join in a critical search for something new" (p. 45). Anti-dialogic matrices involve "vertical relationships between persons…. It is self-sufficient and hopelessly arrogant" (p. 46). Anti-dialogic practices lead to what Freire famously calls *the banking concept of education.* Freire (1990b) says, "In the banking concept of education, knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing" (p. 58). Education becomes a transaction between depositors and depositories.

Rule (2011) claims that a dialogic pedagogy is the exact opposite of the banking concept of education. Rule studies the relationship between Bakhtin's and Freire's theories of dialogue and concludes that there are commonalities in their perspectives. In creating a dialogue between the work of the two theorists, Rule (2011) discovers that they both recognized the open-endedness and unfinalizability of dialogue. Using dialogue as a grounding principle, Rule (2006) writes, "A poetics of dialogic pedagogy thus explores the creative tensions between constitutive elements such as learner and educator, formal and informal, programme and institution, university and community, seeing these are relations rather than polarities" (p. 80). However, Graff (2003) explains why conflicts, disagreements, and a wider range of outcomes may be a more logical expectation for a pedagogy based on dialogue. Graff (2003) famously advocates "teaching the conflicts" and Lattuca (2001) identifies others who agree (pp. 149-153). What Graff (2003) means by his phrase is that philosophical, social, and disciplinary conflicts are teaching opportunities that should be at the center of the academic curriculum. He says, "if disagreements over what should be taught and how are inevitable, the sensible course would be to quit trying to hide these disagreements and start making productive use of them in classrooms" (p. 12). Graff (2003) claims that "teaching the conflicts can be done in any discipline or subject area" (p. 12). More importantly, teaching the conflicts is a way to clarify academic culture and make the differences between disciplines more coherent for students. Evading conflicts obscures rather than transforms the life of the mind for students. Graff (2003) describes thinking as a dialogical process that depends on the contrasts that conflict provides. However, the academic curriculum too often does not reflect this approach (p. 13). Gadotti (1996) agrees. He claims that dialogic pedagogy has contributed to our contemporary understanding of learning and school systems. However, the pedagogy of conflict stands in its shadow. Echoing Derrida, Gadotti (1996) writes, "Conflict is a category I continue to claim as essential to all pedagogy. The role of the educator is to educate. Educating

presupposes a transformation, and there is no kind of peaceful transformation. There is always conflict and rupture with something, with, for instance, prejudices, habits, types of behaviors, and the like" (p. xvi). For Gadotti, all pedagogy refers to practice. It is performative. Pedagogy is action, and learning theory should reflect this important feature (1996, p. 7).

In activity theory, action is recognized as an essential part of the learning process. Activity theory supports a pedagogy that focuses on dialogic practices, and it serves as an example of the direction in which Holzman and Morss (2000), Shotter (1991, 1993), and Usher and Edwards (1994) suggest that psychology can expand beyond scientism (pp. 49-50). Wertsch (1981) identifies the major features of activity theory. In the theory, activities are evaluated from various levels and viewpoints. They are goal-directed and mediated. Activities are analyzed in terms of their developmental significance and their social processes. If we are to comprehend the assumptions and ramifications of activity theory today, we must recognize how it is influenced by the iconic psychologist Lev Vygotsky (Wertsch, 1981, p. 17). A contemporary of Mikhail Bakhtin and a noted critic of scientism in psychology, Vygotsky (1962) reminds us of the powerful role that semiotics play in our understanding of cognitive development and he anticipates the postmodern approach in psychology (Klempe, 2018). Vygotsky (1962) argues that a word is a "microcosm of human consciousness" and a psychological tool for continuous learning (p. 153). Vygotsky (1962) describes the relationship between words and thoughts as an intertextual process rather than a linear procedure. He says this process is a "continual movement back and forth from thought to word and from word to thought" (p. 125). The changes that occur are regarded as evidence of development. Vygotsky (1962) writes, "Thought is not merely expressed in words; it comes into existence through them. Every thought tends to connect something with something else, to establish a relationship between things. Every thought moves, grows, and develops, fulfills a function, solves a problem" (p. 125).

It is in activity theory that we see cognition and communication brought together by the integrative power of language and dialogue. Russell (1995) reveals the ways in which this connection can also inform our understanding of the symbiosis between interdisciplinarity and intertextuality. As a functional system, activity theory involves the following interactive components and not steps: "subject (a person or persons), and object(ive)(an objective or goal or common task), and tools (including signs) that mediate the interaction"(p. 53). Arguably, there are five important constituents involved in this system. Russell (1995) says, "Activity systems are historically developed, mediated by tools, dialectically

structured, analyzed as the relations of participants and tools, and changed through zones of proximal development"(p. 54). Mediational tools are interdisciplinary and metaphorical. They include actual tools, computers, speaking, reading, writing, music, architecture, and physical activities (p. 54). In the postmodern sense, mediational tools are equivalent to texts and they signify integration as an important feature in culture and activity theory. Russell (1995) reminds us that "texts are tools for carrying out some activity and they vary with the activity, just as hammers vary in their design and use depending on the work to be done using them"(p. 54). He goes on to write, "For those tools that are in the form of texts, meanings almost always arise in relation to previous texts (intertextuality) as well as relation to nontextual phenomena"(p. 55). Ultimately, activity theory characterizes learning as situated, pragmatic, intertextual, disciplinary, and interdisciplinary. In activity theory, the two modes of interdisciplinarity integrate rather than compete. Activity theory serves as an example of the continuum that Szostak (2015) conceptualizes and recommends. In his evaluation of interdisciplinarity, Szostak (2015) concludes that there is a symbiotic relationship between conceptual and instrumental interdisciplinarity. He confirms that we can begin to "cope with the seeming dichotomies" by defining the continuum between them (p. 103). Activity theory fulfills this role. Lastly, activity theory suggests that our conceptualization of learning may need to be redefined as the continuous change in human consciousness and performance due to interdisciplinary and interactive experiences with language and a changing world (Driscoll, 2000).

CONCLUSION

As a noted interdisciplinarian and systems theorist, Bateson (1979) has argued that "there is no existing science whose special interest is the combining of pieces of information" (p. 21). This may be true. However, this discussion reveals that we do have a metaphor in the *matrix.* It could prove to be just as beneficial as science in helping us to understand and negotiate complexity. Bateson (1979) appears to agree when he says, "What has to be investigated and described is a vast network or matrix of interlocking message material and abstract tautologies, premises, and exemplifications"(p. 20). This discussion not only describes an alternative epistemology for interdisciplinary learning based on a network of texts and activity theory, but it also outlines the ways that the matrix—as a paradigm, permeates postmodern theory and pedagogy. We also discover that the matrix represents a network of heterogeneous relations where the parts always relate to the whole. It symbolizes the unity of process and product,

reading and writing, and theory and practice. The matrix is the praxis and paralogic at the center of postmodern education.

More importantly, it is also inherently interdisciplinary. The matrix is one of the few terms that resonates across the human, social, and natural sciences. Most standard dictionaries will list the many meanings and disciplines associated with the word *matrix.* There are very few terms that rival its reoccurrence across academe. It serves as a metaphor that can help us to understand the future of teaching and learning, as it evokes the hypertextuality and connectivism that are now the hallmarks of online education. In their influential study of metaphor, Lakoff and Johnson (1980) remind us that metaphors are more than just words. They represent thought and action in conceptual systems. Conceptual systems are fundamentally metaphorical and so are our various formulations of cognitive processes (pp. 3-6). As the actualization of activity theory, matrix thinking brings these processes together as two aspects of the same phenomenon. Ultimately, the matrix is the trope that signifies the vast epistemological, biological, ecological, and digital network on which everything in existence can be framed and explored. As a symbol of Vygotsky's "web of meaning," the matrix is the kind of root metaphor that we need in interdisciplinary studies and higher education. We can only hope that its symbolic power will inspire new academic conversations about the role of psychology and disciplinarity in a world that is increasingly hyperinteractive and unapologetically interdisciplinary.

REFERENCES

Alfaro, M. J. M. (1996). Intertextuality: Origins and development of the concept. *Atlantis, 18*(1/2), 268-285.

Augsburg, T. (2005). *Becoming interdisciplinary: An introduction to interdisciplinary studies.* Dubuque, IA: Kendall Hunt Publishing.

Bakhtin, M. (1986). *Speech genres & other late essays* (M. Holquist & C. Emerson, Eds.). (V. W. McGee, Trans.). Austin, TX: University of Texas Press.

Bakhtin, M. (1990). *Art and answerability: Early philosophical essays by M. M. Bakhtin* (M. Holquist & V. Liapunov, Eds.). (V. Liapunov, Trans.). Austin, TX: University of Texas Press.

Barthes, R. (1989). *The rustle of language* (R. Howard, Trans.). Berkeley, CA: University of California Press.

Barthes, R. (1990). *The fashion system* (M. Ward & R. Howard, Trans.). Los Angeles, CA: University of California Press.

Bateson, G. (1979). *Mind and nature: A necessary unity.* New York, NY: E. P. Dutton.

Berger, P. L., & Luckmann, T. (1967). *The social construction of reality: A treatise in the sociology of knowledge.* New York: NY: Anchor Books.

Bernauer, J. A., & Tomei, L. A. (2015). *Integrating pedagogy and technology: Improving teaching and learning in higher education.* New York: NY: Rowman & Littlefield.

Bernstein, B. (1990). *The structuring of pedagogic discourse.* London, England: Routledge.

Boix Mansilla, V. (2010). Learning to synthesize: The development of interdisciplinary understanding. In R. Frodeman, J. T. Klein, C. Mitcham, & J. B. Holbrook (Eds.), *The Oxford handbook of interdisciplinarity* (pp. 288-306). Oxford, England: Oxford University Press.

Botha, E. (2009). Why metaphor matters in education. *South African Journal of Education, 29,* 431-444.

Campbell, D. (1969). Ethnocentrism of disciplines and the fish-scale model of omniscience. In M. Sherif & C. Sherif (Eds.), *Interdisciplinary relations in the social sciences* (pp. 328-348). Chicago, IL: Aldine.

Chandler, D. (2002). *Semiotics: The basics.* Oxford, England: Routledge.

Derrida, J. (1978). *Writing and difference* (A. Bass, Trans.). Chicago, IL: The University of Chicago Press.

Derrida, J. (1997). *Of grammatology* (G. C. Spivak, Trans.). Baltimore, MD: Johns Hopkins University.

DeZure, D. (2010). Interdisciplinary pedagogies in higher education. In R. Frodeman, J. T. Klein, C. Mitcham, & J. B. Holbrook (Eds.), *The Oxford handbook of interdisciplinarity* (pp. 372-386). Oxford, England: Oxford University Press.

Driscoll, M. (2000). *Psychology of learning for instruction* (2nd ed.). Boston, MA: Allyn & Bacon.

Farris, M. H. (2017). Disciplines and interdisciplinarity as relations-in-différance: A Derridean account of disciplinary knowledge differences. *Issues in Interdisciplinary Studies, 35,* 53-64.

Fish, S. (1989). Being interdisciplinary is so very hard to do. *Profession* (pp. 15-22). New York, NY: MLA.

Foucault, M. (1995). *Discipline and punish: The birth of the prison* (A. Sheridan, Trans.). New York, NY: Vintage Books.

Freire, P. (1990a). *Education for critical consciousness.* New York, NY: Continuum.

Freire, P. (1990b). *Pedagogy of the oppressed.* New York, NY: Continuum.

Frodeman, R. (2014). *Sustainable knowledge: A theory of interdisciplinarity.* Basingstoke, United Kingdom: Palgrave-Macmillan.

Gadotti, M. (1996). *Pedagogy of praxis: A dialectical philosophy of education*. Albany, NY: State University of New York.

Graff, G. (2003). *Clueless in academe: How schooling obscures the life of the mind.* New Haven, CT: Yale University Press.

Graff, H. J. (2015). *Undisciplining knowledge: Interdisciplinarity in the twentieth century.* Baltimore, MD: Johns Hopkins University Press.

Haynes, C. (Ed.). (2002). *Innovations in interdisciplinary teaching.* ACE Series on Higher Education. Westport, CT: Oryx Press/Greenwood Press.
Holzman, L., & Morss, J. (Eds). (2000). *Postmodern psychologies, societal practice, and political life.* New York, NY: Routledge.
Jacobs, J. A. (2013). *In defense of disciplines: Interdisciplinarity and specialization in the research university.* Chicago, IL: University of Chicago Press.
Klein, J. T. (1996). *Crossing boundaries: Knowledge, disciplinarities, and interdisciplinarities.* Charlottesville, VA: University Press of Virginia.
Klein, J. T. (2001). Interdisciplinarity and the prospect of complexity: The tests of theory. *Issues in Integrative Studies, 19,* 43-57.
Klein, J. T. (Ed.). (2002). *Interdisciplinary education in K-12 and college: A foundation for K-16 dialogue*. New York, NY: College Entrance Examination Board.
Klein, J. T. (2017). Typologies of interdisciplinarity: The boundary work of definition. In R. Frodeman, J. T. Klein, & R. C. S. Pacheco (Eds.), *The Oxford handbook of interdisciplinarity* (2nd ed.). (pp. 15-30). Oxford, England: Oxford University Press.
Klempe, S. H. (2018). Postmodernism and crises in psychology. *Human Arenas, 1*(4), 373-385.
Kristeva, J. (1984). *Revolution in poetic language* (M. Waller, Trans.). New York, NY: Columbia University Press.
Kristeva, J. (1986). *The Kristeva reader* (T. Moi, Ed.). New York, NY: Columbia University Press.
Kvale, S. (Ed.). (1992). *Psychology and postmodernism.* Thousand Oaks, CA: Sage Publications.
Lakoff, G., & Johnson, M. (1980). *Metaphors we live by.* Chicago, IL: The University of Chicago Press.
Lattuca, L. R. (2001). *Creating interdisciplinarity: Interdisciplinary research and teaching among college and university faculty.* Nashville, TN: Vanderbilt University Press.
Leitch, V. B. (1986). Deconstruction and pedagogy. In C. Nelson (Ed.), *Theory in the classroom* (pp. 45-56). Urbana, IL: University of Illinois Press.
Lyotard, J. F. (1984). *The postmodern condition: A report on knowledge* (G. Bennington & B. Massumi, Trans.). Minneapolis, MN: Minnesota University Press.
Mackey, J. (2002). Rules are not the way to do interdisciplinarity: A response to Szostak. *Issues in Integrative Studies, 20*, 123-129.
Moran, J. (2010). *Interdisciplinarity* (2nd ed.). New York, NY: Routledge.
Newell, W. H. (2001). A theory of interdisciplinary studies. *Issues in Integrative Studies, 19,* 1-25.
Newell, W. H. (2013). The state of the field: Interdisciplinary theory. *Issues in Interdisciplinary Studies, 31,* 22-43.
Newell, W. H., & Arvidson, P. S. (2018). Integrity in education: William H. Newell in conversation with P. Sven Arvidson. *Issues in Interdisciplinary Studies, 36*(2), 14-44.

Nissani, M. (1997). Ten cheers for interdisciplinarity: The case for interdisciplinary knowledge and research. *Social Science Journal, 34*(2), 201-216.
Norris, C. (1987). *Derrida.* Cambridge, MA: Harvard University Press.
Orr, M. (2003). *Intertextuality: Debates and contexts.* Cambridge, England: Polity.
Parshall, K. H. (1998). *James Joseph Sylvester: Life and work in letters.* Oxford, England: Oxford University Press.
Payne, M. (1993). *Reading theory: An introduction to Lacan, Derrida, and Kristeva*. Cambridge, MA: Blackwell Publishing.
Peirce, C. S. (1955). *Philosophical writings of Peirce* (J. Buchler, Ed.). Mineola, NY: Dover.
Pepper, S. C. (1942). *World hypotheses: A study in evidence*. Los Angeles, CA: University of California Press.
Piso, Z. (2015). Integration, language, and practice: Wittgenstein and interdisciplinary communication. *Issues in Interdisciplinary Studies, 33,* 14-38.
Plotnitsky, A. (2003). Algebras, geometries and topologies of the fold: Deleuze, Derrida and quasi-mathematical thinking (with Leibniz and Mallarme). In P. Patton & J. Protevi (Eds.), *Between Deleuze and Derrida* (pp. 98-119). New York, NY: Continuum.
Repko, A., & Szostak, R. (2017). *Interdisciplinary research: Process and theory* (3rd ed.). Thousand Oaks, CA: Sage Publications.
Ribeiro, F. A., & Relvas, J. B. (2018). Profiling interdisciplinarity in higher education: An ecological approach. *Working Papers in Higher Education Studies, 3,* 121-145.
Rule, P. (2006). Bakhtin and poetics of pedagogy: A dialogic approach. *Journal of Education, 40,* 79-102.
Rule, P. (2011). Bakhtin and Freire: Dialogue, dialectic and boundary learning. *Educational Philosophy and Theory, 43*(9), 924-942.
Russell, D. (1995). Activity theory and its implications for writing instruction. In J. Petraglia (Ed.), *Reconceiving writing, rethinking writing instruction* (pp. 51-77). Mahwah, NJ: LEA.
Shotter, J. (1991). Rhetoric and the social construction of cognitivism. *Theory & Psychology, 1*(4), 495-513.
Shotter, J. (1993). *Conversational realities: Constructing life through language.* Thousand Oaks, CA: Sage Publications.
Sylvester, J. (1904). *The collected mathematical papers of James Joseph Sylvester: Vol 1, 1837-1853*. New York, NY: Cambridge University Press.
Szostak, R. (2002). How to do interdisciplinarity: Integrating the debate. *Issues in Integrative Studies, 20,* 103-122.
Szostak, R. (2015). Extensional definition of interdisciplinarity. *Issues in Interdisciplinary Studies, 33,* 94-116.
Tennant, M. (2000). *Adult learning and self work: Proceedings from the Adult Education Research Conference.* Vancouver, Canada.
Ulmer, G. L. (1985). *Applied grammatology: Post(e)-pedagogy from Jacques Derrida to Joseph Beuys*. Baltimore, MD: Johns Hopkins University Press.

Usher, R., & Edwards, R. (1994). *Postmodernism and education.* London, England: Routledge.
Vygotsky, L. S. (1962). *Thought and language* (E. Hanfmann & G. Vaker, Eds. & Trans.). Cambridge, MA: M.I.T Press.
Welch, J. (2018). The impact of Newell's "A theory of interdisciplinary studies": Reflection and analysis. *Issues in Interdisciplinary Studies, 36*(2), 193-211.
Wertsch, J. V. (Ed.). (1981). *The concept of activity in Soviet psychology.* Armonk, NY: M. E. Sharpe.
Worton, M., & Still, J. (1990). *Intertextuality: Theories and practices.* Manchester, England: Manchester University Press.

JEREMY DENNIS is the Chair of Liberal Arts at St. Louis Community College. His research interests are in the areas of interdisciplinary theory and pedagogy in higher education.

Manuscript submitted: ***December 17, 2018***
Manuscript revised: ***March 29, 2019***
Accepted for publication: ***April 20, 2019***
