

The Kantian Effect: Reconceiving the Integration of Knowledge in Interdisciplinary Theory

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Abstract: *In interdisciplinary studies, multiple definitions and practices proliferate. Interdisciplinaryists such as William H. Newell claim that complex systems theory provides the rationale that we need to guide reform. However, complex systems theory alone cannot rationalize interdisciplinarity and inform what Ernest Boyer calls the scholarship of integration. Language and texts also play a key role. This claim is just as significant today as it was when Immanuel Kant noted the importance of texts in his controversial blueprint for higher education. Not only is Kant one of the fathers of modern philosophy and constructivism, but he is also a key architect of the disciplinary silos that instrumentalists such as Newell claim to oppose but indirectly reinforce through reductionist practices. A dialogic conceptual framework recalibrates these practices and their correlates, thus improving interdisciplinary education in the digital age. This article reveals that a study of Kantian architectonics and its dialogic reinterpretation by Mikhail Bakhtin has much to teach educators about interdisciplinarity as an agent for integrative learning and higher education reform.*

Keywords: Architectonics; dialogism; higher education; integrative theory; interdisciplinary theory

Introduction

In *The New Education*, Davidson (2017) calls for a complete redesign of higher education. This transformation entails bridging the gap between disciplines that are increasingly disconnected. Davidson (2017) determines that interdisciplinarity has an important role to play if we are to provide the kind of adaptive education that students need in the digital age. In an earlier call for academic reform, Boyer (1987) reaches a similar conclusion and posits the *integrative core* as a strategy that can help teachers create a more integrated view of knowledge for college students. As an alternative to the fragmentation found in general curricula, the integrated core is an attempt to introduce students to the many ways in which knowledge is connected across the disciplines. Boyer (1987) identifies seven areas of inquiry that link the disciplines and relate common experiences. They are language, art, heritage, institutions, science, work, and identity. However, Boyer (1987) does not specify how we *weave together* these components. This is ironic, considering that he provides many of the founding ideas for the scholarship of teaching



and learning, and he specifically identifies *integration* as one of the key scholarly functions or domains of academic work.

For Boyer (1990), integration is the process of contextualizing, interpreting, and connecting specialized knowledge in ways that help teachers and students to discover intellectual patterns and develop greater insights. As the boundaries of human knowledge are reshaped, Boyer (1990) indicates that we must give more attention to the connection between interdisciplinarity and the scholarship of integration (also see Frodeman, 2014). Not only is there a reciprocal relationship between these two areas, but one is difficult to achieve without the other. Integration is a strategy for teaching and learning. Interdisciplinarity is the kind of disciplinary reconfiguration that facilitates integration (Klein, 1990; McKinney, 2013). To improve pedagogical scholarship in the future, Weimer (2006) recommends connecting teaching and learning and the scholarship of integration. This recommendation requires our (re)consideration because the scholarship of integration often fails to receive the same level of attention as other areas of Boyer's work (Weimer, 2006). As a result, influential scholars in interdisciplinary studies such as Newell (2013) have filled this gap with reductive theories of interdisciplinarity and integration that many scholars and teachers contest.

Purpose and Method

The following discussion will explain why reductive appreciations of interdisciplinarity and integrative learning are problematic and what the legacy of the philosopher Immanuel Kant can teach us about their dialogic interdependence. Appropriations of Kantian architectonics (sometimes used in the singular in philosophy) will reveal the important role that language and texts play in providing us with an alternative epistemological rationale for our competing views of interdisciplinarity and integration. As a theory of the systematic and constructivist nature of relations, architectonics is the trope near the center of Kantian thought. In building a model of higher education that mirrors his view of the organization of the mind, Kant applies architectonic theory as a framework that allows him to unify his philosophical and pedagogical conceptualizations. This study also makes use of architectonics as a way to understand *dialogism* or what Mikhail Bakhtin describes as the interrelation of utterances and texts. What many scholars view as two separate concepts is actually the metaphorical effectuation of the architectonic idea that Kant (re)inaugurates. This lineage is what I call the *Kantian Effect*, a metaphor for the kind of integrative thinking that Bakhtin locates in Kantian philosophy. This study will utilize dialogism as a theoretical framework for reexamining Newell's treatment of integration in his consideration of interdisciplinarity. The results reveal the dialogic principles that we can adopt in order to make interdisciplinarity a more effective agent for integrative learning and higher education reform.

Literature Review

According to Graff (2015, 10), "efforts to explain interdisciplinarity exhibit problems of conflict and contradiction." These problems are often caused by the multiple definitions, metaphors, and practices that have proliferated in interdisciplinary studies and made it a target



for criticism. For Jacobs (2013), interdisciplinarians use a range of competing terminology. In fact, discussions about interdisciplinarity are actually hindered by the overabundance of terms. Generally, interdisciplinarity is defined as the integration of two or more disciplines for a research project or educational program or experience. In practice, the interdisciplinarian uses a variety of activities to integrate information, techniques, tools, and/or concepts from various disciplines in order to address complex problems (Boix Mansilla, 2010). The term *interdisciplinarity* and its many derivatives tend to be characterized by their levels of integration and purposes (Klein, 2017; Nissani, 1997). This explains why Moran (2010, 14) argues that there are “potentially as many forms of interdisciplinarity as there are disciplines.” Moran (2010) describes interdisciplinarity as a form of dialogue between disciplines. Yet, he claims that the purpose and impact of this interaction will require evaluation. Klein (2017) and Lattuca (2001) examine these areas that Moran identifies and they provide us with typologies of interdisciplinarity that demonstrate the various definitions, approaches, and practices in the field.

To navigate interdisciplinarity’s complex landscape and fault lines, Klein (2017) and Lattuca (2001) help us to differentiate between the two views of interdisciplinarity and their orientations. The instrumental approach is more practical, linear, and oriented toward problem-solving and research. The conceptual approach is more theoretical, nonlinear, and oriented toward challenging knowledge structures, especially through teaching. The consequence of these competing views of interdisciplinarity is that we have more difficulty connecting a coherent theoretical view to our vast array of practices. The greater problem is that the instrumental approach often dominates the field, producing a reductive view of interdisciplinarity that many scholars and teachers find objectionable. Lattuca (2001) argues that the instrumental approach is not always applicable to research in the humanities, to collaborations that are not team based, or to projects that involve interdisciplinary teaching.

When interviewing a number of educators about their pedagogical and research practices, Lattuca (2001) encounters a range of responses that highlight many of the contradictions and challenges that we still face today (also see McKinney, 2013). The study indicates that there are gaps between the rhetoric of interdisciplinarity and the realities of practicing it. Lattuca (2001) claims that a disciplinary worldview persists among faculty who advocate interdisciplinary practices. However, some faculty are able to use the challenges and conflicts that they encounter doing interdisciplinary work by turning them into teachable moments. Like Lattuca (2001), DeZure (2010), Haynes (2002), and Klein (2002) all confirm that there is no special pedagogy or unique set of strategies for teaching interdisciplinarity. Klein (2002, 13) says, “Interdisciplinary pedagogy is active, dynamic, and process-oriented.” Haynes (2002) claims that one almost has to use a variety of pedagogies in interdisciplinary education. Whichever methods or approaches one decides to use or not use, DeZure (2010) admits that there is still room for improvement in our understanding of pedagogy.

In presenting his instrumental interpretation of interdisciplinarity, Newell (2001a, 2001b) argues that pedagogy is important but we first need an epistemological rationale for interdisciplinarity to guide it. In his controversial essay “A Theory of Interdisciplinary



Studies,” Newell (2001b) proposes complex systems theory as a rationale. He claims that complex phenomena require interdisciplinarity, and complex systems theory is an appropriate focus for interdisciplinarity. Complex systems are defined by elements that interconnect through nonlinear relations. According to Newell (2001b, 16), “Each step in the interdisciplinary process should have some analog in complex systems theory.” To prove this point, Newell (2001b) identifies the steps that he says characterize the interdisciplinary process for teaching and learning. They are defining, determining, developing and gathering, searching, generating, integrating disciplinary insights, identifying and evaluating, resolving and constructing, creating, producing, and testing. In this reductive conceptualization, Newell does not specify how complex systems theory helps us to understand the integration of disciplinary knowledge. The strong responses from critics—Mackey (2001), Bailis (2001), Klein (2001), and Carp (2001)—confirm this important point and so does Newell (2001b, 18) when he states that integration as a process is still a mystery. With one exception (Meek, 2001), Newell’s critics suggest that a sound rationale did not arrive with his theory and we are still waiting on an epistemological rationale that can guide interdisciplinary education.

Newell (2013, 32) responds to his critics and he summarizes their criticisms: “The reasons varied from one respondent to the next—it’s not the first theory, it’s not a theory at all, its conception of complex systems is wrong, its conception of interdisciplinary studies is wrong, its ontology is wrong, its treatment of disciplines is misguided, its reasoning is flawed, it’s unworkable, and it’s limiting, among many other objections.” Later, the debate over Newell’s theory is revisited by Szostak (2002) and Mackey (2002). Szostak (2002) extends Newell’s troubled theory, and Mackey (2002) repeats his claim that instrumental approaches or rules are not sufficient in characterizing interdisciplinary processes and integrative practices. Returning to this debate, Henry (2018) and Welch (2018) reassess the benefits and deficits in Newell’s theory and its criticisms. Henry (2018) concludes that the theory is a worthy ontology yet open to enrichment. Welch (2018) confirms that Newell’s hope for a unified theory and methodology has not been realized, but he recognizes the import of Newell’s contribution to the field and the growth of interdisciplinary studies. What is paradoxical and problematic in this expansion is the reproduction of instrumental approaches, even after critics such as Frodeman (2014) have clearly identified the limitations in a methodical approach. Nonetheless, the number of educators who reinforce Newell’s theory or variants of it continues to grow in pedagogical influence in higher education (Augsburg, 2005; Boix Monsilla, 2010; Hursh, Haas and Moore, 1998; Newell and Arvidson, 2018; Repko and Szostak, 2017).

If interdisciplinarity is to play a key role in Davidson’s and Boyer’s call to reform higher education in ways that better prepare students for worlds beyond the classroom, then we must move beyond instrumental theories in interdisciplinary education. As a leading authority in the field, Klein (2001) explains why a reorientation is beneficial. She provides us with a succinct description of our challenges as educators when she assesses Newell’s theory (and its kin). Klein (2001, 44) refers to Newell’s theory as a “modernist agenda in the midst of postmodern skepticism.” While the theory offers insight and value as a metaphor, Klein (2001) suggests that it is prescriptive, reductive, and the opposite of the conceptual interdisciplinarity that students also need in order to solve complex problems. Once an advocate for Newell’s



approach to interdisciplinarity, Klein (2001, 53) admits that she has accepted a more postmodern conceptualization of these processes. She writes, “In a subsequent proposal for a generic model of integrative process, I retained the fundamental dialogical coexistence of differentiation and unity.”

Klein (1996, 221) also claims that “Interdisciplinary work entails rhetorical, social, and political negotiation.” In viewing interdisciplinarity as a form of communication and action, Klein (1996) outlines a new interdisciplinary idea that is congruent with the kinds of reforms that Davidson (2017) and Boyer (1990) recommend. In this new system of higher education, nonlinear thinking replaces reductive thinking. Plurality and dynamism are features of interdisciplinarity that can be employed to help students to cross different boundaries of knowledge. Learning to do boundary work, students develop the integrative skills that they need to solve problems and negotiate complexity in life, the classroom, and the workplace. What kind of theory supports these practices? Klein (1990) anticipates the answer in her assessment of rhetoric and metaphors in interdisciplinary studies. Klein (1990, 84) claims that “interdisciplinarity is an architectonic, productive process, something constructed rather than given.” No concept or metaphor captures the interrelation and integration of differences better than architectonic(s), a theoretical perspective that we associate with Immanuel Kant—even though its use precedes him. Klein’s prescience here is valuable because it indicates that architectonics still has much to teach us.

The Legacy of Kant

The impact of Immanuel Kant’s ideas signifies his legacy in philosophy and education. Not only is Kant a major craftsman of the Enlightenment, but he is also regarded as the “and/or” philosopher, a logocentrist, a pedagogue, a systems thinker, and a catalyst for postmodernism and poststructuralism. His influence symbolizes the ways in which his ideas impact every aspect of Western thought, making him a hindrance and a stimulus for change for well over two hundred years (Beck, 1981; Derrida, 2004; Noddings, 1995; Taylor, 2010). As one of the fathers of constructivism and modern higher education, Kant uses architectonic theory to promote academic reform. Though abstract, architectonics is defined as the constructive role of cognition in perception (Holquist, 1990). It characterizes the complex system of interrelations that Kant utilizes to explain his view of cognition and his justification for disciplinary divisions in higher education. In clearer terms, Kant’s architectonic model of the mind mirrors his architectonic model of higher education. According to Manchester (2003, 192), Kant interprets architectonics as “the ‘art of systems’ and a system is ‘the unity of the manifold cognition under one idea,’ the latter being a ‘form of the whole,’ functioning as an archetype for the legislative constitution of human beings.” Ironically, Kant’s contributions to learning theory and disciplinarity are basically ignored by most educators and interdisciplinarians (Derrida, 2004). Though many of us seldom consider his impact outside of philosophy, Kant’s influence permeates—even haunts—all serious contemporary discussions on the state of reform and (inter)disciplinarity in academe. Not only does Kant anticipate many of the problems that we have in higher education, but he is partially responsible for them (Taylor, 2010). His work offers us the historical and philosophical context that we need in order



to better understand the academic fragmentation that we continue to see reflected in the work of Boyer, Newell, and others (Jacobs, 2013; Graff, 2015; Klein, 2017). In his critique of Kant's support for disciplinary boundaries, Derrida (2004, 98) indicates that language "deprives us of any rigorous distinction" between conceptual borders. Graff (2015) goes on to add that language is inseparable from the organization of disciplinarity and interdisciplinarity. In his attempt to understand the role that language plays in (inter)disciplinary studies, Piso (2015) claims that our understanding of language as epistemology and ontology will need more evaluation. To address these concerns, Piso (2015) turns to the philosophy of Ludwig Wittgenstein. However, Kant proves to be an even richer resource.

In *The Conflict of the Faculties*, Kant (1798/1979) presents his controversial model of higher education where the faculty are divided by rank. The model reproduces social divisions; nevertheless, it foreshadows our academic system today. It was embraced in Germany by Wilhelm von Humboldt, then rapidly duplicated across the world. The German model was eventually adapted in the United States of America by academic architects such as Harvard University's Charles W. Eliot (Davidson, 2017). This model continues to support the separation of disciplines into departments as well as departments into divisions and schools, leaving a legacy of fragmentation in higher education and society that interdisciplinarians struggle to (re)integrate. Ironically, the organizational structure that we have inherited from Kant and others is almost indestructible. In many ways, we are bound to it and unlikely to escape its effect. In analyzing Kant's influence in academe, Taylor (2010, 143) argues, "The historical organization of knowledge has become so fundamental to higher education that it is rarely questioned, but it is laden with presuppositions that are very problematic." Taylor (2010) indicates that there are powerful metanarratives influencing Kant's academic architecting. Kant is preoccupied with censorship, competing academic values, and their disruptive impact on academic freedom. Echoing further in the background is Kant's concern with systems of knowledge (Manchester, 2003).

Such influences help us to understand why Kant divides the faculty into two ranks: three higher faculty and one lower faculty. The higher faculty is composed of theology, law, and medicine. The lower rank consists of two areas: historical knowledge and pure rational knowledge or what we recognize today as the human sciences, social sciences, and natural sciences. He refers to the faculty who teach in this lower rank as the *philosophy faculty*. Kant (1798/1979, 45) says, "And it [the philosophy faculty] also studies the relation of these two divisions of learning to each other." He later tells us that a "respectful distance" must be maintained to avoid misalliances and interferences between the higher faculty and the lower faculty. One wonders what a "respectful distance" entails, especially when Kant makes such a concerted effort to signal the importance of textual communication across the disciplines. He specifically identifies writing and texts as a necessary benefit to those inside and outside his system of higher education. Forster (2012) reminds us how unusual this is for Kant, who does not give language or writing the same level of importance in his more famous works. In his major works, Kant affords language nothing more than a subordinate role (Forster, 2012). This oddity in Kant's oeuvre shows the importance that he attributes to language and texts as key features in



an academic structure. Actually, writing creates the interrelations between the disciplines that help to hold Kant's model together as a system that he says accords with reason.

In *Critique of Pure Reason*, Kant (1787/2007) redirects philosophy after resolving the conflicts between empiricism and rationalism. It is Kant's famous theory of cognition that provides us with the more influential articulation of the dual nature of all judgments and the conflicting relations in which perceptions are always entangled. Kant (1787/2007) claims that all cognition is a judgment, an expression of a perception that is constructed inside of our heads. It is the activity in the human mind and not our senses and experiences alone that determine our reality. In Kant's model of cognition, there are three higher faculties and several lower categories in our minds that help us to judge, to perceive, and more importantly, to create. In other words, there are several constructs in our minds, and they influence what we see and how we create knowledge and meaning in the world. These constructs form a system of knowledge that is the basis of human reason. They help Kant to explain the way that cognition develops and integrates knowledge. Kant (1787/2007) says that our diverse modes of knowledge must form a system and not a rhapsody. For Kant, the formation of this system is an architectonic process. According to Noddings (1995), Jean Piaget traces the roots of his theory of constructivism to Kant. Hawkins (1994) claims that architectonics is actually one of our earliest articulations of constructivism. For some scholars and practitioners, constructivism is a process where meaning is integrated and constructed through social participation and dialogic activity (see other interpretations of constructivism in Hopkinson, 1999, and Shotter, 1993). While Hawkins (1994) imagines Kantian architectonics as a constructive process, Mikhail Bakhtin (1990) suggests that it is a process that is also mediated and modeled by dialogue and texts.

Architectonics as Dialogism and Paradigm

Mikhail Bakhtin is one among many in a long tradition of philosophers who have appropriated architectonic thinking. Scholars claim that the general idea of architectonic theory as an epistemology begins with Aristotle and develops in the work of Gottfried Leibniz, Johann Lambert, Alexander Baumgarten, Christian Wolff, Charles S. Peirce, and Michel Foucault (Manchester, 2003). Bakhtin insists that language is essential to the way humans construct knowledge about the world, others, and themselves (Holquist, 1990). Bakhtin (1990) concludes that the space between our minds and the world is dialogic and not as technical and systematized as Kant claims. The mind is an essential artistic space for human creativity, interconnectivity, and construction. A neo-Kantian in his early years, Bakhtin (1990, 1993) later criticizes Kantian ethics and challenges Kantian synthesis by reconsidering the ways that unity forms out of differences. Bakhtin accepts Kant's belief in an "unbridgeable gap" between the mind and the world, but he focuses less on transcendentalism and more on socio-historical interrelations on the ground. Bakhtin (1981, 1990) appropriates Kantian architectonics to characterize this integrative process and later presents us with a dialogic reconceptualization of architectonics (chronotopes).

As a leading scholar in Bakhtin studies, Holquist (1990, 29) writes, "Dialogism is a form of architectonics, a general science of ordering parts into a whole. In other words, architectonics



is the science of relations.” As a common metaphor for complex relations, language and dialogue are part of the conditions that mediate the boundary between sameness and difference (Holquist, 1990). For Bakhtin (1981), dialogue is the interrelation of utterances or words between people. Dialogic relations are borderless, integrating continuously across all aspects of differences. According to Bakhtin (1981, 291), “languages do not exclude each other, but rather intersect with each other in many different ways.” Later in his life, Bakhtin (1986) meditates on the ways that language and dialogue serve as a continuum for understanding disciplines, genres, and texts (also see explanations of disciplines as texts and knowledge formations in Carp, 2001, and Hirst, 1974). Bakhtin (1986, 103) insists that texts are foundational for the disciplines, and “Where there is no text, there is no object of study, and no object of thought either.” Bakhtin (1986, 161) also makes this claim about texts: “Each word (each sign) of the text exceeds its boundaries. Any understanding is a correlation of a given text with other texts.”

In his assessment of the interrelation of texts or *intertextuality*, Barthes (1989) argues that they characterize a continuous form of production. A text does not stop because the process of language knows no cessation, and meaning is always becoming. Barthes claims that texts are always experienced as an interactivity. They are paralogical and indeterminate. As a complex network of relations, texts permeate all borders. Texts cannot be limited by hierarchies, genres, or disciplines. They are inherently interdisciplinary and integrative (also see Kristeva, 1986). For Barthes (1989), interdisciplinarity is not simply the combination and confrontation of various branches of knowledge. It begins when the disciplines reconfigure and a new object and a new language are allowed to emerge. Barthes (1989, 72) says, “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.”

(Re)Thinking Interdisciplinary Theory

In “A Theory of Interdisciplinary Studies,” the linear steps in Newell’s theory of interdisciplinarity are at odds with the dynamism that Bakhtin (1981, 1986) and Barthes (1989) associate with texts and interdisciplinarity. According to Newell (2001a, 2001b, 2013), complex systems theory will help us to justify our methods and their range of applications. Again, the steps that Newell (2001b, 16) says characterize the interdisciplinary process are defining, determining, developing and gathering, searching, generating, integrating disciplinary insights, identifying and evaluating, resolving and constructing, creating, producing, and testing. He specifically tells us that “each step in the interdisciplinary process should have some analog in complex systems theory.” When we investigate his theory more closely, we find the exact opposite. In reviewing the steps, we discover that an explanation of integration is missing. Newell (2001b, 18) explains this absence: “But no one I have talked to or read (including my own writing) has been able to explain clearly how to integrate disciplinary insights into a comprehensive understanding. We are not even clear on exactly what is meant by integration.” However, he maintains his claim that complex systems theory can still validate the remaining steps in the model. After reflecting on the claims in his theory,



Newell (2013, 35) later concludes that “we need to re-evaluate and perhaps expand our understanding of interdisciplinary process and theory.” We can begin by considering a conceptual rather than an instrumental approach to interdisciplinarity. Architectonic theory reimagined as dialogism provides us with a theoretical framework that helps us to explain the role of integration in interdisciplinary education.

As stated earlier, Bakhtin adapts Kantian architectonics and effectuates it as dialogism to describe the construction of parts into a whole. Integration is a form of construction or what Bakhtin calls *authoring*. Authoring is an activity that creates infinite meanings using words, dialogue, and texts as tools (Holquist, 1990). According to Shotter (1993), we are all *practical authors*. In his investigation of the central role that language plays in the process of developing, organizing, and conditioning human cognition and social relationships, Shotter (1993) claims that the collaboration and creativity of participants in work activities mirror that of an author creating a text. Like a text, our activities are always incomplete. They are relational and responsive. Shotter and Cunliffe (2003, 17) write, “Put simply, meanings are created in the spontaneously coordinated interplay of people’s responsive relations to each other.” Borrowing from Bakhtin, Shotter and Cunliffe (2003) tell us that these relations are dialogical, collaborative, and creative. Bakhtin (1990) insists that we can never know “the technical aspects” of the creativity associated with authoring (also see Sawyer, 2012). For Bakhtin (1990, 7), “The actual work of creation is experienced, but this experiencing neither hears nor sees itself; it sees and hears only the product that is being created or the object to which it is directed.” As an open system, the authoring process is always dynamic, dialogic, intertextual, and interdisciplinary (Bakhtin, 1986, Klein, 1990; Morson and Emerson, 1989). For von Bertalanffy (1968), a system is a set of interrelated and interactive elements.

A system is considered closed if material cannot leave or enter it. It is considered open if material is able to flow freely without constraints. Like von Bertalanffy (1968), Senge (1990) recognizes the important role that language plays in systems thinking. He argues that system-wide interrelationships require a language that combats fragmentation. Senge’s ideas on language are derived from the work of the physicist David Bohm. Bohm (1996, 6) describes dialogue as a “stream of meaning flowing among and through us and between us.” Out of this interaction grows new understandings that may have not been evident at the beginning. Echoing Bakhtin, Bohm (1996, 6) writes this about dialogic interaction: “It’s something creative. And this shared meaning is the ‘glue’ or ‘cement’ that holds people and societies together.” Holquist (1990) calls this “glue” *dialogism* or the unity of differences in the event of utterances and texts. As both architectonics and authoring, dialogism is a philosophy of interrelations that defines and utilizes language as a modeling system for the varied dimensions of existence. Holquist (1990) claims that dialogue is Bakhtin’s master trope. It represents the *mutuality* of differences. It is also present in exchanges between words, people, and processes in the natural world. Bakhtin’s dialogism avoids reductionism because dialogue is the dynamic agent that continuously alters these relationships.

With all of dialogism’s dynamism, Alford (1995) claims that it is best understood as a unified field theory that is complex, complementary, and continuous. In a unified field theory,



dialogism resembles a continuum that allows us to think systematically and metaphorically without being reductive, deterministic, or procedural. Because centripetal and centrifugal forces are inherent in thought and action, language models the simultaneity of order and disorder. It characterizes the dynamic process that allows elements to continually reorganize and reconstitute (Alford, 1995). As a leading expert in complex adaptive systems, Miller (2015) argues that this is the kind of logic that is reshaping our world and education in the digital age. He claims that it is in the act of construction that “complexity abounds” and it is complexity that helps us to understand the world that surrounds us. Complex systems are interactive, non-linear, heterogeneous, and unpredictable. Complex systems transcend disciplines and present a direct challenge to the fragmentation in academe. For example, Miller (2015, 4) argues, “Science as currently practiced—with psychology separate from economics, physics separate from biology, and on and on—has been remarkably productive.... The cost, however, is that individual fields have become increasingly separated from one another intellectually.” Miller’s assessment explains why Newell (2001b) turns to complex systems theory to unify our divergent approaches to interdisciplinarity as a way to improve pedagogy. However, we more clearly see that complex systems theory alone does not explain interdisciplinarity. Language and texts play key roles, just as Bakhtin (1986) suggests in his use of dialogue to signify complex interrelationships.

Conclusion

This theoretical study posits the claim that dialogic thought connects our competing views of interdisciplinarity, thus making it a stronger change agent for the kinds of integrative practices that benefit students and those of us engaged in connecting interdisciplinary studies and the scholarship of teaching and learning. Dialogic connections are made more evident when interdisciplinarity is viewed through the architectonic frame that Kant reformulates and Bakhtin appropriates. Interdisciplinarity is almost impossible to practice without the integrative power of texts. Apart, their conceptualizations may be less effective as agents for reform in higher education. Nonetheless, interdisciplinarity remains a key response to fragmentation in academe. This includes the abstract approach that we find in Boyer’s treatment of integration and the instrumental approach that we find in Newell’s. Newell (2013) is correct to point out that too many definitions of interdisciplinarity have proliferated and a clearer articulation is a prerequisite for a theory that resonates inside and outside the classroom. Yet, this study indicates that his theory is enriched by dialogism and the role that language and texts play in explaining the nature of integration in interdisciplinarity.

As a form of architectonics, dialogism offers us a rare historical and philosophical context for reconceiving interdisciplinarity and understanding the integration of knowledge. This warrants a change in our understanding of the relationship between interdisciplinarity and integrative learning. To promote (re)vision, I propose the *Kantian Effect* as a much needed metaphor for the scholarship of integration and a paradigm for reimagining interdisciplinarity. As a metaphor, the Kantian Effect characterizes the constructivism and intertextuality evident across the disciplines that Kant separates using architectonic thinking and Bakhtin (re)connects using dialogic thinking. Not only is the metaphor constituted by a long tradition of epistemological



thought, but it also defines and substantiates the process of integration in ways that we do not find in Boyer's or Newell's articulations. The Kantian Effect reminds us that knowledge is always constructed, negotiated, and managed in a complex system of interrelations that permeates all boundaries and borders.

Under the aegis of the Kantian Effect as a paradigm, 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 dialogic processes, making intertextuality and interdisciplinarity figurative equivalents as contemporary appreciations of architectonics. The third principle recognizes dialogism as a continuum on which intertextuality and interdisciplinarity serve as nodes and complementary ways to contemplate the creation and organization of knowledge in cognition and institutions. The last principle acknowledges 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 and through digital technology. Ultimately, language conditions these principles and prevents them from becoming reductive. They sustain interdisciplinarity as a revolutionary educational process. Using these principles to theorize about teaching and learning will make interdisciplinarity an even stronger agent in the redesign of higher education.

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