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## **TOWARDS A TRANSDISCIPLINARY VIEW: INNOVATIONS IN HIGHER EDUCAT**

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### **Abstract:**

A Transdisciplinary view (or “Transdisciplinarity”) is defined as practice and research efforts conducted by academics from different disciplines working jointly to create new conceptual, theoretical, methodological, and transnational innovations that integrate and move beyond discipline-specific approaches to address complex problems. Often the traditional structure of education is the fragmenting knowledge into narrow and isolated academic disciplines. Learning is seen as a product, not a process. This more traditional view sees academics as an accumulation of objective facts, rather seeing the world as a dynamic whole composed of a myriad of interrelated phenomena. The authors call for a more connected Transdisciplinary paradigm for education, research and practice. Examples of such emergence areas of study are given and discussed.

### **Keywords:**

Transdisciplinary, Transdisciplinarity, Multidisciplinary, Higher Education

**JEL Classification:** I20, I21

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## Introduction

A Transdisciplinary view (or “Transdisciplinarity”) is defined as practice and research efforts conducted by academics from different disciplines working jointly to create new conceptual, theoretical, methodological, and transnational innovations that integrate and move beyond discipline-specific approaches to address complex problems. This article (and presentation) will highlight the authors own areas of study (behavioral health, expressive arts) to highlight how this approach can be used in research, professional practice, and in teaching.

## Transdisciplinarity

Although scholars have discussed “Trans-discipline,” “Transdisciplinary,” or “Transdisciplinarity,” remains “rather elusive concepts” that continues to evolve (Jahn et al., 2012). Transdisciplinarity was introduced to the world in 1972 at a Paris seminar held by the Organization for Economic Cooperation and Development (OECD). Conceived as a concept in the early seventies (Apostel et al. 1972; Jantsch 1972; Kocklemans; 1979; McGregor, 2011), it has only just recently gained momentum and grudging acceptance as a necessary paradigmatic, methodological and intellectual innovation. Transdisciplinarity is a relatively new, emerging approach to knowledge creation, competing with longstanding multi- and interdisciplinary focus (Du Plessis et al., 2013).

## Two Versions of Transdisciplinarity

There are two dominant transdisciplinary camps (Augsburg 2014; Klein, 2004):

(1) The approach championed by physicist Basarab Nicolescu (and philosopher Edgar Morin); they view transdisciplinarity as a new methodology to create new knowledge (Nicolescuian transdisciplinarity)

(2) The other camp (frequently referred to as the Swiss, Zurich or German school) emerged from an International Transdisciplinary Conference held in Zurich in 2000 The Zurich camp conceptualizes transdisciplinarity as a new type of research, called Mode 2 research.

## Nicolescuian Transdisciplinarity

This view suggests the presence of several levels of Reality and the space between disciplines and beyond disciplines is full of information. Disciplinary research concerns, at most, one and the same level of Reality; moreover, in most cases, it only concerns fragments of one level of Reality (Nicolescu, 2002).

According to this view, transdisciplinary concerns the dynamics of several levels of Reality at once. The discovery of these dynamics necessarily passes through disciplinary knowledge. While not a new discipline or a new “super-discipline” transdisciplinary

research and practice are fed by disciplinary research; in turn, disciplinary research is clarified by transdisciplinary knowledge in a new complementary way (Nicolescu, 2002)..

### **The Zurich School**

In Mode 2 multidisciplinary teams are brought together for short periods of time to work on specific problems in the real world for knowledge production and problem resolution. This 'mode' can be explained by the way research funds are distributed among scientists and how scientists focus on obtaining these funds.

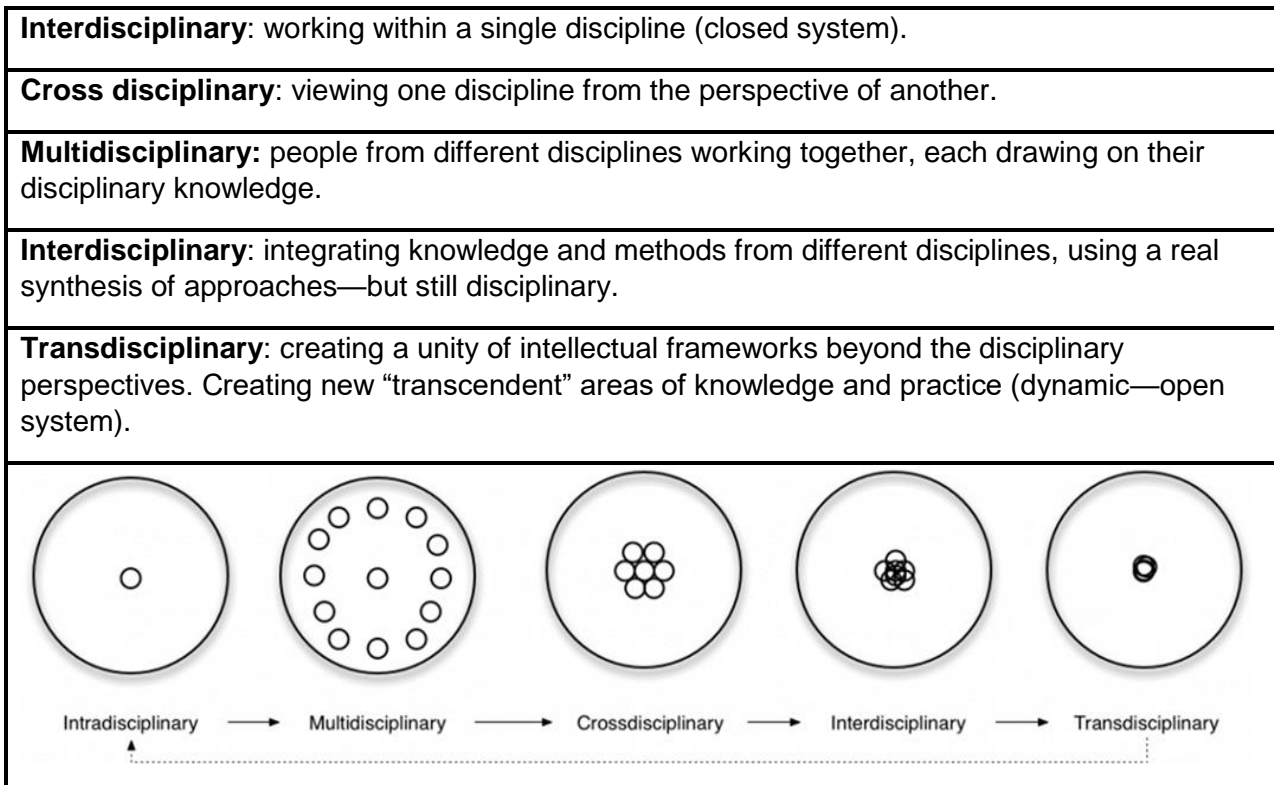
In contrast, Mode 1 is knowledge production which is motivated by scientific knowledge alone (fundamental research) and which is not bothered by the applicability of its findings. It is also founded on a conceptualization of science as separated into discrete disciplines (e.g., a biologist does not bother about chemistry).

### **Transdisciplinary Research**

Transdisciplinary Research can be defined as research efforts conducted by investigators from different disciplines working jointly to create new conceptual, theoretical, methodological, and transnational innovations that integrate and move beyond discipline-specific approaches to address a common problem(s).

### **Different from “Multidisciplinary” or “interdisciplinary”**

Interdisciplinary, like Multi-disciplinarily, concerns the transfer of knowledge and/or methods from one discipline to another, allowing research to spill over disciplinary boundaries, but staying within the framework of each discipline.

**Figure 1: Differences in disciplinarity: intra, cross, multi, inter, trans**

Source: Nicolescu, B. (2002).

### “Faux Interdisciplinary”

Education still very much requires both content (crystalized knowledge/intelligence) and process (or fluid knowledge/intelligence—which according to research is best provided through different disciplinary and true interdisciplinary lens (to move one from rigid dualistic cognitive processing to more flexible relativistic thinking).

Academic Harvey Graff warns of “faux interdisciplinary.” While no one doubts that powerful insights are developed through applying the intellectual resources of different disciplines to particular problems or skill development--- Graff notes, significant intellectual ability development and intellectual insights are likely to be achieved through true engagement in disciplinary knowledge, “not bypassing it” (Graff, 2015). He warns that superficially designed courses that appear to combine disciplines (e.g., teaching history through fads or non-experts in methods and depth of the field) makes the appearance of understanding—but short-changes true intellectual skill development.

## “Wide Lens View”

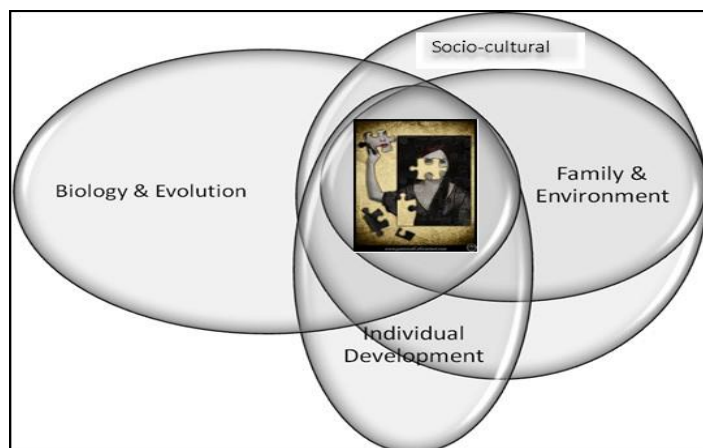
Whether it is education, research, assessment, intervention, or policy --we need to make sure we are doing "holistic" multi-method data collection that takes both the "objective" (empirical-behavioral-external) view--as well as the "subjective" (internal-qualitative narrative) views in account. To overemphasize empirical reductionism is see the world with a myopic focus. Reductionism or reducing things to their constituent parts can teach us important things, but we also need to study how they function as a whole, and do justice to their emergent properties. Biological reductionism, the idea that all of psychological experience can be explained, in principle, by the interplay of neurons and chemicals, is like someone who, discovering the lever mechanisms in a typewriter, declares "now we know how books are written." When we focus on these phenomena separately, we get piecemeal "solutions" that fail to capture the underlying dynamics of the larger system.

Transdisciplinarity requires adequate addressing of the complexity of problems and the diversity of perceptions of them, that abstract and case-specific knowledge are linked, and that practices promote the common good (Du Plessis et al., 2013).

## MAP Model (Appel, Kim-Appel, 2010)

The authors have developed a theoretical model for a deeper understanding and description of human development and identity. This model is called the Multipath Approach to Personality (MAP). The assumptions of the Multipath Approach to Personality (MAP) model is extended to include the notion that the total spectrum of functioning (self) as well as personality is shaped by the combined forces of evolutionary, biological, situational, mental, as well as psycho-spiritual processes--all embedded in a temporal, sociocultural, and developmental context (see Figure 2).

**Figure 2: Intersectionality of Personality and Development**



Source: Appel & Kim-Appel (2010).

The Multipath Approach to Personality (MAP) consists of following dimensions or levels of analysis:

*(1) The Neuropersonal; (2) the Intrapersonal; (3) the Interpersonal; (4) the Exopersonal; (5) the Ecopersonal; and (6) the Transpersonal.*

### **The Neuropersonal**

A ground level of analysis can be thought of as the —“Neuropersonal“ level. Through this viewfinder human beings are viewed as biological and evolutionary organisms. This level or dimension of the self is focused on biological, genetic, and physiological functioning and also represents the pre-personal personality field. From this perspective the individual can be primarily described as driven by biological and evolutionary mechanisms.

### **The Intrapersonal**

The Intrapersonal level is the psychological and the intrapsychic domain. This is the realm of territory staked out by cognitive science and ego psychology and its intellectual descendents. From childhood into adulthood as the neo-cortex and frontal lobes expand the neural networks, a more differentiated self-reflective consciousness develops.

It is at this level we then began to give way to an increasing sense of separation from the whole, with an accompanying growing sense of individual self-consciousness and self-identity beginning to develop.

### **The Interpersonal**

The Interpersonal is the family and social relationship field. Healthy Relationships are important for human development and functioning, with personal and family relationships providing many intangible healthy benefits, and feedback and identity to the self-system. When relationships are dysfunctional, individuals may be more prone to disordered behavior and/or mental disturbances.

### **The Exopersonal**

The Exopersonal represents the cultural and societal aspect of the self system. This level acknowledges that human personality development arises from particular socio-cultural contexts. This level suggests that some sociocultural stressors reside within the social system – not within the person (but are expressed at other levels, including the interpersonal and intrapersonal level). This level of analysis recognizes assumptions people make vary widely across cultures—depending especially on whether the culture emphasizes individualism or collectivism.

### **The Ecopersonal**

The Ecopersonal is the self –system that is part of the global-planetary field, which is — post-personal. This level represents an ecological consciousness. It is how we see ourselves, our egos, in relationship to the planet and the natural world as a whole.

## **The Transpersonal**

The Transpersonal field represents the collective unconscious and the emerging collective and unity consciousness, as well as acknowledgement of the nearly universal need for the spiritual dimension of the human psyche. This domain extends the —post-personal —and emerges into the —transrational stages of consciousness. Reason is not excluded in this level, but is integrated with other methods of inquiry and ways of knowing. At this level one is driven towards wholeness, subject/objective unification, and the field of fundamental consciousness.

The MAP Model assumes one can use various levels of analysis in the description of a phenomenon (psychological/behavioral functioning in our research), and no one level would be the complete or accurate description. But taken together all levels provide an additive view that constructs a wider perspective.

To use the metaphor of a microscope—one can only focus on one level of magnification at a time, with other levels falling out of focus. Yet beyond observation, all levels remain in synchronized existence. This model supposes that each discipline or sub-discipline in the sciences or behavioral sciences does not have a monopoly on the “truth”— but can serve as a commentary whole.

## **Other Transdisciplinary Applications**

### **Systems Theory**

Systems Theory Biologist Ludwig von Bertalanffy (1950) proposed that the biological concept of a system was a useful framework for studying the phenomena of all sciences. It was at this time the concept of general systems theory was born. General systems theory or systems theory is a conceptual framework that moves beyond the reductionistic and mechanistic tradition in science that has focus on linear cause and effect relationships. Systems theory frames explanations in terms of wholeness, self-organization, relationships, and interactions between parts. Pattern recognition and events in the environmental context are key notions (Hanson, 1995).

General systems theory has also been utilized by numerous professional disciplines in varying forms within the latter half of this century. An example of this can be seen in the development of the biopsychosocial model in medicine. This model attempts to provide a comprehensive systems-oriented basis for integrating factors in health and illness that range from the molecular-biological to the sociocultural domain (Engels, 1980). Recent developments in this model have even expanded the levels to include the transpersonal/spiritual domain (Sulmasy, 2002). The acceptance of the biopsychosocial model has been slow to displace the contrasting biotechnical model of medicine and psychiatry. This model views illness in a linear fashion-- as a mechanistic breakdown of the body “machine.” Writers have pointed out that the psychological and emotional functioning can be viewed as a system with roots in biology and embryology, wherein the

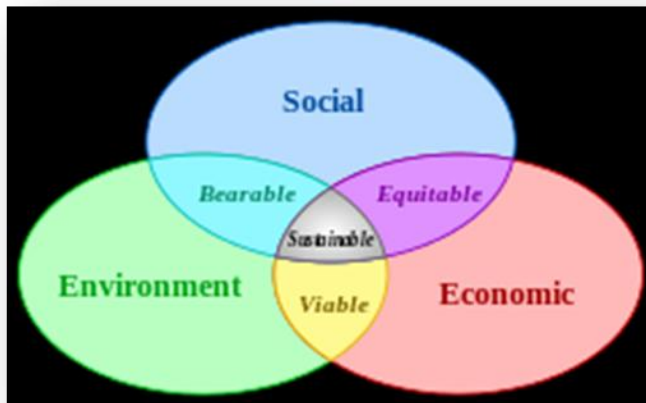
fertilized egg repeatedly divides into cells that perform different tasks as a means to achieve balance of function but can be greatly impacted by environmental systems (Papero, 1990).

Systems theory has also been utilized by experts and researchers in the fields of the behavioral sciences (Appel & Kim-Appel, 2010). Systems theory frames explanations in the general principles of wholeness, organization, relationships, reciprocity, and mutual causation. The focus is on the identification of interacting variables and pattern recognition. In this view, identity, personality organization, and mental health symptoms emerge out of a jointly active and dynamic process. Models with these views describe holistic epistemologies which attempt to reflect this complex ontology and thereby avoid reductionism.

### Sustainability Science

'Sustainability science' is problem-driven, multi-disciplinary scholarship that seeks to facilitate the design, implementation, and evaluation of effective interventions that foster shared prosperity and reduced poverty while protecting the environment (Harvard, 2018). 'Sustainability science' employs multiple disciplines of the natural, social, medical and engineering sciences and focuses on examining the interactions between human, environmental, and engineered systems to understand and contribute to solutions for complex challenges that threaten the future of humanity and the integrity of the life support systems of the planet (Komiya & Takeuchi, 2006)—topics include climate change, biodiversity loss, pollution and land and water degradation as well as social and economic variables (see figure 2).

**Figure 3: Intersectionality of Sustainability Science**



Source: De Vries, B. J. (2012). *Sustainability science*. Cambridge University Press.



## **Therapeutic Jurisprudence**

There is a newer proposition for an interdisciplinary approach to social deviance and violence, which has emerged out of the approach called “Therapeutic Jurisprudence” (TJ) (Wexler, 1996). This model suggests collaboration between the human service/mental health systems and the criminal justice systems provides opportunities. TJ contends that legal processes can influence upon the well-being of those participating in them. The scope of TJ is broad. It studies the impact of legal processes on all participants including judges, magistrates, lawyers, victims, witnesses, jurors, defendants, and justice or human service system professionals (Wexler, 2015)

However, TJ presumes that access to mental health and other human services can provide the legal system with opportunities to develop more appropriate resolutions to family problems, therefore reducing recidivism (Wexler & Winick, 1996).

## **Neuro-Law**

‘Neuro-law’ (e.g. Eagleman, 2008; Eastman and Campbell, 2006; Moriarty, 2008; Wolf, 2008; Yang and Raine, 2008)—examines what neuroscience data reveal about the mind, brain and behavior asks what relevance this understanding may have to forensic questions regarding violent individuals and the effective criminal justice and legal response.

## **Behavioral Economics**

Behavioral economics — a relatively new field that combines insights from psychology, judgment, and decision making, and economics to generate a more accurate understanding of human behavior. Among the pioneers of the behaviorist approach in economics were Daniel Kahneman (also a Noble Laureate 2002) and Amos Tversky (Tversky & Kahneman, 1992), who established the framework of the so-called "Prospect Theory", where "loss aversion" was among the most important factors that cause such deviations from rationality.

## **Cognitive Computing**

Cognitive computing (CC) is the field that combines knowledge of computer systems with knowledge of the human brain (Kelly, 2015). CC also includes the scientific disciplines of artificial intelligence, signal processing, and cognitive sciences (Wang, Zhang, & Kinsner, 2010). This field’s goal is to teach computers to think like a human mind, rather than developing an artificial system. Cognitive computing integrates technology and biology in an attempt to develop more effective systems of intelligence. With major advances the cognitive sciences, researchers interested in computer intelligence wanted to use deeper biological understanding of how the brain worked to build computer systems modeled after the mind, and most importantly to build computers that could integrate past experiences into its system.

## **Convergence of Art, Science, Technology & Health**

Transdisciplinarity can also be found in the arts and humanities. For example, the Planetary Collegium seeks "the development of transdisciplinary discourse in the convergence of art, science, and technology and consciousness research." The Plasticities Sciences Arts (PSA) research group also develops transdisciplinary approaches regarding humanities and fundamental sciences relationships as well as the Art & Science field. The Cleveland Clinic's Arts & Medicine Institute is an example of a combined health and art program, in which doctors-in-training receive art appreciation education, and an art therapy approach is heavily used in patient recovery.

## **Collaborative Patient-centered Practice (CPCP)**

Collaborative Patient-centered Practice (CPCP) is medical practice orientation that represents health care professionals working together and with their patients/families. It is based on the continuous interaction of two or more health professions or disciplines, organized into a common effort, to solve or explore common issues with the best possible participation of the patient. CPCP promotes the active participation of each discipline in patient care (interdisciplinary—but also Trans-emergent). CPCP enhances patient and family-centered goals and values, provides mechanisms for continuous communication among caregivers, optimizes staff participation in clinical decision-making within and across disciplines, and fosters respect for the disciplinary contributions of all professionals (Herbert, 2005).

## **Interprofessional Education (IPE)**

Education from a reductionist perspective also conflates information and learning, and seems to think that technological skills can solve every problem. There is also a conflation of training vs. learning. "Soft" topics like the humanities and history are seen as superfluous to the education system. "Interprofessiona"l education occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes. Once students understand how to work interprofessionally, they are ready to enter the workplace as a member of the collaborative practice team. This is a key step in moving health systems from fragmentation to a position of strength" (WHO, 2010).

## **Global Education**

The future of universities, communities, education, and professional development rests in diversity and internationalization. Audrey Osler, director of the Centre for Citizenship and Human Rights Education at the University of Leeds, asserts that "education for living together in an interdependent world is not an optional extra, but an essential foundation". Education of the present and future needs to be based on a philosophical foundation rooted on the principles of "Global citizenship education (GCE)" (Green, 2012). GCE is a form of education that involves civic learning that requires students' participation and

active learning in projects that address global issues of a social, political, economic, or environmental nature. The two main elements of GCE are 'global consciousness'; the moral or ethical aspect of global issues, and 'global competencies', or skills meant to enable learners to compete in the global job market.

The need for an international perspective in higher education continues to take on an increasing exigency within the growing global community. No longer can we afford not to re-examine our theoretical models of helping and its underpinnings for relevancy in the 21st century. One of the criticisms of this "internationalization" has been that this globalization of helping has been consistently one-way, in that it has been more about "exporting" our (western) ways of scholarship and practice, rather than a real exchange or exporting of ideas and techniques.

What has been consistent among these viewpoints are an increasing call for a global view of higher education, and a call for a dialogue about what the professional educator/scholar roles are in an increasing worldwide context.

### **The Present: Why Aren't We There?**

A question that often comes up when discussing the concepts of Transdisciplinary practice and education---is why don't we embrace this more? Like Transdisciplinary itself the answer is multi-level. Often the traditional structure of education is the fragmenting knowledge into narrow and isolated academic disciplines. Learning is seen as a product, not a process. Often this more traditional view sees academics as an accumulation of objective facts, rather seeing the world as a dynamic whole composed of a myriad of interrelated phenomena. This view is also embedded in the self-serving, "guild mentality". Most professional associations are almost exclusively interested in solely advancing the professions and the professionals they narrowly serve. This often gets translated to "my field can beat up your field" with the stakes being perceived as competition for prestige or economic gain. Inter-professional interactions or cooperation may occur, but status levels are clearly defined (e.g. Psychiatrists are head of interdisciplinary mental health teams).

### **The Wide Future**

Socialization to a profession is a critical process for education into a field or discipline. While professional identity is important, it may be a premature end to a developmental process. Like the Buddhist idea that one "needs to be somebody before they are nobody," one needs to understand the knowledge and tools of a given profession, before they can clearly understand its weaknesses and limitations. We argue that one must develop a professional identity and then move on to transcend it within a "Trans-professional" Identity. If one does not do this it becomes too easy to become stuck in one's professional "silo". Research and practice can be a reflection of the (closed) systems that hold them. A classic example in the behavioral health field is when the major paradigm or practice is biological psychiatry, medication becomes the proverbial

hammer, seeing nothing but nails. A transdisciplinary approach, while not negating the value of a biological viewpoint or intervention, it would recognize that other approaches may also be of value or even more effective. The implications of such an approach would also be more interdisciplinary cooperation and contact. A transdisciplinary approach would also strongly suggest use and publications in international interdisciplinary journals as well as interdisciplinary transnational conferences. True insights could be obtained with cross-fertilization of ideas and with inter-professional (and global) education. This would supplement (not supplant) more traditional systems of academic developmental.

## **Conclusion: Towards Transdisciplinary Research, Practice, and Education**

Transdisciplinary Research, Practice and Education could aid the development of the evolutionary spirit of internal critical consciousness, where even divergent fields as religion and science are seen as complementary. Respect, solidarity and cooperation could be global standards for the entire human race development. This ‘wide lens’ multiple systems view—reflects an “emergence” paradigm. The whole is not just the sum of the reductionists’ parts. Linear causality may not reflect the true reality of many phenomena. “Emergentists” contend the appearance of genuinely novel phenomena within various levels in the complexity and reciprocity of living processes and matter.

Institutions of Higher Education need to create transdisciplinary learning communities of scholars and practitioners dedicated to creating a new forms of knowledge in humane and sustainable comprehensive understandings through education and research. We must respond to the challenges of our times by promoting a transdisciplinary framework that respects the multiplicity of views and ways of knowing in our diverse global community.

## **References**

- Apostel, L. (1972). *Interdisciplinarity Problems of Teaching and Research in Universities*.
- Appel, J., & Kim-Appel, D. (2010). The multipath approach to personality (MAP): A meta perspective *Journal of Transpersonal Research*, 2, 108-115.
- Augsburg, T. (2014). Becoming transdisciplinary: The emergence of the transdisciplinary individual. *World Futures*, 70(3-4), 233-247. <https://doi.org/10.1080/02604027.2014.934639>
- De Vries, B. J. (2012). *Sustainability science*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511794469>
- Du Plessis, H., Sehume, J., & Martin, L. (2014). *Concept and Application of Transdisciplinarity in Intellectual Discourse and Research*. Real African Publishers.
- Eagleman, D.M. (2008). Neuroscience and the law. *Houston Lawyer*, 16(6), 36–40.
- Eastman, N. & Campbell, C. (2006). Neuroscience and legal determination of criminal responsibility. *Nature Reviews: Neuroscience*, 7(4), 311–318. <https://doi.org/10.1038/nrn1887>

- Engel, G. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry*, 137 (5), 535-544. <https://doi.org/10.1176/ajp.137.5.535>
- Graff, H. J. (2015). *Undisciplining knowledge: Interdisciplinarity in the twentieth century*. JHU Press.
- Green, M. F. (2012). Global citizenship: What are we talking about and why does it matter?. *International Educator*, 21(3),
- Hanson, B. G. (1995). *General Systems Theory: Beginning with Wholes*. Bristol, PA, London: Taylor & Francis.
- Herbert, C. P. (2005). *Changing the culture: Interprofessional education for collaborative patient-centred practice in Canada*.
- Jahn, T., Bergmann, M., & Keil, F. (2012). Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, 79, 1-10. <https://doi.org/10.1016/j.ecolecon.2012.04.017>
- Jantsch, E. (1972). Towards interdisciplinarity and transdisciplinarity in education and innovation. *Interdisciplinarity: Problems of teaching and research in universities*, 97-121.
- Kelly III, Dr. John (2015). *Computing, cognition and the future of knowing*. IBM Research: Cognitive Computing. IBM Corporation
- Klein, J. T. (2004). Prospects for transdisciplinarity. *Futures*, 36(4), 515-526. <https://doi.org/10.1016/j.futures.2003.10.007>
- Kochelmans, J. (1979). *Why interdisciplinarity? Interdisciplinarity and higher education*, edited by J. Kocklemans. University Park.
- Komiyama, H., Takeuchi, K. 2006. Sustainability science: building a new discipline. *Sustainability Science* 1:1–6. <https://doi.org/10.1007/s11625-006-0007-4>
- McGregor, S. L. (2011). Transdisciplinary axiology: to be or not to be. *Integral Leadership Review*, 11(3).
- Moriarty, J.D. (2008). Flickering admissibility: neuroimaging evidence in the U.S. courts. *Journal of Behavioral Sciences and the Law*, 26, 29–49. <https://doi.org/10.1002/bsl.795>
- Nicolescu, B. (2002). *Manifesto of transdisciplinarity* [Trans. K-C. Voss]. New York, NY: SUNY.
- Papero, D. V. (1990). *Bowen family systems theory*. Needham Heights, MA: Allyn & Bacon.
- Sulmasy D.P. (2002). A biopsychosocial-spiritual model for the care of patients at the end of life. *Gerontologist*, 3, 24-33. [https://doi.org/10.1093/geront/42.suppl\\_3.24](https://doi.org/10.1093/geront/42.suppl_3.24)
- Tversky, A. & Kahneman, D. (1992) Advances in prospect theory: Cumulative representation of uncertainty”, *Journal of Risk and Uncertainty*, 5: 297–323. <https://doi.org/10.1007/BF00122574>
- Wang, Y., Zhang, D., & Kinsner, W. (Eds.). (2010). *Advances in cognitive informatics and cognitive computing* (Vol. 323). Springer. [https://doi.org/10.1007/978-3-642-16083-7\\_1](https://doi.org/10.1007/978-3-642-16083-7_1)

- Wexler, D. (2015). Moving forward on mainstreaming therapeutic jurisprudence: An ongoing process to facilitate the therapeutic design and application of the law. *Therapeutic Jurisprudence: New Zealand Perspectives*.
- Wexler, D. B., & Winick, B. J. (Eds.). (1996). *Law in a therapeutic key: Developments in therapeutic jurisprudence*. Carolina Academic Press.
- Wexler, D. B. (1996). Applying the law therapeutically. *Applied and Preventive Psychology*, 5(3), 179-186. [https://doi.org/10.1016/S0962-1849\(96\)80010-2](https://doi.org/10.1016/S0962-1849(96)80010-2)
- Wolf, S.M. (2008). Neurolaw: The big question. *American Journal of Bioethics*, 8, 21–36. <https://doi.org/10.1080/15265160701828485>
- World Health Organization (WHO), (2010). Framework for action on interprofessional education & collaborative practice.
- Von Bertalanffy, L. (1950). The theory of open systems in physics and biology. *Science*, 111(2872), 23-29. <https://doi.org/10.1126/science.111.2872.23>
- Yang, Y., & Raine, A. (2008). Brain abnormalities in antisocial individuals: Implications for the Law. *Journal of Behavioral Science and the Law*, 26, 65–83. <https://doi.org/10.1002/bsl.788>