Higher Education and Science for Development: The Historical and Conceptual Foundations of Mode 3 Knowledge

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Abstract: The reflection is framed in the scenario identified in the essay “The new production of knowledge” (Gibbons et al., 1994) where the traditional way of knowledge construction, typical of the classical scientific research, is discussed (Mode1). In the same essay a new construction model, called “Mode2”, is proposed and it underlines the interactive and socially distributed aspect of the research proposing a transdisciplinary approach. The author’s reflection goes beyond this vision and he proposes a further perspective called “Mode3”. The author offers the state of the art of this new perspective from a theoretical, methodological and practical point of view. The word “Mode3” is currently at the centre of an interdisciplinary research and it’s used for different objectives. The author in its international and interdisciplinary overview deepens, on one side, the “Mode3” perspective in the Philosophy of Knowledge and in higher education, and on the other side, he widens the “Mode3” dimension in the field of management.

Riassunto: Lo scenario da dove parte la riflessione è quello delineato nel saggio “The new production of knowledge” (Gibbons et al., 1994) dove viene messo in discussione il modo tradizionale di produrre conoscenza (Mode1), tipico della ricerca scientifica classica. Nello stesso saggio si propone una nuova modalità di costruzione chiamata “Mode2”, che mette in evidenza l’aspetto interattivo e socialmente distribuito della ricerca e propone un approccio transdisciplinare. La riflessione dell’autore supera questa visione e si inserisce nella prospettiva di una ulteriore visione chiamata “Mode3”. L’autore fornisce lo stato dell’arte di questa prospettiva emergente, ‘Mode3’, dal punto di vista teorico, metodologico e pratico. Il termine “Mode3” è attualmente al centro di una ricerca interdisciplinare ed è utilizzato per scopi diversi. L’autore offre questa panoramica internazionale ed interdisciplinare, approfondendo, da un lato, la prospettiva “Mode3” nella Filosofia della conoscenza e nell’istruzione superiore, dall’altro, la dimensione ‘Mode3’ nell’ambito del management.

Keywords: Human Development, Mode 3 Knowledge, Electronic-Information Era, Ontological Turn, Teaching and Learning, Moral and Existential Questions, Intensity, Vocation
Introduction

This paper gives a brief overview of the recent history and conceptualization of the term 'Mode 3' with regard to knowledge generation and cultivation in today’s higher education and society. The core meaning of Mode 3 still appears to be dynamic and unsettled and there are various claims by several scholars about what it means, both in regard to theory, methodology, scope, application and practice. The fact that multiple scholars around the world have coined or gravitated to the same term, independently of one another and with different purposes and audiences in mind, but all in response to the terms ‘Mode 1’ and ‘Mode 2’ (Gibbons, et al. 1994), reveals a fascinating story. This paper documents the emergence of Mode 3 thinking, compares how it is used and applied by different authors and explores what it does or might mean for the present and future of higher education and science for development on local, regional and global scales.

The prospect of studying 'Mode 3 knowledge' was first proposed to me in 2010 in the context of development studies, specifically with respect to the roles that science and technology play in the contemporary world. The topic of knowledge generation and cultivation, particularly in the way that knowledge plays a role in the Academy (or universities) and beyond it in ‘knowledge societies,’ appealed to my interdisciplinary interests. Also, being a child of the computer and internet generation, born in the so-called post-modern era of wires and cables, satellites and mobile phones fuelled my imagination. How does the electronic-information era (E-I era) impact my career as an educator and researcher, the lives of the students I teach and colleagues I work with?

As a postdoctoral fellow, I was asked to assess the landscape of those who have begun to use Mode 3 terminology and to elaborate what it means or could mean for higher education studies and practises. The task set forth in this paper is mainly to discuss not ‘Mode 1’ or ‘Mode 2,’ but rather ‘Mode 3’ knowledge, though some brief contextualisation will be provided. At their most basic level, the notions of Mode 3, as well as Mode 1 and Mode 2 connects pedagogy or educology with discussions of where knowledge is generated institutionally, how, when, by whom, and for what individual and social purpose(s).

Several terms are used in the paper: ‘Mode 3,’ ‘Mode 3 knowledge,’ ‘Mode 3 knowledge generation,’ ‘Mode 3 knowledge production’ and ‘Mode 3 production systems.’ Generally, I will use one of the first two
terms because in my view the generation or production of knowledge is a distinct, but overlapping issue with speaking about 'knowledge itself.' There is obviously an instrumental feature of producing and using knowledge, but we also need to distinguish various kinds or types of knowledge. To do this, we identify distinct 'modes' that will be discussed below.

After conducting research over a period of 9 months and corresponding with some of the initial theorists of Mode 3, I have found it necessary to divide the paper into 2 main sections: first, Mode 3 in Philosophy of Knowledge and Higher Education, and, second, Mode 3 in Management, Operations and Systems Thinking. This division reflects a sometimes subtle, but significant difference in strategy and context in which some of the early users of Mode 3 framed the discourse, though there may be more overlap than it appears on the surface.

This paper makes no direct policy suggestions. It only presents historical-descriptive information and offers a few opinions about it, though policymakers and educational administrators might draw their own conclusions. The goal of the paper is to highlight various features of higher education development and transformation that are occurring today and that have triggered the emergence of what is called 'Mode 3 knowledge.' It expresses a reflexive academic desire to study new forms of knowledge and science against this background and then to share the results of the research with educators and scholars.

The main task in the paper is to find out where the notion of 'Mode 3' came from, who started using it, when and what it means to them. That being said, I will likely miss the mark in multiple ways, given the scale and complexities involved. The topic broadly deals with higher education transformation on local, regional and global levels, knowledge production, consumption and management, commodification and marketisation of knowledge, pedagogy and curriculum development, student/teacher attitudes towards the E-I era, research, teaching and practice, university planning and operations strategies, as well as policies towards them that are already actively engaged by long-tenured and mature professors, administrators, educators, politicians, curriculum planners, university committees and higher education leaders with a lot more experience than I have. My basic approach will therefore be to let the voices speak for themselves, while maintaining a minimal narrative framework for coherency.

There are admittedly those who still feel Mode 2 is sufficient, or even that the Mode 2 vs. Mode 1 distinction was itself misplaced. Thus, it is
assumed that this article might open a path for others to go further in their research than the narrow boundaries of this article. The convergent history of Mode 3 theories themselves is a curious occurrence, which is now shown in general outline.

A. Mode 3 in the Philosophy of Knowledge and Higher Education

Logically Mode 3 follows Mode 2, which follows Mode 1. It is likewise basic and fundamental to accept that all human development begins with choices, decision-making and individual or group social-action. This is said plainly and up-front because it is not altogether uncommon nowadays to meet scholars who not only disbelieve in free will and social responsibility, but who live daily with the view that their choices do not matter on a personal or social level. That is, they believe that the environment (natural, social, cultural, technological, linguistic, religious, or political) completely determines their everyday existence; that they are merely puppets or automatons in a universal evolutionary game that makes their individual choices insignificant or irrelevant, even in the field of education.

I am not one of those fatalistic persons, which is to volunteer a reflexive moment at the start of the paper. It is also expressed because it seems quite clear to me, after spending several months of my life researching this theme, that basic, meaningful questions about human beings and existence, i.e. perceptions of ontology and phronesis, play a crucial role in conversations about Mode 3. They are as important as topics that involve thinking, learning, imitating, knowing and controlling nature or machines, i.e. epistemology and techné. Leaving this out is to misunderstand Mode 3.

The stage for how ‘Mode 3’ came into existence starts with a book Gibbons, et al. *The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies* (1994). The book distinguishes two ‘modes’ of knowledge production, creation or generation – Mode 1 and Mode 2. It is a collaborative work by several decorated scholars in sociology of science and higher education from Europe (Austria and the U.K.), the USA, Canada and Brazil, which was written in response to the transformations in higher education and knowledge production that were being witnessed.

In short, Mode 1 is the ‘traditional’ Newtonian (or even Mertonian) model of knowledge production that is disciplinary, homogeneous, hierar-
chical, permanent, quality controlled by an expert few, minimally socially responsible and not aimed primarily at being marketable, though possibly so. In contrast, Mode 2 is trans-disciplinary, heterogeneous, less hierarchi-
cal and more heterarchical, transitory, quality controlled by diverse participants (not just university experts), more socially responsible and focussed on marketable knowledge.

The transition to Mode 2 knowledge means that instead of universities having a monopoly over production of knowledge, more power-sharing is involved with other social actors, including government, business, media and even military (cf. C. Wright Mill's *The Power Elite*). Universities therefore aim to find 'niches' of specialisation in which they can concentrate their expertise, in particular for solving problems, while additional niches are also established outside of the boundaries of university teaching, re-
search and learning. Many of the other categories that Gibbons et al. identified have been covered at length since the book was published, including an updated volume by Nowotny, Scott and Gibbons (2001) *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. The term ‘uncer-
tainty’ will return again in Mode 3 thought below.

One reason for identifying Mode 2, Gibbons et al. write: “knowledge production is becoming more socially accountable” (1994: vii). They con-
tinue, saying that “the characteristics of Mode 2 developed in the text pro-
vide a useful heuristic for those seeking to understand what is changing in the sciences and what this implies for the future of our principal knowl-
edge producing institutions.” (Ibid: viii) A significant commentator has suggested that by a ‘useful heuristic,’ it means that the book “was written as a primer in theory for policymakers” (1995). Gibbons writes on his own not long after: “To summarise … in mode 1 problems are set and solved in a context governed by the, largely academic, interests of a specific community. By contrast, mode 2 knowledge is worked out in a context of application” (1997). Thus, the ways that we apply knowledge, whether to solving problems or for other purposes, is part of the distinction between Mode 1 and Mode 2.

Some scholars consider the notion of different ‘modes’ of knowledge within longer frames that involve many theorists. Physicist and philoso-
pher H. Radder writes about:

“a far-reaching change in the mode of production of scientific knowledge, which has been analyzed under different headings by many contemporary phi-
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Philosophers and sociologists of science, such as Lyotard (1984), Latour (1987), Collins & Pinch (1998), Grint & Woolgar (1997) and Nowotny, Scott & Gibbons (2001). The common focus of these different analyses is the social embedment of scientific knowledge, which is analyzed from different but related angles.” (2009: 4)

The social embedding of scientific knowledge is a major contribution from the sociology of science, which began in the first third of the 20th century in socialist context (B. Hessen, N. Bukharin, et al.) and has gradually gained prominence in (‘western’) capitalist societies in the years since (R.K. Merton, J.D. Bernal, T. Kuhn, G. Bachelard, B. Barnes, D. Bloor, H. & R. Collins, B. Latour, S. Fuller, et al.). This recognition that science is social and not only individual has brought with it a new understanding of what it means to ‘do science’ and to think scientifically. It has also challenged and continues to re-shape conventional notions of knowledge production and what sciences ‘means’ to people. This is partly what led to the ‘science wars’ of the late 1990s and 2000s over the demarcation of science from pseudo-science, proto-science or non-science, i.e. as distinct from critical theory and post-modern philosophy.

Mode 3 gives attention to the attitude of individuals and communities with respect to awareness of their potential to transform the world around them using science, technology and other types of personal and community knowledge. Knowledge in Mode 3 thus cannot be studied without using ‘reflexive tools’ – what can I/we do? – in other words it offers reflexive knowledge about ourselves as subjects as well as knowledge and science as ‘objects’ that are inter-subjective by definition. Positivistic educational practices therefore make little sense in today’s university environments, where one cannot simply program or engineer students to a pre-ordained model, but must be more attuned to learners’ needs and desires.

The remainder of this section concentrates on Mode 3 in the words of people who coined and expounded it. These are T. Ray and S. Liddle, R. Barnett, L. Wheelahan, S. Slaughter and G. Rhoades, H. Kunneman, J.C. Tromp, and a few others.
Ray, Little and Taylor – Mode 3 (2001)

The first ‘Mode 3’ paper published was by T. Ray and S. Little in 2002, “Communication and Context: Collective tacit knowledge and practice in Japan’s workplace” (2002). This is not to say that the ‘idea’ of ‘Mode 3’ was not invented or discussed before this time, or even perhaps presented in public. It is simply to suggest that by publication date this seems to be the first time the term ‘Mode 3’ appeared in the literature.

This paper was actually preceded by another paper, however, which curiously announced the forthcoming publication about the still undefined notion of ‘Mode 3.’ As S. Taylor and Ray wrote in 2001, “the Mode 1 and Mode 2 debate appears to be an incomplete picture. Acknowledging the importance of collective tacit knowledge, defined as Mode 3 knowledge by Ray and Little ([forthcoming] 2002), offers potential to support a more meaningful interpretation of the interrelationship between working, learning and innovation.”

Sometimes it is not possible to identify a particular ‘X’ that marks the spot, but rather only a series of signposts that point in the same or similar direction. The first one to identify in Ray and Little’s 2001 paper is the publication of M. Polanyi’s books *Personal Knowledge: Towards a Post-Critical Philosophy* (1958) and *The Tacit Dimension* (1966). These texts suggest that not all ‘knowledge’ should be seen as material or outward, but that it is also personal, ideational and inward. Indeed, the person who is learning or ‘being educated’ carries his or her own ‘tacit knowledge’ to bear on whatever teaching program or course is delivered in a higher education institution (HEI). The anthropological re-appraisals that follow from Polanyi’s view of knowledge suggest a reason for new educational approaches to human persons and individual and group teaching and learning styles, especially so nowadays in the light of the E-I Age.

The awakening of this new thinking trajectory in Ray, Little and Taylor’s Mode 3 approach was verified again by Ray’s publication: “Rethinking Polanyi’s Concept of Tacit Knowledge: From Personal Knowing to Imagined Institutions” (2009). What we witness is a turn from knowledge production as detached, impersonal epistemology to a kind of personalised social epistemology in the educational process of teaching and learning. This move would correspond to further uses of Mode 3 soon to follow, but it is not clear if Ray, Little and Taylor’s Mode 3 was or is followed significantly by others.
Barnettian ‘Mode 3’ (2004)

Ronald Barnett’s first published paper on Mode 3 was “Learning for an Unknown Future” (2004). This title was taken from a conference of the same name in Christchurch, New Zealand in 2003, which was based on his higher education work. The key to Barnett’s usage of ‘Mode 3’ is the notion that we live in an ‘age of super-complexity’ (i.e. the E-I Age) and therefore of uncertainty. This thesis was put forward by Barnett already in 2000 as he contemplated the future of the University.

In Barnett’s words:

“The institutional autonomy upon which such a contemplative conception of knowledge had some basis is no longer available to the university. … In a world of supercomplexity, there can be no assuredness to the epistemological base of the university. Yet, in reaching out to such a new epistemology, the university – as it turns out – emerges in continuity with its rhetorical past. Its earlier beliefs in itself as a site of enlightenment, of critical scrutiny, of the open society, and of personal fulfilment: all these are now back on the table. The university can be reborn.” (2000: 420-421)

These are quite strong claims, especially for a ‘rebirth,’ but they are not uncommon in the higher education literature nowadays. Understanding that we live in a knowledge culture or knowledge society means that our fundamental ways of teaching and learning must change and have changed already to reflect (for better or worse) the new higher educational environment. Indeed, Barnett is calling just as much for new pedagogy as he is describing the challenges that face universities today.

“This age of supercomplexity is marked by an abundance of new accounts of the world. New images, new technologies, new texts, new discourses; new forms of professional life: all serve to provide new knowledges. New frames of understanding: this is what an age of supercomplexity calls for. Very well: let the university be daring in the accounts that it offers to the world.” (Barnett 2000: 417)

This leads to perhaps the single-most compact and at the same time helpfully explanatory definition yet available of ‘Mode 3 knowledge,’ which Barnett defined in 2004 simply as: “knowing-in-and-with-uncertainty.”
The new environment of learning and teaching in higher education provides a recognition that can and often does “disturb human being as such.” (2004: 257) What this means is that human beings are facing an ‘ontological turn,’ which coincidentally requires a new pedagogy for human existence: “No matter how creative and imaginative our knowledge designs it always eludes our epistemological attempts to capture it,” explains Barnett (2004: 252). This speaks of a fundamentally different condition of human life and experience than in ages past. Avoiding this environmental and personal reality is not an option.

There is, however, also a prescriptive dimension to Barnett’s call for a new Mode 3 knowledge generation. Research, he says, must come to be seen as “active in the world (Mode3)” (2009). In other words, research is not done simply for the sake of research or knowledge gained simply for the sake of knowledge, as in the Humboldtean model of university education. “[T]his is a world in which solutions cannot be designed, in the sense that a problem has been entirely satisfactorily met; there are always repercussions, unintended consequences and loose ends,” says Barnett (2004: 145). We cannot therefore expect higher education to continue in the same ways it has in the past, or to pursue a backwards-looking cookie-cutter model where the personality of the individual student is marginalised and abbreviated.

Students must come to be seen “as persons, not merely as knowers,” claims Barnett. From a sociological perspective, this is a rather bold claim of the present and future of higher education, with considerable repercussions if taken seriously. Curriculum should therefore be “aimed at the transformation of human being; nothing less” (2004: 256-257). Indeed, this suggests a radical rethinking of not only how higher education is structured, managed, organized and actualised in practise, but also that its goals should be to ‘produce’ workers as well as human beings generally, global citizens if you will.

**Supporters of Barnettian Mode 3**

Barnett has been cited as the founder of Mode 3 knowledge by Elwyn Thomas (2004), Leesa Wheelahan (2007), Maggi Savin-Baden (2007), the UNISA UNGC Working Committee – Discussion Document (2009), and others. First, it should be noted that Dr. Thomas is a colleague of Barnett’s
at the Institute for Education at the University of London. He presented a paper at the UNESCO Teacher Training and Education in Bangkok, Thailand (2004), saying:

“It [Mode 3] is a mode which attempts to come to terms with an ever complex world, where the conditions for human existence have become more unpredictable than ever. In this context, a supra-level curricular integration would combine all three modes, the dominance of each mode depending on context and what influences pervade at a particular time. … Teaching in higher education is no longer a solely Mode 1 activity, it encompasses Mode 2 and Mode 3 approaches as well. The emphasis on construction as opposed to knowledge transmission, of uncertainty and inquiry rather than blind acceptance, a stress on process rather than outcomes (Parker 2003), are skills that academic staff need to master if a truly Integrative Education is to be relevant and effective.”

Leesa Wheelahan is an Australian higher education scholar, now based in Canada, who challenges higher education transformation philosophically using a ‘social realist’ approach. She has highlighted Barnett’s work extensively in her research and, as such, I will quote her at length:

“Ronald Barnett (2004) called for an ‘ontological turn’ in curriculum and pedagogy away from a focus on knowledge and skills to a ‘pedagogy for human being’, which seeks to develop the human qualities and dispositions needed to thrive in an uncertain future. … While agreeing with him [Barnett] that generic skills are a dead-end, this paper argues that a ‘pedagogy for human being’ must be contextualised by a vocation … Unless the notion of vocation is used to ground Barnett’s ‘ontological turn’ in the curriculum, the danger is that the attributes and dispositions he seeks will result in disconnected and fragmented identities, which find expression in market oriented capacities and patterns of consumption (Bernstein, 2000), rather than an intrinsic sense of inner calling, or (as sought by Barnett) an authentic self.” (no page #)

“[M]ode 3 knowledge as the basis of the curriculum and pedagogy. [Barnett] says that … pedagogy itself must be characterised by uncertainty, with knowledge loosely framed, provisional and open-ended, and curriculum must be designed so that it insists students confront and engage with the uncertainties and dilemmas in their field of knowledge, but in ways in which “human being itself is implicated” (Barnett, 2004: 257). As for knowledge, this has now
become a process of active knowing, rather than something that is external to individuals.” (in Osborne et al. 2007: 145)

“Except for universities losing their privileged position as the only knowledge producers, the knowledge required by a supercomplex world challenges traditional discipline and inter- and intra-discipline knowledge (Mode 1 and Mode 2) and requires universities to make an ‘ontological turn’ in addressing not only knowing and acting but being in an uncertain world (Mode 3) (Barnett 2000: 414). … While discipline and inter- and intra-discipline (Mode 1 and Mode 2) knowledge will remain fundamental in higher education, Mode 3 knowledge underlines the ontological turn in higher education in which students’ being is just as important as what they know (Barnett 2004: 247). In support of the ontological turn, the emphasis in higher education is changing from just producing competent graduates for places of work, but also a critical citizenry. Higher education will therefore continue to initiate students into various disciplines and inter-and intra-discipline spaces as well as generic skills. Higher education will increasingly also have to emphasise a certain openness to not knowing.” (Discussion Document, 2009)

Wheelehan’s criticisms of ‘old’ pedagogic models in light of the so-called ‘ontological turn’ serve as a significant challenge to the notion that teachers are knowers and students are those learning to know. Much like Marshall McLuhan’s insistence in the 1960’s and 70’s that education is a dialogue, rather than a monologue, Wheelehan’s higher education philosophy strikes at a common dance, where teachers and learners are both crew members on ‘spaceship earth.’ Her talk of ‘vocation’ (cf. M. Weber 1919) also fits quite appropriately with McLuhan’s claim that young people in the E-I era are now looking to fill ‘roles’ instead of hold ‘jobs,’ the former highlighting a sense of involvement and belonging that the latter often renders unavailable.

There are additionally some scholars who credit the current understanding of Mode 3 to a combination of views presented by Barnett along with G. Rhoades and S. Slaughter (more below). For example, Allison Shreeve writes:

“The features of Mode 2 knowledge are that it is more applied, problem focused, is transdisciplinary, entrepreneurial and demand driven [than Mode 1]. Mode 2 knowledge has now been superseded by the idea of Mode 3 knowledge
(Barnett 2004, Rhoades & Slaughter 2006) which is related to work outside the university and is uncertain and transitory in nature.

Shreeve says about Mode 3 knowledge and the impact it makes on peoples' lives: “It’s not [about] what I do, it’s what I am.” Such academic ‘philosophy’ seems to be inextricably intertwined with Mode 3 discourse in the arena of higher education studies.

**Rhoades and Slaughter (2006, 2010)**

Sheila Slaughter teamed up with Gary Rhoades (2006) to develop Mode 3 in higher education, co-writing *Academic Capitalism and the New Economy: Markets, State and Higher Education*. Earlier Slaughter had worked with L. Leslie (1997) on a similarly titled book: *Academic Capitalism: Politics, Policies, and the Entrepreneurial University* from the same publishing house. The term ‘Mode 3,’ however, is not, as far as I could tell, found in the latter work.

Slaughter confirmed with me: “We [with Rhoades] first developed the Mode 3 idea for an NSF training grant. It was our conceptualization, in response to Gibbons et al.” It is still not clear to me if Slaughter published on Mode 3 before 2006, which means they would be four years after Ray and Little and just two years after Barnett.

Admittedly, I have learned the least amount about Slaughter and Rhoades’ views of Mode 3 and how they are applying it in their work. But their general approach seems to overlap and continue with work done in higher educational studies, which is consistent with Barnett’s and others’ work above. Therefore I include it here as part of the historical narrative of the emergence of Mode 3 thinking.

**Kunneman (2005)**

H. Kunneman also started using the notion of ‘Mode 3’ in 2005, though it appears to be an independent origination of ‘Mode 3’ thought, since he does not cite any of the others above. Nevertheless, as with the others, he means to establish a new mode of thinking in contrast with Giddens’ et al. Mode 1 and Mode 2. With this in mind, he writes:
"I propose to distinguish a third mode of knowledge production characteristic of postindustrial and postmodern societies. This mode three knowledge production concerns moral and existential insights necessary for the development of adequate solutions for practical problems defined within professional language games in the context of knowledge-intensive organizations." (2005: 198)

This responds to the need for building “a new, influential model of the dynamics of scientific knowledge-production in postindustrial societies” (2005: 195). Kunneman is perhaps most explicit in highlighting the moral and existential dimension, though it is present in several other advocates of Mode 3 knowledge too. He cites what he calls "places of bother" (2005) that make the learning process much more difficult due to normative and existential discourse. He therefore advocates more attention in education to moral deliberation and existential learning processes, which might sound too philosophical for some and not concrete enough for others. Are some fields more susceptible to include such deliberation and learning processes than others?

“Upon closer inspection,” he says, “it becomes clear that most of the empirical material referred to by Gibbons and Nowotny to substantiate their thesis is taken from developments involving the natural sciences and technological innovation processes. The social science and the humanities get much less attention” (2005: 198). This is an important admission that seems to identify the Anglo-American definition of ‘science’ as referring only to natural sciences. In that school of thought, social sciences and humanities (SSH) are ‘non-scientific’ and therefore ‘softer’ or less rigorous.

However, the importance of SSH have re-emerged and even been reaffirmed by Nowotny herself directly in the face of natural sciences and technological innovations, during her presidency of the European Research Council. At the 2013 “Horizons for Social Sciences and Humanities” event in Vilnius, Lithuania, Nowotny and many others involved in European science and research committed themselves (cf. Vilnius Declaration6) to dialogue that necessarily includes SSH at the very heart of deliberation about knowledge, innovation and problem-solving, such that SSH should not be seen as just an ‘add-on’ for ethics and morals to ‘harder’ or more exact sciences. Indeed, Nowotny tells that SSH has a major role to play in the new mode of knowledge production that is taking place in our time.

Kunnemann also writes, much more recently:
“In the first place cognitive models, providing a general picture of our world and its most basic characteristics (Mode 1); in the second place pragmatic models, developed in view of the solution of specific technical and professional problems (Mode 2); and lastly narrative models, addressing existential and moral questions connected with scientific and technological developments on the basis of hermeneutic complexity and horizontal transcendence (Mode 3).” (2011: 14)

“This form of knowledge provides a direct link between moral and political considerations and situated narratives on the one hand and the content of technological solutions and organizational arrangements on the other.” (Ibid: 16)

Kunneman’s attention to Mode 3 and his promotion of it (including to A. Portegies, J. Lengkeek and V. Platenkamp) seems to stem particularly from his view of the “exclusively profit-driven form of Mode 2 knowledge production.” (2011: 399) But the table of conversation about Mode 3 has by now become much less clear, with such labels as pragmatism, hermeneutics, epistemology, ontology, narratives, realism, capitalism and socialism involved. Is Mode 3 knowledge just a cover-all term for a wide variety of sometimes dissolute perspectives that think Modes 1 and 2 are not entirely coherent in the 21st century or that are seeking, but still not convinced, to identify the as yet future trajectory of higher education in the E-I era?

Several other thinkers and educators have taken up discussion about Mode 3 and how it influences the discourse involving knowledge and higher education.

As J.C. (Coyan) Tromp explains, “mode 3 knowledge also calls for the input of inspiring narratives, visions and metaphors with regard to moral dilemma’s and the big questions in life. As such, it forms the source that we can draw upon when dealing with the practical issues we are faced with, as well as with the inevitable tensions related to them.”

By 2009, according to Isaac and Platenkamp, Mode 3 has come to refer to normative and existential knowledge production where participants argue from within ‘places of bother’ (2010). It is not necessarily about ‘finding the truth’ or about ‘solving problems’ per se. Instead, the learning process is taken into account as part of the broader life-world, where children, youth and adults are cross-generationally educationally engaged, both officially or unofficially, formally and informally. Included in a paper about tourism...
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development, this vision of Mode 3 obviously exceeds the boundaries of higher education studies and suggests that life as an educational process can be both a personal and a global endeavour.

Isaac et al. speak of a growing need “to distinguish between the truth finding of mode 1, the sophisticated problem solving intention of mode 2 and the slow and attentive, relativistic but argumentative ‘soft power’ of mode 3” (2009). This raises a normative and existential discourse that involves ethics and values, including topics such as globalisation or internationalisation of knowledge, social and cultural solidarity, indigeneity and belonging, as well as how we can still relate to classical notions of ‘truth, goodness and beauty’ under new educational circumstances. Surely Mode 3 is not taking an ‘evolutionary’ approach that says ancient is ‘primitive,’ modern is ‘civilised’ and that we have nothing to learn about humanity today from the ideas, ethics and values of era-ago Byzantium, Rome, Greece, China, India, Egypt or Mesopotamia?

This leads to a question that seems to be lurking behind several of the theorists of Mode 3 in philosophy of knowledge and higher education. The political-economic system plays such a significant role in the conversation that addressing it directly may help untangle some of the pressures and tensions. Is higher education still an autonomous institutional player or has creating bases for local, national or regional businesses become the main purpose of generating knowledge? How is the commercialisation of mass higher education influencing the discourse and how do on-line courses, MOOCs and other ‘free education’ options influence talk of Mode 3? Is the main realm in which Mode 3 is discussed that of consultants, social engineers and business managers or that of teachers, educators and learners? This final question marks a transition from the first section above to the second section below, which looks at an alternative approach to Mode 3, often which focuses on the production of knowledge and less on the students and teachers themselves.
B. Mode 3 in Management, Business, Operations and Systems Thinking


Elias G. Carayannis is on the faculty of the Management of Science, Technology, and Innovation Program at the School of Business and Public Management of George Washington University in Washington, DC. Carayannis contends that he is the creator of ‘Mode 3 knowledge production systems’ as a conceptual novelty. It is unknown whether he is familiar with the other uses of Mode 3 outlined above or not. He has suggested that he has been developing these ideas since the early 1990s, though I have not found any evidence in the literature of this. As far as I can tell, Carayannis’ first publication mentioning Mode 3, together with David Campbell, does not appear until 2005, after both Ray and Little and Barnett.

In 2011, Caryannis writes: “As a new input for discussion we wish to introduce the notion of the ‘Mode 3’ knowledge creation, diffusion and use system and we define below the essential elements or building blocks of ‘Mode 3.’ The notion ‘Mode 3’ was coined by Carayannis (late fall of 2003), and was a concept jointly developed by Carayannis and Campbell (2006).” (2011: 10) Regardless of whether or not Carayannis coined the term in “late fall of 2003,” this is still after Ray and Little.

To the specific meaning of “Mode 3 knowledge production systems,” it is best to hear from Carayannis himself:

“The Mode 3 Knowledge Production System architecture focuses on and leverages higher order learning processes and dynamics that allow for both top-down government, university, and industry policies and practices and bottom-up civil society and grassroots movements initiatives and priorities to interact and engage with each other toward a more intelligent, effective, and efficient synthesis.” (2011: 3)

In addition, Carayannis places discourse about Mode 3 in the broader context of the so-called Triple Helix of university-industry-government (Etzkowitz and Leydesdorff 2000) and Quadruple Helix of innovation (government, university, industry and civil society). More recently, he speaks about a Quintuple Helix, which includes the ‘natural environment.’
In Carayannis’ approach, Mode 3 relates to the Quadruple and Quintuple Helixes, but not to the Triple Helix. He writes of the move towards Mode 3 as the ‘evolution’ of “models of knowledge creation.”

Carayannis claims that Mode 3 knowledge creation and diffusion is suitable for more and more diverse and pluralistic societies. “Mode 3 even accentuates such pluralism and diversity of knowledge and innovation modes,” he contends, “as being necessary for advancing societies and economies. This pluralism supports the processes of a mutual cross-learning from the different knowledge modes.” (2012: 3) In this way,

In 2007, Caryannis and Campbell state the background for their vision of Mode 3 knowledge: “‘Mode 3’ is based on a system-theoretic perspective of socio-economic, political, technological, and cultural trends and conditions that shape the co-evolution of knowledge with the ‘knowledge-based and knowledge-drive, global economy and society’” (2007). Here I must admit disagreement with Carayannis’ (and Schumpeter’s) language, particularly his choice of the terms ‘evolution’ and ‘co-evolution,’ since from a social scientific theoretical perspective ‘change-over-time’ in human-made things (i.e. artefacts) is dissimilar enough from biological (or cosmological) evolution to require different terminology. As intentional agents, as ‘persons,’ we should not be reduced to mere evolutionary machinations, no matter how friendly the metaphor appears on the surface. Nevertheless, it is helpful that Carayannis openly identifies the general ‘systems’ paradigm (Weiner, Bertalanffy, et al.) in which he frames his version of Mode 3, to see how it anchors his wide-ranging interests in the Helix-approach to civilisation.

Carayannis addresses Mode 3 in the context of knowledge and innovation paradigms, competitiveness between and specialization of knowledge systems, integrating media and culture, fractal knowledge and ecosystems. He writes about sustainable development, global warming and entrepreneurship all within a ‘systems’ philosophy of life and human existence. It has a decidedly different flavour than the work done by educators and pedagogues above, but will likely appeal to scholars active in government, business, military and media models of education and training.

Jiménezian Modo 3 (2008)

Another figure who shares a similar approach to Carayannis, though as far as I know they are not aware of each others’ work, is Jaime Jiménez
of the National Autonomous University of Mexico’s Institute for Applied Mathematics and Systems and current Executive Committee Member of the International Sociological Association. Jiménez came up with or was suggested the idea of Mode 3 (Modo 3) in 2006. He affirmed in conversation with Ann Denis at the International Sociological World Congress that Mode 2 was insufficient for ‘developing countries,’ such as Mexico. Denis then suggested to Jiménez about the potential for developing a ‘Mode 3’ in order to bring developing countries into the discussion. It seems that neither Denis nor Jiménez knew anything about the several previous efforts to define and articulate Mode 3. Juha Tuunainen (2002) had written a critical analysis of Mode 2 in the Journal Science Studies, on whose editorial board Jiménez sits. Jiménez nevertheless clarified the background for his ‘discovery’ by saying, “We call it ‘Mode 3’ to differentiate it from the modes defined by Gibbons et al.” (2009).

As Jiménez wrote, “Indeed, we are in the presence of a different mode of doing science, ‘Mode 3,’ which salient property is the genuine response to social needs, missing in Mode 2” (2009). What Jiménez was looking for was to develop a kind of “science for the 21st century.” By the latter statement, Jiménez means a more socially responsible, communitarian/national view of science that is not animated primarily by “serving the interests of a few” (2008). Thus, he speaks of “a new way of doing research directly and unquestionably linked to societal needs, in line with the ‘Spirit of Budapest,’ baptized in this text as ‘Mode 3’” (2009). At the time, Jiménez still believed he was the first person to coin the term ‘Mode 3.’

The desire for Jiménez to construct a new ‘mode of doing science’ can be put into context when studied in light of the World Food Summit (WFS) in Rome, Italy, 1996 and the World Social Forum (WSF), Brazil, 2001. New solutions were being sought to overcome the neo-liberal (read: USAmerican and broadly ‘western’) domination of world markets and the corresponding commercialisation of higher education, to the exclusion of significant social classes. Jiménez instead witnessed a non-commercially-oriented model of research and training in Mexico that was beginning to produce local-level results that included graduates in the natural sciences from outside of the major urban centres.

What Jiménez sought were “examples of ‘research at the service of mankind,’” that are “in consonance with an alternative definition of development, not necessarily associated with ‘growth’” (2009). This is a rather difficult position to promote however, as it goes against much development
theory to suggest that shrinkage (the economic opposite to growth) can somehow also be ‘developmental.’ For Jiménez, ‘development’ is a relativistic concept that has no objective measurement (throwing all of the supposed human development indexes out the window) and depends entirely on personal and/or group/community needs and desires. “In conclusion,” says Jiménez, “each country has first to define what development is for its inhabitants, and then design its own ways to approach it” (2008).

For Jiménez, “Development is not a question of what one has, but of what one does with what one has. It is the desire and ability to use what one has to continuously improve one’s own quality of life and those of others” (2008). This is a view he adopted from the USAmerican systems theorist, R. Ackoff (1974), under whom Jiménez wrote his adult dissertation on development and participation. Ackoff, along with J. Gharajedaghi, defined the term this way: “Development is the process in which people increase their abilities and desires to satisfy their own needs and legitimate desires and those of others with what one has” (1986: 18).

On the topic of grassroots science development, Jiménez writes that “regional scientific communities, on their part, are an answer to the needs and desires of individuals in rural communities, and implement innovative forms of learning and research better suited to the social and economic conditions of the segment they serve” (2009). Indeed, the focus not only on the grassroots, but also the non-urban is more often stressed by Jiménez than by any of the other proponents of Mode 3 listed above. Indeed, this approach could potentially be applied also to indigenous knowledge for development as an alternative to ‘western’ science, though Jiménez does not seem to have followed that ethnic and/or religious pathway.

Jiménez cites as an example of a regional scientific community practicing Mode 3 the loosely-coupled Centre for Innovation and Educational Development (CIDE) in Mexico. This Centre features an interest in developing alternative (non-traditional) and often informal models of research and teaching, learning and doing science, etc. where there are few lectures, minimal or no salaries or student fees and where a kind of socialistic-socially responsible atmosphere predominates. Likewise, he has written extensively and participated directly with CEJUS – Justo Sierra Study Centre (Centro de Estudios Justo Sierra, CEJUS) in Surutato, an isolated village located in the mountains of the northwestern state of Sinaloa,” which he says “is a unique educational experience based on the same educational and human principles advocated by CIDE” (2009). These ‘institutions’ of
knowledge production, though significantly different from the universities involved above, achieve a sense of ‘doing science’ and ‘doing research’ that it is Jiménez’ goal to enhance in Mexico and globally.

The key point that Jiménez makes is that Mode 2 is not actually as socially responsible as it claims to be, which is why he thinks there needs to be a Mode 3 that is “really socially responsible” (2009). This can be seen especially in developing or emerging countries, where the scientific elite does not always ‘give back’ to the community but instead leaves out poorer, marginal or less strategically located communities in new educational opportunities. Jiménez’ approach is one of inverting hierarchies, in a way that contends “Mode 3 are bottom-up initiatives, whereas Mode 2 are top-down” (2008). What Jiménez misses, however is a balanced sociological theory wherein both individuals and societies are taken into account for educational purposes, which is what is behind the ‘ontological turn’ cited above. This makes it difficult to see how his approach to Mode 3 will have any lasting impact.

Jiménez’s view of ‘Mode 3 knowledge production’ comes from outside of the mainstream, at least in so far as Jiménez did not rely on any theorists and operates in Spanish language in a so-called developing or emerging country. Jiménez’s training in physics, systems theory, design and planning and operations research has been put to work in science and technology studies and in development of regional science communities in Latin America. Nevertheless, one gets the impression that identifying Mode 3 is deemed more as a problem-solving management tool, than as a humanitarian idea with a theoretical basis or practical reach. Jiménez’ Mode 3 has a notable absence of theory, coinciding with a preference for operational practise, unlike the educational theories above.

The purpose in distinguishing these two advocates of Mode 3 terminology from those above is not to say that they aren’t also interested in higher education theory and pedagogy as part of their vision. Rather, it is to identify that for them, Mode 3 signifies a broader discussion wherein higher education transformation and universities in particular are only one feature within a wide-ranging ‘systems’ theoretic approach to knowledge production and consumption.
**Mode 3 Definitions**

Now a brief return to a few definitions of Mode 3 and why people think Mode 3 is needed, that re-connects the narrative with the higher education discourse in the first section.

J.C. Tromp defines Mode 3 knowledge concisely as: “Knowledge concerning personal learning processes in which also moral and existential issues are addressed” (2009: 187).

B. Karpinska-Musial speaks more sceptically about Mode 3 knowledge, perhaps rightly so, saying it is knowledge that “does not imply any solutions or answers, thus producing more uncertainty” (2007). None of the authors above seem to imply a slippery slope to cynicism or scepticism, generally, but the notion of ‘uncertainty’ might suggest a legitimate element of risk about Mode 3 that was not showcased above and which could be further explored by others.

H. Kunneman cites the overall need to identify Mode 3 knowledge, bringing in the notion of human flourishing and returning to the themes of morality and ethics in the ‘post-modern’ era. He says:

“It deserves to be distinguished from mode one and mode two knowledge production, not only because its contribution is very important for the quality of practical solutions created in mode two, but also because this form of knowledge and insight is dependent on specific conditions to be able to flourish. These conditions are connected with the specific characteristics of mode three and with the changing forms of moral deliberation and existential learning emerging under postmodern cultural conditions.” (2005: 198)

My own tentative sociological definition of ‘Mode 3’ perhaps most closely echoes with this statement by H. Finn. He speaks of:

“the need for a ‘Mode 3 approach’, where more ontological and existential aspects of learning, teaching and research are taken up. To become a critical creative and educated student (or teacher) one should not only be able to hear ‘the voice of knowing’, ‘the voice of doing’ and ‘the voice of control and marketing’, that is the professional epistemological voice, the practical and technological voice and the voice of the Systems. One should indeed also hear ‘the voice of being’, that is the ontological voice”.
Though it shares several features with Barnett’s et al. definitions above, the perceived affinity may also just be because I have become somewhat of an ‘ear thinker’ in recent years, in contrast to ‘eye thinking,’ following the culture, technology and communication work of M. McLuhan. One thing that became particularly clear during my studies of Mode 3 is that I grew largely uninterested in addressing only an operational, systems thinking or management definition of ‘Mode 3 knowledge.’ Thankfully, quite a few other options are available that go right to the heart of contemporary higher education and pedagogy.

Conclusions

Multiple voices are currently speaking about Mode 3 knowledge in contrast to Modes 1 and 2. But up until now they are not always addressing the same thing (or even speaking the same language) and are not in several cases even aware of each other. This paper has attempted to bring these voices into a ‘textual’ dialogue with each other, in order to supplement a common desire to face the challenges of the new global educational landscape together. Likewise, it inquires if their voices are being heard and taken seriously in the pedagogical and higher educational studies community and how in particular Mode 3 is being put into practise.

There is a new paradigm, new model, new theory or new approach to higher education and knowledge, etc. now called ‘Mode 3.’ So what? Why does this matter? Does it mean an actual re-turn amongst educators to address existential features in higher education, where learning and teaching is not just about epistemology and techniques, but also about being and living? Does it mean strategic reforms can be implemented that will change institutions, programs, relations between learners and teachers? To address the challenges of generation ‘?’ of the E-I era, educators would therefore be called to attempt to reach out to students/learners as both persons and participants, not just as customers or clients. This resonates with a sense of involvement, belonging, participating, and making a contribution or playing a career role or roles that no governmental appeal to national job creation or market management mechanisms will satisfy. The internet (e.g. social media) is such a powerful information and communications tool that we are indeed in the midst of a higher education revolution in its midst. How can Mode 3 theory engage this revolution?
Even though we live in an era of super-complexity and uncertainty, living in risk societies of unprecedented proportions, still there must be ways to navigate the information super-highway while also promoting a sense of belonging and purpose in higher education institutions that invigorates the ‘community’ to aim above the mundane and mechanical. The term ‘alumni’ still means something for many ‘old school’ thinkers and thus a generational calibration of honour and allegiance to elders, memories and institutions appears to be an important part of the story. This may be a world where university drop-outs turn into multi-billionaire business persons, but that does not mean either those leaders discount the value of higher education as a way of learning about ourselves and each other in community and globally.

In the E-I era, knowledge extends from and to a variety of sources. It is sometimes intensive and sometimes less so. Universities are not the sole guardians of knowledge discovery, innovation and diffusion that they once were and both learners and teachers are heavily influenced outside the traditional campus classroom in more and more ways than ever. But the overall system of higher education, of learning and teaching at the tertiary level are certainly not on the brink of being made obsolete just yet. Much more can be done to update the production and consumption of knowledge, the handling and the experiencing of knowledge and academic community in the higher education realm. In my view, the introduction of discussions about Mode 3 knowledge can be a helpful tool in this endeavour.

In contrast with the views of Carayannis and Jiménez, the author’s view is that the main distinction of ‘Mode 3’ is not primarily about systems theory, management, technical control or operations research, though that doesn’t mean those approaches to Mode 3 are invalid. Politicians and civil servants undoubtedly have interest in linking science and higher education with opportunities for innovation and local, regional or national development. The main point is that Mode 3 is primarily about higher education transformation and new approaches to knowledge generation and cultivation in the post-modern era, under electronic conditions. This requires philosophical upgrading that directly confronts the ‘ontological turn,’ and ‘the voice of being’ in a person, whether teacher or learner. Technique could only ever be part of the story, so that in this sense, the two sections above could be divided into 1) the educators and 2) the technocrats.

Imagination, innovation and especially nowadays integral thinking are
just as important as techniques and instrumental knowledge. With the fragmentation of the Academy in the modern and late-modern periods, the post-modern situation requires more attention to opening new discursive space that involves techné, epistemology and phronesis. The latter notion is again being considered as something worth returning to, as applications of learning and recollections of wisdom in community help supplement basic technocratic and economistic capacities or competencies approaches. The Mode 3 platform that engages moral and ethical

Are there prospects of Mode 4 knowledge? Surely there are or eventually will be. Some scholars have already written about Mode 4 and even Mode 5 (e.g. Savin–Baden 2007), as if stopping at 3 were simply incomprehensive of the current changes happening in higher education and society today. Nevertheless, the term Mode 3 knowledge has been discussed and applied by several scholars…

There seems little to lose and much to gain by highlighting ‘vocation’ (as Wheelehan suggests). If this notion is connected with vertical-cultural rather than horizontal-economic goals of higher education and purpose, this would seem to fit most appropriately with the so-called ‘ontological turn.’ What I would add, from my non-educological work, is that this exposes a dire need to discover and explore what students and teachers mean by the term ‘intensity’ in the educational process. What makes education, learning, knowledge, living, doing, being more or less ‘intense’ and how do we calibrate the intensity as individuals and in groups? We can gain an ‘extensive’ amount of knowledge and information, using the internet, in addition to books, articles, lectures, seminars, etc. But the personal character meets with some knowledge, information or teaching and learning practices more intensively than others and we need to discover more about this active relationship. Thus, for me, teaching and learning about intensity, individually and socially is a key feature of what Mode 3 knowledge is meant to convey.

Pedagogically, for teachers an age of uncertainty means being willing to tell when you’re not sure, when you’re not the expert, when you don’t have control of the tower of information or knowledge. Sometimes teaching then means simply directing traffic, facilitating the learning process and admitting not to know the answer, but to help in the search. Access to vast knowledge and information pastures, creates a need for more shepherds in the fields, locally, regionally and globally.

This paper has given a historical overview of the emergence of Mode 3
theories to contribute to a global discussion of higher education transformation in the E-I era. It suggests an attitudinal pedagogical shift is needed regarding the upbringing and maturation of the new E-I era generations. It seeks to encourage new conversations about higher education and knowledge for living that were previously avoided or ignored, specifically regarding the inclusion of anthropology, philosophy of knowledge and sociology of science. What then are the ‘horizons’ for higher education transformation, for local, regional and global partnerships that will guide institutional reforms for development in the coming years and decades? There are perhaps more trajectories and possibilities to navigate than ever before in the history of higher education.

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Note

1 “Gibbons et al. expend so much effort on showing how ‘Mode 2’ knowledge production marks a break from the discipline-based, normal-scientific ‘Mode 1’ that they are hard-pressed to admit that Mode 1 is itself little more than an ideal type, one whose likelihood of being superseded is only matched by its unlikelihood of ever having existed.” – Steve Fuller (1995)

2 “Phronesis is most important because it is that activity by which the analytical and instrumental rationality of episteme and techne is balanced by value-rationality.” – B. Flyvbjerg (http://flyvbjerg.plan.aau.dk/whatisphronetic.php)

3 “Social scientists work alongside natural scientists, engineers, lawyers and businesspeople because the nature of the problems requires it. Social accountability permeates the whole knowledge production process. It is reflected not only in interpretation and diffusion of results but also in the definition of the problem and the setting of research priorities.” – Gibbons et al. (1994: 7)

4 http://www.arts.ac.uk/docs/Alison_Shreeve_2008.pdf (vacated)


7 “A more extreme form of Mode 3 knowledge suggests that there may not be a role at all for theorists, because they operate outside of practice. This perspective construes practice as deliberative action concerned with the making of appropriate decisions about practical problems in situ. However, we should not conclude from
this that there is no role for theory at all.” – David Scott, Andrew Brown, Ingrid
Lunt (Professional doctorates: integrating professional and academic knowledge. Open
University Press, 2004: p. 48)

8 “The Creative Force of Wonder” http://www.srhe.ac.uk/conference2010/
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WHEN EDUCATION RESEARCH MEET OTHER TOPICS
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