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Epistemic governance and epistemic innovation policy in higher education

David F. J. Campbell^{1,2*} and Elias G. Carayannis³

*Correspondence:

david.campbell@univie.ac.at;
david.campbell@aau.at;
david.campbell@uni-ak.ac.at

¹ Institute of Science
Communication and Higher
Education Research, Alpen-
Adria-University Klagenfurt,
Vienna, Austria

Full list of author information
is available at the end of the
article

Abstract

Epistemic governance and epistemic innovation policy formulate a critique against too-narrowly defined approaches to governance, where governance follows one-sidedly bureaucratic or technocratic considerations. Instead, epistemic governance (also quality management and quality enhancement) and epistemic innovation policy should be regarded as a plea for a more comprehensive understanding, where the explicit-making, comprehension and reflection of knowledge, knowledge production, and knowledge application are keys for a successful governing and governance. For the further progress of advanced knowledge society, advanced knowledge economy, and advanced knowledge democracy, universities and the higher education sectors are crucial for driving development. How should the governance of higher education, the quality enhancement of universities, and the careers of academic faculty (the academic profession) be organized? Epistemic governance introduces here a novel approach and understanding. Epistemic governance emphasizes that the underlying epistemic structure, the underlying epistemic base, or the underlying epistemic paradigms (knowledge paradigms) of those organizations, institutions, or systems (sectors), which should be governed, are being addressed. This defines a benchmark and set of criteria for internal and external governance in higher education that is interested in applying a good, effective, and sustainable governance. Quality assurance, quality enhancement, and quality management of higher education, from the perspective of epistemic governance, should also orient themselves to quality and quality dimensions that cross-refer to the underlying epistemic structure of higher education. In a traditional understanding, the academic career patterns of the academic core faculty at universities follow a tenure-track logic. Cross-employment (multi-employment), on the contrary, refers to academic faculty (the academic profession) with simultaneous employment contracts to more than one organization only within or both inside and outside of higher education. Epistemic governance, in combination with crossemployment, should add to the organizational flexibility and creativity of universities and other higher education institutions, supporting the integration of a pluralism and diversity of knowledge production (basic research in the context of knowledge application and innovation), the formation of nonlinear innovation networks, and providing a rationale for a new type of academic career model.

Keywords: Cross-employment, Epistemic governance, Epistemic innovation policy, Higher education, Innovation, Knowledge paradigms, Linear innovation, Mode 1 and Mode 2 knowledge production system, Mode 3 knowledge production system, Non-linear innovation, Quadruple Helix innovation systems, Quality, Quality enhancement, Quintuple Helix innovation systems

Background

The concept of epistemic governance is based on the understanding that the underlying epistemic structure, the underlying epistemic base, and the underlying epistemic paradigms of those organizations, institutions, or systems (sectors) are being addressed, which should be governed. In context of higher education, governance can refer not only to internal governance within a university (higher education institution) or within the higher education system, but also to external governance, for example governance measures of a government for universities. A more detailed definition of epistemic governance would stress: “Epistemic’ governance of and in higher education therefore requires that the underlying epistemic structure of higher education and, more particularly, also the underlying paradigms of the produced knowledge are being addressed. Epistemic governance refers directly to the underlying ‘knowledge paradigms’ of higher education that carry and drive higher education” (Campbell and Carayannis 2013a, p. 27). Here, in this definition, the focus is placed on “epistemic” in the context of “epistemic governance.” Consequently, one important implication therefore is: “good, sustainable and effective (external and/or internal) governance of organizations, institutions or systems (sectors) is in the long run only possible, when the underlying epistemic structure, the underlying epistemic base or the underlying epistemic paradigms” are indicated (Campbell and Carayannis 2013a, p. 27). The epistemic structure reveals also, what the self-rationale of an organization or a system is. Alternative definitions of epistemic governance may lean more toward the aspect of governance within the context of epistemic governance: “In this context the conceptual framework of ‘epistemic governance’ aims to address the power relations in the modes of creating, structuring, and coordinating knowledge on socio-ecological issues. ... Finally, the production and use of knowledge is seen to be linked to questions of relational, structural, and soft power, and to the relationship between science and policy” (Vadrot 2011, p. 50). Vadrot (2011) introduced the concept of epistemic governance to academic debate in reference to social ecology. Campbell and Carayannis (2013a) were the first to apply the concept of epistemic governance to higher education.

The conceptual definition of epistemic governance and of epistemic innovation policy

Is it possible that there is an organization, institution, or system, without an underlying epistemic structure? This may (or may not) be true for some organizations or institutions; however, for a whole system or sector this appears to be unlikely and improbable. Particularly in the case of universities, higher education institutions, and higher education systems, it is evident that these rely, operate and behave on the basis of an underlying epistemic structure. “Knowledge paradigms” refer to the conceptual understanding of knowledge production (research) and knowledge application (innovation) in the higher education system (universities) or the economy (firms). For describing and explaining, how knowledge production is functioning within the higher education sector or a university-type system, the concepts of “Mode 1” and “Mode 2” of knowledge production were introduced more recently (Gibbons et al. 1994; see also Nowotny et al. 2001, 2003, 2006). University research in a traditional understanding of Mode 1 concentrates on basic research, mostly organized within the matrix of academic disciplines,

and not formulating a particular interest for the practical use of knowledge and innovation. Mode 1 is being challenged by Mode 2. Mode 2 expresses a greater interest for knowledge application and a knowledge-based problem-solving by referring to the following principles: “knowledge produced in the context of application”; “transdisciplinarity”; “heterogeneity and organizational diversity”; “social accountability and reflexivity”; and “quality control” (Gibbons et al. 1994, pp. 3–8, 167). Success and quality are being approached and defined differently in the analytical architecture of Mode 1 and the Mode 2. For Mode 1, the answer is: “academic excellence, which is a comprehensive explanation of the world (and of society) on the basis of ‘basic principles’ or ‘first principles,’ as is being judged by knowledge producer communities (academic communities structured according to a disciplinary framed peer review system).” For Mode 2, success and quality are: a “problem-solving, which is a useful (efficient, effective) problem-solving for the world (and for society), as is being judged by knowledge producer and knowledge user communities” (Campbell and Carayannis 2013a, p. 32). Mode 3 knowledge production represents the conceptual and organizational attempt of trying to combine Mode 1 with Mode 2 (Carayannis and Campbell, 2006, 2009, 2012). A Mode 3 university, higher education institution, or higher education system is a type of organization or system that explores ways and approaches of integrating different principles of knowledge production and knowledge application (such as Mode 1 and Mode 2), thus not only promoting diversity and heterogeneity, but also creating creative and innovative organizational contexts for research, teaching (education) and innovation. Therefore, Mode 1, Mode 2, and Mode 3 qualify as examples for “knowledge paradigms” in higher education.

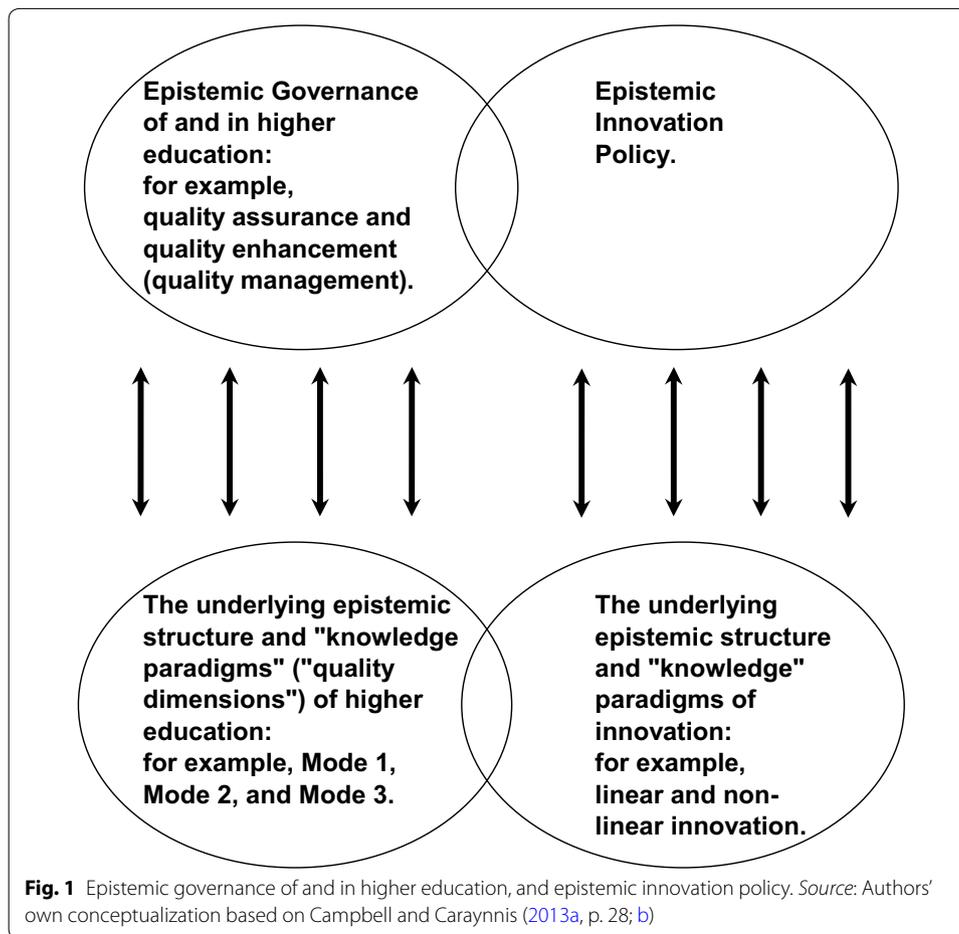
Quality management (QM) within universities or other higher education institutions refers not only to quality assurance, but increasingly also to quality enhancement. Advances in the quality of a university and support of university development represent objectives of QM. Therefore, also QM should be designed, implemented, processed, and developed in accordance with the principles of epistemic governance: “This emphasizes our understanding that all forms of comprehensive and sustainable QM in higher education must also refer to the underlying epistemic structure of higher education (at least implicitly)” (Campbell and Carayannis 2013a, p. 27). For example, it makes a difference, whether a university or university unit operates according to Mode 1 or Mode 2 or a combination of both in Mode 3. This must be reflected by the specifically applied approaches in governance and QM. For that purpose, it appears also to be necessary, to connect and to link the underlying epistemic structure and the knowledge paradigms to concrete “quality dimensions,” so that governance and QM can refer to knowledge paradigms as well as quality dimensions. Possible quality dimensions are quality, efficiency, relevance, viability (sustainability), and effectiveness (Campbell 2003, p. 111; Campbell and Carayannis 2013a, p. 52). When knowledge paradigms are being translated into quality dimensions, this may make it then for governance and QM easier, to address epistemic issues in relation not only to knowledge production, but also knowledge application. According to Ferlie et al. (2008, 2009), there exist currently two main narratives of and for governance in higher education: New Public Management (NPM) governance and network governance. While NPM already appears to be more conventionally established, network governance represents a more radical frontier for contemporary

governance, with not so clear implications, fostering perhaps a demand for creating also new types of organizational manifestation in higher education. “Cross-employment” (Campbell 2011; Campbell and Carayannis 2013a) may serve here as one possible example, where one and the same person is being simultaneously employed by more than one organization (by at least two organizations), either within higher education or trans-sectorally connecting higher education with organizations outside of higher education. Cross-employment qualifies as a form of multi-employment.

Ramifications of epistemic governance should also be thought-about in a wider context. Principles of epistemic governance apply to innovation and innovation policy as well, and the concept of “epistemic innovation policy.” Innovation policy should address the underlying epistemic structure and knowledge paradigms of the innovation and type of innovation to be governed. Two examples for knowledge paradigms in context of innovation are linear innovation and non-linear innovation. The more traditional model of linear innovation is being frequently referred to the concepts of Bush (1945). The core understanding here is that the linear model of innovation underscores that first there is basic research in a university context. Gradually and step-by-step, this university research diffuses out into society and the economy. Firms and the economy as a whole pick up these lines of university research, and develop them further into knowledge application and innovation, with the goal and interest of creating economic and commercial success and success stories in markets outside of higher education. Within the model of linear innovation, there operates a sequential first-then relationship between basic research (knowledge production) and innovation (knowledge application). Non-linear innovation follows a different logic (Campbell and Carayannis 2012). The model of non-linear innovation expresses an interest in drawing more direct connections between knowledge production and knowledge application. Here, basic research and innovation are being coupled together not in a first-then, but within the structural design of an “as well as” and “parallel” (parallelized) relationship (Campbell and Carayannis 2012). Networks for non-linear innovation operate differently than networks of linear innovation, but may overlap substantially. Examples for non-linear innovation are either firms or other types of organizations operating across a variety or ensemble of technology life cycles with differing degrees of technology maturity on the one hand, or specific constellations of cross-employment on the other hand, where persons work (at the same time) concurrently at organizations, where in one case the organization (organizational unit) focuses on knowledge production, but in the other case on knowledge application. Non-linear innovation also cross-connects to Mode 3 knowledge production. One key interest of Mode 3 is to encourage and to promote “basic research in the context of application” (Campbell and Carayannis 2013a, b, p. 34). Furthermore, also Mode 2 appears to be compatible with a more non-linear logic of innovation (see Fig. 1).

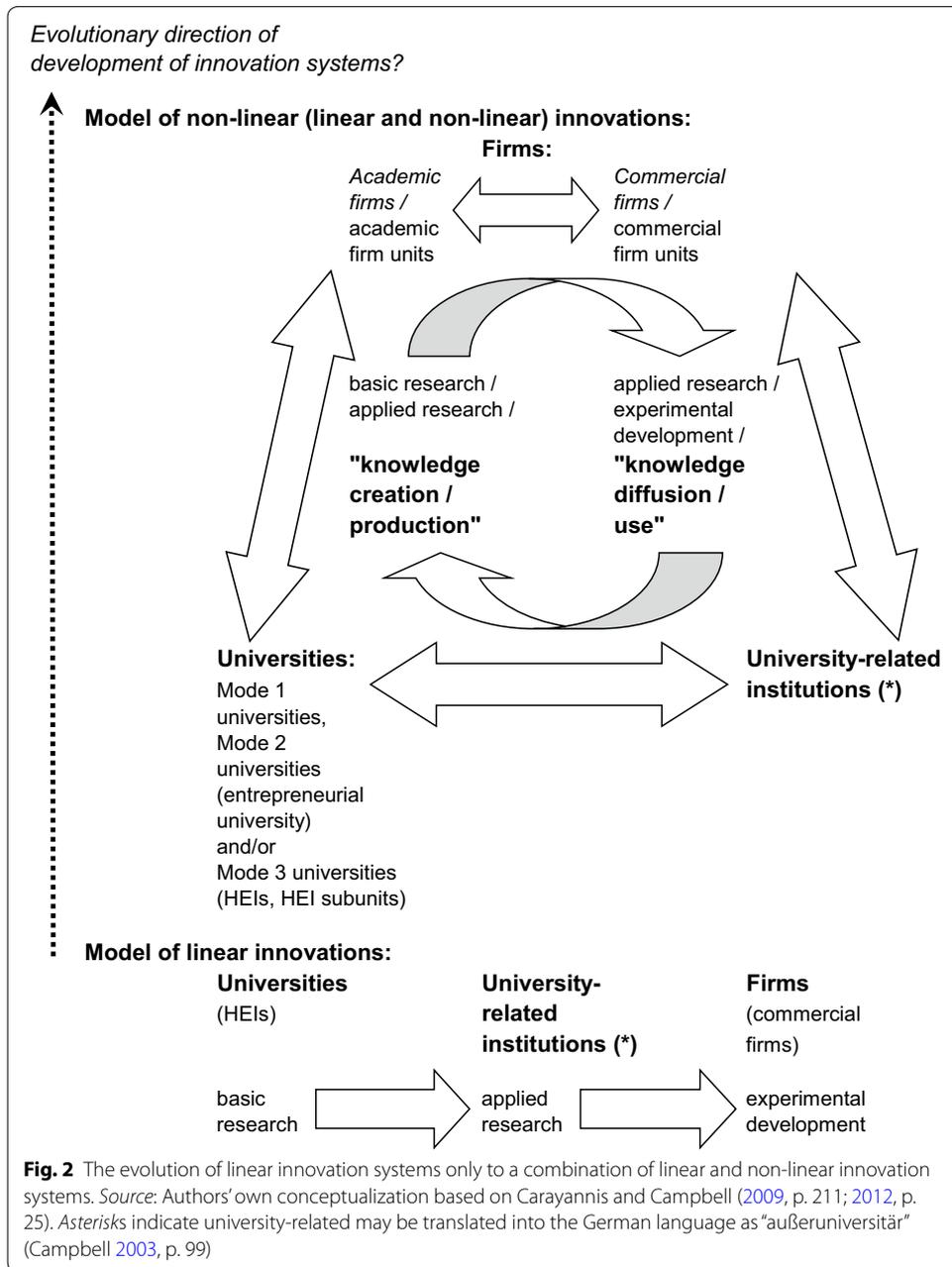
Results and discussion

In the following, we want to review some of the dominant paradigms of knowledge and knowledge production in the higher education sector that currently exist or co-exist (see Fig. 2 for a conceptual summary in visualization):



1. *Linear and non-linear models of innovation, the Triple Helix, Quadruple Helix and Quintuple Helix model of innovation, and the Creative Knowledge Environments* The linear model of innovation is being conventionally ascribed to Vannevar Bush, as for example is being asserted by Narin et al. (1997, p. 318), even though Bush himself, in his famous report *Science: The Endless Frontier*, even never mentioned the word "innovation"¹ (Bush 1945). It could be argued, however, that Bush (1945) referred to innovation implicitly. What does the concept of linear innovation mean and imply? Referring to research, the implications are as follows: universities and the higher education sector, in general, focus on basic research that is mostly publicly financed. Gradually, from the higher education sector outward and in some "laissez-faire" fashion, university basic research diffuses out into society and the economy. Finally, the economy and different business firms pick up some of these basic research lines and convert them into applied research and experimental development, out of an interest to create commercial products and services that can be marketed and sold with profit. Applied research and even more so experimental development, therefore, are

¹ This observation can be verified easily by a word retrieval command of the indicated (electronic) document. In a modern policy context, it probably would be unthinkable that such a comprehensive and important macro-level strategy paper has no explicit references to innovation. We see here, to which extent the word and term of "innovation" already has diffused out into our every-day professional language during the course of the last half century. But this certainly was not the case before or earlier in the twentieth century.



being carried out in the business enterprise sector and are being mostly privately financed (in less mature industries and less advanced economies, the public financing may be more important). There operates a *first-then sequential order* from basic research to applied research and then to experimental development. Non-linear models of innovation, on the contrary, are also inclined to focus on "parallel" effects or the simultaneous engagement of universities and firms in basic research as well as applied research and experimental development: "In contrast to the linear model, the paralleling of basic research, applied research and experimental development demands that the different R&D activities should be considered, to phrase it in a challenging language, as 'parallel processes'" (Campbell and Güttel 2005, p. 167; see

also Campbell 2000). At the organizational or institutional micro-level (meso-level) distinct linear-innovation-lines still may operate. However, at the meso-level or macro-level, the organization or institution has opportunities of participating in different linear-innovation-lines at different stages. *What results is that universities and firms carry out and perform basic research, applied research and experimental development at the same time, R&D is being and becoming paralleled. The sequential first-then relationship is transformed into a “first–first” relationship.* One key challenge focuses now on setting up research designs, where there is a cross-learning and cross-fertilization between different linear-innovation-lines or research-lines. *We may experience here an overlapping of liner and non-linear innovation, generating, all together, a system of non-linear innovation* (compare also with Carayannis and Campbell 2012, p. 25). When universities engage in applied research and firms in basic research, this creates opportunities (but also needs) for more hybrid and network-based linkages between universities and firms but perhaps also between universities and other organizations: university-related institutions, but also the “media-based and culture-based public” and “civil society” in Quadruple Helix innovation arrangements (Carayannis and Campbell 2009, p. 207; 2011, pp. 13–14; 2012, pp. 13–14).² The Quintuple Helix, ultimately, integrates the “environment or the natural environments” into the overall architecture of innovation systems (Carayannis and Campbell 2010, pp. 61–62). “The Quintuple Helix finally embeds the Quadruple Helix (and the Triple Helix) in context of the environment or the natural environments” (Carayannis and Campbell 2010, pp. 61–62).³ The university–industry–government relations of the Triple Helix model of knowledge production and innovation addresses such interactions and interferences, by speaking in this context of “tri-lateral networks and hybrid organizations” (Etzkowitz and Leydesdorff 2000, p. 111). Not only universities increasingly could (should) learn business management skills and competences, but also firms could (should) open themselves for the academic world. This creates niches and opportunities for the “Entrepreneurial University” (Etzkowitz 2003) and the “Academic Firm” (Campbell and Güttel 2005, pp. 170–172). Academic firms and commercial firms may co-exist and co-evolve. While the concept of the commercial firm focuses on profit and profit maximization, *the concept of the academic firm is interested in developing social environments that foster academic (academic-style) knowledge creation and creative knowledge production* that are not dissimilar to university contexts, for example, also engaging some of their knowledge work efforts in publishing activities and academic publications (Carayannis and Campbell 2009, pp. 211–212). An academic firm may be a whole firm; a subunit, subdivision or branch of a “commercial” firm; or represent certain “characteristics” of a whole (commercial) firm such as supporting continuing education, life-long learning, and partial absence (leave, sabbaticals) of employees or allowing split “cross-employment” (Campbell 2011) of their employees with other organizations, most notably academic institu-

² See also: Danilda et al. (2009).

³ “The Quintuple Helix model is interdisciplinary and transdisciplinary at the same time: the complexity of the five-helix structure implies that a full analytical understanding of all helices requires the continuous involvement of the whole disciplinary spectrum, ranging from the natural sciences (because of the natural environment) to the social sciences and humanities (because of society, democracy and the economy). The Quintuple Helix also is transdisciplinary, since it can be used as a frame of reference for decision-making in connection to knowledge, innovation and the (natural) environment” (Carayannis and Campbell 2011, p. 62). See, furthermore, Campbell and Campbell (2011, pp. 15–16, 23–27).

tions (higher education institutions) (Carayannis and Campbell 2012, pp. 24–28). Universities (entrepreneurial universities) and firms (academic firms), of course, can not and should not coincide completely; there still must operate some distinct differences. These manifold mutual hybrid overlappings and networks of knowledge and innovation, in which universities, entrepreneurial universities, commercial and academic firms interplay should also foster developing and creating “Creative Knowledge Environments” (CKEs) that are defined as (Hemlin et al. 2004, p. 1): “CKEs are those environments, contexts and surroundings the characteristics of which are such that they exert a positive influence on human beings engaged in creative work aiming to produce new knowledge or innovations, whether they work individually or in teams, within a single organization or in collaboration with others.”

2. *Mode 1 and Mode 2 of knowledge production* Gibbons et al. (1994) focus on analyzing key principles of knowledge, of knowledge that roots in knowledge production⁴ in higher education (universities) and then diffuses out into society and the economy. Their conceptual starting point is the “Mode 1” production of knowledge, referring to (mid-term or long-term) basic university research that expresses no major interests in innovation and knowledge application and which is structured and organized according to a disciplinary logic (see Gibbons et al., 1994, pp. 1, 3, 8, 24, 33–34, 43–44, 167). Mode 1 is being challenged by the new “Mode 2” of knowledge production that is being driven by the following principles: (1) “knowledge produced in the context of application”; (2) “transdisciplinarity”; (3) “heterogeneity and organizational diversity”; (4) “social accountability and reflexivity”; and (5) “quality control” (Gibbons et al. 1994, 3–8, 167). Mode 2 grew out of Mode 1, and Mode 2 co-evolves with Mode 1 (Gibbons et al. 1994, pp. 14, 17). Mode 1 coincides with a traditional understanding or picture of universities and of university research, whereas Mode 2 focuses more on the integration of knowledge production of the universities into and with the knowledge production of society and of the economy. Mode 2 university research is directed toward problem-solving, thus emphasizing the applicability and usability of university-created knowledge for the needs of society and of the economy. Implications of Mode 2 are that the whole spectrum of basic research, applied research and experimental development are being reframed into a context of application.⁵ There occurs to be an increasing overlapping of “discovery,” on the one hand, and the “application” and “fabrication” of knowledge on the other (also experimentation and simulation). By applying knowledge, also new knowledge is being discovered. Epistemic implications may be that (at least partially) knowledge-application is necessary for further enhancing basic research, in the sense of some overlapping of linear and non-linear innovation modes. Application feeds back, also into basic research, thus supporting the further development and creation of theories. Application is also important for “continuous innovation” (on Mode 1 and Mode 2, see furthermore: Nowotny et al. 2001, 2003, 2006; Scott 2009; Campbell 2006, pp. 71–73,

⁴ One may formulate the proposition that the term “knowledge production” in Gibbons et al. (1994) already incorporates the whole spectrum of “knowledge production” and “knowledge creation.” An attempted distinction could emphasize that in context of higher education, knowledge creation is more basic or fundamental than knowledge production. However, throughout the whole text here, the terms of knowledge creation and knowledge production are being used in an interchangeable way and manner.

⁵ This emphasis on application, however, certainly does not imply that basic research becomes replaced by applied research. This would be a misperception or wrong interpretation (Gibbons et al. 1994, pp. 4, 33–34).

91–92; Carayannis and Campbell 2010, pp. 48–52). For Mode 1 knowledge as well as Mode 2 knowledge the quality, of course, is key. However, quality is being differently defined in these two domains. Quality according to “Mode 1” is: *academic excellence, which is a comprehensive explanation of the world (and of society) on the basis of “basic principles” or “first principles”, as is being judged by knowledge producer communities (academic communities structured according to a disciplinary framed peer review system)*. Quality according to “Mode 2” is: *problem-solving, which is a useful (efficient, effective) problem-solving for the world (and for society), as is being judged by knowledge producer and knowledge user communities*. Mode 1 and Mode 2 certainly qualify to be interpreted as “knowledge paradigms” that underlie higher education (on paradigms, see also Kuhn 1962).

3. *Mode 3 knowledge and Mode 3 universities (higher education systems)* Mode 3, as a concept (and as a metaphor), emphasizes that there can exist and co-exist very different types of knowledge and also very different paradigms of knowledge. Innovation represents applied knowledge. Mode 3 stresses also the importance of this co-existence and co-evolution of different knowledge and innovation modes and paradigms. “Mode 3’ allows and emphasizes the co-existence and co-evolution of different knowledge and innovation paradigms. In fact, a key hypothesis is: *The competitiveness and superiority of a knowledge system is highly determined by its adaptive capacity to combine and integrate different knowledge and innovation modes via co-evolution, co-specialization and co-opetition knowledge stock and flow dynamics (for example, Mode 1, Mode 2, Triple Helix, linear and non-linear innovation)*” (Carayannis and Campbell 2009, p. 223). This pluralistic structure and design of Mode 3 indicates potentials of congruence between Mode 3 and democracy. “Pluralism of knowledge modes” and “Democracy of Knowledge” interrelate (Carayannis and Campbell 2009, pp. 208, 224). This makes plausible why also advanced Mode 3 knowledge and knowledge-based democracies and knowledge democracies interrelate. Therefore, one can assert and claim a co-evolution of knowledge societies, knowledge economies, and knowledge democracies (Carayannis and Campbell 2010, pp. 52–58). “Mode 3 claims a certain congruence of structures and processes of advanced knowledge and advanced democracy” (Carayannis and Campbell 2010, p. 52). *As a Mode 3 higher education system (higher education sector) qualifies a higher education system that operates simultaneously according to different paradigms (and types) of knowledge and innovation. A Mode 3 higher education system perceives and assesses such a pluralism, co-existence and co-evolution of different paradigms (and types) of knowledge and of innovation also as positive and as necessary for advancing higher education, the society and economy (and democracy) in the “age of knowledge.”* Epistemic governance, externally and internally, is directed toward the different knowledge paradigms that underlie higher education. One implication is that in Mode 3 higher education the Mode 1 and Mode 2 (Mode 1 and Mode 2 knowledge production) co-exist and may be coupled in creative organizational designs, perhaps based on networks or network-style arrangements. Such a coupling of and in Mode 1 and Mode 2 may also create a sustainable surplus and other synergies in knowledge creation and knowledge production of the higher education sector, so necessary for knowledge societies and knowledge economies, also featuring the “creativity economy” (Dubina

et al. 2012). One may even set up the proposition for discussion that de facto all higher education systems in advanced societies are Mode 3. However, an “advanced Mode 3 higher education system” would make this also explicit, emphasizing that this pluralism, co-existence and co-evolution of knowledge paradigms is being acknowledged and is being valued positively. A Mode 3 higher education system enables and favors very different combinations of different types and paradigms of knowledge and knowledge production. *Higher education institutions can be organized according to Mode 1, Mode 2 (the “entrepreneurial university”) or Mode 3, then implying that higher education institutions are interested in covering Mode 1 and Mode 2, allowing both to exist explicitly but also setting up creative Mode 3 designs of a cross-referencing that should create a surplus in high-quality knowledge production.* For example, Mode 1, Mode 2, and Mode 3 can exist at the level of the whole university or at specific sub-levels, such as faculties (schools) or university departments. From an organizational developmental perspective, a whole spectrum of various strategies, options, or profiles opens up for universities and the university sub-units. Nothing should be precluded, *in fact we could imagine a co-existence and co-evolution of Mode 1 universities, Mode 2 universities (entrepreneurial universities) and Mode 3 universities and of Mode 1, Mode 2 and Mode 3 university sub-units.* This hybrid and creative overlapping of Mode 1 (linear innovation), Mode 2 (entrepreneurial university), and Mode 3 (non-linear innovation) universities and university sub-units additionally offers opportunities for implementing and promoting “CKEs” (Hemlin et al. 2004). Creativity is essential for producing new knowledge in higher education: “That line of thinking emphasizes to interpret new knowledge as a creative knowledge. Or to rephrase: new knowledge qualifies as a potential candidate for a creative knowledge. ...Without creativity, the knowledge input for the innovation process might face serious constraints” (Carayannis and Campbell 2010, pp. 47–48). In several contexts, networks can offer representing the dominant organizational approach of linking together and combining Mode 1, Mode 2, and Mode 3 knowledge production. *At the aggregated level of the whole national innovation system, a hybrid dynamics of a knowledge co-evolution of Mode 1, Mode 2 and Mode 3 universities and university sub-units, on the one hand, and of commercial and academic firms and firm sub-units, on the other, may unfold and drive further the next-step advancements of knowledge societies, knowledge economies, and knowledge democracies. This may also refer to other levels (sub-national, supranational, transnational) of the architecture of multi-level innovation systems* (Carayannis and Campbell 2012, pp. 32–35). To a certain extent, this “Mode 3 University” can be understood as the epistemic concept as well as the organizational developmental concept, how to make possible and to foster a combination and co-evolution of Mode 1 and Mode 2 knowledge production in university context. If true, this co-evolution would generate and create a crucial knowledge production surplus. Mode 1 knowledge production distinguishes between basic research and applied research. The Mode 3 emphasis (*shift of emphasis*) in knowledge production may be to focus, instead, more on “basic research in the context of application.” Mode 3 also encourages interdisciplinarity⁶

⁶ On a further discussion of interdisciplinarity (“Interdisziplinarität”), see also Arnold (2009, pp. 65–97).

and transdisciplinarity. In a short-cut, *transdisciplinarity may be defined as the application of interdisciplinarity* (transdisciplinarity = application of interdisciplinarity?).

The Mode 3 inclination for a basic research in context of application highlights a possible route of further development for transdisciplinarity (and interdisciplinarity).⁷

4. *Academic faculty (academic profession), academic “cross-employment” and academic “cross-careers” inside and outside of higher education* In the world of Mode 1 universities or Mode 1 university sub-units, at least in conceptual terms, status and the career schemes of the academic faculty (or of the academic profession) at higher education institutions appear to be clearer and more evident. There is a “core faculty,” interested in achieving tenure, and dominating the top-hierarchy positions at the university. Anyone who is not core faculty and wants to stay within the university, tries to become a member of the core faculty. Knowledge production (university research, basic university research) of Mode 1 is directed toward “academic excellence,” as is being verified (or falsified) by peers in peer review against the background and logic of the academic disciplines. Academic excellence, in Mode 1, coincides to a large extent with assessment results of a disciplinary-based peer review. The linear-innovation-tendency of Mode 1 also implies that either you work within the university or you work outside of the university, then for a firm or a different organization in society. Research (R&D) or other forms of knowledge production, which are university-based and firm-based, are linked together more in a first-then relationship. One career pattern in Mode 1, therefore, may be: an academic researcher starts working at a university, leaves for a firm, and later may be interested in re-entering the university. The world of Mode 2 universities is already more complicated. In Mode 2, quality is directed toward an efficient and/or effective problem-solving. The problem-solving is being evaluated by communities of knowledge producers as well as knowledge users. Thus, the spectrum of potential peers in Mode 2 enlarges itself dramatically. Disciplinary-based peer review loses in Mode 2 its primary gate-keeping function. However, at the same time, defining criteria for quality or a quality-based selection of peers (coming from the knowledge producer and/or knowledge user side) may turn into an equally tricky proposition for Mode 2. *While Mode 2 knowledge is just as important as Mode 1 knowledge*, we might experience in higher education that the core faculty is being dominated by the Mode 1 knowledge paradigm, and that Mode 2 knowledge paradigms are being pushed outward to the context of the non-core faculty. In higher education operates a potential mismatch between Mode 1 and Mode 2, to the disadvantage of Mode 2, even though for innovation it is so crucially important that higher education covers and integrates the comprehensive spectrum of knowledge production of Mode 1 and Mode 2. The Mode 3 knowledge paradigm, on the contrary, emphasizes that higher education institutions should reflect consciously on whether developing a Mode 1 or Mode 2 profile (portfolio), or Mode 1 and Mode 2, and what opportunities there exist for creatively combining Mode 1 and Mode 2. Mode 3 not only challenges universities, but also liberates universities from a possible Mode 1 and Mode 2 deadlock, *encour-*

⁷ For interesting, creative and innovative examples of integrating and analytically combining research in fields and disciplines of the social sciences and natural sciences, see furthermore: Gottweis (1998), Hindmarsh and Prainsack (2010), Prainsack and Wolinsky (2010).

aging and highlighting novel routes of quality enhancement for further development. Implications may be manifold: (a) the same academic (core) faculty could be partially Mode 1 and Mode 2-based; (b) the non-linear innovation momentum of Mode 3 suggests that academic workers should not necessarily engage first in basic university research and later in applied firm research, but may do both at the same time. For this second option, we propose the term and concept of “cross-employment” or multi-employment (Campbell 2011). *Implications of this are that knowledge producers and R&D workers are being simultaneously employed by more than one organization or institution.* Several forms and variations of cross-employment are thinkable and reasonable. Cross-employment can stretch (in network-style arrangements) across different higher education institutions or can link universities with non-universities, i.e., organizations outside of higher education (for example, firms or organizations of the civil society).⁸ Cross-employment should foster the creativity of and in knowledge production and knowledge creation. The cross-employed academic profession or cross-employed academic faculty involves itself and engages in a much broader spectrum of knowledge production, possibly integrating Mode 1 and Mode 2 knowledge and knowledge skills. *In a university, operating under Mode 3, the same academic faculty member could be based in parallel on different academic employment contracts that interplay.* This overlapping of employment contracts could help making the boundaries between core and non-core faculty more flexible, more open and fairer. *Cross-employment enables the academic faculty and academic profession to engage in in-parallel “cross-careers” inside and outside of higher education at one-and-the-same time.* The same knowledge-producing person can follow career tracks at two different universities or at a university and a non-university organization. Cross-careers and cross-employment support the formation of (hybrid) networks between organizations and contribute to the networking capabilities and capacities of organizations. *Cross-employment facilitates and sustains non-linear innovation.* This should add crucially to the dynamics of “self-organizing, cross-overlapping networks” (see Fig. 2). *Cross-employment and cross-careers, in cross-connection to Mode 1, Mode 2, and Mode 3, certainly identify potential objectives for epistemic governance.* In final implication, cross-employment represents a role model of equal importance for academic (university) careers, when compared with the academic career model of tenure-track. *Therefore, cross-employment is a role model for academic careers (inside and outside of higher education), on par with tenure-track.* This we want to recognize as a proposition for further discussion.⁹

Conclusion

Epistemic governance and epistemic innovation policy formulate a critique against too-narrowly defined approaches to governance, where governance follows one-sidedly bureaucratic or technocratic considerations. Instead, epistemic governance (also QM

⁸ Civil society represents explicitly one reference for the Quadruple Helix innovation system, by this also co-constituting the Quadruple Helix (Carayannis and Campbell 2009, p. 207; 2011; 2012, pp. 13–14).

⁹ In pragmatic terms, of course, the empirical trend still would have to be verified: “It remains to be seen, whether cross-employment has the capability to establish itself as an additional and positively defined role model for academic careers in higher education, in parallel to the already existing role mode of tenure-track (tenure)” (Carayannis and Campbell 2012, p. 26).

and quality enhancement) and epistemic innovation policy should be regarded as a plea for a more comprehensive understanding, where the explicit-making, comprehension and reflection of knowledge, knowledge production, and knowledge application are keys for a successful governing and governance. In that respect, epistemic governance speaks and argues also in favor for the practical feasibility of a “Philosophy of Governance.” Epistemic governance, as a concept and as a practice, qualifies as a novel form of governance, representing a new and innovative frontier and frontier line of and for governance, with a hybrid overlapping to other concepts and measures such as network governance, cross-employment, and epistemic innovation policy (see Fig. 3 for the core model of epistemic governance of and in higher education). There is also a governance of innovation and innovation policy, so the cross-connections between epistemic governance and epistemic innovation policy demand further elaboration and a more advanced fine-tuning for practical purposes. In conceptual terms, epistemic governance and epistemic innovation policy still require to be broadened and expanded. For example, also universities of the arts are being regarded as institutions that contribute considerably to national and multi-level innovation systems (Carayannis and Campbell 2012, pp. 14–17). From that universities-of-arts-based input, important inter-disciplinary and trans-disciplinary impulses ought to be expected. The specific and potential roles of arts universities and artistic research, also in connection to their governance and epistemic governance, are to be further developed. The same applies to cross-connections between artistic research, artistic innovation, and epistemic innovation policy.

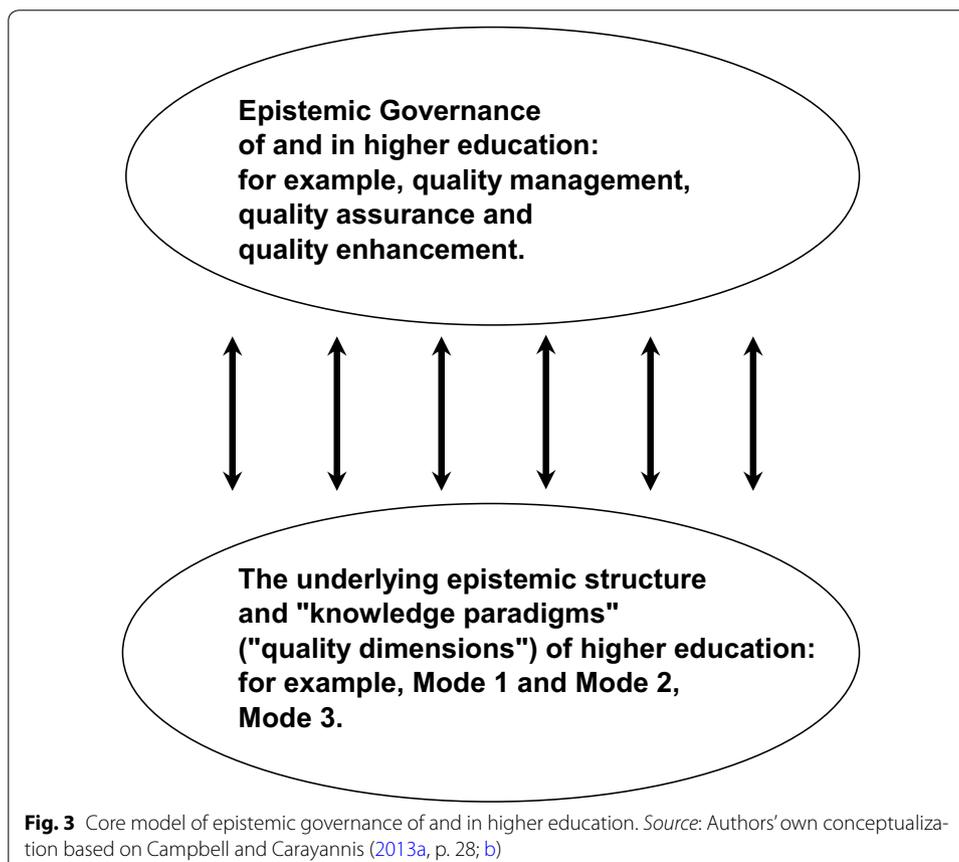


Fig. 3 Core model of epistemic governance of and in higher education. *Source:* Authors' own conceptualization based on Campbell and Carayannis (2013a, p. 28; b)

Methods

The article follows the attempt and logic of reconstructing (by this designing) key elements of the current discourses on innovation and knowledge. For that purpose, also writing skills based on “Mode 3 writing techniques” were utilized (Carayannis and Campbell 2006).

Authors' contributions

DFJC and EGC are the authors and conceptual architects of the article, and contributed in equal shares. The metaphor for this therefore is CC (“creative couple”). Both authors read and approved the final manuscript.

Author details

¹ Institute of Science Communication and Higher Education Research, Alpen-Adria-University Klagenfurt, Vienna, Austria.

² University of Applied Arts, Vienna, Austria. ³ Department of Information Systems and Technology Management, School of Business, The George Washington University, Washington, DC, USA.

Competing interests

Both authors declare that they have no competing interests.

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