Article

New Trading Zones in Contemporary Universities

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Abstract

This article aims to distinguish and depict the features of communications and collaborations in contemporary universities through the concept of trading zones. The author also considers the role that the idea of a digital university might play in shaping interactions in transforming local context where different actors can find a common ground of exchange. The new contexts, including the pragmatic orientation of contemporary society and new technologies and environments, contribute to reconsidering the idea of the classical university, in which interactions between professors and students have outstepped customary collaborations in laboratories, as well as the idea of education and research integration. This article focuses on distinguishing new forms of interactions, boundary practices, and environments, which are suggested by today's universities. Proceeding from them, the author argues that new concepts of the university, such as the digital university, and renovated campuses—to some extent—contribute to the adaptation of a renewed idea of Humboldt's Bildung.

Keywords

trading zone, Humboldtian university, digital university, boundary environment, boundary practice

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1. Trading Zones in Science and Education

1.1. The Concept of Trading Zone

The notion of trading zones was first introduced into studies of collaborative research efforts between heterogeneous communities by Peter Galison (1997, 1999). Galison studied how groups of physicists collaborated, despite differences in purposes, norms, understandings, and meanings, without coming to global understandings of these issues. A defining characteristic of trading zones is the problem of communication between communities (Collins, Evans, and Gorman 2007). What is striking in Galison's use of the term is how stability and common understanding of exchanged objects is not viewed as a necessity for collaborative efforts. As described by Kellogg, Orlikowski, and Yates (2006, 39), the absence of shared understanding implies a performative view of exchange between communities:

> Engaging in a trading zone suggests that diverse groups can interact across boundaries by agreeing on the general procedures of exchange even while they may have different local interpretations of the objects being exchanged, and may even disagree on the intent and meaning of the exchange itself.

It is important to acknowledge that trading zones may emerge in fully voluntary conditions, but also in quite coerced conditions, where certain parties dominate and the other parties are more or less forced to collaborate in exchange. In their 2007 paper, Collins, Evans, and Gorman (2007) presented a model through which trading zones can evolve, defined by the parameters of homogeneity, heterogeneity, collaboration, and coercion. The vertical axis demonstrates the extent of enforcement of trade, while the horizontal axis shows variation as to whether or not a new homogeneous culture evolves. Relying on these parameters, the model suggests four different ideal types of trading zones: interlanguage, fractioned, subversive, and enforced.

Both Galison and Collins' approaches have begun to frequently act as a theoretical framework, including the idea of trading zone evolution (see, for example, Jenkins 2010). In my study, I will attempt to adapt the concept for a contemporary university context, particularly for a few situations of how interactions and collaborations occur between university teaching and research staff (TRS) and students. The participating parties in my case to some extent include administrative and service staff (AdSS), though merely as facilitators in building fruitful trading zones, rather than major actors. As a substantial element of today's higher education, digital practices will be also considered, along with the university campus as a space which might either beneficially contribute to an evolution of university–students trading zones,

remain not especially trading zone friendly, or even discourage and restrain this process.

Among other elements associated with trading zones, I will also consider boundary objects and boundary practices. Boundary objects, a concept introduced by Star and Griesemer (1989) and then used by Galison (2010), are conceptual and/or material entities, such as standardized forms, ideal types (maps, diagrams, etc.) that are "plastic enough to adapt to local needs and the constraints of the several parties" (Star and Griesemer 1989, 393). What is very important, such entities are not marked by some presupposed universal meaning and may be of different significance to the parties involved: as Star and Griesemer (1989) put it, they "have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation." The concept of boundary object has later been adapted in various areas, to explain boundary-crossing capacities that emerge between different actors.

1.2. Trading Zones and Higher Education

Furthermore, in the context of my study, it will be inevitable that we address the issue of a shared language, since, besides practical interactions, trading zones involve local "language games" for the exchange between parties that do not share "deeper" values and conceptual understandings (Mäntysalo and Kanninen 2013, 60). Tackling Galison's distinction between a pidgin and a creole, I will primarily focus on a pidgin formation in university–student trading zones, including extracurricular interactional practices between TRS and students, such as discussion clubs, science festivals, science slams, and the like. As is well known, pidgin trading zones enable local coordination between beliefs and action without mitigating linguistic, epistemological, and cultural differences. As for creoles, they mean the evolution of new unified fields or cultures, exemplified by interdisciplinary collaborations resulting in new research areas, which during their emergence involve students as young researchers as well.

It is important to note that scholars, having applied the concept of trading zones toward education in a few cases in context of the interdisciplinary perspective, mostly do not consider students as participants—they rather describe pedagogical collaborations. For instance, David Mills and Mary T. Huber (2005) suggest the notion of an educational "trading zone" as an analytically helpful way of describing a space in which ideas about learning and teaching are shared within and between disciplines (in their case anthropology and the humanities). William P. Fisher Jr. and Mark Wilson use the concepts of trading zones and boundary objects in relation to educational

assessment research and practice. Their consideration embraces quite a diverse range of players, such as "teachers, assessment developers, psychometricians, information technology (IT) experts, curriculum developers, policy-makers"; however, students are not viewed as participants (Fisher and Wilson 2015, 57). Johan Sandberg et al. (2015) consider trading zones in university–industry R&D collaboration in the context of open innovation. Presenting a case study of four research centers with a history of participating in innovation networks, they also do not consider students.

An example of a study in which students are participants is suggested by Koichi Nakagawa et al. (2017) in the research into university–industry collaborative education. University–industry collaboration encourages two-way interactions and learning: university students can obtain rich and insightful experiential know-how from industry-side participants, and practitioners can gain theoretical knowledge from students. Furthermore, the effectiveness of university–industry collaboration for entrepreneurship education is enhanced particularly through project-based learning, where both university students and industrial practitioners jointly tackle a social, business, or technological problem (Nakagawa et al. 2017, 38-39). The notion of trading zone figures as a theoretical framework to describe and access a knowledge exchange between heterogeneous groups, which results in each side's knowledge transformations. With this, a shared language is encouraged by faculty members as a third party—"program facilitators," including university lecturers and office staff, represents the infrastructure of the program (Nakagawa et al. 2017, 42).

Perhaps, it is not so easy to imagine students as actors in trading zones, since their contribution may seem not obvious. Indeed, what could they possibly offer TRS to trade if they enroll in educational programs to acquire knowledge, skills, and the like (we are not talking here about their dealing with university administrations related to education payments)? What kind of knowledge sharing can there be? I will suggest an answer to this question.

The importance of advancing university–industry collaborative education seems quite reasonable in our time of market-driven (almost) everything. The questions I would like to raise in my study and attempt to give some answers to are as follows: (a) whether we may apply the metaphor of trading zone to university education, and, given the existence of several university models including the Humboldtian and the Entrepreneurial ones, which model is better fitted to the trading zone approach; (b) whether it is possible to suggest a new, digital, university model, and whether it is more beneficial in terms of sharing and exchange between university TRS and students.

Along with this, the nature of contemporary communications and collaborations in the university is obviously influenced by new digital mobilities. As

Anthony Elliott and John Urry (2010) put it, complex mobility systems are transforming everyday lives. New mobilities thus include virtual movements of people and ideas, communication movements (interactions with other people through information and communication technologies). The idea of the digital in education has resulted in some new models, such as the digital university, which I will consider in more detail in Section 3.

2. Academia in the Flux of Time

> "[A]ll the world seems to be on the move."
> Sheller M, Urry J. The new mobilities paradigm (Sheller and Urry 2006, 208).

Till today, an increasingly large number of scholars has contributed to the topic of the transformations in academia and scholarship. Indeed, since the end of the 18th century, the idea of the university had been discussed in a good number of publications and debates, which resulted, as known, in significant changes commonly referred to as the Humboldtian university model. Debates on the university did not stop—they went on in different directions, including critically oriented ones. For instance, in 1918—the year after Max Weber's lecture "Science as a Vocation"—Thorstein Veblen's *The Higher Learning in America* sounded an alarm about the "conduct of universities by businessmen" [Shapin 2003, web]. Being constrained by my own research focus, I will not be able to provide a more detailed review of this variety of discussions, but will rather emphasize some major factors involved in the university transformations and influencing the issue of university trading zones.

The academy is going through an adaptation to a time of extremely rapid changes connected to a global market affecting work patterns and conditions and the implementation of neoliberal policies emphasizing the private sector, the importance of individual well-being, and so on. The globalization of higher education implies the application of a neoliberal market forces model based on competition and choice. The role of universities in society and the economy is changing and will continue to change significantly in the next decade. In an increasingly competitive Higher Education sector, universities need to differentiate themselves through new and emerging business models.

Speaking in market terms, Frodeman, Briggle, and Holbrook (2012, 2), for instance, depict a situation in which university leadership pursuing "strategic dynamism" constantly monitors "the demands of their customers (formerly known as students) and their overseers (governing boards, and through them, corporate clients)," while students want a cheaper, faster, and more convenient education, where "education" means a ticket to a job. Or, as Michael A. Peters (2015) bluntly puts it, "universities are 'engines of

innovation' for 'fast capitalism' dealing in 'fast knowledge', 'fast publishing' and 'fast teaching," while students are now "paying customers," as stated in a publication *The 2018 Digital University. Staying relevant in the digital age* by The PriceWaterhouseCoopers (2018, 10).

Besides market influence, another significant factor is the impact that digital technologies produce in many fields, including the academy. As Martin Weller, professor at the Open University, noted in his recent article "The Digital Scholar Revisited," at the time when he published his book *The Digital Scholar* (Weller 2011), "the general attitude towards digital scholarship was cautious, although areas of innovative practice were emerging" (Weller 2018, 52). Examining the current landscape, Weller (2018, 63) concludes that "[W]hat has been realised then is not so much a revolution in academic practice, but a gradual acceptance and utilisation of digital scholarship techniques, practices and values." Particularly for education, he notes that "the use of online and blended teaching approaches, even at on campus universities" is becoming mainstream (Weller 2018, 62). Along with it, he points to a certain criticality on the digitalization (Weller 2018, 60-61), by means of which, for example, according to Lupton, Mewburn, and Thomson (2017), teachers, academics, and students are "measured and judged" basing on "overzealous use of data."

Along with this, a most essential issue accompanying these factors is an increasing acceleration. Having an objective character, time can be subjectively experienced—both individually and collectively. As noted in the introduction to the book *Universities in the Flux of Time: An Exploration of Time and Temporality in University Life* (Peters 2015, Introduction, pp. 1–6), "one academic institution may have quite a different pace and rhythm from another," and yet academia on the whole is experiencing "lack of time, compression of time and time famine" (Peters 2015, 2). No matter how some of us treat the transformation of universities, all of academia has to participate in related processes, whether it is a compilation of numerous bureaucratic reports, a design of multichoice tests or new "best-selling" educational programs, or an introduction of some digital know-how.

Education itself is becoming an essential part of the knowledge society and is going to occur rapidly at a global scale. It is unlikely to be too a strong statement to say that education will soon be everywhere, at every moment, through our mobile devices driven by algorithms (at least that is obviously the idea). To a certain extent, Michael A. Peters (2015) might be right when asserting that our age is "the epoch of digital reason," whose concepts are "the concepts of speed and velocity," as well as "system, feedback and control."

3. University Models: The Humboldtian—the Entrepreneurial—the Digital?

3.1. The Humboldtian University

The modern university of the 19th century is often referred to as the Humboldtian university, named after Wilhelm von Humboldt (1767-1835), a German educator who based his work on the ideas of Friedrich Schleiermacher, a German philosopher emphasizing the importance of producing new knowledge. Here, I mean the Humboldtian model of higher education (German: Humboldtisches Bildungsideal, literally: Humboldtian education ideal) a concept of academic education, which had been shaping on the slow reform process during the 18th century, along with the intense intellectual debate in the decades around the year 1800. There, the contributions of Kant, Fichte, and Schleiermacher regarding the status of the faculty of philosophy were part of the discussion, which was, as Östling (2018, 29) puts it, far more comprehensive than that. In his turn, Humboldt made a synthesis from varied viewpoints and in 1809-1810 embodied his intentions.

It should be noted, though, that by a notion of Humboldtian university scholars might mean anything but not invariably the same entity. Quite often it is referred to as the combination of research and studies, the unity of teaching and research, the complimentary principles of freedom to teach and freedom to study, and so on. A central position in Humboldt's educational philosophy, as well as it was thoroughly foundational to his idea of the university, was held by the idea of *Bildung*. As a pedagogical idea, it is related to older concepts and can be traced back to the Greek *paideia*, an idea of a comprehensive cultivation of human spiritual, aesthetic, and physical abilities to shape a harmonious citizen. Besides Bildung, the Humboldtian idea included *Wissenschaft*: in Östling's (2018, 40-41) words, contrasted to schools, science/scholarship should be seen as "an as yet unsolved problem which always calls for further research." Throughout the 19th century, a debate continued about the German university. On the whole, there was agreement regarding the idea that the qualities that above all others distinguished the German university were academic freedom and theoretical-scholarly/scientific teaching.

Yet, it is commonly acknowledged that the ideal has hardly been realized. The Humboldtian conception was closely linked to idealistic philosophy, which, however, during the latter half of the 19th century was replaced by materialism and positivism. As is well-known, the classical ideals of comprehensiveness and the pure search for knowledge proved incompatible with the 20th-century integration of science with civic structures and business.

3.2. The Entrepreneurial University

Historians note that despite the convenience of the shorthand, there was no such thing as "the German model." Instead, "the German model" came in a variety of versions based on different interpretations, understandings, and (re)applications. Nonetheless, despite its varying interpretations, the German Humboldtian model of a university seems to have exerted significant influence over modern universities around the world. The Humboldtian university was designed to create the most productive and innovative thinkers and to encourage experimentation and exploration. It is at the origins of the research university and the education system that we have inherited from today. Contemporary education policy, however, narrows education to a preparation for the labor market.

It is no secret that a question has arisen of whether the University itself is needed indeed in the new environment. The standard, education–research model has faced a challenge of self-justification in the era of transnational global economy, "cognitive capitalism" and institutional pragmatism. For example, the collection of papers "The Future University: Ideas and Possibilities" ponder the idea of the university: has the word "university" retained something of its classical meaning, its foundation? What are university opportunities in the 21st century? (Barnett et al. 2012). Nowadays, many believe that higher education should be able to rapidly respond to changing market conditions and take advantage of the new opportunities presented in the digital age, rather than imposing some educational ideal—the way the Humboldtian conception presupposes. Some new models are suggested, such as the Entrepreneurial University, having been a research topic during recent years (see, for example, Audretsch 2014; Clark 1998, 2004; and others).

The entrepreneurial university descriptions, having started with a focus on applying managerial models along with teaching and research, have acquired a new aspiration for integrating with the business sector and stakeholders (Etzkowitz 2001, 2008, 2011, 2013). Concerning this active linking to business, it clearly has to do with the trading zone: the business sector profits socially and economically from university research, while the university benefits from the knowledge acquired by its closeness to the entrepreneurial environment (Etzkowitz 2001, 2008, 2011, 2013). Moreover, basing ourselves on the entrepreneurial university models, one might find a variety of actors, since "universities are part of an entrepreneurial society in collaboration with companies, associations and institutions" (Fernández-Nogueira et al. 2018, web). Add here governmental bodies in the so-called "triple-helix," that is, a university–industry–government network (Etzkowitz 2008, 2011).

It would not be too strong to say that universities need to be proactive to stay relevant in today's increasingly dynamic societal context. Contemporary students are facing such challenges as a rapid significant reduction in the life cycle of professions largely due to the fast-moving evolution of IT that will make currently demanded jobs, for example, of corporate lawyer, redundant in the very near future. This encourages us to promote such a model as an educational supermarket, in which "customers" independently pick up the products they themselves consider essential, rather than being compelled to consume those imputed by educational standards.

I, however, will focus on educational trading zones, bearing in mind that they are influenced by the "triple-helix" as well, since it has an impact on educational contexts, which are increasingly built on the assumption that the entrepreneurial university is a driver of innovation and entrepreneurship (though not all universities might fall into this category). Besides, another contemporary aspect needs to be considered, and that is the above-mentioned digital university, which has also become the focus of scholarly interest (Johnston, MacNeill, and Smyth 2018).

3.3. The Digital University

Speaking of the digital, one has to make it clear what exactly is implied by this concept. In everyday usage, "the digital" commonly refers to technologies that incorporate digital computer processing, which for universities embraces the desktop computer, the Internet, the Web (with its evolving versions), smart phones, tablets and other devices, cloud computing, and specific university software such as leading management systems and massive online open courses.

In their review of distance education universities, based on a global perspective, Qayyum and Zawacki-Richter (2018) conclude that online and distance education enrolments are strong and mainly growing; existing institutions are increasing their online and distance education offerings; distance education is an integral part of higher education, and it is accepted as mainstream in developed countries. According to their survey, the trend is a steady increase of distance education enrolments in developed countries and a strong increase in enrolments in developing countries. What is noteworthy is the growth of dual-mode (on-campus and online) institutions: a large number of campus-based institutions are offering distance and particularly online education (Qayyum and Zawacki-Richter 2018). As for the emergence of online institutions, such as the most well known in the MOOC Coursera, Udacity, and EdX, they are gaining mainstream acceptance. Along with that,

according to Qayyum and Zawacki-Richter (2018), basic enrolment and provision data on a global scale are still difficult to track.

Along with this, the notion of a "digital university" demonstrates, as Johnston, MacNeill, and Smyth (2018, 6) put it, a wider horizon of meaning, such as "digital skills," "digital age," "digital generation," and "digital natives"; thus, 'the digital" might mean both things and ways of doing things. Does the "digital university" embrace all of them or does it relate merely to digital technology and infrastructure? Furthermore, Jones and Goodfellow (2012, 60) rightly distinguish between the digital as being beyond materiality (hyper, virtual, or cyber) and being digital materiality, that is, "incorporated in assemblages of hardware, software." In this way, the digital university is an assemblage of the material and the immaterial, emerging from a network of people, things, technologies, arrangements, and so on.

In their report on the 2018 Digital University, PriceWaterhouseCoopers (2018) argues that "the idea that digital is all about technology is a common misconception": being significant indeed, technology is "simply the canvas upon which the digital experience is created." In other words, it would not be correct to interpret the "digital university" as simply a university that offers educational content through digital technologies, basically, via online learning and courses. The report refers to the need for creating digital-friendly environments inside campuses. There is, though, something more to it than that. The digital university also implies cultural and organizational changes. The whole conception of university education along with a university campus undergoes changes to answer new, mobile, and nomadic lives with mobilities both physical and digital.

The PwC report insists on the digital university as a strategy, very beneficial and inevitable for those universities that seek to be leading (which means proactive). Queen's University Digital Planning Project Group (2018) in their "Themes Emerging from Environmental Scan of Digital Strategies in Higher Education" suggests a few examples of digital strategies, including a comprehensive one illustrated by the University of Bergen (Norway) with their strategy for 2016-2022 "Ocean, Life, Society." The latter includes "a) an underlying digitalised infrastructure (supporting research and education), b) user-oriented digital services, c) digitally accommodating university, d) a self-service university administration, and e) a culture of change and implementation" (Queen's University Digital Planning Project Group 2018). As for teaching techniques, digital technology has encouraged innovations, such as flipped classrooms and hybrid (a combination of online and face-to-face) teaching models. Universities introduce their own digital know-how, as, for instance, Lancaster University with their "dot.everything" approach, "whereby all processes—from student admissions and assessment to requesting travel and

managing payroll—are carried out online" (Lancaster University: Digital Fluency for Everyone 2018). Besides, universities tend to create innovative learning spaces, which are not fixed and static.

Yet, despite the increasing interest in the digital university as an idea and a strategy, its conceptualization is still at its beginning. To my mind, a good attempt at conceptualizing it may be found in Jones and Goodfellow (2012) and Johnston, MacNeill, and Smyth (2018), who argue that the digital university is not so much a particular type of university, but a construct that should be viewed through the notion of "discursive construction." As Johnston, MacNeill, and Smyth (2018, 6) put it, both "the digital" and "the university" are "problematic and contestable constructs, which are subject to definition and redefinition by powerful sociocultural forces and political and economic interests." Jones and Goodfellow (2012, 60) rightly distinguish between general cultural and media discourses, policy discourses, and practitioner discourses on the "digital university." As an example of media debates, they refer to the "digital native" notion coined to characterize young students who are commonly fluent with digital devices (Jones and Goodfellow 2012). Practitioner discourses are illustrated by a claim that "Internet expert communities are gradually replacing colleges and universities as the source of learning for lifelong learners" (Jones and Goodfellow 2012).

In this context, the idea of sociomateriality in education (Acton 2017; Fenwick, Edwards, and Sawchuk 2011) might facilitate the understanding of how an exchange is possible between TSA and students. Connected to the theories of physical space, actor–network theory, and some other conceptual frameworks, the sociomateriality perspective allows us to depict an exchange in university trading zones not in terms of knowledge sharing but rather in terms of shared building practices and experiences. Adapted for the specifics of the digital university, this relational approach, according to Jones and Goodfellow (2012, 62), rests on a comprehension that "all knowledge and learning is embedded in the material, in the actions and interactions of a variety of elements in a network."

Indeed, a significant factor encouraging universities toward digitalization is adapting to students, a good many of whom are now tech-savvy "digital natives" typically equipped with a smartphone, a tablet, and a very advanced knowledge of digital devices. Can we say that the needs of such "digital natives" have to be maintained by some new approaches, perhaps even a university model that might accordingly be referred to as the "Digital University"? According to Jones and Goodfellow, such a mode of thinking demonstrates a rather "determinist rhetoric." The latter occurs, for example, in Tapscott and Williams (2010, 18) arguing that the transformation of the university is "an imperative" demanded by the new needs of a new student

generation in a situation when the Internet is intercepting higher education relay and "inexorably, becoming the dominant infrastructure for knowledge." In their turn, Jones and Goodfellow provide a criticism of such comments. They argue that little empirical evidence, in fact, supports them and provide examples of their statement that fluency with digital technologies does not mean an easy adaptation to using them in education (Jones and Goodfellow 2012, 60-61).

Despite all the criticism, one can hardly deny the significant impact of the digital, along with the general sociocultural and economic contexts, on the way communications between TRS and students occur in contemporary universities.

4. Trading Zones in Contemporary Universities

Considering the question of communications and collaborations related to the academy, Ilya Kasavin (2017) and Alexander Dorozhkin (2017) maintain that there is a need to consider some new trading zones. The general idea of the Humboldtian University aims at integrating research and learning, and possible areas of scientific exchange between TRS and students emerged and evolved, basically, in university laboratories and lately research centers. If we talk about new contexts and new trading zones, what should they be? Particularly Ilya Kasavin (2017, 254) points here to interactions between researchers from varied disciplines, as well as communications between scientists, engineers, officials, managers, industrialists, and businesses within sociotechnical projects, which also involve universities. Dorozhkin (2017) distinguishes between "Humboldtian" and "non-Humboldtian" trading zones—the latter engaging science and the public. Referring to the abovementioned sociomateriality and digital mobilities, I would like to add that such new trading zones, granted the wider sociotechnical context universities are rooted in, imply some friendly environments (both physical and cyber spaces), practices and mindsets enabling and benefiting such interactions. In this way, we cannot skip the question of space and, accordingly, the university campus.

4.1. Trading Zone Space: Developing Campus Environments

The influence of physical space on human activity is more or less generally acknowledged. As for the university campus space, one may often encounter an argument that the physical environment of a university campus provides the context for learning and social interactions: educational spaces should be flexible, equipped with technology, and encourage collaboration.

For example, Nancy Chism (2006) sums up the elements suggested for a harmony between space and learning, including flexibility (a comfort switch between traditional lecture or demonstration to team or project-based activities or working independently); comfort (comfortable seating, surfaces for a variety of work); sensory stimulation (a stimulating design); technology support; decenteredness (spacing conveying co-learning and co-construction of knowledge, rather than a "privileged" space; places for discussion and study outside the classroom).

An illustration of an innovative campus environment is Delft University of Technology (German: Technische Universiteit Delft), also known as TU Delft, the largest technical university in the Netherlands. It provides a green-friendly landscape, cozy for rest; meeting places and lounges; a stable Wi-Fi and opportunities to recharge devices; bars and restaurants with takeaway food and drinks; and so on. Furthermore, TU Delft constructs additional education facilities, such as Pulse. I would like to accentuate this very facility, since it specifically aims to bring students and lecturers together to collaborate, acquire, and share knowledge; it has teaching spaces able to support interactive seminars, a flipped classroom and video conferencing, and houses food and beverage facilities featuring approximately 200 seats for relaxation and studying.[1] The idea rests on creating an up-to-date environment bringing the physical and the digital together to encourage efficient education and collaboration.

Besides, TU Delft provides multidisciplinary environments, such as Dimes (Delft Institute of Microsystems and Nanoelectronics), a multidisciplinary research school with the focus on silicon and silicon-based technology and facilities and equipment enabling the collaboration and integration of nanoscale and high-speed device physics, materials science and process technology, and so on in one institute. Multidisciplinary centers exist also in other universities (a few are created, for instance, under the Leiden–Delft–Erasmus alliance).

4.2. Boundary Practices and Languages

As for the boundary objects, in this context, I would rather suggest special cross-boundary spaces, such as Pulse and multidisciplinary centers, and boundary practices. The latter may be exemplified by the above-mentioned university–industry collaborative education at Osaka University depicted by

[1]The information has been taken from the University campus website at: http://campusdevelopment.tudelft.nl/en/project/pulse/ (accessed February 21, 2019).

Nakagawa et al. (2017). Obviously, in contemporary universities, there are far more boundary practices related to heterogeneous groups, such as researchers from different disciplines working on shared projects or even educators and researchers collaborating on learning and development. In this respect, I would also like to mention another boundary practice type—science festivals and other science-pop participatory events aimed to engage a wider public; not to mention participatory museum spaces and science parks, which intensely involve a variety of boundary objects. University TRS increasingly rest their interactions with students on extracurricular discussion clubs and workshops.

Furthermore, together they arrange a variety of events in establishments like anti-cafés, engaging a wider outside public (a kind of extraterritorial and decentered exchange space). For instance, Shibarshina, Shnyreva, and Feygelman (2017) attempted to investigate boundary practices between philosophers and nonphilosophers. The authors argued that a common language here does not always serve as a tool for achieving mutual understanding, since any popular oversimplification would risk generating a vulgarization (a kind of philosophical fast-food with child-friendly definitions). As their study demonstrates, practitioners of one community engaged in such practices employ sophisticated philosophical categories as one of the "jargons," along with their own neologisms aiming to "hack" fixed mindsets and automatism of perception (Shibarshina, Shnyreva, and Feygelman 2017, 415-16)—a kind of decentered language. Besides, they post content created through similar approaches on their own website.

5. Concluding Remarks: Contemporary Universities and the Renewed Ideal of Bildung

Going back to the Humboldtian idea of Bildung, I would like to argue that, to some extent, new contexts in which universities evolve, on one hand, impose market standards and values on both universities and students, seemingly making university education a way to better-paid future jobs rather than a comprehensive personal development. On the other hand, however, so many innovative environments, practices, technologies, techniques, and so on emerge that students, indeed, are offered a larger number and wider range of tracks for building personal knowledge and skills, sometimes at their own pace (yet, mainly through massive open online courses [MOOCs]), and sharing them with others. In this way, the digital university and renovated campuses—to some extent—suggest a renewed idea of Bildung, though significantly adapted for new realities.

To my mind, they might serve as an illustration of new evolving trading zones both between outside university actors and between the university and a wider public. In doing so, the initiators of such trading zones will need to consider at least two significant conditions: the retention of the institutional character of trading zones and the acknowledgment of decenteredness, extra-territoriality, mobility, structural uncertainty, inconsistency, and an event-related character as specific properties of many contemporary events.

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