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Teaching public administrators and leaders to handle complexity

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Abstract: *Understanding and working under complexity has become 'the new normal' in public administration. Hence complexity must also be integrated into teaching and training of public administrators, not only in higher education but also in in-service training and educating wider society. This can be done by combining the ongoing research agenda into courses and teaching methods. This article describes the integration of complexity thinking and teaching in one university, both by giving examples on the courses and methods applied, student feedback received and by anticipating future developments. Finally, practical advice for teachers of complexity is given.*

Keywords: Complexity; Wicked problems; Public administration; Curriculum; Higher education

1. Complexity as an integral part of a public management curriculum

Since 2010, complexity has been an integral part of teaching and research in social and health management at the University of Vaasa, Finland. The 240 students in the department are mostly adult learners with a background in nursing or social care, who might be studying for either a bachelor's or a master's degree. The department also offers an additional master's degree program in Helsinki, in collaboration with the Hospital District of Helsinki and Uusimaa. The majority of students target a managerial position within the social and health care field, which might be that of chief nursing officer, manager of municipal social and health services, or human resource manager. The department also offers a doctoral program, which currently has more than 20 PhD students. In addition, the department provides in-service training.

Complexity came to the attention of the department initially through the research done on the concept of wicked problems. The first such research articles in the wicked-health-care context were published from 2005 (Vartiainen 2005; 2008), and the research gradually expanded to include complexity sciences. The first course on complexity was added to the curriculum in 2009, and the first PhD dissertation on the topic was published in 2010 (Raisio 2010). As research on the theme increased and involved more researchers, the complexity perspective began to be added to other courses as well. Today, complexity is a cross-cutting theme in the department's curriculum.

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In Finland, students must pass an entrance examination in order to be accepted to pursue a degree, and this is where the first introduction to complexity occurs, as one of the articles in the pre-reading materials for the entrance examination deals with complexity leadership (Lindell, Ollila & Vartiainen 2014). The department's bachelor's degree courses familiarize students with the complexity worldview, and the master's degree courses extend the understanding of complexity. Research interests on complexity have also been expanded at the faculty level, which is evident from the master's theses and the PhD dissertations applying a complexity framework. The department of social and health management also strives to extend the understanding of complexity on the societal level. This takes place for example through podcasts, Open University courses, and lectures offered to a range of organizational actors.

The approach adopted in the department's curriculum is that of a "softer" complexity. In Richardson's (2007) classification, this approach could be considered (depending on the content of the course) to align with either the critical pluralist school or the metaphorical school. While the critical pluralists focus on "the limits of our knowledge in the light of complexity, limits that are often trivialized by contemporary scientific thinking," the representatives of the metaphorical school use complexity as a "powerful metaphorical tool" (Richardson & Cilliers 2001, p. 6–7). Later in this paper, we explore the issues around introducing the "harder" side of complexity (the neo-reductionist school) into the curriculum. For Richardson and Cilliers (2001, p. 5) this particular side of complexity can be understood as a reductionist complexity science that is "strongly allied to the quest for a theory of everything (TOE) in physics." Owing to the department's grounding in qualitative studies and social sciences, there was a rather natural leaning toward the softer side of complexity.

The premise for the strong inclusion of the complexity perspective in the department's curriculum can be found in Boulton, Allen and Bowman (2015, p. 123) who argue that, "to accept that the world is complex rather than predictable and controllable is to change our approach to everything: our approach to change, to management, to policy development, to evaluation, to leadership – and to living!" The premise applies equally to teaching. The public management curriculum and educational methods have to respond to reality, to the complexity of the world the students of public administration face every day. Public management educators have an obligation to enhance their students' capacity to act in an environment of ever-increasing complexity. This is especially true in the health care sector where "leaders at all levels are faced with some of the most complex and challenging problems confronting leaders" (Hutchinson et al. 2015, p. 3021).

2. Courses, in-service training and educating wider society

In social and health management, the course contents and learning methods are diverse, and below we detail the courses most clearly connected with the complexity perspective, starting with examples where the complexity perspective is most explicit. The description of the courses continues with the level of detail offered reducing gradually until we reach the courses that only touch upon complexity. Furthermore, we provide examples of in-service training and attempts to educate the general public.

The Curriculum

Edge of Chaos is a master's degree level course that has been on the curriculum since 2009. The course is divided into three modules. The first module helps students extend their understanding of the history and key concepts of the complexity sciences. The 10 principles of complexity by Cilliers (1998) and Mitleton-Kelly (2003) are used as a general basis for establishing an understanding of complexity. The course content seeks to convey concepts that can be difficult to comprehend through real-life examples. The second module includes the perspective of complexity leadership, and in it, complexity leadership theory (see e.g., Lichtenstein et al. 2006; Uhl-Bien, Marion & McKelvey 2007) and its applications are explored in detail. The third module is more action-oriented and the method of implementation usually changes every year. Past examples of experiments include using dialogue mapping, deliberative forums, and network analysis. Dialogue mapping (see Conklin 2005; Raisio & Lindell 2010) is a facilitation tool where a shared display is used and the problem is examined through dialogue. As a tool, it helps to illustrate the multi-dimensional nature and the ambiguity of wicked problems, and the importance of collective intelligence in handling these particular issues. Deliberative forums work in a similar fashion, but are more strongly built upon the principles of deliberative democracy (see Lindell 2014). During deliberative forums students address an actual real-life wicked issue, acquire information through questioning various experts, take part in facilitated small group discussions, and finally write out their proposals to tackle the issue, which are given to the relevant decision makers. Social network analysis [SNA] (see e.g., Koliba 2014, Koliba et al. 2011, 2016) is the most recent development, and attempts to deliver an improved balance between "soft" and "hard" complexity. Social network analysis also stresses the importance of relations (ties) between actors and can thus be applied to illustrate the interconnected and intertwined nature of complexity. The students are graded based on a traditional examination.

Welfare Game – The complex nature of social and health services is a bachelor's degree level course, which was first offered in 2015. The pedagogy of work-related learning forms the basis of the course. The course involves students in simulation gaming (see Klievink & Janssen 2010). Due to the nature of the course, the number of course participants must be limited, for example, to a maximum of 20 students. The course begins with students being informed about the background of simulation gaming and its relationship with the complexity worldview. A practice oriented article describing the experiences of real leaders embracing the paradigm of complexity (Raisio & Lundström 2015) is obligatory reading material. The article uses three detailed narratives to present to students what complexity means in real life. The actual game is based on real world cases that are processed though different scenarios. Students are divided into groups of three or four, and each group has one researcher and one social and health care professional as its instructors. Each group has a different opening scenario. The progress of the scenario will vary nonlinearly according to the choices and decisions made by students. The game, however, does not proceed in real time. After each new scenario development, students have on average two weeks to record their responses based on the relevant source material. They are subsequently informed of the instructors' reactions. The game's "plot" then takes shape and develops through the interaction between instructors and students. For example, one group struggled with a scenario where they were faced with the consequences of the European refugee crisis. The scenario was set in a small fictional Finnish municipality and the students took different roles (e.g., municipal manager and the chair of the municipal council) depending on the nature of each new scenario development, beginning with the preparation for the arrival of asylum seekers. The aim of the course is to prepare the students for increasingly more complex operating environments. Students begin to understand how different parts of the whole are

interwoven, interact, and hence co-evolve. In addition, the non-linear scenarios encourage the students to develop their capacity for what-if thinking. The course is graded as a pass or fail.

The Future of Social and Health Systems is a master's degree course, which has been on the curriculum since 2016. The course combines futures studies, a complexity worldview, and the analysis of social and health care systems. Its focus is on futures studies as methods and techniques for administrative sciences, not so much on futures studies as a science. Concepts such as trends, megatrends, weak signals, wild cards and black swans, and methods such as scenario building workshops, the futures wheel, and the Delphi method are presented and explored. Moreover, instead of attempting to teach forecasting (predicting one single best future), the emphasis of the course is on foresight (developing many plausible scenarios for the future). According to Curry (2014, p. 13) "it is in scenario building where there is the greatest room for growth in public administration futures research." Additionally, the relationship between foresight and complexity is discussed throughout the course. The course addresses for example the way that complexity challenges scenario thinking in futures studies. As Cilliers (2000, p. 28) has stated, to model complex systems, we would have to "model life, the universe and everything," which is naturally impossible. In futures studies, and in foresight in particular, this can be seen as a widely accepted fact. The promise of creating future scenarios is then not so much in their power to predict the future, but in that such scenarios make us speak out and imagine what the future might hold (see Raisio & Lundström 2015). The analysis of potential futures for social and health care systems takes place after the opening lectures. Students form small groups and select a theme for their group. Each group is tasked to write a futures oriented analysis of their selected theme, such as what the Hospital District of Helsinki and Uusimaa might look like in the year 2030; or how technological developments could influence the provision of health care services in the future. For approximately a month, students familiarize themselves with the theme, and analyze the associated trends and megatrends. They look for weak signals and reflect upon different black swan events. They use their analysis to formulate from three to four future scenarios and present them to other students. As a group, the students explore different scenarios and assess their plausibility and desirability. The grade is based on the quality of the written work and the presentation.

The Citizen's Voice in the Welfare Society is a bachelor's degree level course offered for the first time in 2015. The premise of the course is that the ever-increasing prevalence of complexity and of wicked problems calls for a more active citizenry and a stronger role for public participation in public administration. As Yankelovich (2015, p. 5) argues "...with all the wicked problems the nation faces, it will be difficult to get back on track without a more thoughtful, more fully engaged public, and without a more public-minded philosophy than now prevails." The course consists mainly of lectures and an exam. Lectures cover three themes: public participation in general, client/patient participation, and deliberative democracy. The focus is particularly on public deliberation, as the growth of deliberative democratic theory has brought to the fore the role of citizens in addressing wicked problems (see Raisio & Vartiainen 2015). The students are made aware of how taking part in deliberative mini-publics, such as citizens' juries, deliberative polls, and also participatory budgeting, can help citizens grasp the complexity of public policies. Additionally, students produce a written assignment exploring specific participatory and deliberative methods selected from the website participedia.net. In 2017, facilitation training by a qualified facilitator was also included in the content of the course.

The aforementioned courses are those most explicitly dealing with complexity, but other courses also touch upon the topic. For example, in one of their first courses, Welfare Services in a

Developing Environment, students examine the current challenges and opportunities for the development of the welfare society. During the course, complexity and wicked problems are very briefly explained and connected to the context of the welfare society. The bachelor's level course, From Vintage to Modern Leadership, covers the historical background of leadership development. Complexity leadership is briefly examined as a part of modern change leadership. On a master's level course, Human Resource Management and Welfare, one of the topics is conflict management and working life. The course content includes the use of roleplays to foster a realistic understanding of managing highly complex situations. The use of real complex cases as instruments means each student takes a different role in their own group and so is exposed to some extent to reality. After each roleplay exercise, the lecturer debriefs the students on the solutions they applied to handle such delicate and complex situations. In addition, the students are exposed to a complexity perspective on a course entitled Project Innovations and Practical Development. On this master's level course, students, guided by a researcher, act as a research community and implement a real research and development project. One of the more implicit objectives of the course is to help students to understand the complexity of engaging in project work.

In-service training

In-service training on complexity is provided by the department and varies from the provision of lectures of between two and three hours duration to one-day training modules. The department is, for example, taking part in a middle management leadership coaching program, organized by advocacy organizations for local government employers and for Finnish municipalities. In 2017, the program will be run for the third time. The program lasts for one year, after which participants receive a certificate as an indication of their capabilities to hold a management position. In the first year, 137 participants received the certificate. The social and health care department's role on the program is to introduce the complexity worldview to the participants. During a one-day training module, the first half day includes an introduction to the central tenets of complexity and the main characteristics of wicked problems, alongside an exploration of complexity leadership theory. As a novel content, the so-called emergence of evil (see Bella 2006; Vartiainen, Raisio & Lundström 2016) is studied. In raising this darker side of emergence, Bella, King and Kailin (2003, p. 68), refer to "dark outcomes [which] emerge from interactions among well-intended, hardworking, competent individuals." The concept resonates strongly with the experiences of the participants of in-service training. The second half of the day sees students participating in a World Café (see Carson 2011), to encourage them to reflect on and build a shared understanding of complexity and problem wickedness.

Educating the wider public

Examples of methods used to educate the general public on complexity include podcasts and an Open University course. The relevant podcasts cover the topics of complexity and wicked problems and are hosted by one of the department's researchers and produced in cooperation with KEVA, a public-sector pension institution with an interest in workplace wellbeing. The first season began in January 2017 and each season is scheduled to include approximately 10 episodes, each of around 45 minutes duration. The aim has been to invite guests who are senior leaders and have a deep understanding of complexity, and who have used that understanding to develop their

leadership style. The Open University course, *Uncertainty: A Path to Innovation* was offered as part of the so-called Newspaper University, a tradition stretching back over 20 years that is organized by the University of Vaasa, the Open University, and the local newspaper, *Pohjalainen*. The Newspaper University project ensures popular science articles on a topical theme are published in the local newspaper, and supports the building of an Open University course related to those themes. Completing the course requires students to expand their reading to incorporate other relevant literature and write an essay on a related topic. The social and health management department took responsibility for the course in 2013. Newspaper articles explored the complexity worldview from different perspectives, and were published both in print and online (see Sanomalehtiyliopisto 2013), to offer non-subscribers an opportunity to participate. Ongoing interest in the course means it has remained among the courses offered by the Open University. To date, around one hundred people have taken part in the course.

3. Student feedback

Feedback from the university students and the participants in the in-service training has been positive. One contributory factor might be that the students have mostly been adult learners. One opinion elicited from the feedback received is that having work experience and being faced with complexity in everyday life helps people appreciate what complexity is about. It has often been stated that gaining an understanding about complexity eases the pain of dealing with the rapidly moving, constantly changing environment, where nothing is certain. Complexity seems to offer an answer to the question of why everything is as it is. As one the leaders interviewed by Raisio and Lundström (2015, p. 2) stated, "In a way [complexity] is a liberating image of reality. It just is and we do not need to feel pain about it." Becoming familiar with the complexity worldview enables students and participants to assign names and labels to phenomena and problems they face in everyday life. As theory and reality merge together "a lot of things fall into place."

In particular, the various practical exercises undertaken during the courses are considered useful. For example, the simulation gaming on the *Welfare Game* course was initially challenging for the students. Typically, in examinations, answers are often considered to be either right or wrong, but in simulation gaming this does not apply. Actions taken are in the students' own hands, which might cause discomfort at first. The course itself proceeds according to the principles of complexity. Both simulation gaming and the scenarios created in *The Future of Social and Health Systems* course have helped students to understand the high degree of connectivity and interdependence between the different actors and dimensions of a system and also between the system and its environment, giving rise to complex behaviors and coevolution. Similarly, the deliberative forums have been a valuable way of exposing students to the apparent complexity of public service structures and policy. In addition, the various exercises and methods have not only been pedagogical tools, but also practical ones available for use in the future. Students have, for example, implemented various deliberative forums at their employers. Moreover, they have become more alert to weak signals and observant in imagining different futures. As one of the students recently explained: "Weak signals and the search for them led me to react to newspapers somewhat differently than before. Or indeed, the theme of the whole course [futures studies and complexity] was awakening, so that in newspapers my attention is drawn to different things than before." Students' feedback supports the optimism of the teachers that the complexity knowledge gained during the courses also helps students to confront the complexity of the real world; they can be more at ease with complexity and strive to steer their organizations toward the space of

possibilities at the edge of chaos. As future managers, they would be more agile and able to adapt as well as more tolerant of ambiguity and failure.

However, learners have also reported that the concepts used in complexity can initially be difficult to comprehend, particularly because the language of complexity differs from that they are used to, and hence, absorbing the complexity worldview takes time. Course participants have also reported on factors facilitating their learning; and have suggested more discussion sessions during the courses and for the course work to have a stronger connection to practical work. In addition, the participants on in-service training courses in particular have highlighted the challenge of thinking and acting according to the complexity worldview in institutions organized on the basis of a mechanistic view. Participants have stressed that existing structures and legislation make it impractical to challenge the mechanistic worldview. That situation highlights a form of imbalance or even a paradox between learning and doing. The various barriers to embracing complexity have recently been explored in detail in the *Leadership under Complexity* workshop, organized by The Finnish Innovation Fund Sitra (see Doz et al. 2017).

4. Developments in the future

The department of social and health management at the University of Vaasa is considering several ways in which the curricula it administers might be developed. In their current form, the curricula highlight the so-called soft side of complexity. Depending on the course structure, the complexity perspective is based either on the metaphorical school (mainly at the bachelor's degree level) or the critical pluralist school of complexity (mainly at the master's degree level). The hard side of complexity receives considerably less attention. This neo-reductionist school of complexity (see Richardson 2007) should feature more strongly in the department's curricula in the future. For example, agent-based modeling and simulations could be taught and explored in the context of social and health care systems (on agent-based modeling in PA see e.g., Koliba 2014; Koliba et al. 2011). Social network analysis and dynamic social network analysis also seem promising, in that they might bring together the empirical and theoretical sides of complexity in public administration (e.g., Puustinen 2017; Schipper & Gerrits 2015; Schipper et al. 2015; Schipper & Spekkink 2015). Combining network theory and complexity theory could be seen as one of the new streams bringing together complexity and PA (see e.g., Eppel 2017; Koliba et al. 2016; Koppenjan & Klijn 2014). Although promising, network theory, SNA, simulations, and modeling also have their weak points. None of them can extensively address the real-life dynamics of a complex social system, where actors constantly interpret and are aware of their own behavior and that of others (e.g., Deacon & Koutroufinis 2014; Puustinen 2017). Such dynamics are hard to employ with students since all of them require a significant methodological understanding that neither bachelor's or master's level degree courses routinely include.

In practice, bringing together the harder and softer forms of complexity could be for example an optional advanced course, which would also be offered to students of other faculties, especially the Faculty of Technology, and the Department of Computer Science within it. This would combine the metaphorical understanding of complexity and the mathematical, computer based simulations of complex systems. However, there are some potential barriers to such a plan: The scientific languages of public administration and natural or computer sciences do not always accord, and research streams have been, and still are, rather separate (e.g., Hidalgo 2015).

Nevertheless, the multidisciplinary aspect of the teaching of complexity in public administration should be strengthened, and this can be done in ways other than by methodological advances. Now the perspective of the curriculum is most clearly focused on the public sector. In the University of Vaasa, collaboration could be enhanced not only with the aforementioned Faculty of Technology, but also with the Faculty of Business Studies, which hosts researchers with a background in complexity science (e.g., Luoma 2006). Such collaboration could for example open up the area of managing complexity in public-private partnerships as a topic to study. A multidisciplinary approach to teaching would naturally follow the principles of complexity.

Most clearly, theory-practice dialogue needs to be increased during the courses. This would strengthen the connections between the theoretical side of complexity and the existing management culture. Specifically, the power of example should be applied. This could be realized through presentations by visiting lecturers, who would be leaders strongly embracing the paradigm of complexity, such as those who informed the study of Raisio and Lundström (2015). As an alternative option, webinars and podcasts could be applied. Theory, practice, and empirical research on complexity should also be strengthened in a similar manner. This applies both to encourage the more comprehensive inclusion of students in ongoing research initiatives, and enhanced action-oriented research agendas focusing on analyzing complexity and its facets in society at large and organizations in particular.

Furthermore, in-service training could be extended in the years to come, especially through multidisciplinary collaboration. To date, training has been offered almost entirely to public-sector organizations, and in future, the private and third sectors should also be included. In-service training could also be of longer duration and more extensive, even including the elements of action research in the organization, following for example Mitleton-Kelly's EMK methodology (Mitleton-Kelly 2015). Adopting a more utopian view, the future objective should be to make complexity thinking a civic skill. This view emerged in one of the small group dialogues in a recent one-day in-service training module. The respondents suggested that social media has created "bubbles and black and white thinking." Originating from there, complexity needs to be understood better and "complexity thinking should be trained."

5. Advice to teachers of complexity in public management contexts

Based on our experience in teaching complexity, we can offer the following advice. First, it is useful to combine the fields of wicked problems and complexity sciences (see Zellner & Campbell 2015). The concepts of tame and wicked problems (Rittel & Webber 1973) help to concretize the differences between the mechanical worldview and the worldview of complexity. For example, often during in-service training the concept of wicked problems is first defined and different resolution strategies explored, and only after that are they connected to complexity thinking. This step-by-step approach makes it easier to take in the concepts, ideals, and practices of complexity. It is especially useful when the wicked problems presented are familiar to the learners, so they resonate strongly with their own experiences. This is also in line with the need for public administrators to recognize their respective theories-in-use applied in their work, and to find the ways in which complexity concepts add value to the existing mental models and extant policies (Eppel 2017). As Eppel (2017, p. 858) further states, "we need to develop a deliberative sensitivity to complexity friendliness," both among our students and in public administration in general.

Second, the role of examples, exercises, and a practical orientation cannot be emphasized enough. The risk is that complexity remains on an abstract, theoretical, and conceptual level, which significantly hinders learning. Using different kinds of exercises, such as simulation gaming and deliberative forums, students not only begin to grasp complexity better, but they actually *get to operate within complexity*. In teaching complexity, the role of the teacher must be emphasized. Ideally the teacher acts as a mediator between the abstract theory and the real-life phenomena. Classic literature on complexity can be very challenging for students, so the teacher has to be able to illustrate what complexity is about in practice.

Third, complexity should be an all-encompassing theme in the curriculum, not only a separate course. Otherwise an explicit disparity might emerge between what is taught on the complexity course and on other courses. Courses should be mutually supportive and their connections should be made clear to all students. For example, in the department's futures studies course, the interfaces and challenges involved in combining the complexity worldview and forecast and foresight are made explicit. This ensures that the parts comprising the curriculum work in unison to form a coherent whole, rather than as separate bits and pieces that can cause confusion among students.

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