Wicked Problems in Health Professions Education: Adaptive Action in Action [version 1]

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Abstract
This article was migrated. The article was marked as recommended. Each educational institution is different. Every clinical setting is unique. Faculty members - clinical, academic, volunteer - are separated by discipline, history, and professional focus. Students begin at different places and learn in different ways. And yet, we focus on the standardization, rigor, and accountability to competencies and curricula in every facet of health professions' education. The search for consistency and control in such a highly variable system leads inevitably to intractable, wicked problems. Wicked problems are ones that cannot be solved using traditional methods. They are different from traditional problems, in that they are 1) defined differently from multiple perspectives, 2) appear differently in each different context, but follow consistent patterns wherever they appear, and 3) can never be completely solved. Problems that persist for educationalists in health professions meet these criteria and can be classified as "wicked" problems. Rather than solutions to wicked problems, practitioners must choose contextualized, iterative, incremental actions to influence their intractable patterns over time.

Keywords
Health Professions Education, Wicked Problems, Pattern, Adaptive Action, Human Systems Dynamics, Complex Adaptive Systems, change

Open Peer Review

Migrated Content
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1. Felix Silwimba, University of Lusaka
2. Alan Bleakley, University of Plymouth
3. Susan Van Schalkwyk, Stellenbosch University
4. Tim Dornan, Queen's University Belfast
5. Joachim Sturmberg, University of Newcastle, Australia

Any reports and responses or comments on the article can be found at the end of the article.
Introduction
At the Association for Medical Education in Europe (AMEE) conference in Helsinki, Finland in 2017, and Basel, Switzerland in 2018 approximately 150 and 100 health professions educators, respectively, engaged in an emergent dialogue process to address the wicked problems they face in their institutions. Using Open Space Technology (Owen 2008; 2018), the design of the sessions applied principles and practices from human systems dynamics. The purpose was to empower participants and encourage them to plan action that could influence patterns of intractable issues, even when complete solutions were impossible. This paper outlines the intractable problems they identified, explains the shared nature of these diverse issues in terms of complex adaptive systems, shares the principles and practices that were applied during the session, identifies some of the options for action they developed, and proposes recommendations for future research and practice to expand the use of complex adaptive systems theory and human systems dynamics practice to address wicked problems in health professions education.

The Problem
Some challenges in health professions education are easy to identify, analyze, and solve, but that is not always the case (Hall, 2002; Huwendiek et al., 2010; McKenna, 2012; Schuwirth and Ash, 2013). Other problems persist in spite of investments and innovations (Conklin, Basadur, and VanPatter, 2007a, 2007b; Irby, 2011; Maniate, 2017; Mennin, Curran, and Eoyang, 2016; Sullivan and Rosin, 2008; Writer, 2015). Table 1 provides a list of such issues that was generated by participants in symposia at the AMEE conferences. Participants were health professions educationalists from a variety of disciplines, roles, and institutions around the world. In spite of their diversity, they shared many of these same intractable issues. Some of the issues were related to curriculum, others to collaboration and conflict. The most frequently named concern was “resistance to change.” This list of issues represents a whole class of challenges faced by the people and institutions engaged in health professions education (Bleakley, Bligh, and Browne, 2011; Bloom, 1989; Mennin and Krackov, 1998; Mennin, Eoyang, and Nations, 2018).

While these broadly stated issues are consistently named across the wide range of participants, no two situations are identical. Each educational institution is different. Every clinical setting is unique. Faculty members-clinical, academic, volunteer—are separated by discipline, history, and professional focus. Students begin at different places and learn in different ways. And yet, we focus on the standardization, rigor, and accountability to competencies and curricula in every facet of health professions education. The search for consistency and control in such a highly variable system leads inevitably to intractable, wicked problems. Wicked problems are ones that cannot be solved using traditional methods.

They do not follow the assumptions required for usual analysis and resolution methods. They emerge from the dynamics of complex adaptive systems, so they exhibit open boundaries, multiple factors, and nonlinear causality (Cilliers, 1998; Eoyang and Holladay, 2013). All of these characteristics make reductionist, standardized analysis, replication of solutions, and predictable outcomes impossible. Rather than predicting the future, applying best practices, and searching for definitive solutions to such challenges, practitioners must find another path. As we learn from the sciences of complexity and chaos (Bak, 1996; Briggs and Peat, 1989; Gleick, 1987; Poole and Van de Ven, 2004; Uhl-Bien and Marion, 2008), the only reasonable path involves contextualized, iterative, incremental actions to influence the intractable patterns of these issues over time. Problems that persist for educationalists in health professions meet these criteria and can be classified as “wicked” problems.

Intractable problems like these are pervasive and persistent across a range of health professions educational environments. If traditional problem-solving methods worked, one would expect such challenges to be less frequent, less widely recognized, and less permanent. Since they emerge in radically different settings and persist over time, it is clear that current methods are not sufficient to solve them. Individuals, teams, and institutions cope with such problematic patterns, but sustainable success does not come often. Professionals need some alternative approach to help them see, understand, and influence intractable problems in healthcare professions education.

Wicked Problems
In the mid-1970s, Rittel and Webber (Rittel and Webber, 1973) identified a new class of problems in social systems, which they called “wicked problems”. In the decades since, the concept of wicked problems has been expanded and articulated in a number of ways (Zimmerman, Lindberg and Pseke, 2001; Weber, Lach and Steel, 2017). Three characteristics are common across diverse disciplines, theories, and stages of evolution of the concept. Wicked problems are:

1. Defined differently from different perspectives
2. Context dependent, but patterned across contexts
3. Impossible to solve completely
In practice, it is relatively easy to identify wicked issues. All the challenges defined by participants in our symposia (see Table 1) meet these three criteria. What is not so simple is to figure out how individuals and institutions should respond to wicked problems, given that they cannot be solved by traditional approaches. For this, we turn to the theory of complex adaptive systems (Dooley, 1996; Olson and Eoyang, 2001) and the practice of Human Systems Dynamics (G. Eoyang, 2011; G.H. Eoyang and Holladay, 2013).

**Table 1. Wicked Problems Identified by Participants at AMEE 2017 and 2018 Symposia**

| Collaborative planning and implementation of curriculum | Finding trainees who are prepared and motivated |
|--------------------------------------------------------|-----------------------------------------------|
| Competition among roles and values of student, teacher, research, clinician | High failure rate in first year |
| Conflict between individuals and among groups | Implementing new technologies and strategies to instruction |
| Conflict of interest between student, physician, faculty (pass, learn, become a doctor) | Managing at the nexus of teaching and research-finding synergy rather than competition |
| Creating learning environments that are staged and structured, as well as adapting to individual learning needs and pace | Medical education in time-poor clinical situations |
| Developing clinical practitioners into instructors | Negotiating research agreements across national, institutional, and departmental boundaries |
| Developing excellence in volunteer and clinical faculty | Politics in a medical university |
| Developing professional levels of oral and written communication skills | Promoting interprofessional education |
| Developing self-direction in students | Recruitment and retention of general practitioners and family practice physicians |
| Educational inequities in access to technology, insufficient early education, transportation, etc. | Resistance to change |
| Faculty resistant to learning about learning, pedagogy, and instruction | Teaching and assessing complex competencies such as ethics and social accountability |
| | Teaching and learning "on the job" for junior staff |

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**Human Systems Dynamics (HSD)**

Human Systems Dynamics (HSD) (www.hsdinstitute.org) is a field of theory and practice derived from applications of complex adaptive systems to wicked problems in human environments. It provides an alternative to traditional problem “solving” approaches and supports professionals as they encounter otherwise intractable issues. The characteristics of wicked problems stymie the assumptions of traditional problem-solving methods, but HSD models and methods support innovative, adaptive, agile approaches that tame wicked problems, even when the problems cannot be solved.

HSD is built on the foundation of a simple, iterative cycle called Adaptive Action. Iterative cycles are widely accepted as a learning process (Kolb, 1984). They are also recognized as a problem-solving and quality management method (Baxley, Hubbs, Shay, and Karanian, 2011). HSD focuses on such a cycle to see, understand, and influence the complex patterns of systemic interactions that generate wicked problems and hold them in place.

The HSD version of a problem-solving and learning cycle consists of three questions: What? So what? and Now what? Adaptive Action works across scales because an individual, team, group, or institution can use the same questions. It also works across time scales (addressing cycle times of seconds to decades) and applies to multiple contexts (applying to personal, professional, and social issues). The three-step process and the familiar language make Adaptive Action accessible to a wide range of audiences and environments. It is particularly useful in response to wicked problems because it responds to the unique challenges they present. We now explore the connection between the three steps of the Adaptive Action cycle and the characteristics of wicked problems.

**Diverse Perspectives-What?**

The first stage of Adaptive Action asks What? (Eoyang and Holladay, 2013, p. 32). This step requires the user to pause and reflect on what IS. Too often, busy professionals speed through this question and move into action without fully understanding the nature of the problem. HSD uses a variety of methods to help groups uncover multiple views of the essential pattern of a wicked problem.

At the AMEE symposia, the idea of wicked problems and Adaptive Action were briefly introduced as were Open Space Technology, and self-organizing conversation (Bates Evoy, 2016; Owen, 2008). We asked participants to identify wicked problems they wanted to focus on in small groups. People then organized themselves around the challenges that were most interesting to them. The first step of the exercise was to engage with wicked problems-What? Each person who was experiencing the same challenge was invited to share their views of the persistent patterns related to the group’s wicked problem.
In this short discussion, people realized that others shared the problem, but that each person saw the issue differently. The questions and insights came from different people around the circle with different roles, levels of experience, and personal perspectives. Each person added depth and complexity to the narrative of the wicked problem (Ripley, 2018). By the end of this segment, individuals were beginning to appreciate others’ views and to create a more nuanced and tractable vision of their own wicked problem. In some ways, this step gives hope to those who suffer from wicked problems. They come to realize that they are not alone and to move beyond blaming (themselves and others) for their persistent problems. These difficult issues get normalized, and each person acknowledges the myriad ways that the same wicked problem can emerge.

All data collected was group data. No individuals were identified. How many groups, size of groups, length of workshop, follow-up data from participants’ What? So What? Now What? that we’re complete were used as examples.

**Context Dependent, but Patterned across Contexts - So what?**

Even though wicked problems cannot be solved, they can be influenced. The purpose of this second stage of Adaptive Action—So what? (Eoyang and Holladay, 2013, p. 64)—is to set conditions for individuals to imagine a wide range of options for action. Given the complex nature of the challenge, a wide range of steps could make a difference in the wicked, complex, problematic pattern. By sharing their experiences and observations, groups begin to generate new and innovative options for action. The purpose is to be and to feel less “stuck” in the wicked pattern.

One real challenge of wicked problems is that they are recognizable from one place or time to another, but they never appear in exactly the same way. Resistance to change, for example, is a pervasive problem, but no two people will feel or express their resistance in the same way. To make it even more complex, a single person is likely to express resistance in different ways at different times. During the So What? phase of Adaptive Action, people engage with their own contexts and constraints to recognize what is unique about the problem as they experience it and to explore innovative actions to leverage the opportunities and constraints that are unique to the challenge currently.

In Helsinki and Basel, groups were invited to spend 20 minutes considering the question, “So what are the opportunities and constraints related to this wicked problem?” The experiences varied greatly from one group to another. Some conversations were dominated by individuals who thought they had a solution for others. Other groups got stuck in What? and continued to reiterate their problem descriptions—focusing on constraints more than opportunities. Many groups, however, began to unlock possible pathways for action that could shift the wicked pattern, even though it would not solve the problem (See Table 2 for some sample actions). Given the wide range of quality among the conversations in Helsinki, in 2017, we realized that the groups could have used more detailed guidance and facilitation in the process. Consequently, in the 2018 symposium in Basel, we increased small-group time and improved the handouts to guide learning.

**Impossible to solve completely - Now what?**

Solving problems is the ultimate goal in Western society (Jullien, 2004). Even beyond a cultural preference, this pattern is central to the roles of the health professional and the educator. Expertise is the goal, and expertise is defined by the problems we can solve. We should not, therefore, be surprised when wicked, unsolvable problems become such barriers to effectiveness and efficiency in health professions education. The third step of Adaptive Action—Now what? (Eoyang and Holladay, 2013, p. 82)—gives a disciplined alternative, when solution is not an option.

Our shared narratives often represent wicked problems as singular, coherent challenges. They are glorified as rocks in the road, walls to beat our heads against, or other kinds of immovable objects. Seen through the complex systems lens, with the aid of HSD models and methods, these wicked problems are converted into patterns. As opposed to problems, patterns exist at multiple scales. They have open edges and intricate structures within. Often, they can be seen to move on their own, without assistance from us. They are highly variable, so they offer a wide diversity of options for action.

When engaging with a problem as a pattern, the need for a solution evaporates. You cannot expect to change a whole complex pattern in one action. You have an alternative. Rather than removing the rock, one can merely shift the pattern, and it might become something altogether different. Or not! Complex adaptive systems are essentially unpredictable. There is no way to anticipate ahead of time whether an intervention will be a tipping point (Bak, 1996; Gladwell, 2000) to shift the entire system or merely a drop of water in the ocean. Still, as responsible professionals, health care professions educationalists must take action.

The Now What? step of Adaptive Action invites reasonable and practical action in a given moment and situation, even with incomplete information. People are invited to do something—anything that is reasonable based on what they discovered in So what? We call this choice the “next wise action.” It may not be the perfect action, and it certainly won’t
be the final action, but given what is known about the wicked problem-turned-pattern, it is the most wise action available. Physicians do this when they engage in presumptive treatment of a problem pending further evaluation.

One guideline is particularly important to effective Adaptive Action. Each situation is unique. That means that a next wise action for one person at one time in one context might not be so wise for someone else in another time and place. Each individual or group has to engage in its own Adaptive Action to find its own next wise action each and every time.

In their experience in the Open Space at AMEE in 2017 and 2018, individual participants saw and committed to new options for action. They had stated their wicked problems in similar ways, but because their contexts were so different, their wise actions were diverse. Some examples are included in Table 2.

Each of these proposed actions came from a participant, and no one committed to more than one next wise action. None of these actions will resolve the issue completely, but they will all make some kind of difference in the problematic pattern. Ultimately, even if the action does not work as planned, it will be an experiment that generates new understanding and options for the next Adaptive Action cycle.

The final point about the Now What? step of Adaptive Action is that it is never the end. Any action in a complex system brings unexpected consequences. That means that any “next wise action” will result in unpredictable system change, so every Now What? must be followed immediately with a next What? As each wise action generates consequences and impacts, the actor stays aware and adaptive to see what emerges (What?), to understand the changing patterns (So What?), and to choose the next, next wise action (Now What?).

The symposia sessions with participants was well received and useful for many. In retrospect, we would have made some design adjustments to accommodate the short, 90-minute session, the number and diversity of participants, and the expectations for applied learning. On the other hand, the session served as an experiment and a “next wise action” in building adaptive capacity for the complex field of health professions education.

**Conclusions**

Health professions educators face an array of wicked challenges that emerge from the complexity of their expectations and environments. As long as they struggle to solve the unsolvable, they will experience frustration and failure. On the
other hand, when we are able to distinguish tame, solvable problems from those that are wicked, we can access new methods of analysis and decision making that are fit for function in our complex, unpredictable, and fast-changing environments. Human systems dynamics offers one such pathway into effective action in complexity-Adaptive Action. The discipline of Adaptive Action guides individuals and groups to:

- **What?** Recognize the power of diverse perspectives when dealing with seemingly intractable issues
- **So What?** Acknowledge wicked problems as patterns, where each incident and each moment offer options for action
- **Now What?** Take a next wise action to shift the pattern and learn from the consequences, even when solutions are out of the question
- **Now What?** Continue the cycle of Adaptive Action to influence and tame wicked problems over time and contexts

**Recommendations**
This experience with wicked problems of health professions educationalists has reinforced some of our underlying assumptions and challenged others. We recommend that the practice be continued and expanded to build adaptive capacity for individuals and systems engaged in complex educational settings around the world.

For future Symposia using Open Space technology with diverse groups of educationalists to explore wicked problems, we recommend:

- Dedicate less time to theory and overview of concepts and more in the practice of Adaptive Action to allow groups to explore their own Adaptive Actions more completely
- Provide more specific instructions and tighter constraints in terms of the use of time, the focus on conversations, and the expected output from the groups to help improve the specificity of the outcomes
- Facilitate individuals’ commitments to executing their next wise actions and sharing their learning with others
- Provide a method for participants to report their actions and findings following the meeting and share those reports with others

For the application of Adaptive Action more broadly across the field of health professions education, we recommend:

- Document and distribute case studies where Adaptive Action has been applied to wicked issues in health professions education
- Select one particularly wicked problem that is endemic to health professions education. Apply Adaptive Action to that issue in a variety of settings and track results and impacts over time
- Embed the concept of wicked problems and Adaptive Action into training and education for health professions educators to help them develop reasonable expectations for themselves and increased adaptive capacity in response to complex challenges they face.

**Take Home Messages**
Wicked problems share three characteristics. They are: Defined differently from different perspectives; Context dependent, but patterned across contexts; Impossible to solve completely. Human Systems Dynamics is a field of theory and practice derived from applications of complex adaptive systems to wicked problems in human environments. The characteristics of wicked problems stymie the assumptions of traditional problem-solving methods. HSD models and methods support innovative, adaptive approaches that tame wicked problems. Adaptive Action is a simple, iterative cycle of three questions: What? So What? Now what? that works with wicked problems across time scales and multiple contexts.
Notes On Contributors
Glenda H. Eoyang, PhD is Founding Executive Director of the Human Systems Dynamics Institute. Circle Pines, MN US.

Stewart Mennin, PhD is a Consulting Associate at the Human Systems Dynamics Institute, Adjunct Professor, Department of Medicine, Uniformed Services Institute of the Health Sciences, Bethesda, Md., Professor Emeritus, Department Cell Biology & Physiology and former Dean for Educational Development and Research, University of New Mexico, School of Medicine, Albuquerque, NM USA. He is the author and creator of ESME, Essential Skills in Medical Education and ESIA, Essential Skills in Action.

Appendices
Appendix A lists participants at the AMEE Symposia on Wicked Issues held in Helsinki, 2017 and Bern, 2018, who contributed to the work represented in this manuscript and who gave permission to the authors to have their names appear in this manuscript.

Appendix A

| Name                          | Name                   |
|-------------------------------|------------------------|
| Aphang, Meylin               | Nevalainen, Maarit     |
| Arikoski, Pekka              | Noehr, Suzanne         |
| Bullock, Shane               | Norris, Madeleine      |
| Chang, Jason                 | Nowakowski, Michael    |
| Cheng, Nicholas              | Parish, Emma           |
| Chue, Shien                  | Petroni Mennin, Regina |
| Deshparde, Saee              | Pippa-Savolainen, Eija |
| Dimitriadis, Konstantinos    | Pope, Lindsey          |
| Ditchfield, Carol            | Prevost, Yolanda       |
| Edgren, Gudrun               | Raatikainen, Kaisa     |
| Gray, Amy                    | Rcsiweth, Anant        |
| Gummesson, Christina         | Roder, Carrie          |
| Hammond, Jennifer            | Rogers, Kem            |
| Heinaaho, Emil               | Rundlof, Anna-klara    |
| Helin-Salmivaara, Arja       | Schlegel, Elisabeth    |
| Hevenn, Maura                | Seddon, Kate           |
| Heyligers, Ide               | Smallwood, David       |
| Hultgren, Catharina          | Sornalingam, Sangeetra |
| Irish, Bill                  | Sum, Sutida            |
| Jason, Hill                  | Tan, Brian             |
| Jones, Liz (Linda)           | Tan, Chee-kiat         |
| Kligtgaard, Tine             | Tobin, Hannah          |
| Krishnasamy, Charmaine       | Tsai, Jer-Chia         |
| Lahtinen, Alexandra          | Tun, SanYuMay          |
| Lai, Christine               | van Dam, Marjel        |
| Launio, Sara                 | van Woozile, Tamare    |
| Luciom Machado, Jose         | Watter, Maria          |
| Ludman, Ronald               | Weissman, Gaby         |
| Luginbuehl, Helena           | Westberg, Jane         |
Appendix A Continued

| Name               | Name          |
|--------------------|---------------|
| McCrory, Richard   | Woon Li, Seo  |
| Metsavainio, Kirsimarja | Wozniak, Helena |
| Mier, Maria        | Yee, Look     |
| Myers, Junette     | Yeh, Huei-Ming |

Declarations
The author has declared that there are no conflicts of interest.

Ethics Statement
This was a public symposium at an International Congress of AMEE.

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Joachim Sturmberg
University of Newcastle, Australia

This review has been migrated. The reviewer awarded 4 stars out of 5

This article is a succinct description of a particular approach to managing wicked problems in the education sector. Not being – principally – an educationalist, I can clearly see the potential of this method in managing an – ? isolated – wicked problem. As an academic I share some of Tom Dornan's observations and would like to add another, namely the “system wide” perspective. A wicked problem, as described here, represents a phenotypical expression of a particular system's behaviour. Hence it is important to also map the system structure and connections that contribute to its dynamics, only then will one reach an overall appreciation of the problem in hand. This overall appreciation, I feel, will not only help to understand the issue more deeply but also find the “wisest” possible next step in managing the problem.

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Tim Dornan
Queen's University Belfast
This review has been migrated. The reviewer awarded 3 stars out of 5

This article draws a very important topic to readers’ attention: a tendency for people at the present time to represent educational problems as very tangible ones (‘incompetence’, ‘unsafe behaviour’, ‘unprofessionalism’, ‘inefficiency’) and place undue emphasis on applying predetermined solutions to remediate ‘perpetrators’ of these problems. The popularity of competence-based education, which focuses strongly on assessing individual students’ or doctors’ competence and bringing it up to acceptable levels, epitomises this. Enthusiasm for applying stock solutions to stock problems, which is widespread in contemporary society, has been termed ‘Fordism’ after Henry Ford, who pioneered a production line approach to manufacturing. The authors of this article are telling us that, rather than requiring production line methods, social problems tend to be complex and require craft rather than automation. I agree. The authors offer useful rules of thumb for the craft of tackling complex social problems.

I commend to readers’ attention some points made by the authors: that it is important to examine and explore complex problems carefully before attempting to solve them; that the imaginative development and evaluation of candidate solutions is a constructive approach to problems; and that taking an incremental approach is better than aiming to solve problems in one go.

As a post-publication reviewer, though, I think it is important also to provide a critical counterpoint to the authors’ narrative. There are some general features of the article that encourage scholarly criticism. For example:

• The narrative is descriptive and enthusiastic rather than critical; this should prompt caution
• It tends to make sweeping generalisation: ‘solving goals is the ultimate goal in Western Society’ (who's ultimate goal?); ‘expertise is the goal’ (who's goal?). We should be careful, then, not to be yield too willingly to the authors’ enticing advocacy for their approach

There is one specific feature of the article, which I feel particularly calls for critical comment: the authors are both affiliated to a ‘Human Systems Dynamics Institute’. I know nothing about the Institute and have no idea whether or not the authors have competing interests, nor am I particularly interested. As an academic critic, though, I am a bit bothered by the authors offering ‘principles and practices from human systems dynamics’ as a healing balm for the ills of our age. Specifically, the authors imply that human systems dynamics offers novel and unique insights. In reality, the principles and practices the authors espouse date back to the creative energy of Kurt Lewin in the middle third of the twentieth century, if not earlier. Quality improvement (QI), action research, and other cyclical improvement methods are based on just the same approach, even if they use a different language from the one the authors use. The one contemporary approach that, for me, adds real value to Lewin’s work is Engeström’s suite of ‘formative interventions’, based on Activity Theory. To conclude, I find the notion of ‘wicked problems’ relevant and helpful, even if presented in too catchy a way for my sceptical academic comfort. I support the authors’ general approach and hope readers will be motivated to persevere in tackling problems that don’t yield to their first improvement efforts. I urge readers, though, to see the central messages in all their simplicity rather than regard Human Systems Dynamics as ‘the’ approach. Action research has been described as a signature methodology for education research. Let’s give Kurt Lewin, who first thought of it, credit for his relentless pursuit of social justice. Let’s be inspired by Eeyong and Mennin to continue Lewin’s mission in the present age. For those who want genuinely new ideas, I commend the work of Engeström. Tim Dornan
**Competing Interests:** No conflicts of interest were disclosed.

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Susan Van Schalkwyk
Stellenbosch University

This review has been migrated. The reviewer awarded 5 stars out of 5

I agree with the previous reviewers that this is really an excellent article. I am familiar with human systems dynamics and the adaptive action process, but found this well-described and practical application most useful. The notion of problems not having solutions potentially frees both students and educators from the burden of always having the answer. It gives us license to essentially ‘sit with’ challenges (focus on the ‘what’ and the ‘so-what’) before rushing into ‘now what’. These are important ideas. It was also great to read about the outcomes from the two AMEE symposia emphasizing the value of this type of engagement at conferences to give ‘voice’ to a large group and to build shared understandings (look for patterns), among a wide range of health professions educationalists.

**Competing Interests:** No conflicts of interest were disclosed.

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Alan Bleakley
University of Plymouth

This review has been migrated. The reviewer awarded 5 stars out of 5

This is a terrific article and such a privilege to review. The authors frame insoluble contradictions in healthcare education as ‘wicked problems’. Where we frame issues as problems we search for solutions, but wicked problems demand another mindset – first, one of appreciation (pattern recognition); and second, of “wise action” (contextualized, probably partial, but innovative). Contradictions usually arise
from the concrete reality of complex and turbulent practice presentations meeting the idealism of approaches such as competence-based learning that stress standardization such as uniform outcomes. As I read the clear and expertly framed Abstract I thought of the tensions between ‘smooth/ de-territorialized’ and ‘striated/ territorialized’ phenomena articulated by Deleuze and Guattari. The authors are experts in the field of complexity thinking applied to healthcare education and practice. Here, they remind us that ‘problem solving’ is an inappropriate strategy for facing wicked problems. They also point out that while intractable problems do not invite solutions, they do present as patterns that can be appreciated, understood and influenced. This is best achieved through working knowledge of complex adaptive systems theory and systems dynamic practice. The paper presents results of a collaborative dialogue across a large number of informed health professionals bringing a range of wicked problems identified within their communities of learning and practice. The most frequently identified complex issue was “resistance to change”. (This has been identified in Yrjö Engeström's work as regression to tradition or ‘will-to-stability’, rather than progression to innovation as ‘possibility knowledge’ or learning-for-change, where an individual locus of expertise shifts to a collective locus of expertise). The authors list 23 such wicked problems that, in both Activity Theory and Actor-Network Theory, would be termed ‘contradictions’ and would be seen as sources of potentially productive change rather than regressive frustration and crystallization. Such wicked problems could potentially expand activity systems or learning frames as long as the mindsets of participants also changed to embrace their structures - defined by complexity and open (human) systems dynamics. This means defying reductionism to embrace the artistry of learning and practice, and adopting incremental and iterative activity that is contextualized and multi-faceted. The authors again make a persuasive case for adopting sensemaking that embraces intractable problems rather than using reductionist approaches. We might compare this with Nietzsche’s ‘philosophizing with a hammer’. By this Nietzsche did not mean just hitting hard, but rather choosing the right tool for the job – the authors, from their own innovative modeling – stress “adaptive” and “agile” approaches to “tame” wicked problems. (I have a bit of an issue with “tame” – isn't the approach the authors describe more one of ‘alignment’ and ‘appreciation’, developing adaptive actions that are at once appreciative and active?) Through a ‘what?’, ‘so what?’ and ‘now what’ cycle, participants engage at a deep level with wicked problems. This turns events into experiences, and is beautifully and clearly described – a joy to read! I am a bit of a stickler concerning ‘data’ as plural (‘datum’ singular). Thus, “all data collected were group data” (not “was”).

**Competing Interests:** No conflicts of interest were disclosed.

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Felix Silwimba
University of Lusaka

This review has been migrated. The reviewer awarded 5 stars out of 5

this conference report has made me aware of issues have questioned concerning the conduct of lecturing staff and students in university. I now appreciate wicked issues. it is a very educative write up.

**Competing Interests:** No conflicts of interest were disclosed.