

Evaluating the Complexity of Service-Learning Practices: Lessons From and for Complex Systems Theory

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Abstract

This article examines the intersection of service-learning with complex systems theory. It is based on a research project we undertook to explore whether complex systems theory might be useful for better understanding the dynamics of service-learning practice and thus for assisting in the design, running, and evaluation of service-learning projects. Additionally, we were interested to find out whether the specifics of our service-learning experience and knowledge, what we refer to as “critical service-learning,” might have something of value to contribute to the interdisciplinary and ever-broadening paradigm of complexity studies. Our findings respond to these two tasks in the affirmative: We conclude complex systems theory can be of benefit to service-learning practice in a conceptual, operational, and strategic capacity. In instances where critical service-learning practice initially appears to be incongruent with complex systems theory, conversely these instances instead highlight precisely how service-learning could advance the analysis of systems in complexity studies.

Keywords: critical service-learning, complex systems theory, community engagement



For those involved in the delivery of service-learning, it is self-evident that this practice is complicated and complex. But could it be that service-learning is “complex” whereby this term is said in the technical sense given it by *complex systems theory* (CST)? This article will share the findings from research we recently completed that evaluated the complexity of service-learning practices in our university department. In addition to assessing the appropriateness of CST for understanding the dynamics of service-learning, our research also sought to (a) explore the extent to which the framework of CST could identify strengths/weaknesses in our service-learning practice, leading to adjustments in practice, and (b) explore whether our experience and knowledge of service-learning might in turn have insights to offer the interdisciplinary paradigm of CST.

Although CST is by no means a new conceptual paradigm for assessing social-physical systems and phenomena, its use in service-learning and community engagement environments is still relatively novel. To the best of our knowledge, this research is the first to explore the intersection of CST with the knowledge and practices of service-learning. We believe there is much to be gained from this encounter. To begin with, CST has proven to be a powerful tool for assisting community-led transformation (Durie & Wyatt, 2013), and there is every chance that service-learning practice could benefit from drawing on these findings. In the other direction, the field of service-learning has itself produced much knowledge about systemic processes and transformation that could potentially enhance our understanding of complex systems. We would thus anticipate that there are many and varied contributions that could be made in this area to cross-pollinate CST and

service-learning. Thus, our intention with this article is not to provide a definitive and comprehensive account of the CST–service-learning nexus; rather, we hope that in time it will be viewed as the opening salvo of a long and fruitful exchange.

For the service-learning practitioner this article is intended to open up one new and potentially useful avenue for theorizing and reflecting on practice, with the aim of developing and validating that practice. The very complicated and complex sets of relationships and structures involved in facilitating service-learning are understood and deeply felt by all of us working in this field and have indeed been theorized elsewhere (see, for example, Osman and Castle's [2006] use of critical education theory and McMillan's [2011] work using activity theory). What a complex systems lens might bring to us is a way of systematically describing, naming, and understanding our service-learning practice and helping others—such as senior administrators and managers, but also students—to appreciate this complexity too. Some of the principles of CST had immediate and deep resonance for the current authors as service-learning practitioners. As the article will explore, key characteristics of complex systems—such as their open, emergent, and nonlinear nature—appear to align well with the features of service-learning. Aside from motivating the research, this apparent synergy indicates why and how CST can be useful for the analysis of and approach to service-learning.

After providing some contextual background to our service-learning endeavors and the paradigm of complex systems theory, the article will outline our research activity and the key findings—namely, the role that value alignment, structures and systems, and time and rhythm play in the success or failure of service-learning projects. This will be followed by an analysis of the “complexity” of service-learning at Nottingham Trent University (NTU), after which we will engage in a more reflective discussion about the lessons from CST for service-learning, and vice versa.

Background

Critical Service-Learning at Nottingham Trent University

As practitioners and scholars of service-

learning will be well aware, a significant amount has been written on what service-learning is and how it could or should be defined. Reviewing the details of this literature is beyond the scope of this article. Nonetheless, it is necessary to provide a brief overview of how we understand and practice service-learning here at Nottingham Trent University, so as to give some context to our recent engagements with complex systems theory and the research this article is based on.

We began service-learning in our Department of Sociology at Nottingham Trent University (NTU) in 2013 with a small pilot of two community partners and two small groups of sociology students. The following year it became credit bearing and core for three courses in the department (BA Sociology, BA Criminology, and MA Sociology). Since the pilot we have moved deliberately toward developing “a critical approach that is unapologetic in its aim to dismantle structures of injustice” (Mitchell, 2008, p. 50). In our view, this commitment to social justice, and not simply a focus on student transformations, is key to differentiating *critical* from *traditional* service-learning (Butin, 2015; Martin & Pirbhai-Illich, 2015; Mitchell, 2008; Mooney & Edwards, 2001). This intentional direction is in response to both our disciplinary focus and the significant issues evident in our city. To highlight some of them, Nottingham is ranked the eighth most deprived district in England out of a possible 326 (Department for Communities and Local Government, 2015). Nottingham also has the lowest household disposable income in the United Kingdom, high levels of hate crime, and increasing levels of child poverty (End Child Poverty, 2018). Our city is home to two of the largest universities in England, yet statistics also show that one suburb of Nottingham has the lowest number of young people applying for university places in the United Kingdom. This rather bleak picture of our city sets the justification and context for our service-learning activities—we want to work in solidarity and toward change with our community. As a result, service-learning for us is less a pedagogical practice and more an active partnership with the community working on the pressing issues in our city.

In making these claims we maintain that the student experience is not depoliticized. In our service-learning we ask students to

unravel the root causes of why their service exists in the first place and to do so within a disciplinary framework of public sociology and public criminology (Barrera, Willner, & Kukahiko, 2017; Butin, 2010; Mitchell, 2008; Petray & Halbert, 2013). In attempting to ensure that our service-learning does not reinforce privilege, the establishment and promotion of shared values that can guide practice takes precedence in our work (Butin, 2010; Jerome, 2012; Ledwith, 2015; Marullo, 1999; Mitchell, 2008). These values center on working in partnership on authentic community needs, mutual and reciprocal benefit, critical reflective practice, and creating opportunities for a more porous and dynamic university (Duncan, Manners, & Wilson, 2014). Furthermore, we hope to enhance disciplinary connections and for students to understand root causes from their own experiential perspective. The pedagogical aspect of our service-learning is thus encompassed within a broader framework of social justice and activism that operates through collective endeavors, thus challenging the dominant discourse of “the student experience” as being individualized and consumerist.

In practice what does this look like? In the current academic year, 2018–2019, this involves around 280 students across the three courses, working with a range of community partners. This number is set to rise to approximately 350 next academic year. All of the community engagement and partnership work, academic preparation, and the matching of these two parties takes place within the department and is done by two academic staff, one of whom is part time. Throughout the duration of the service, workshops and seminars are supported by six additional colleagues. Students work in groups of varying sizes in partnership with not-for-profit organizations across the city on social justice projects identified by the community partner. Numbers of partners vary each year but average 25, which generally equates to the same number of projects. The actual service varies according to the organization, but examples might include undertaking a focused research project on an issue—for example, understanding hate crime across the city, helping at a community kitchen in a neighborhood, and working with activist groups on issues such as street harassment or homelessness in the city. Other projects have been more ambitious and have an on-going impact not just on local communities

but on national debate and policy. Students, we argue, should not “fill” core business nor draw resources from the organization. Rather, through projects agreed on with the partner, students undertake work that the organization would otherwise not be able to do, leading, we hope, to transformations in the city and our students.

The next section will attempt to briefly explain complex systems theory. As noted in the introduction, for the current authors there was an immediate recognition of some of the elements of CST in the practices of service-learning. That said, we recognize that complexity theory can be challenging when first encountered, particularly in the abstract. To assist in this regard, examples of the principles outlined below will be explored in relation to service-learning in the Findings and the Further Discussion sections, in contexts that may be more familiar to the reader.

Complex Systems Theory and Community Engagement

Complex systems theory, or complexity theory, is a theory that describes how phenomena emerge through the interaction of elements in a system. Initially developed in the natural sciences to explain and model biological and physical change, CST has since been appropriated and further developed by other fields across the social sciences and humanities. For example, in economics CST has been used to better understand market fluctuations (Beinhocker, 2007), and in health policy the principles of complexity have been deployed in order to improve community health outcomes (Durie & Wyatt, 2007; Hawe, 2015). Other examples include the use of CST for assessing the dynamics of systems and problems that involve both human and nonhuman components, such as weather systems and traffic flows. CST has been closely affiliated with chaos theory and nonlinear dynamical systems theory; however, it should be noted that CST is a broad and contested paradigm lacking consensus as to its precise definition. In other words, CST is not a formalized system of axioms and theorems, nor can its foundational principles be confined to a narrow field of scientific theory. That being said, researchers who draw from and apply CST generally agree on the following:

- A complex system is composed of a large number of elements that interact reciprocally with each other

and their environment, which is to say that elements within a complex system are coadaptive or coevolving.

- Following from the above, a complex system is an open system (rather than closed) that continually responds to changes in the environment, just as the environment itself adapts to changes among its elements (Durie & Wyatt, 2013).
- As such, a complex system cannot be reduced to the sum of its component parts, for it holds the potential to produce new phenomena and characteristics that are emergent from the dynamic relations of elements within the whole and their environment.
- These dynamic relations are nonlinear as opposed to linear, which is to say that (a) the system has a disproportional relation between inputs and outputs, and (b) the system disobeys the superposition principle, where the net response caused by two or more stimuli is the sum of the responses that would have been caused by each stimulus individually. As a consequence of this, a small event can lead to a big change—the so-called butterfly effect, in which the flapping of a butterfly's wings leads to wide-ranging systemic changes.
- Due to the open, emergent, and nonlinear characteristics of complex systems, there is limited predictability as to how the system will change over time (with such knowledge often dependent on the extent to which facets of the system can be mapped onto linear schema that serve as temporary estimates).
- Nonetheless, complex systems are path dependent or historically dependent, which is to say that the specifics of a developmental progression play an active role in determining the outcome of a complex evolution.
- Operative in complex systems are negative and positive feedback loops, the former of which return the system to its initial conditions (by making adjustments to cancel

out emerging divergences), and the latter of which amplify divergences.

- When divergences within a complex system are amplified, taking that system far from equilibrium, the system is said to be at the *edge of chaos*—that is, in a region between the prior ordered state of the system and terminal chaos. In this region, self-organization occurs through the exploration of *adjacent possibles*, leading to the emergence of a new schema—a *phase transition* (Kauffman, 2000).

When assessing the complexity of systems, it should be borne in mind that complex systems will rarely if ever display all of the above characteristics in their fullness at every moment. This is an important point to make, for it reminds us that complex systems transition through different phases and the absence of any particular characteristic from the above list at a given time does not necessarily mean that the system is noncomplex. For example, a complex system may experience a long period of stability with minimal emergence, after which an event sparks a process of divergence leading to systemic change. An assessment that is restricted to the period of stability might therefore incorrectly conclude that the system did not display characteristics of complexity.

A recent paper by Durie, Lundy, and Wyatt (2018) has demonstrated the significance of attending to such nuances when evaluating the complexity of social systems. In their study of community engagement projects that involved partnerships between academics and people/institutions outside academia, the research results initially appeared to be contradictory: Although some successful partnerships clearly exhibited characteristics of complexity, others did not. With further reflection, however, the researchers accounted for this discrepancy by taking into greater consideration the particular phase that projects were in when exhibiting complex or noncomplex characteristics. As they concluded, CST is indeed a valuable paradigm for evaluating and designing community engagement partnerships, provided that a multiphase model is employed that attends to the differences between (1) the *engaging phase*, in which relationships and parameters for engagement are developed; (2) the *project phase*, in which the now-constrained project is car-

ried out or delivered; and (3) the *follow-on phase*, in which evaluation of the completed project and renegotiation of potential future engagements occurs. According to this multiphase model of engagement, the first and third phases display characteristics of complexity, whereas the second does not in projects that are “successful” (Durie et al., 2018, pp. 127–130).

Building on research in the social sciences that draws on CST, and in particular the work just described, our research sought to explore whether CST might be of use to service-learning and vice versa. For example, could the three-phase model proposed by Durie et al. (2018) help us to understand and potentially reshape some of our service-learning practices? And in the other direction, might the principles and experiences of service-learning at NTU provide lessons, or at the very least additional examples, that are of use for our appreciation of social complexity?

Methodology

The research might best be described as employing a case study design, with the case being NTU’s service-learning provision and the “embedded units” (De Vaus, 2001) being community partners, students of different levels and disciplines, and staff. Structural elements of the service-learning provision are also units to be analyzed, such as assessment types and timings. Including the widest range of embedded units, we aim to understand more than “something qualitatively different from, that which any constituent element of the case could tell us” (De Vaus, 2001, p. 221). The inclusion of different elements means that a variety of different methods may be appropriate and necessary (De Vaus, 2001), and in our research we included one-on-one in-depth interviews, focus groups, and a participant validation event.

An important strength of case studies is their ability to be used for theory testing, which is a central aspect of our research. De Vaus (2001) claims that they “seek to achieve both more complex and fuller explanations of phenomena” (p. 221), enabling both ideographic and nomothetic explanations. This is important for us, as it will allow us to identify unique elements of our practice as well as to consider what we can generalize about complex systems theory and its value for understanding what

makes a successful service-learning project.

Case studies are intended to study “wholes rather than parts” (De Vaus, 2001, p. 231), where there is a small number of cases with a large number of variables. The application of CST to our service-learning means that we are conceptualizing our service-learning as a system, as a whole, and are keen to explore how the large number of variables or elements interact to produce a successful outcome or not.

Within the larger case, three distinct service-learning projects, embedded cases, were selected for analysis: one BA Criminology project, one BA Sociology project, and one MA Sociology project (Table 1). As well as spanning the three courses in our department where service-learning is a core element, the three cases were selected using a form of theoretical sampling, allowing us to access the social processes of interest to our research, and this led to the selection of cases or participants “where the phenomena in which the researcher is interested are most likely to occur” (Henn, Weinstein, & Foard, 2009, p. 182). As we were seeking to understand whether CST could help us to understand what makes a successful service-learning project, we selected projects that we perceived to have achieved various levels of success—based on anecdotal evidence—as well as having a variety of project trajectories. Students, community partners, and academic staff involved in each project were interviewed, providing a holistic understanding of the processes involved in each case.

One-on-one interviews with community partners and focus groups with each student project were conducted by a researcher who was not part of the teaching team. We were concerned with preexisting relationships and the extent to which they might cloud the research relationship and, in the case of the students, the power imbalance between them and an academic member of staff who had taught them and graded their work. A focus group of the academic staff who had developed and taught the various service-learning modules was facilitated by one of the current authors who sits outside the service-learning team. Finally, a negotiated feedback session was organized to share the initial findings of the project with the research participants, allowing for an evaluative discussion that fed back into the analysis of the data and led to refining the cross-cutting themes. The approval of

Table 1. The Case Studies

<p>Project A (BA Criminology) This project involved seven students working with an anchor organization in a Nottingham neighborhood on a project designed to help new arrivals to the city to integrate better with the help of a “welcome pack.” This involved interviewing members of the community for whom the welcome pack was created. The project’s trajectory was smooth, with few obstacles or unexpected events; the project outcomes were achieved with all the information for a welcome pack researched and pulled together by the students. The community partner and the students perceived it to be a success.</p>
<p>Project B (BA Sociology) This project involved six students working with a very small community organizing project, seeking to promote social action in Nottingham neighborhoods. The project aimed to address the divide between younger generations and older generations of social groups in Nottingham, challenging the perception that older people and younger people have little in common and therefore have little to offer the other age group. The output of this project was to hold a meet-and-greet event across all age groups whereby life stories were shared with one another and commonalities discussed across the generations. Numerous obstacles occurred during the project phase: For example, the sole employee of the organization did not live in Nottingham and could not meet the students for the first few weeks of the project phase. The outcome desired by the community partner was not met in that the meet-and-greet event did not take place. The project was perceived to have failed by the partner and by the students.</p>
<p>Project C (MA Sociology) This project involved working with an organization run by and for migrants and refugees to Nottingham, aiming to support their integration. This was part of a wider collaborative project with other community partners who were producing multiple outputs for policy change. One of the MA students, X, already volunteered there and took the initiative to develop the service-learning project. It started as a solo project for her (most MA students do solo projects), with two other students being recruited partway through the project—which is not a standard trajectory. X was the lead student, mediating between the organization and the other students, with the latter never going to or meeting with representatives of the organization. The project was deemed a success by both the community partner and the students.</p>

the School of Social Sciences Research Ethics Committee was obtained prior to data gathering.

Findings

The data was subjected to two levels of thematic analysis: an initial level that aimed to articulate emergent cross-cutting themes and a second level that examined the data through the lens of CST.

Cross-Cutting Theme 1: Values

It is perhaps to be expected that when reflecting on their service-learning projects—how they began, proceeded, and

ended—many interviewees commented on the importance of values, such as the values that motivated their initial involvement and/or guided their activity. For example, one student from Project A said that their reason for joining the project was that they identified with the people that the organization provided services for, and that they wanted to assist those in a similar situation. This indicates the significance of value alignment between participants in a project. It must be noted, however, that close value alignment is not always necessary for the success of a project, and it certainly does not guarantee it. Moreover, value alignment can undergo processes of divergence or convergence during the course of projects.

These contrasting processes were borne out in the projects that we examined, as shown in Table 2. Project A, which was deemed successful by all participants, exhibited a tight alignment of values from the early stages of the project and throughout, with no appreciable shift in the quality or closeness of their commitments. Project B also commenced with a close alignment of values that was maintained through the project; however, it was agreed by all that the project ended in failure due to a range of other reasons, including poor communication and a loss of trust, leading to a lack of motivation. Unlike Projects A and B, the partner organization for Project C did not have a preexisting relationship with NTU, nor were they familiar with service–learning. But it so happened that this organization took value alignment very seriously and had established processes for ensuring that this occurred between collaborators prior to the commencement of the project. According to the participants in this project, the process of value alignment during the engaging phase of the project was central to their subsequent success.

[W]e interviewed them, because that’s what we do and we know how to do that. Now I know how to work out who’s a good student and a bad student, and we did that quickly with [X], we said she is a good student. I would say that it worked for us. . . . She was very honest from the beginning; she mentioned that . . . there was a passion although she had uni work, she was organised. (Project C partner)

Cross-Cutting Theme 2: Structures and Systems

The importance of structures and systems to the functioning of the service–learning projects was most evident, though in different ways. The students of Project A,

which was thoroughly successful, made use of meeting patterns initially formed by the module timetable to ensure regular and familiar modes of communication. As for the partner organization, they brought to the project well-established institutional structures for engaging with students, which were said to have greatly assisted the smooth running of their project. The same was the case for the partner organization of Project C, which had strong structures in place prior to the engaging phase and systems for supporting the students. As the partner explained:

As an organisation, as part of commitment, if we take on a student, we need to be prepared, we need to have a job for that student, we don’t expect them to come here and start twiddling their thumbs because they don’t know what to do. When they come here we want to know what they’re going to do. How they will be supported and all of that. (Project C partner)

This project also benefited from one student serving as the liaison between the partner and student group, with regular meetings to brief both groups. This communication system emerged dynamically through the course of the project. Although it seems to have assisted the smooth running of the project, it would be difficult to generalize and recommend this system more broadly, since it seems just as likely that it could be a hindrance in other situations.

As for Project B, which was deemed a failure by participants, there was a distinct lack of structures for engagement between the students and partner. This appeared to hinder the progress of the project, ultimately leading to its premature end. For example, the initial meeting between students and partner was delayed by several weeks, and when they did eventually meet, there was

Table 2. Value Alignment Across the Projects

	Project A	Project B	Project C
Successful?	Yes	No	Yes
Values aligned in engaging phase?	Yes	Yes	Yes
Shift in alignment during project phase?	No	No	No
Previous experience with NTU service–learning?	Yes	Yes	No

very little structure put in place to ensure the project's objectives were going to be met by the intended deadline. As the project disintegrated, the partner withdrew from the engagement, and the students turned their focus to ensuring that they were still able to complete the module by satisfying the assessment demands.

Cross-Cutting Theme 3: Time and Rhythm

All participants spoke of issues relating to time and rhythm and how this impacted the levels of success of their project. Participants spoke of "good time-keeping" relating to punctuality and meeting deadlines, being aware of and accommodating other commitments that students or the partner organization had, setting aside time for certain elements of the project, and understanding the ongoing nature of the project's long-term aims. Establishing the "time" and "rhythm" at the beginning of the project was crucial in ensuring that the rhythm continued throughout.

For Project A, the members spoke of setting informal and unwritten ground rules very early on regarding punctuality and deadlines. Also, as the project went on, a rhythm developed that allowed the students to assess the project structures and flexibly accommodate any changes. For example, the students realized that meeting physically every week was unnecessary and that communication could instead occur through online updates and scheduled meetings when needed. Another element that aided this flexibility without hindrance was the partner's knowledge and appreciation for the students' additional workload outside the project.

So, in terms of me managing the project it was me managing their workload and making sense of that with them but also making sure that we were fulfilling their university criteria . . . it was important that they felt that they were being successful both in their studies and in doing a project that had some meaning to it. (Project A partner)

Project C also had positive experiences of time and rhythm, but for them this arose from the flexibility and alteration of time and rhythm throughout the project. As an example, on two occasions the deadline for this project was pushed back, but the stu-

dents accommodated this by shifting their other work around—an outcome that the students were grateful for later in the year.

With service-learning as well, there were deadlines that we had to produce our poster presentation and then was it two days after that something needed to be submitted to [teaching staff member], what we'd actually done. Ours had already been sent off and everything created but for other people, some of them are still probably doing service-learning now having given only a small brief. (Project C student)

Project B operated quite differently from the two described above. Although the students spoke of bonding a lot in the first few weeks of the project, little progress was made on the actual work of the project. By the time the students met with their partner, a pattern of inertia had already set in, making it difficult to generate momentum. In their words, the project took "too long to begin" and was replaced with a sense of "I'd rather just get it done with now." The partner then reinforced and solidified this negative sentiment:

So if I was to show you the dates [of e-mail communication] you'd see how derailed it became right from the beginning because only one person sent me back the first ya know research task. So then where . . . what am I supposed to do, follow them all up individually? Well that's just going to eat up all of my time, and I'm not going to do that, you know? (Project B partner)

Although the three themes identified in the research findings came through very strongly individually, we also saw overlaps and interlays between them. Figure 1 uses a Venn diagram to illustrate examples of this. For instance, issues of time and rhythm overlap with systems and structures in instances where community groups and the university operate according to different calendar and/or funding cycles (e.g., the academic year and grant timelines).

The Complexity of Service-Learning at NTU

Service-learning at NTU is clearly com-

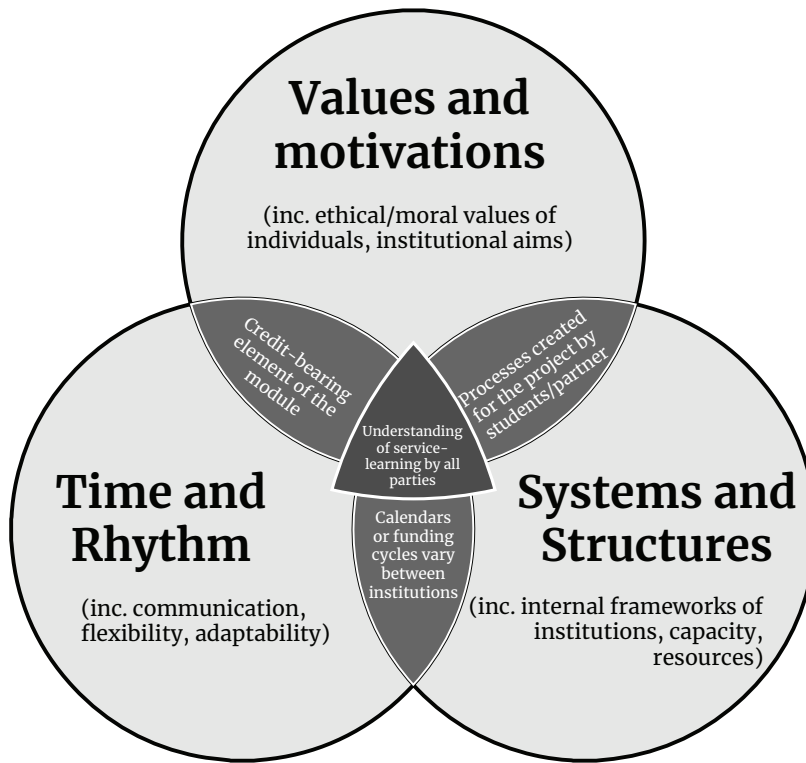


Figure 1. The Three Main Cross-Cutting Themes

plicated, but is it complex in the sense of complex systems theory? At the descriptive level the answer is yes, in a variety of ways. When each project is assessed as a system, it appears to us that each is composed of numerous elements that interact reciprocally with each other and their environment in a manner suggestive of coadaptation. It would be equally accurate, and we feel uncontroversial, to say that each project was an open system that displayed emergent behavior, limiting as a result the level of predictability. The extent to which these characteristics were present in the projects examined, however, varied. Moreover, the more successful projects appeared at first to be less open and exhibit greater predictability.

At this point we must draw attention back to the research conducted by Durie et al. (2018). In accounting for these results, Durie et al. concluded that successful projects often exhibited noncomplex features in the project phase of the engagement but were usually complex in the prior engaging phase and subsequent follow-on phase. Our data, however, appeared to suggest some results to the contrary. For example,

although the process of value alignment in Project C could be thought of as one of emergence, this entire process was guided by a predetermined structure/system created by one party and imposed on the other. Indeed, service-learning more broadly could be said to often operate in this manner, most explicitly when it comes to the classroom learning that students must navigate in order to take part in service-learning projects. Similarly with Project A, much of its success was due to the fact that the partner came to the engagement with predetermined structures/systems and expertly managed the relationships with students so that everything went according to plan. The students no doubt played their part in the success of this project, but it would be difficult to say that this project was an overt example of CST in action. This example, to be sure, does not invalidate CST, but it does require that one take a broader view of the system and its history. To illustrate, although the engagement between partner and students often appeared to be noncomplex, this set of relationships itself sits within a larger set of connections between the service-learning staff and the partner/

students—and this network of connections of course has a history. When seen from this processual long view, stretching back to the initial interactions between the service-learning staff/program and the partner, it becomes easier to see how the phenomena of a stable and productive relationship and set of systems was the emergent result of coadaptive interactions. The current state of the system could also now be said to exhibit negative feedback loops that maintain the status quo and indicate the path-dependency of future engagements.

As for Project B, CST would again seem to provide useful explanations for the dynamics of its unfolding. For instance, we could say that the system was nonlinear, with a disproportional relation between inputs and outputs—for example, the 3-week delay in the initial meeting between partner and students that produced a terminal tailspin. The project could also be said to have experienced a positive feedback loop that amplified divergence leading to chaos. That being said, one could argue that this project suffered because it failed to take on board some of the lessons from CST, such as the importance of reciprocal interaction in the early stages of the engagement (the engaging phase) that lead to the emergence of a well-functioning system with shared values and practices.

This brings us to a reflective consideration of the lessons that can be potentially learned from CST for service-learning and vice versa.

Further Discussion

Lessons From CST for Service-Learning at NTU

It would be a stretch to say that our recent engagement with CST has completely revolutionized our understanding and practice of service-learning. Nevertheless, we have found the process to be productive in a number of ways. To begin with, CST, and in particular the multiphase model for its application devised by Durie et al. (2018), has assisted us in our thinking about the different phases of service-learning work and the various dynamics therein. The data from our research may have presented contrasting dynamics within each phase, as opposed to a shared pattern of dynamics across the projects, but the more significant lesson we draw from this is that different phases of a

project will display different dynamics of complexity, and projects could perhaps be usefully designed accordingly.

A further, and no less important, effect of the multiphase model is that it has allowed us to explicitly name and point to these phases when discussing service-learning with colleagues and management. In our experience, adequate resourcing of service-learning has been an ongoing struggle. This situation has been exacerbated by a lack of recognition for the vital work that is done in Phases 1 and 3 of service-learning—the engaging phase and follow-on phase. All university modules of course involve preparation prior to their delivery, but it would seem to us that the preparatory work required for service-learning—in the form of developing new partnerships, maintaining/ updating existing ones, and creating a roster of projects for students—is exceptionally high year-on-year (compared, for instance, to a standard module that can be repeat taught with minimal change to the content). Because of this, the underappreciation of the engaging phase of service-learning work has led in our case to an unsustainable situation that not only increases the likelihood of staff burnout but also places the service-learning program in jeopardy. As for the follow-on phase, if this were given greater attention, it would allow for successful projects and partnerships to be more effectively captured and built on, thus improving sustainability and mitigating the amount of work required in the subsequent engaging phase of the next cycle. It goes without saying that the service-learning provision, and the benefits from it that are enjoyed by all those involved, would be much improved if all phases of the service-learning cycle were further recognized and resourced.

Aside from helping to highlight the resourcing and capacity issues of service-learning provision, our encounter with CST has also encouraged us to think more deeply about the ways in which we as a team equip our students with the resources to successfully deal with complex and difficult situations. By recognizing that what students experience may not just be messy and “unpredictable” (Deeley, 2015) but might also take them “to the edge of chaos,” it raises questions about how we support students through this experience. Prior agreement on shared values among the people involved in a project can no doubt be of assistance

in times of difficulty; however, as our data demonstrated, it is not a sufficient criterion for success. Alongside values we therefore need to recognize the benefit that clear structures and systems can bring to the service–learning process. Although this is, in one respect, an obvious thing to state, the point is not that structures and systems should be created and imposed in order to eliminate the effects of complexity; rather, their use is for preparing participants to deal with complexity in a way that maximizes positive “sayings, doings and relatings” (Kemmis, 2009). Moreover, CST can help those involved in service–learning activities to critically reflect on their sayings, doings, and relatings, and also recognize the impact that these might have had in their project trajectories. When combined with the above lessons from complexity, this means three things in terms of our practice:

- giving students a very clear framework for their projects within the multiphase model;
- introducing students to the CST paradigm so that they can see how complex systems are composed and anticipate disequilibrium; and
- providing students with a very structured training process in reflection, using, for example, the DEAL model of reflection developed by Ash and Clayton (2009), so that if or when students approach the edge of chaos in a service–learning project, they are equipped to analyze the specifics of their development progression and how that has determined or conditioned the outcomes they are experiencing, thus putting them in a stronger position to explore adjacent possibilities and to bring the project back to equilibrium.

A final lesson from CST for service–learning that we would like to briefly mention concerns the broader education context: How does a practice that we claim is complex and potentially chaotic sit within the current UK higher education landscape that is so focused on the metrics of measuring the student experience? How does service–learning perform in such metrics, and what risks are service–learning staff exposing themselves to by taking on this singular and complex practice? If compulsory university-wide evaluation tools are administered at

the point when students are at the edge of chaos, what price does the service–learning practitioner pay for this? These concerns are particularly important to address given the comments above about organizational blindness to anything but the project phase and the consequent difficulties of gaining adequate resourcing for the engaging and follow-on phases.

Lessons for CST From Service–Learning at NTU

CST has proven useful for spurring constructive reflection on the nature and dynamics of our service–learning experience. Although we would not go so far as to categorically insist that all service–learning activities do or should conform to the characteristics of CST, it seems sufficient to say that CST can help service–learning practitioners in their evaluation and shaping of service–learning activities. But at the same time, it has been equally apparent to us that service–learning, as we understand and enact it, contains insights that could be beneficial for the paradigm of CST.

The foremost among these insights involves the ethico–political dimension of what we refer to as *critical service–learning*. Due to its genesis in the natural sciences, CST purports to provide a description of reality devoid of ethical and political concerns. For example, the dynamic change of weather systems or organisms is neither “good” nor “bad”—it simply is. The processes and activities of critical service–learning, however, are eminently ethical and political. Indeed, it could be said that the ethico–political dimensions of critical service–learning are the driving force of all affiliated processes and that without it critical service–learning becomes meaningless. Thus we would say that values take precedence in critical service–learning processes and activities (even, and perhaps especially, in cases where there is disagreement about values). Moreover, in our experience these values are foundational and in most cases (though not all) established prior to any actual service–learning activity. These features would at first appear to be outside, if not antithetical to, the paradigm of CST. It may not matter to CST whether the system under examination is human or nonhuman, fascist or democratic, but it certainly matters to critical service–learning. Critical service–learning therefore poses this question to CST: Whence the ethico–political?

Let us briefly elaborate on these elements of value precedence and priority. In our instantiation of service-learning, there are certain values that are not up for negotiation: for instance, mutual benefit, mutual respect, and a commitment to social justice. These values are formed prior to any interaction in complex service-learning activities, and they are more or less impervious to relational influence within the system. In addition, these values are not incidental, but on the contrary are of the utmost importance in shaping the nature of the complex system. In the absence of agreement on these values by all parties, it is unlikely that the partnership will continue. But one could also make the simple observation that systems with different ethico-political positions operate in different ways. For example, a fascist system functions quite differently from a democratic or anarchical system: They exhibit different levels/kinds of openness and closedness, hierarchy and flat organization, and so on. All this suggests that it is inadequate and/or naïve to suppose that all systems involving humans are equally subject to the principal characteristics of CST. Surely it is of relevance if the people involved in that system happen to already adhere to the values of openness and emergence through negotiation.

A further challenge to CST arises from this line of critique: Was it ever true in the first place to maintain that CST is devoid of ethics and politics? Could we not say, for instance, that the features of reciprocity, coadaptation, openness, limited predictability, and self-organization already align with, and indeed promote, a particular ethico-political stance? The claim that supposedly neutral scientific theories are not actually neutral is by no means novel. As it happens, advocates of CST have themselves effectively demonstrated how Darwin's theory of evolution was itself influenced by (and advanced) an underlying Judeo-Christian ethic (Goodwin, 1997). We should not then be surprised if CST also exudes an ethics and politics. It is for others more qualified than us to ascertain the inherent ethical and political character of CST; our more limited point here is that the ethico-political imperative of critical service-learning can usefully draw attention to the ethico-political aspects of CST. If advocates of CST wish to insist upon ethico-political neutrality, then more work will need to be done to convincingly establish this. But if, on the other hand, it is accepted that the paradigm of CST is ethi-

cally and politically infused, and naturally so, then we would suggest that the field of service-learning has resources for assisting in the mapping out and tracking of ethico-political considerations throughout complex systems.

Conclusion

This is not the first attempt to theorize service-learning, nor is CST the only theoretical lens that might be brought to "this singular practice" (Butin, 2010). However, we feel that this endeavor has had considerable benefit for us as service-learning practitioners, enabling challenging dialogue and deep and critical reflection on our practices. As stated at the outset of the article, this is not intended as a definitive statement on what CST and service-learning have to bring to each other but is hopefully the starting point for future research and practice endeavors.

In conclusion, it may be fruitful to remind the reader why we set out on this research endeavor and what we think the findings offer to the service-learning practitioner. Previous research on community-university engagement has benefited from bringing a CST lens to understanding the processes involved there (Durie et al., 2018), enabling those involved to appreciate, for example, the multiphased nature of engagement. However, to our knowledge, service-learning had not been analyzed using complexity theory—service-learning being another form of community-university engagement, but one where a different quality or kind of relationship is added to the mix: namely, that between students and academic staff, and students and community partners. Although the principles of complexity theory are challenging in the abstract, when placed alongside service-learning there was immediate resonance for the current authors. We were thus keen to apply complexity theory to our service-learning practice in order to understand what we could learn from this paradigm, what it in turn could learn from service-learning, and we also hoped that along the way a CST lens would facilitate an evaluation of what makes service-learning successful. Our research has indeed generated learning for us from CST, and conversely, we believe, from service-learning to CST.

An important conclusion we draw from this research is that the ethico-political impera-

tive of critical service–learning can usefully draw attention to the ethico–political aspects of CST. Service–learning is a deeply normative practice, with a strong and explicit value base around mutual benefit and social justice. For this reason we had concerns about deploying CST alongside service–learning because of the former’s apparent apoliticalness. However, our reflections have led us to question whether CST really is devoid of an ethico–political dimension (a point that could perhaps be made about many seemingly objective, scientific paradigms). This suggests that there is work to be done by advocates of CST to more fully explore the ethico–political dimension of this paradigm.

In turn, valuable lessons may be offered to service–learning from CST. It does not offer a panacea or assured path to successful service–learning. What it has enabled in this research, however, is the clear and systematic identification of how complex service–learning operates. It seems that the prospects for a successful service–learning project are significantly enhanced when the values and motivations of all parties align; when the systems and structures existing prior to or developed for the project work in concert; and when the time scales, deadlines, and rhythms of all match up. But we cannot control for all of these variables. CST allows us to be alert to the potential

for projects to reach the edge of chaos and to use this knowledge and experience to inform others involved, especially students. There is value for all stakeholders in recognizing that service–learning projects have the open, emergent, and nonlinear characteristics of complex systems, meaning that there is limited predictability as to how the project will unfold. We can prepare students for this and, perhaps, as suggested in the discussion above, provide them with very structured reflective tools, equipping them to analyze the specifics of their development progression and how it has determined or conditioned the outcomes they are experiencing, thus putting them in a stronger position to explore adjacent possibilities and to bring the project back to equilibrium.

Finally, a further conclusion that we drew from this research and that may be of benefit to others working in the service–learning field, is that CST allowed us to recognize and name the multiphased nature of this form of community–university engagement, and to do so in conversations with management about resourcing. All phases of the service–learning cycle need to be adequately recognized and resourced—the engaging phase, the project activity phase, and the evaluation or follow–on phase—if service–learning is to be successful for all involved and sustainable into the future.



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