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ORIGINAL RESEARCH

Micro-Skills for Learning Soft Systems Methodology? Challenges and Opportunities in an Undergraduate Dissertation Project

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Abstract
Soft Systems Methodology (SSM) holds promise as an effective approach to addressing real-world problem situations. However, new learners of SSM can expect a number of challenges in learning the approach: its ambiguity and complexity, the number of likely unfamiliar concepts, its focus on rational analysis over emotion, and the demanding environment in which it is applied. This paper furthers the discussion of the teaching and learning of SSM in undergraduate education by considering SSM and its components from a skills-based perspective. We suggest that attention to critical, underlying component behaviors that make up SSM and an increased consideration of emotional issues in its application are key to improving learning outcomes for initial learners. We explore challenges and an approach for address these through an illustrative case involving an undergraduate dissertation project. Finally, we offer a number of recommendations and possible future lines of research which could support SSM's more widespread adoption in education and practice.

Keywords Soft systems methodology · Problem structuring methods · Management education · Change management · Soft OR

Introduction

Soft systems methodology (SSM) has been lauded by many for its potential to address complex problems in the field (Tully et al. 2018), and researchers have described its use across a wide range of contexts (van de Water et al. 2007). Broadly, SSM is an approach grounded in a systems framework that involves representing, exploring, and comparing systems of human activity as they are and as they could be as the basis for transformative change (Checkland 2000; Checkland and Poulter 2006; Checkland and Scholes 1990). As the most widely used of Soft OR approaches or Problem Structuring Methods (PSMs) (Gomes Júnior and Schramm 2021), SSM would seem to be well-positioned for addressing exactly the type of issues that are expected to increase as work becomes more ambiguous, as the line between social and

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technical skills is blurred, and which demands flexibility, creativity, and adaptability (García-Pérez et al. 2021; Hilton 2008; Leopold et al. 2016).

Despite its seeming suitability, evidence suggests that SSM has yet to realize its potential impact in addressing the challenges described above. While SSM is one of the most popular Soft OR approaches, its use in practice remains limited (Mingers 2011). Furthermore, published works on SSM tend to limit its use to represent issues, stopping short of describing implementation during which its transformational potential would be realized (Hanafizadeh and Mehrabioun 2018). And while some ideas of SSM like Rich Pictures have been adopted into other approaches (see, e.g., Berg 2015), along with other Soft OR approaches, courses on SSM are hard to come by (Ackermann 2019). This is a major issue when we consider that SSM is an approach that takes some skill to execute effectively (Mingers and Rosenhead 2004) especially when working with those unfamiliar with the approach (Checkland et al. 2000; Hermanto et al. 2021).

One issue that may be sustaining the lack of diffusion of SSM relate to how we teach it to beginners. That the flexibility, fluidity, and conceptual richness that make it useful for addressing complex issues also make it difficult to learn and teach has long been recognized, not least by Checkland and colleagues themselves. In this paper, we seek to extend the discussion by reconsidering the process of learning SSM as a skill like any other, and review the challenges of moving from initial skill acquisition to eventual mastery. Because it is both complex and because new learners will start from different baseline skills, effective teaching will involve a dynamic process of breaking down SSM into component subskills when needed. Secondly, because new learners especially will face additional challenges in applying SSM in their workplaces, we discuss two approaches, validation and extended uses of SSM, which can be used to encourage SSM use prior to mastery. Finally, we illustrate such an approach in an undergraduate dissertation project in which we used SSM.

We see two contributions emerging from our efforts. First, even though our emotional responses from conducting the SSM were relatively mild, they do highlight the influence and prevalence of emotions in conducting successful SSM projects. Our experience leads us to call for a further humanizing of SSM by incorporating a richer discussion of emotion in relation to applying SSM, and consider practical ways emotions can be supported. We consider the links between thinking, doing, and *feeling*, and suggest that these links require a renewed consideration of the component skills—the *micro-skills* of SSM—needed to support its mastery.

Second, we consider a set of underlying micro-skills of SSM that support successful learning outcomes, and that could address the limitations of SSM. We argue that viewing SSM as a set of skills—behaviors that are meant to be more effective in achieving goals than the alternatives—reveals a limited treatment of cognitive and emotional issues that hinder its acquisition and mastery. Our experience is that these micro-skills profoundly impacted the success of SSM. Further research and incorporation of such "lower-order" skills, we argue, could help address issues in teaching and learning SSM, and help those new to the approach successfully apply it in their practice.

Background

SSM is a skill. This statement may appear obvious, even unnecessary. Indeed, Adams (1987) offers a decidedly broad definition when he states that "anything that has well-learned behavioral complexity, in which the partial actions are integrated into a behavioral whole, qualifies as a skill." SSM easily fits into the three criteria of skills Adams provides:

Its applications are inherently complex; it is *learned*, usually requiring a deal of experience, and whether or not it achieves the goal sought through its use is dependent on what people do, i.e. their behavior.

Why the focus on skills in the first place? Apart from a rich and evolving research tradition, mainly, because such a perspective can help address the challenges of SSM, by further operationalizing its component behaviors such that the effective can be distinguished from the ineffective, broken down into meaningful, learnable units, and to help us consider it is carried out in practice. The notable complexity in conducting SSM is no barrier to treating it in such a manner. Indeed, Gross et al. (2019) have applied a similar approach in teaching Crew Resource Management training, a program aimed at reducing critical error in high-risk, ambiguous, and complex environments.

In particular, a skills-based focus draws attention to the way behaviors are acquired and mastered, or not. Our goal is to understand how increase the behavior we want—learning SSM, which presupposes its application in practice—and decrease the behavior we do not—not learning SSM. In pursuing this aim, we adopt the perspective the causes of behavior—and with it clues to how to change it—can be understood as according to the purpose of the behavior serves a particular context (Ramnero and Törneke 2008), a perspective known as *functional contextualism.* As we will discuss, SSM presents challenges on both the functional and the contextual account because its functions are not always clear to new learners, and its context has been limited.

Before proceeding we should acknowledge that some may object to our use of this perspective on the grounds that it seeks to reduce SSM to a formulaic set of steps that can be simply applied unproblematically across contexts. Rather than exactly the kind of retreat into reductionism SSM and other Soft OR approaches avoid (Checkland 2019), we believe a skills-based perspective can inform what Mease (2019, p. 421) refers to as the development of repertoires of response strategies—multiple options for responding to a given situation that consider a particular situation, both its past and the possibilities it might offer for the future. Two ideas underly our attempt. First, that some approaches to SSM *work* better than others. Second, that the effectiveness of SSM itself versus other approaches—the subject of recent study (Gomes Júnior and Schramm 2021; Lami and Tavella 2019)—will also rely on its subcomponent skills.

Though treating SSM as a skill provides a theoretical foundation, as a fundamentally social activity, it leaves ample room for ambiguity and interpretation in distinguishing effective from ineffective. Skilled behavior can ultimately be distinguished from unskilled behavior because, all things equal, it tends to do better at achieving the outcomes sought through its use than the alternatives. Juggling five balls in the air is certainly a skill. Yet we can say with some certainty that juggling five balls in the air will tend to be ineffective as a means of developing, say, the organizational strategy of a large bank. Thus, skills can be *functionally equivalent*—meant to achieve the same ends—but perhaps not equivalent in terms of effectiveness. Ultimately, however, what is effective is in the eye of the beholder (Phillips et al. 2014)**.**

Acquiring Skills

Having established the appropriateness of a skills perspective for SSM, we can now consider its implications. Just as one skill may be more effective than another for achieving the same goal, the same skill also may exist on a continuum ranging from totally unskilled to skill mastery. Moving toward mastery is referred to as skill acquisition, and it has been

described as involving several distinct phases: a cognitive phase wherein the behavior is first learned, an associative phase in which understanding is deepened and performance becomes more reliable, and an autonomous phase where the behaviors become more natural and less demanding (Ackerman 1992). The effective use of a skill in practice can further be described as involving the ability to generalize (Linehan 1993), as exposure to a new context may render a skill ineffective. Hampson and Junor (2010) note that in organizations, it is helpful to add two additional stages toward mastery: creative solution sharing and shaping solutions.

Just how a learner moves through these stages has been the subject of some debate, but broadly, we can capture several key areas of some consensus that have direct implications for SSM. Skills develop through both formal training and experience (Hampson and Junor 2010). Further, learning one skill can improve the function of other similar skills that rely on common subskills. This mutual support has been noted in relation to Soft OR approaches of which SSM forms a part. For example, Ackermann (2011) notes that teaching Soft OR often requites simultaneously teaching facilitation skills, as applying the techniques in groups requires them. Finally, skill acquisition depends on three factors that spell trouble for SSM: task complexity, related emotional issues, and the context in which a skill is acquired. The following paragraphs explore these issues in more detail and their relation to SSM.

Task Complexity

First, consider complexity. Learning can occur in response to environmental stimuli, unconsciously or because one expects a particular behavior to result in a desired outcome (Bandura 1978; Ku et al. 2015). Ackerman (1992) notes that simple, well-defined tasks are easier to learn, and that this is a problem for SSM. The clearer the outcome, the easier it is to learn through experience, and the outcomes of SSM are often difficult to interpret and dynamic.

Breaking down complex tasks into subtasks is one means of decreasing the cognitive resources required for skill acquisition and mastery. Which subtask needs to be broken down in such a way depends on the stage of acquisition a learner has progressed to (Russell and Kuhnert 1992). Training, these authors note, tends to lag behind in supporting learners in later stages of skill acquisition. Experience, and the ability to interpret experiences, plays a more significant role as skills progress. This, of course, so long as the skill remains in use.

Just how complex is SSM? Difficulty in establishing its value for new learners, the number of new concepts it contains, its flexibility, its sometimes-ambiguous outcomes, and that it targets underlying assumptions in addition to technique are all elements that contribute to SSM being quite complex indeed to acquire as a skill. The following paragraphs explore these issues.

Likely the first challenge to be encountered is clarifying the purpose of SSM and relating these to student goals. Soft OR approaches suffer what Tully et al. (2018) refer to as a "value paradox", meaning that because much of their value derives from defining a problem to be addressed, it is difficult or impossible to specify their value to others until after they have been carried out. So too is the case with the case of learning SSM: students wanting to know whether or not it will "work" and in what ways may be frustrated by a lack of clear answers (Hindle 2011). In other words, its function is not clear. The ambiguity in outcomes is a serious issue because the inability to identify the relevance of the

methodology to their goals has a detrimental impact to motivation and knowledge retention (Bandura 1978; Tyng et al. 2017).

Second, new learners will face a number of likely unfamiliar concepts and behaviors, not just in things to do but in ways of thinking, further complicated by the numerous versions of SSM one may encounter. While a strength of SSM *in practice* is that there are many ways it can be conducted (Checkland and Scholes 1990: 285), its specific form allowed to vary in accordance with the context, or combined with other approaches (e.g. Hindle and Franco 2009), the same flexibility also has drawn criticism from educators. In response, Checkland and offered a number of "constitutive rules" to distinguish SSM from other approaches. Clearly, these concepts allow significant room for interpretation and adaptation, which Checkland also recognized could be difficult for new learners, while recognizing the usefulness of the 7-Step version for teaching purposes. Having this version may reduce ambiguity, but it does little to reduce the demands on new learners of the approach.

A third issue in learning SSM is that, even when students possess clear instructions for carrying out the approach, the outcomes of these are ambiguous. Research has highlighted the effort and difficulty of establishing the effectiveness of SSM implementations (Gomes Júnior and Schramm 2021; Hanafizadeh et al. 2020; Lami and Tavella 2019). Hanafizadeh et al. (2020) note that writings on SSM are light on ways to approach the process of accommodation required for establishing the criteria for effectiveness in practice. This issue is more acute for students lacking work experience—often the case for undergraduates—and this lack of clarity complicates experiential learning.

The next challenge is that learning SSM involves not just overt behavior but also ways of thinking, understanding, and assumptions which are also targets of learning and tied to its successful generalization and application in the real world. Checkland and Scholes (1990) enumerate the necessary ones: First, that the world is made up of problematical situations that cannot be "solved" in an engineering sense, but which are susceptible to improvement. Second, SSM perhaps unsurprisingly subscribes to a systems view of the world, that systems are adaptive wholes that can survive through time by adapting to changes in its environment, and that to survive needs a) communication b) processes, including c) control processes or feedback loops d) that it forms a part of and is made up of other systems. Any purposeful human activity can be seen in such a way. Finally, SSM also holds a form of epistemological relativism which maintains that we cannot know reality directly, and so SSM revolves around creating models that allow us to ask good questions and learn about a situation, with the aim of reaching desirable and feasible outcomes (Checkland and Poulter 2006: 11).

That SSM involves learning new ways of thinking adds additional challenges which need to be considered. What SSM is doing is to ask its learners to change the way they see the world. In the language of SSM, this would be the Weltanschauung. These ways of seeing have also been described as underlying models (Cossette and Audet 1992), rules of the game, or schema, where a schema is essentially a set of underlying rules drawn from experience that allows for sensemaking (Stacey 1996). Learning new ways of thinking is possible, and considering them as a part of a learning initiative is beneficial for the learning process (Hollingsworth 1989). At the same time, change scholars have observed that it is far more challenging to target ways of thinking than ways of doing (Argyris 1982; Schein and Schein 2015), and pre-existing ways of thinking can be a major impediment to learning systems thinking in particular (Rogers et al. 2013).

There are additional challenges for teaching. Targeting ways of thinking present challenges in that they are only directly accessible to the person thinking them—and even then,

may exist only in the subconscious (Axelrod 1973). This makes it more difficult to assess progress and provide feedback, especially when people readily espouse one way of thinking while acting in another (Argyris and Schön 1978).

Emotion

Research continues to highlight the role of emotions in learning (Tyng et al. 2017). Neisser (1963) notes the substantial association feeling and thinking, and makes emotion the primary driver of learning outcomes, rather than reason. Emotions are complex, integrated, systems-level responses, consisting of both biochemical changes, subjective experience, and expressive behavior (Linehan 1993). Emotions themselves can have consequences which feedback upon biochemistry, experience, and expression. Emotional competencies are increasingly seen as central to effectively supporting change projects for their capacity to reduce destructive conflict, reducing tension, decreasing stress, and increasing job satisfaction, amongst other effects (Boyatzis et al. 2019).

As a component of the "humanness of human beings" (Mingers 2000) which SSM aims to integrate, it would seem that emotions would form an integral part of SSM. However, considerations of emotions are largely limited to considerations of subjective experience, considered as a part of Weltanschauung. Explicit reference to emotion analysis is notably absent from the typical analyses of SSM of history, culture, and politics.

While a full consideration of emotions and SSM are outside the scope of the current discussion, there are two points to make that are directly relevant to learning SSM. First, it is relevant to note that emotion can derail processes of accommodation and group sense making that are a major component of SSM. Second, targeting ways of thinking is an inherently emotional affair, and can be psychologically threatening (Diamond 1986). Exposure to ideas that threaten a person's understanding of the world can destabilize the sense of self and position in the world. Given the choice, many people will simply avoid addressing how they think altogether (Diamond 1986). While the possibility of solving real-world problems could be significantly motivating for practitioners, such may not be the case for students. Such discussions for students without experience are lacking.

Context

The final challenge for learning SSM concerns the context in which learning takes place. Russell and Kuhnert (1992) note that developing transformational capacities that indicate skill mastery requires both experience and self-development. Ideally, uses of SSM—or any effective methodology, for that matter—inspire more uses of SSM and with it, greater experience and expertise. This idea is captured by Checkland and Poulter (2006) in the LUMAS model (for Learning for a User by a Methodology-informed Approach to a Situation).

There are a number of challenges to creating this type of virtuous learning cycle for SSM. First, the discussion of SSM centers on its use by those with some authority to implement change in practice using the methodology, whereas new learners of SSM almost certainly will have a more limited mandate for change, or may lack the confidence, knowledge, or drive for implementing it (Ackermann 2011). Soft OR approaches can be difficult enough for experienced practitioners to sell (Tully et al. 2018).

Second, even if users have the confidence, knowledge, and drive, workplaces are often skeptical of SSM due to its complexity and required time investment (Checkland et al. 2000). Further, arguably the most challenging stage, that of accommodation, in which

divergent views are meant to come together is also quite ambiguous (Houghton 2013), and liable to be hijacked to serve those in power (Jackson 2001). Hermanto et al. (2021) suggest addressing the issue through a 7-S framework, but this approach also requires significant buy-in from other stakeholders. Flood (1993) notes that the process of design and debate accommodation only dismantles power structures if it is genuinely open, while if it is threatening to the powerful then it will be shut down. The outcome may provide yet another disincentive to the learner: the project rejected, colleagues or bosses annoyed, efforts aimed at transformative change redirected to supporting the status-quo. From a functional perspective, for a new learner, other, less complicated approaches to problem solving are likely to appear better able to serve their needs. In other words, the cards are stacked against gaining SSM mastery in the practice.

Overcoming the Challenges of Teaching SSM

There have been a few notable discussions of how to overcome the challenges discussed in the previous section, summarized below in Table 1. Ackermann (2011) draws on her extensive experience teaching in varied contexts to comment on Soft OR approaches generally. Hindle (2011) discusses the teaching of SSM in particular, and makes a number of recommendations for advisers, including using a simplified version of SSM consisting of 5 steps, proving guidance students in the beginning, using a case study before attempting a real-world application, using role play. Some of these are dependent on the classroom setting such as the suggestion to have group meetings with mentors to guide students through modelling options, providing high-quality examples of common models built for a particular case study, and combining lectures with other approaches. Kleeman (2005) also mentions some other approaches that take advantage of a classroom setting, such as including related content in exams.

Two issues remain that the above works do not address. First, while suggestive of potential approaches, they do not sufficiently address the lack of discussion of supporting learning outside of contexts outside the classroom or other setting with resources available for the application of SSM. The workplace is doubtlessly more demanding, even hostile, and what works in one setting may not translate to the other (Benjamin and O'Reilly 2011). Second, SSM requires addressing additional issues which have been implied but not addressed directly for the purposes of education: learning new ways of thinking, learning and applying SSM in situations of relatively little authority, and issues of emotion.

Therefore, what the previous discussion suggests is that first, we lack sufficient consideration of the environment within which SSM is learned, strengthened, and potentially mastered, because it will ultimately determine the outcomes, including the type of resulting SSM, and that such a discussion is heretofore lacking with first time learners especially. Second, we highlight the role of emotion in the learning process for both student and adviser around which we have little evidence.

A universally acceptable process to address these issues is unlikely. Rather, developing effective ways of teaching SSM to new learners is likely to require a contextually dependent approach that does two things: First, it should anticipate required component skill needs for the learner, and offer an approach for meeting these needs. These are likely to be diverse and vary from student to student, though the previous discussion is suggestive of the need for common component skills such as communication, facilitation, (see Table 1) as well as emotional awareness (Boyatzis 2009).

Table 1 Challenges and recommendations for teaching soft OR and SSM

Challenge	Recommendation	Source
General: Learning SSM's ways of thinking and doing	Promoting the "tortoise mind": promoting contemplative thought and sense making	Poulter in Checkland et al. 2000
	Avoiding expositions of SSM as methodology, but rather waiting to explain it until after it has been applied	Poulter in Checkland et al. 2000
	Include "natural" systems thinkers in the group	Poulter in Checkland et al. 2000
Appreciating how Soft OR helps balance process, content, within a political and cultural landscape	Provide vignettes	Ackermann 2011
	Asking students to reflect on their own experience in making decisions	Ackermann 2011
	Providing connection to the world outside of the classroom through guest lecturers and experiential work	Ackermann 2011; Kleeman 2005
Concern for needing to have the "right" answer; concern for fixing / solving the issue addressed	Helping students appreciate the benefits that providing structure provides to clients and to problem solving	Ackermann 2011
	Having students carry out small Soft OR approaches on real clients	Ackermann 2011
	Encouraging reflection on learning and on benefits to problem solving	Ackermann 2011
Addressing the simultaneous need for facilitation skills as well as modeling skills	Using classroom exercise that encourage students to apply Soft OR to situations that are meaningful to them	Ackermann 2011
	Using role play meetings	Hindle 2011
	Using small group projects with external clients.	Ackermann 2011
	Discussing difficult situations to provide vicarious learning	Ackermann 2011
	Providing students with reading relevant to facilitation, specifically.	Ackermann 2011
Providing Students with an Appreciation of the Whole and the Details	Providing details of Soft OR theory before providing the details of the PSM techniques	Ackermann 2011
	Incorporating guest lecturers who have experience with the method	Ackermann 2011
	Mix reading with class material so that the concepts can be absorbed more easily	Ackermann 2011
	Discussing a range of scenarios or cases and how the PSM has been applied	Ackermann 2011

Table 1 (continued)

Challenge	Recommendation	Source
Helping Students Manage Complexity, Uncertainty, and Holism	Providing students with comfort level in representing complex or ambiguous issues. For example, asking students how they would *feel* if a complex issue could be understood.	Ackermann 2011
	Providing clear, specific guidance on what to do, especially early on	Hindle 2011
	Using more straightforward models in the beginning, e.g. the 7-Step model	Hindle 2011 Checkland and Poulter 2006; Kleeman 2005
	Helping students to appreciate the benefits of holistic models by reflecting on the benefits of these for client decision making	Ackermann 2011
	Taking an inclusive approach, to help students gain ownership and seeing how different views come together	Ackermann 2011
	Use of case studies, either fictitious, specific to a particular aspect of Soft OR, or with real clients who can recount their experiences with Soft OR	Ackermann 2011; Hindle 2011
Covering the Material Necessary Within the Time Allocated	In classroom instruction, presenting Soft OR early on so that it can be internalized throughout the course	Ackermann 2011
	Encouraging advisers of other courses to comment on how PSMs can be integrated into "harder" approaches	Ackermann 2011
	Using a mix of reading, lectures, and experiential work	Ackermann 2011
	Providing access to online resources	Ackermann 2011
Teaching Online	Make materials available online, including case studies that deal with specific issues, videos of clients (where possible), etc.	Ackermann 2011

Ackermann (2011) deals with Problem-structuring methods generally, referred to here as Soft OR, drawing on experience teaching Soft OR approaches to students (pre and post experience) and practitioners, while Hindle (2011) and Kleeman (2005) address classroom teaching of SSM. Poulter, writing in Checkland et al. (2000) address SSM when working with clients

Second, as the approach should include a means for supporting the learner during the acquisition phase, reinforcing target behavior and through feedback. One opportunity is to deliberately include understanding and validating learner emotions when appropriate. Emotional validation is communicating to the learner that their responses are understandable or make sense in the context in which they occur (Linehan 1997). Validation involves acknowledging that a learner's feelings, thoughts, or behaviors *make sense* without necessarily approving of them. Intentionally seeking ways to incorporate validation into SSM and Soft OR approaches generally could be an interesting avenue of research, and indeed, many strategies for dealing with emotion discussed previously (see Table 1) could be understood as forms of validation. For example, Ackermann's (2011) suggestion to recognize student concerns for "getting things right" and addressing these by providing client testimonials on the usefulness of problem structuring involves two forms of validation.

The Case: An Illustrative Reflection on Acquiring SSM as a Skill

We seek to provide a rich account of teaching SSM outside of a traditional classroom setting to a relative beginner. Our aim in presenting this case is to illustrate the challenges discussed in the previous section, and to inspire thought on how these can be addressed. The incorporation of the skills-based perspective and use of validation was based on literature review and the teacher's prior experience teaching SSM and management skills. However, our experience also guided our subsequent reflection and further reading, and therefore our discussion contains some abductive elements which we present in our conclusions.

The context of the research is the second author's undergraduate dissertation project, undertaken from the fall of 2020 and ending in the spring of 2021 within the University of Barcelona Business School (see Fig. 1). The first author served as the dissertation adviser (from here, Adviser), an official role which includes mandatory meetings, guidance, and revision, as well as evaluation accounting for 40% of the final grade. The remaining 60% was determined by an evaluation committee comprised of professors from other departments within the same faculty. Students may choose from a list of predetermined topics or propose their own, in which case they must also solicit the participation of an ad hoc faculty adviser. The second author (from here, Learner) proposed working on an undefined topic related to Soft OR.

To ensure we would meet the internal requirements of the dissertation, we did adopt a structured approach to our research. We employed action research as our methodological framework to guide the dissertation project, as an approach to engage real world issues through an ongoing process of critical reflection (Dick 2015). Our research began with a broad problematic situation—using Soft OR as the object of an undergraduate dissertation—with the intention of learning more about the process. Like much action research, we aimed to intentionally change the process for the better (Dick 2015), at least within the confines of the project, without knowing exactly what those improvements would be.

Throughout the rest of the paper, we will refer to ourselves as Adviser and Learner. This is a limited description as it implies one of us was doing all of the learning and the other all of the advising. In fact, even before selecting SSM to study, in our initial meetings we established that Learner would drive the process, and that whatever Soft OR approach selected, the project would involve its critical evaluation. We felt that the action research approach was the most appropriate given that it is seen as ideal for ambiguous situations like ours (Baskerville and Wood-Harper 1996): We were unsure of the Soft OR approach

Fig. 1 Timeline. Source: The authors

we would use and what the outcomes of its use would be. However, we were fairly sure that *some* learning would result. Further, given that Learner was joining a large consulting firm as an intern, we felt he would be in an interesting position to judge the usefulness of the Soft OR approach chosen and potentially integrate it into his practice.

To meet the research requirements of the dissertation, we used a number of approaches for data collection which also served to reinforce learning outcomes. Over the course of the project, we met regularly to discuss the project, to review Learner's progress, and to troubleshoot barriers in learning and applying SSM. In addition, we both kept a research journal to record our experiences related to the project. In analyzing the data, we reviewed our journal entries along with emails, meeting notes, the materials produced during the project itself, and reflected on our own experience. This approach provided a rich but unstructured source of information from which to draw, which suited the exploratory nature of our study.

To reflect on the learning process, using an approach reminiscent of *Mode II* thinking, in that we employed systems ideas to guide our reflection. In particular, we imagined what the ideal process of learning SSM might be like and compared it to what we experienced. At this point, we could follow a more SSM-like approach, in expressing our findings in terms of SSM. Accordingly, we engaged in model building of our learning process as a human activity system, imagining the ideal and comparing it to the state of affairs we encountered in practice, in order to arrive at possible paths to corrective action (Outcomes and Observations). These are summarized in Table 2, which capture each in relation to the purposeful system of human activity we envisioned. Note our intention here is to model *our* process, not the process of skill acquisition per se*,* of which much has been written. Where relevant, we have included reflections on challenges and emotional aspects of the project, which we include in the first person.

Selecting SSM as the Appropriate Soft OR Approach from those Available

Learner's experience:

At the time I was also doing a full-time internship at a multinational consulting firm, which made me realize there was an existing gap between my theoretical knowledge about management, and the real-world day to day work. I was motivated to do the thesis as a means of filling this gap.

Adviser's experience:

Early in the process, Learner and I met to clarify goals and expectations in supervision. I learned that Learner had recently started an internship at a major consulting firm, and that seemed like both an opportunity and a challenge. On the one hand, he would be learning other "battle-tested" techniques at the same time and be able to judge the Soft OR approaches alongside those others he would be exposed to at work. It worried me some at the same time because I knew from experience the long hours early-career consultants put in, and thought he might have trouble finishing on time. In the end, what really sold SSM for me was that it seemed to fit Learner's professional goals, and he appeared genuinely interested in using it.

We imagined SSM would be an ideal choice if it fits with both the instructor and the learner's long-term goals. We considered the Adviser's goals as well and discussed these openly and found these to be congruent with the Learner. We both began with significant doubt and curiosity as to whether SSM would "work" for Learner in his role as a junior

Table 2 Teaching and learning steps in our soft systems methodology project

Activity	Ideal	State of affairs encountered	Outcomes and observations
Selecting SSM as the appropriate Soft OR approach from those available	Coherence with learner and adviser's long-term professional goals.	We wanted to find a broad approach that would be useful for the student's career as a consultant. We evaluated several possibilities and unsure of the appropriateness of SSM until well into its application.	Both adviser and student began with significant doubt and curiosity as to whether SSM would "work" for student. Increasing excitement and satisfaction as student reports positive learning outcomes and satisfaction with the method.Deliberately critically evaluating SSM as a part of the project alleviated uncertainty: Project success not dependent on "successful" application of SSMStudent and adviser motivation were a significant factor in the success of this project.
Selecting an approach to SSM from the various approaches to SSM	Checkland and Poulter (2006, p. 20) describe the ideal approach to selecting an approach to SSM as being the one most suitable to the user's situation.	The adviser faced some difficulty in selecting an approach for this project. In the end, the adviser chose a version of the 7-Step methodology that fit with his worldview and that followed a workbook format.	Having a workbook with clear instructions reduced the complexity in teaching SSM and provided a foundation for the student from which to build. Adviser fears that some of the spirit of SSM would be left out later proved to be unfounded as the student conducted his own research into SSM and integrated it with prior knowledge.
Learning / Teaching this form of SSM (Skills instruction)	Learning SSM is a process, so we imagined the initial instruction would result in enough knowledge to be able to apply it in practice, where it could be strengthened and integrated into practice.	Initial acquisitioned was hindered by time constraints, concern for following "the right" approach, the number of concepts to learn and their novelty, and confronting multiple definitions of SSM in the literature.	As the project continued, student observed the limitations of the adviser's workbook and incorporated his own learning in carrying out the approach, especially in the first 3 Steps of the 7-step approach to SSM.Adviser focused on creating environment of support and trust to overcome fears of "doing it wrong", where critical reflection and critique was encouraged.

Table 2 (continued)

Activity	Ideal	State of affairs encountered	Outcomes and observations
Selecting case(s) for which to use SSM	Adviser imagined a "more the better" approach, in which SSM would serve as the theoretical foundation from which to view *any* problematic situation.	Student was rightly concerned about meeting the expectations of the evaluation committee and hesitated to carry out the process when it would not be "worth it".	Doubt on the part of the student led to inertia in getting started. More guidance in the initial acquisition phase could be needed to get over this initial fear in future projects. An initial meeting in which student goals were captured, as well as an expectations document were tools used.
Carrying out SSM	The ideal of SSM are those mentioned in the literature: 1. That learning occurs for the participants, that 2. Those implicated in the problematic situation are involved in the SSM and 3. That the situation is improved.	Student and adviser discussed difficulties in getting colleagues involved, aware that as an improvement project it might seem threatening.	Student was courageous and diplomatic in presenting the project, which addressed a problematic issue at his work, to boss and peers despite initial reservations. Acknowledging and accepting reality was a major improvement to the situation: the problematic situation remained, and the main change was student's acknowledgment of it, and perhaps also acceptance or understanding from colleagues.
Sharing the results	The ideal for sharing results was to have something "good enough" so that it could be understood by the relevant stakeholders, especially the evaluation committee.Iterative process of writing by student and review by adviser.	Time constraints meant that iterations for review and feedback were more limited than the adviser had imagined during the formal write-up. Review of analyses more frequent.Student faced multiple complex learning needs at once in learning SSM itself and in writing and defense of the dissertation.	Evaluative committee unfamiliar with the approach, so it required some reframing to fit the concepts into the short time allowed for presentation.The criteria of evaluation for SSM seen as broad, so we drew from action research generally.
Monitoring and Control	Having regular monitoring to help learning through frequent contact.Aiming to have control (review) be reinforcing, not aversive, during skills acquisition	Concern for formal administrative aspects of the project.Initially it was difficult to convince the student to present his work in an unfinished / imperfect state.	The research journal played an integral role in student's learning process. Regular feedback from the adviser both in person and via comments on the documents themselves was seen as integral for the project's success.

Source: The authors

consultant. Making the dissertation about learning and not the outcomes of the SSM application alleviated some pressure from both of us. We were unsure as to whether Learner could learn SSM in such a short time period to be able to apply it, but we felt much more certain that we could record and critically evaluate the experience. In retrospect, this decision was motivating for both of us and likely improved learning outcomes by encouraging frequent, deliberate reflection through the use of a research journal.

Selecting an Approach to SSM from the Various Approaches to SSM

Adviser's experience:

> *I presented SSM along with several other options:* Ackermann and Eden's (2011) *strategy mapping, my own approach to systems analysis based on dialectical philosophy, and a case-formulation approach based on Edgar Schein's* (Schein 1987; Schein and Schein 2015) *work on organizational culture and leadership. Considering the constraints, I felt SSM was the best option because I had already written a short internal guide to using it, and because I was fairly certain the dissertation evaluation committee would respond well.*

Having a workbook with clear instructions reduced the complexity in teaching SSM and provided a foundation for Learner from which to build. The Adviser's fears that some of the spirit of SSM would be left out later proved to be unfounded as Learner conducted his own research into SSM and integrated it with his prior knowledge.

Initial SSM Teaching

Learner's experience:

> *I felt like "lack of time" was a defining characteristic of the whole project, so the learning process had to be very time-efficient. When I started exploring the uses and applications of the SSM, the first thing that I noticed as a learner was how open it is, it almost felt as if I was playing in a methodology sandbox. The amount of information could have been overwhelming had we not previously established the particular approach we would follow. Later, I felt more comfortable deviating from this approach.*

Adviser's experience:

> *I sent Learner a number of texts on SSM, including the workbook I had prepared previously. After discussing on a video call, we agreed that he would try it out, and from this point he took the lead in managing the project. I felt relief at this point because I had a newborn at home and was sleeping little. I had recently completed an intensive course on a type of behavioral therapy which included extensive application of problem-solving skills in a therapy context. This had me keen to apply the techniques to other contexts, including SSM.*

Once we had selected SSM as our approach, a more complete introduction of SSM followed. The Adviser facilitated a reading list, and we looked at case studies together. While the Adviser's workbook acted as a centering device, as the project continued, Learner pointed out some its limitations: It lacked enough detail in the first three sections to be of use on its own. Subsequently, he incorporated his own learning in carrying out the approach, especially in the first 3 Steps of the 7-step approach to SSM.

This first period involved a number of meetings to discuss progress and resolve doubts. The challenge during these for the Advisor was to create an environment of support and trust to overcome fears of "doing it wrong", and in which critical reflection was encouraged. A breakthrough moment occurred when Learner stated "Aha! It's like a PESTLE analysis!".

Selecting Cases for which to Use SSM

Learner's experience:

Being an intern at the firm was a big advantage when working on my analysis, as it made it easier for me to obtain the information I needed. After a couple of tries with smaller cases, I decided to go for the big shot – the case that would finally make it to the thesis. For all the perks that big corporations are able to offer, they also have some flaws. From my point of view, having a longer working day per contract and still having to stay late everyday seemed like a time-management efficiency problem within the system, and therefore it was a suitable case study to write my thesis about. The situation, in addition to having all the desired requirements for being the object of the study, also had an emotional component attached to it. As a professional, I think being time efficient is important, as it increases both production for the firm and work-life balance for the employees, and it bothers me when things are not efficient. I intended to keep working at the firm after I finished the internship, so it seemed only right to understand this problem deeper, identifying its causes and being aware of the consequences.

Adviser's experience:

I was skeptical at first that SSM would be able to hold Learner's attention, because I imagined he would be acquiring alternative approaches as a new consultant. I felt vindicated (this stuff is actually useful!) when that was not the case. Learner and I met three times during this phase to discuss the methods. Despite his espoused enthusiasm, I remember being anxious for him to get started because I knew from experience that the concepts could be difficult to grasp. I encouraged him to try it on little issues to get the hang of it and he agreed, but I remember not wanting to insist too much because it coincided with final exams, and I did not want to overload him.

The Adviser intended for the Learner to try SSM early and often so that he could use the approach in practice. We worked through an example together, but Learner was concerned with choosing a case that would be suitable for write-up, and not wasting limited time on an analysis that would not contribute to the completion of the project. We had a meeting early in the process to capture Learner's goals, and while having the goals clarified was motivating for both of us, because of the short time period available, it may have contributed to a sense that we needed to find "the right" case from the start for Learner.

Carrying out the SSM

Learner's experience:

As one might expect, analyzing a complex system as this one was, indeed, complex. For starters, I was living the situation myself and, as I had never tried to work

through it, I was biased as to who the actors were and what role they played. To tackle this problem, I took a non-judgmental approach, attempting to only focusing on the information that I could verify. I am satisfied that I could set my personal bias aside and found out that some of the assumptions I thought to be true at the beginning of the analysis, were in fact poorly supported.

Even though the goal of applying the SSM to a situation is to solve it, in this particular analysis that was not entirely the case. Surprisingly for me, though, understanding the causes of the problem allowed me to gain perspective on the whole situation, which in turn made me more efficient at my job. While before the lack of understanding was frustrating and draining, being able to identify the root of the problem allowed me to "live with it", even though I could not solve it easily.

As I found out during my research, this sort of complex problem usually does not have a single source. Even though the whole function might be directed by a coordinator, some or all of the actors will need to make a number of changes or adjust their behavior in order to advance to a solution. In my capacity as an intern, I was clearly not the coordinator and therefore could not take meaningful action to solve this situation. It was OK though, because the main objective of this analysis as we had set it– at least, from my point of view – was to be able to understand the problem and work through it, targeting the parts of the problem that I could solve, and accepting the ones that I could not, so I could live with the situation without getting too frustrated.

Given the previous discussion on the constitutive rules of SSM, we imagined the ideal of carrying out the SSM was that the Learner would be able to apply the ideas in practice, and to ultimately use it to bring about its target outcomes: that learning occurs for the participants, including those carrying out the methodology, that those implicated in the problematic situation are involved in the SSM and finally, that the situation is improved.

We faced a number of challenges when carrying out the SSM in achieving these outcomes. First, participation was hindered by ethical and professional concerns. We did not want to put the Learner at risk at work, and while we wanted broad participation from his colleagues, more participation implied potentially more risk since a perceived failure might reflect badly on Learner. Ultimately, Learner selected an issue related to the internal operations of his team, which removed the need to create something "client-facing" from the start, but still had the potential to be useful for his working life. An internal focus still carried some risk, but the initiative was well-received by both boss and peers despite some initial reservations.

It was also interesting that the Learner was initially judgmental of the situations he was viewing, and an outcome of the project that he was less so. Adviser deliberately included exercises on non-judgmental description to address this issue. In retrospect, this seem to be a skill-subset worthy of more deliberate attention during initial instruction, and helped Learner appreciate *Weltanschauung* at a deeper level.

Sharing the Results

Learner's experience:

The Adviser proposed a useful way to help with the different issues. During the development of the analysis, I registered my progress on a log/diary in order to be able to explain my learning process in an easy and visual way. This turned out to be the backbone of the case study part of the Thesis, as it allowed me to create a temporary

line to explain my learning process, that was also correlated to the application of the SSM to the chosen situation. In this way, the reader could walk through the seven stages of the methodology understanding both the reasoning behind the decisions that I took, and how did they help to advance in the analysis, and thus making it a more appealing paper to read for my intended audience.

As a graded project, we needed to share the results not only with the stakeholder operating within the target of our SSM but also to an external evaluation committee within the university, and these results needed to meet the requirements of an undergraduate dissertation. The challenge we faced here was in establishing SSMs effectiveness for a committee unfamiliar with the approach. This required some reframing to meet the requirements, and to relate SSM to its alternatives. The time for presenting the results was brief (10 min maximum), so Learner framed the presentation in terms of action research, with which the committee was already familiar.

Monitoring and Control

The time pressures facing both of us complicated the process of monitoring and control. While university guidelines established a process for bi-monthly meetings with writing targets, it was clear early on that we would need to meet more often to achieve the goal of learning SSM. However, because of the desire to find the "right case", much of the feedback process happened *after* Learner had already spent a good deal of time researching on his own. The pace of review accelerated greatly once the Learner progressed to model building. The research journal also provided a means of self-monitoring for both Learner and Adviser.

Summary

Our case illustrates the prevalence of emotional issues in learning and teaching SSM and the approaches we took to addressing these. The main challenges we faced were time pressure, fear of mistakes, the need to satisfy multiple stakeholders, uncertainty in how to perform SSM and in the results it would produce, and our own assumptions. We anticipated some issues in learning SSM and to deal with ones as they arose: keeping a research journal, defining our goals—personal and professional—for the project, including broad but observable measures of success, using a workbook, and practicing communication with different stakeholder groups. We also incorporated some behaviors to address the emotional elements of SSM: validating emotions, looking for the kernel of truth in other's point of view, and non-judgmental observation and description.

Discussion

What does effective teaching and learning Soft OR approaches look like for beginners? Our experience with SSM is that successful skill acquisition involves a good deal of improvisation to meet the unique and rapidly changing needs of the learner. We imagine that how this manifested in our dissertation project could be entirely different for others, but that the central aspects—tending to emotions and seeking component "micro" skills to meet evolving needs of the learner—could be universally relevant to beginners especially. Indeed, the

purpose of discussing a skills-based framework for SSM is to argue that it can promote an increased impact of SSM through attention to the behaviors, ways of thinking, and emotional aspects of learning. To that end, we reflect below on the implications of such a view on SSM research and practice (Fig. 2).**Fig. 2** A general perspective of learning SSM. Source: The authors

First, consider the thinking and the doing. Many of the challenges we encountered had been observed in other discussions of learning and teaching SSM mentioned previously. We seek to complement these discussions by emphasizing the quintessential point of the skills perspective: That more effective behavior can replace less effective but functionally equivalent behavior, and the key to providing recommendations is in understanding and describing behaviors and coming up with new ones to meet the specific needs of the learner. In other words, effectively teaching SSM requires reflecting on the unique goals and needs of new learners, and providing a means of meeting these.

Likely the heterogeneity of needs and prior skill level in component skills of SSM will require a good deal of improvisation and adaptation on the part of educators. We found the need to provide a greater level of specificity for some activities as described in the SSM materials we had available. In our reflective case study, the second author's incorporation of the PESTLE analysis was one such example that allowed him to carry out the SSM via a technique already familiar to him. Depending on the context, other areas of SSM could benefit from additional description that serve the unique needs of initial learners. This additional clarity could help address challenges like those faced by Ameyaw and Alfen (2018) in conducting political and cultural probes. As readily noted by Checkland, SSM is open to this type of complementarity. The challenge, perhaps, is in sticking to the constitutive rules of SSM when incorporating other skills, which may deviate especially in the underlying assumptions that inform them.

Considering emotions as well as technique is important for teaching SSM to new learners if the goal is for them to keep using it once they leave an educational setting. From its inception, SSM has championed the *humanness* (Checkland 1984) of soft approaches. SSM could likely benefit from a further softening by incorporating further discussion on the irrational side of conducting analyses. Below we reflect on three of these: acceptance as meaningful change, the incorporation of emotional skills to acknowledge and potentially address the emotions of the analyst, and the incorporation of interpersonal skills into SSM

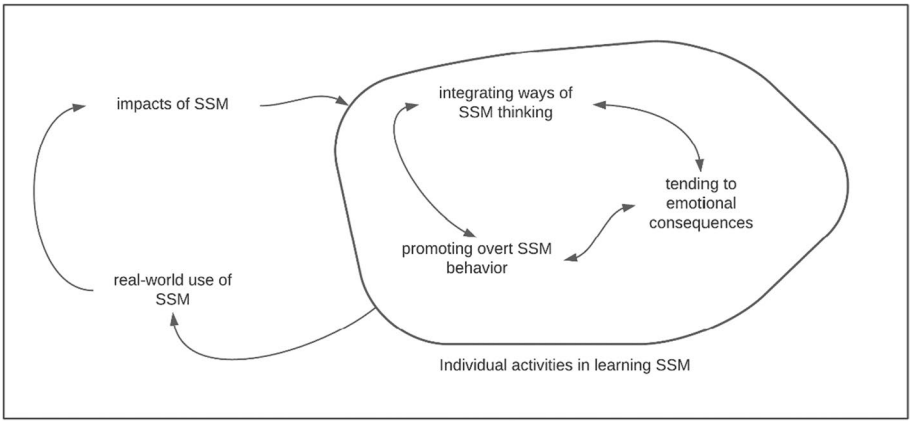

Fig. 2 A general perspective of learning SSM. Source: The authors

training. Taken together, these suggest a subset of underlying micro-skills that could support the general application of SSM.

The first is to embrace a version of change that sees understanding and acceptance as a central aspect of changing things for the better. This could, perhaps, set the stage for supporting an SSM that is more capable of supporting the type of emancipatory aims it seeks to support, but has failed to achieve (Flood 1993). In our case, most of the "real change" had to do with the second author's way of understanding the situation he worked within. SSM, both the writings of Checkland and his colleagues and subsequent research, has had little to say about individual growth of those who use it, versus outcomes at the project or organizational level (see Hanafizadeh and Mehrabioun 2018).

For a user without previous experience, authority, or mandate for change, applications of SSM to promote individual understanding are likely much more accessible. Furthermore, from a practical perspective, the impact of smaller projects should not be underestimated. First, understanding of causes, and accepting these, forms a powerful foundation for actual change (Linehan 1993) and indeed, the move from lack of understanding, or denial to acceptance, is a change itself. Further, as Lami and Tavella (2019) note, individual understanding is at the heart of promoting the use of SSM. Whether or not an individual sees value in the understanding they can gain can spell the difference between whether SSM components like root definitions are seen as "meaningless political slogans" or useful tools.

Second, there is an opportunity to further incorporate emotional considerations in both teaching and execution of SSM. We note that simply recognizing each other's emotions and communicating that understanding to each other to be an effective approach.

Finally, there is a need to elaborate on the interpersonal behaviors required for SSM so that new learners can effectively *communicate* the need, benefits, and results of their analyses. In our case, the second author lacked the formal authority and experience of his colleagues, leaving the power scale tilted out of his favor in the process of accommodation. Building on Ackermann's (2011) suggestion for promoting facilitation skills in Soft OR approaches, incorporating effective communication so that learners can better achieve the interpersonal objectives could be an interesting and fruitful area of research. For example, Berg's (2015) detailed comparison of different approaches to facilitating the creation of rich pictures offers a number of opportunities to be integrated with teaching. Such a granular approach can not only help clarify areas of ambiguity for new learners, but they can also provide alternatives for (new) facilitators to consider. Such discussions also draw attention to "what works" in the use of SSM that may not be readily accessible to new learners in other forms.

We do not mean to call for a potentially cumbersome level of detail in describing SSM. Indeed, ultimately, some level of ambiguity is desirable and supports improvisation and adaptation to a given context (Mease 2019). Rather, as instructors and new learners of SSM we could be mindful of the skill deficits acting as system constraints, and address them.

The goal of our paper is to discuss SSM as a skill as a means of increasing its impact, and to illustrate this through a case study. Clearly, our discussion is subject to limitations. First, the transferability of our experience, based on one dissertation project over a few months, is clearly limited. We mean to provide an illustrative account of one experience, to inspire further exploration of the topic, which is appropriate given the dearth of studies on the topic. Further extensions of skill acquisition could further build on the experience of new learners.

Conclusions

> *If we can find better ways to teach PSMs, develop a consistent and appropriate name, increase the appreciation of the value of the methods and ensure rigour then PSMs are here to stay—the world is unlikely to run out of messy problems.* -Ackermann 2019*, p. 1397*

Scholars promoting PSMs and Soft OR approaches have made the case that if the rigorous use of these is to become more widespread, we must become better at communicating the value of these (Ackermann 2019; Tully et al. 2018) We would emphasize that, in addition to elaborating case studies at the senior level and improving the skills of active consultants as they suggest, attention be paid for making the way easier for novices to learn these techniques and apply them in situations where they will face confusion, hesitation, frustration, and doubt—both their own and that of those stakeholders they interact with. The contexts these first-time learners face may not be large organizational change projects most often described by much literature on SSM to date. Rather, in these situations, change is likely to be small-scale, be more impactful for the learner than for others, and take place without much formal authority.

There appears to be an inherit dilemma in learning SSM and other Soft OR techniques: One needs to know a good deal about it to apply it successfully (Mingers and Taylor 1992), but we learn about it through its use. We can imagine an ideal future where SSM and other forms of Soft OR are common enough that one has ample opportunity and encouragement to use them in the workplace. At present, however, the onus is largely on the learner to acquire the skills required to move from novice to master.

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Declarations

Conflicts of Interest/Competing Interests Nothing to declare.

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