

Journal of the  
Operational Research  
Society



**AN ENHANCED USE OF SOFT SYSTEMS METHODOLOGY  
(SSM) IN MODE 2 TO EXPLORE ONLINE DISTANCE  
EDUCATION IN SAUDI ARABIA**

Journal:	<i>Journal of the Operational Research Society</i>
Manuscript ID	TJOR-2020-OP-0573.R2
Manuscript Type:	Original Paper
Date Submitted by the Author:	n/a
Complete List of Authors:	Basahel, Sulafah; Saudi Electronic University, Cordoba-Pachon, Jose; Royal Holloway University of London
Keywords:	Soft OR, Systems Thinking, Problem Structuring, Education
Abstract:	<p>This paper develops a framework to enhance the use of Soft Systems Methodology or SSM in Mode 2, with the aim of learning about Online Distance Learning or ODE in the country of Saudi Arabia. Mode 2 focuses on learning by mapping, internalising and reflecting on SSM principles, stages or techniques to make sense of situations as fluxes of events. This mode of use has been scarce in the literature in the last 20 years, partly because of the popularity of a more explicit Mode 1 of use which advocates explicit and participative application of SSM stages and methods. In the case under study, one of us (the researcher) engaged with ODE as an area of exploration; difficulties of access to the situation led her to shift to a Mode 2 of SSM use, and include Kolb's experiential learning theory/model in her framework of ideas (F) to refine her initial learning framework. We discuss implications for SSM use to enhance learning of researchers in the future.</p>

SCHOLARONE™  
Manuscripts

## AN ENHANCED USE OF SOFT SYSTEMS METHODOLOGY (SSM) IN MODE 2 TO EXPLORE ONLINE DISTANCE EDUCATION IN SAUDI ARABIA

Sulafah Basahel

José-Rodrigo Córdoba-Pachón

### Abstract

This paper develops a framework to enhance the use of Soft Systems Methodology or SSM in Mode 2, with the aim of learning about Online Distance Learning or ODE in the country of Saudi Arabia. Mode 2 focuses on learning by mapping, internalising and reflecting on SSM principles, stages or techniques to make sense of situations as fluxes of events. This mode of use has been scarce in the literature in the last 20 years, partly because of the popularity of a more explicit Mode 1 of use which advocates explicit and participative application of SSM stages and methods. In the case under study, one of us (the researcher) engaged with ODE as an area of exploration; difficulties of access to the situation led her to shift to a Mode 2 of SSM use, and include Kolb's experiential learning theory/model in her framework of ideas (F) to refine her initial learning framework. We discuss implications for SSM use to enhance learning of researchers in the future.

**Keywords:** Soft Systems Methodology (SSM); Mode 2; Experiential Learning; Kolb; Online Distance Education (ODE); Saudi Arabia.

### Introduction

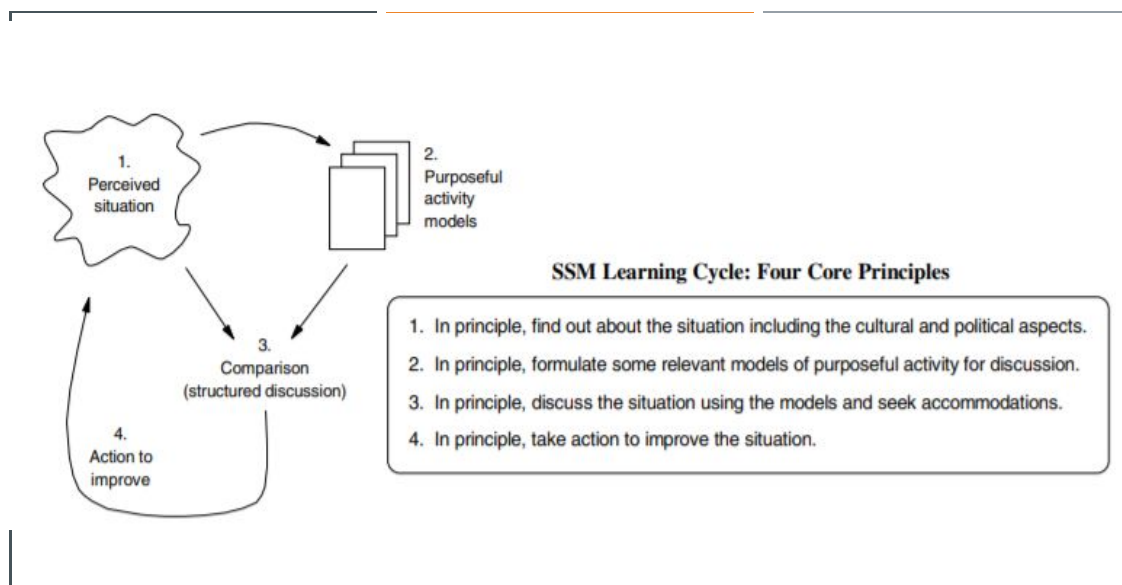
This paper develops a framework to learn about Online Distance Learning or ODE in a higher education institution in Saudi Arabia. The framework is based on soft systems methodology or SSM in Mode 2. In contrast to Mode 1 in which researchers or facilitators explicitly follow SSM stages and often in an explicit, face-to-face or workshop-based fashion, this mode highlights learning and action by mapping, internalising and reflecting on SSM principles, stages or techniques to make sense of situations as fluxes of events.

In the fields of operational research (OR) and systems thinking, SSM has been pivotal for the last forty years or so (Mingers and White, 2010). In these fields, there is currently an increasing degree of awareness of how researchers and practitioners (actors) use methodologies in relation to their own *praxis* (Franco and Hamalainen, 2015) something that Peter Checkland (2000) (main author of SSM) highlighted decades earlier by proposing SSM as a way of building theoretically defensible action research based learning accounts of the social world. This convergence, together with a perceived dearth of SSM Mode 2 cases reported in the literature in the last twenty years, offers us an opportunity to revisit SSM and enhance SSM Mode 2 particular use in research and practice. The paper focuses on the issue of *human learning* by participants as researchers of a situation in which they can also be considered problem owners, solvers or clients simultaneously (Checkland and Scholes, 1990; Checkland and Winter, 2006).

We first provide a brief description of SSM and its Mode 2 of use, highlighting the importance of exploring *alternative* forms of learning than the explicit, face-to-face, workshop-oriented forms which often SSM researchers or practitioners promoted and made popular worldwide before the coronavirus pandemic. Following Checkland (1981) and Checkland and Holwell (1998), an initial framework of ideas (F), methodology (M) and an area of concern (A) was initially devised to help a researcher make sense of ODE in a Saudi Arabian University (KAU). In this case and after encountering access difficulties to the people in the situation, the researcher chose to shift her use of SSM to Mode 2, leading her to also incorporate Kolb's ideas within the initial framework and make sense of the complexities encountered. Her learning was therefore gradually enhanced with the use of SSM techniques like the rich picture and conceptual models, as well as the incorporation of Kolb's learning stages as reflected by a number of cycles. Insights from the case lead us to discuss implications of a more explicit use of Kolb's stages to support learning when using SSM in Mode 2 in future research and practice.

### Soft Systems Methodology or SSM

In the 1970s and partly drawing on the ideas of C.W. Churchman (1968), Peter Checkland and his associates at the University of Lancaster in the UK developed soft systems methodology or SSM (Checkland, 1981; Checkland and Poulter 2006; Checkland and Scholes, 1990; Mingers, 2000). Adopting a view about the intersubjective nature of scientific enquiry, and stating that such an inquiry could be conceived of as a *system*, SSM comprised a set of principles and iterative stages to continuously and participatively learn about and act on 'messy' situations which could be characterised by a perceived diversity of perspectives from situation stakeholders (Checkland, 1981).



**Figure 1. The learning cycle of SSM with four core principles or rules (Checkland and Scholes, 1990).**

As presented in the systems Figure 1 above, learning enquiry with SSM could be supported by employing principles and techniques iteratively and following four (4) different rules. These suggest that facilitators and stakeholders of a situation should elicit different worldviews about it, in order to formulate relevant models of human activity to help them achieve a degree of accommodation between views including those that are related to taking action for improvement in such a situation. Figure 1 also suggests that the learning proposed by SSM is *iterative*. As action is taken using SSM (principle/rule 4 above), new views about a situation can emerge which would require re-starting activities of enquiry. Checkland (1981) proposes considering this process as one of **action research**, given that facilitators (researchers) or other stakeholders would incorporate new ideas both about

the situation, as well as insights about what works or does not work when enquiring or acting about it. For Checkland (1981) and Checkland and Holwell (1998), making any SSM-based enquiry defensible in terms of social science knowledge requires enquirers to explicitly declare their framework of ideas (F), the methodology used (M) to embed methodological ideas, and the area of concern (A) in which they are intervening. This can then help provide both plausible and traceable accounts of their interventions (Checkland, 2000) as shown in figure 2 below.

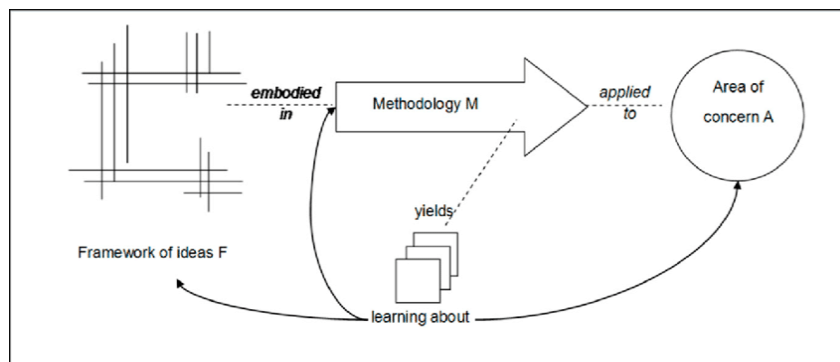


Figure 2. An action research framework (Checkland and Holwell, 1998).

Furthermore, and to enhance flexibility in the use of SSM, Checkland and Scholes (1990) also distinguish **two modes of methodology use**. One in which SSM is to be used centre stage to guide an intervention (Mode 1), and another (Mode 2) in which the methodology could be used to make sense of the continuous flux of events in a situation. Whilst the use of SSM in Mode 1 would involve “a process of inquiry which, through social learning, works its way to taking ‘action to improve’” (Checkland and Poulter, 2006, p. 192), Mode 2 would conceive of learning as the *main action of enquiry* (Flood, 2000), helping participants in “making sense of their experiences by mapping them on to [some of] the stages of SSM” (Mingers and Taylor, 1992, p. 324, brackets added). SSM Mode 1 could be thus conceived of as a “formal stage-by-stage application of the methodology” (Checkland and Scholes, 1990, p. 281), an explicit way of undertaking learning and action using the methodology stages, whereas Mode 2 could be associated with an “internal[ised] use of it [SSM] as a thinking mode” (Checkland and Scholes, 1990, p. 281, brackets added), or in other words, a flexible ‘mapping’ of learning experiences (Checkland and Scholes, 1990; Mingers and Taylor, 1992).

The distinction of these modes of SSM use also follows a perceived need to emphasise more explicitly the *learning nature* of SSM, which could be easily lost if the methodology is understood or followed as unfolding in a fully explicit, prescriptive or linear way (Mingers and Taylor, 1992). SSM used in Mode 2 could facilitate a better capturing of people’s fluid experiences at work or elsewhere. They could, if needed, adopt roles of clients, problem owners *and* problem solvers simultaneously or in parallel (Mingers, 2000; Checkland and Winter, 2006). Although Checkland and collaborators report several cases of use of SSM in Mode 2 in organisations, situations could include those where people are not able to immerse themselves in such a setting. With SSM in Mode 2, people could also follow the methodology stages more openly, flexibly and dynamically, not aiming to complete

them all or using them in their interactions with stakeholders (Checkland and Scholes, 1990; Mingers and Taylor, 1992; Checkland, 1999; Mingers, 2000; Kumar and Sankaran, 2006). Therefore, as noted in Table 1 below, a key difference between modes of SSM use in relation to learning is that whereas in mode 1 the framework of ideas (F) employed by enquirers refers to its systemic nature, in mode 2 SSM, methodological stages or parts of it *become part of F*, and thus subject to further conceptualisation, experimentation or modification.

	<b>Mode 1</b>	<b>Mode 2</b>
Framework of ideas (F)	Systems ideas	SSM stages or streams of analysis (logical, cultural) (Checkland and Scholes, 1990)
Methodology (M)	SSM stages or streams of enquiry (logical, cultural)	Reflection upon the everyday flux of events and ideas (methodology included).
Main driver	Methodology	Situation
Foci of analysis	Intervention	Interaction
Area of concern (A)	Some part of the real world	The <i>learning of whoever does the above</i> (Flood, 2000; Houghton and Ledington, 2002).

**Table 1. Mode 1 and Mode 2 of SSM (adapted from Checkland and Scholes, 1990, p. 282 and Checkland, 2000).**

According to Mingers (2000) and Mingers and White (2010), in the last decade the growing popularity achieved by SSM since its inception indicates that this methodology is now in a stage of *dissemination*, meaning that its use has spread across different areas of knowledge beyond soft operational research or applied systems thinking. Literature reviews of SSM classify its use a) as linear and action based oriented or b) as exploratory (Mingers and Taylor, 1992; van de Water, Schinkel and Rosier, 2007; Mingers and White, 2010; Howick and Ackermann, 2011). In the last few years, there has been a noticed emphasis on the practical usefulness of SSM in combination with other methods (multimethodology), leading to suggest an apparent degree of dominance of SSM mode 1 (Gold, 2001). A brief review of articles reporting on the use of SSM in the last twenty years (see appendix 1/table 1 of this paper) confirms this.

SSM's growing use and dissemination has also brought a number of criticisms by researchers and practitioners alike. From a strand of thinking that incorporates critical social theory, this methodology has been deemed as unable to empower stakeholders to radically transform the status quo in situations (Mingers, 1984 and 2000; Jackson, 2003; van de Water, Schinkel and Rosier, 2007). SSM's practical relevance has been deemed to depend on the personal skills and expertise of those individuals researching on or facilitating an intervention (Bergvall-Kareborn et al. 2004; Córdoba-Pachón, 2011). This means that among other things, the use of SSM could be time-consuming in the generation of effective and practically useful rich pictures or conceptual models (Mingers and Taylor, 1992; Kingston, 1995; van de Water, Schinkel and Rosier, 2007). What is more, the explicit-to-others, participative, and leading-to-collective action orientation of SSM could be also reinforced by confusions generated by the indistinctive use of terms like reflection, experience and interaction by Checkland and Scholes (1990), as well as Checkland (2000)'s excluding claim that SSM Mode 1 is akin to 'novice' practice, and Mode 2 to 'experienced' one. Time to gain expertise and deal with potential conflicts and issues of power suggest that SSM use requires further awareness on how to best adapt it not only in relation to the context of a situation, but also to the *learning* of whoever is using it.

If not reflected upon in the light of its intended flexibility, SSM's key tenet that it contributes to the social construction of reality could potentially privilege Westernised forms of learning (i.e. workshops, face-to-face

1  
2  
3 interviews, debates). These have been accepted as the ‘norm’ prior to the world coronavirus pandemic. *Other*  
4 *forms of learning*, with individual or group learning seen as action (Flood, 2000) seem to have been excluded  
5 from SSM dissemination and use. With such an emphasis, the individual learning of participants as problem  
6 owners, problem solvers or clients in a situation could become secondary or marginalised from enquiry.  
7  
8  
9

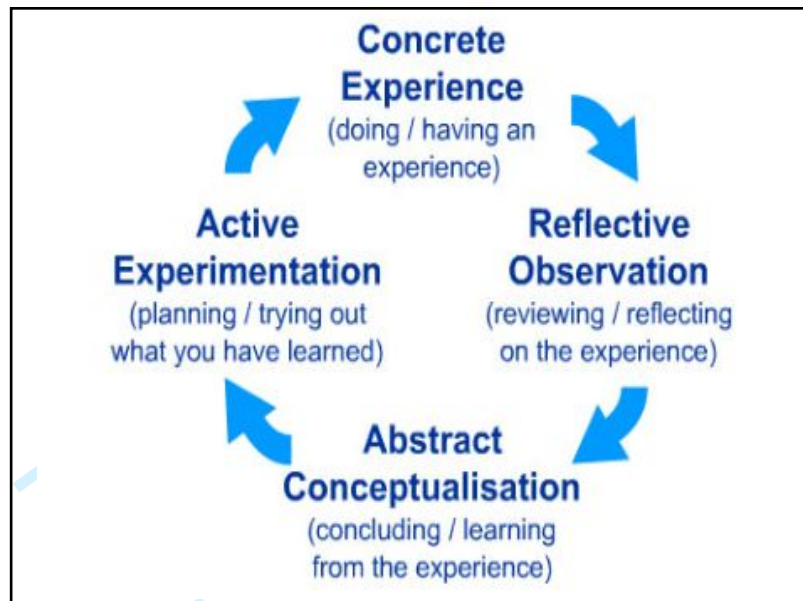
10 It can therefore be said that there are opportunities to address this sort of marginalisation, also in consideration of  
11 the emerging interest in operational research and systems thinking to develop further awareness of how researchers  
12 and practitioners (actors) use methodologies in relation to their own *praxis* (Franco and Hamalainen, 2015). The  
13 importance of reflective praxis is something that Peter Checkland (2000) highlighted decades earlier and would  
14 need revisiting in the light of SSM’s popularity given the aforementioned terminology confusion. In addition, an  
15 emerging emphasis on how SSM learning could be enhanced has been also taking place and could be taken  
16 forward during or post-pandemic situations. For instance, Checkland and Winter (2006) show how SSM could  
17 put emphasis on finding out about a situation (what they call process-based intervention or *SSMp*), as well as  
18 guiding debate and improvement activities (e.g. content based intervention or *SSMc*). Process based intervention  
19 or *SSMp* could in principle be regarded as a form of Mode 2, where researchers (acting as problem owners and  
20 solvers) can explore what could be feasible to learn in a situation (with others); the question here is: How could  
21 their (process, content-based) learning be enhanced? In this line of thought, Hindle (2011) shows how SSM could  
22 be used to help learners *experience* the use of SSM techniques (more on this later in the paper), offering us a  
23 window to complement SSM with other learning methods. And Gold (2001) uses SSM in Mode 2 in combination  
24 with story-telling to help a group of managers better learn about and manage their work. The learning that Gold  
25 (2001) reports in this paper is based on his interactions with managers who elaborated their own SSM outputs.  
26 What if ‘work’ is not limited to, or has to navigate organisational constraints of access?  
27  
28  
29

30 In SSM, learning could be conceived of as ‘accommodating’ different learning activities, and with the possibilities  
31 of incorporating other intellectual devices (i.e. theories, techniques) as well as going beyond established  
32 organisational boundaries (Checkland, 1981; Córdoba-Pachón and Midgley, 2006). To address the above  
33 questions and possibilities, in the next section of the paper the theory/model of Kolb’s experiential learning  
34 theory/model is presented.  
35  
36

### 37 **Kolb’s Experiential Learning Theory/Model**

38  
39  
40 Based on Lewin, Dewey and Piaget’s ideas and often regarded as cognitively constructivist, Kolb’s experiential  
41 learning (1984; Kolb and Kolb 2005; Finlay, 2008) is a popular theory/model used in many organisations and  
42 disciplines including management (Vince, 1998; Kolb and Kolb, 2009; Tomkins and Ulus, 2016), education  
43 (Abdulwahed and Nagy, 2009; Murugaiah and Thang, 2010; Hindle, 2011; Basahel, 2017) and healthcare  
44 (Sharlanova, 2004).  
45  
46  
47

48 Kolb’s main focus is the internal cognitive processes of learners (Davies, 2012) and their direct relationships to  
49 practice (Lewis and Williams, 1994; Clark and White, 2010; Jones and Jones, 2013; Barros-Castro, Córdoba-  
50 Pachón and Pinzón-Salcedo, 2014). In his theory and model of experiential learning, learners construct new  
51 knowledge via abstraction (conceptualisation) and active experimentation. They continuously observe or acquire,  
52 try, accommodate and modify or update it, and by doing this they attain “new levels of cognitive, perceptual,  
53 behavioural, and symbolic complexity” (Lewis and Williams, 1994, p. 9). To reflect this, a learning cycle was  
54 proposed by Kolb as a series of actions aiming to assimilate feelings, perception, thought and function - a four  
55 stage learning model comprised of Concrete Experience (CE), Reflective Observation (RO), Abstract  
56 Conceptualisation (AC) and Active Experimentation (AE), as shown in Figure 3.  
57  
58  
59  
60



**Figure 3.** The four stages of Kolb's experiential learning approach. (Source: McLeod, 2013).

The first stage in the Kolb learning cycle is a *concrete experience*. This stage involves setting individuals, organisations or teams with a task. A key to learning is therefore active involvement by learners. A second stage is *reflection-observation*. It means stopping doing the assigned task and taking time to take stock or review what has been experienced or what has been done or accomplished. A next stage of Kolb's learning cycle is *abstract conceptualization*: a process of making sense of what has happened as well as identifying ideas, theories or interpreting relationships between experienced (intended or unintended) events. The final stage in Kolb's approach is *active experimentation*. Learners consider how they will put into practice what they have learned; so, they plan what/how to do better next time. For active experimentation, planning becomes significant as it helps them develop new understandings and manage the next steps of their learning (Kolb, 1984) and in consideration of their learned ideas, skills or methods.

Kolb's learning theory/model as described above could share similarities with the SSM cycle of learning portrayed earlier in this paper in Figure 1. As learners, researchers of a situation can set themselves the tasks of exploring (observing, representing) it by drawing on their concrete experiences and becoming problem owners-solvers or clients. Defining (modelling, discussing) possibilities for improvement according to SSM could also be linked to Kolb's stages of abstract conceptualisation and active experimentation. In all of these, learners could also devise and try different and suitable actions within specific circumstances of their learning contexts (Abdulwahed and Nagy, 2009). In this way and via SSM Mode 2, learning could thus be iterated more flexibly, frequently and without the need to use all SSM techniques, given that the focus is on their own learning (Beard and Wilson, 2006; Hindle, 2011; Helyer, 2015).

This paper aims to assess more clearly how Kolb's insights could help SSM use in this Mode 2 of use. With the above initial possibilities, a case study of using SSM by a researcher at a university in Saudi Arabia called KAU (Jeddah campus) is presented and discussed. The case is narrated through a series of learning cycles.

### A study - Online Distance Education at KAU

Online distance education or ODE can be defined as an internet-based educational approach where students access online services and communicate with their instructors and peers through computer-based communications at any time and place (Tomei, 2010). In practice, ODE initiatives are subject to a number of challenges ranging from the institutional to the technological, cultural and learning-oriented (Moore and Kearsley, 2012; Basahel, 2017). In recent years, the ODE sector in Saudi Arabia (SA) has rapidly expanded (Al-Shehri, 2010; Aljabre, 2012; Hamdan, 2014). In 2006, the Saudi Ministry of Education (MOE) directed the implementation of ODE systems in the Kingdom, ensuring the application of information and communication technology to realize educational goals, especially at tertiary institutions.

In business organisations and education institutions in SA, hierarchy is generally a characteristic adhered to in organisational structure. As a university, KAU has its own established policies and regulations. It operates in the same way as other educational systems in Saudi Arabia and is strongly affected by factors associated with a distribution of power. Saudi society is oriented towards masculinity; men are responsible for the key areas of planning and decision-making. In organisations where male and female counterparts are necessary, females defer to males in decision-making.

KAU was the first public university to implement an ODE system in Saudi Arabia in 2006 (Aljabre, 2012; Al-Asmari and Rabb Khan, 2014). The university's staff occupies two campuses (referred to as sections) by gender. Male staff head departments in the male section, and female staff the departments in the female section. Men and women occupy separate geographical locations at the same institution and both campuses follow a similar curriculum. Each campus has its own sporting and social facilities. Members of the separate campuses communicate with each other via emails, telephone calls, and video conferencing. Gender separation ensures a comfortable environment in which individuals can freely express themselves, thus ensuring they succeed academically and in terms of their careers. However, it could be a challenge when tasks and responsibilities in relation to ODE improvements require the cooperation of both sections.



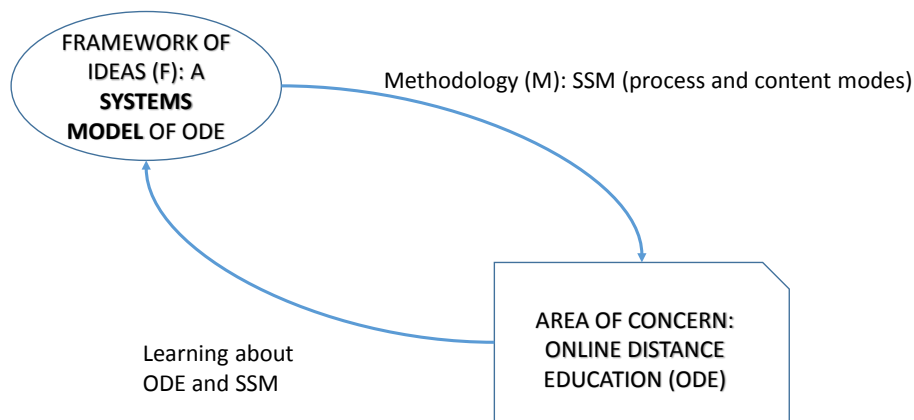
## The learning cycles

### *Cycle 1*

This cycle started with the researcher deciding to undertake an exploration of ODE at KAU. She initially aimed to understand and gain knowledge about both ODE and its implementation at KAU as an area of interest (A), and with a view to using SSM to contribute to improve the situation. The researcher initially adopted the roles of problem owner and solver. She reviewed relevant literature about ODE and systems thinking. She became aware of the fact that cultural norms in Saudi Arabia as well as regulations at KAU could influence her enquiry. As a female, she was not permitted to visit the KAU male campus to conduct face-to-face interviews with male stakeholders, observe their daily interactions or organise workshops.

Through her literature review, the researcher came across a (prescriptively oriented) systems model to develop and manage ODE (Moore and Kearsley, 2012). This model provided some insights about different (technical, non-technical) aspects to be considered when implementing ODE, but in isolation from each other (Basahel and Basahel, 2018). In her view, models like this could be enriched by adopting a soft systems thinking approach which could enable further reflection on the *purposes* of learning systems like ODE, as well as a more participative identification of connections between emerging issues and collaborations between ODE stakeholders which could potentially support deeper forms of learning by students (Barros-Castro, Córdoba-Pachón and Pinzón-Salcedo, 2014).

Following Checkland (1981) and Checkland and Holwell (1998), the researcher devised an initial framework with the elements of F, M and A as mentioned earlier in the paper. As a framework of ideas (F), she was to develop a systems model of ODE using SSM as a methodology (M) in both process and content modes (Checkland and Winter, 2006). Regarding content (SSMc), she would use SSM to learn if or how systems models could be used to learn about and improve ODE in KAU as an area (A) of concern (Basahel, 2016). She would also use SSM to help her devise her enquiry activities (SSMp). The framework is shown in figure 4 below.



**Figure 4. An initial framework to learn about ODE (Basahel, 2016)**

To implement the above framework and to initially use SSM in process mode, the researcher drew a list of potential KAU stakeholders, and devised a conceptual model of data-gathering activities which she would then use to guide her enquiry when interacting with them (see appendix 2 of this paper for one of the versions of this model). With the list of stakeholders, the researcher requested a meeting at the female campus of KAU with the female ODE dean. This meeting also gave her the opportunity to informally meet two departmental heads in this section of the department. The meetings also helped the researcher to learn more about ODE content at KAU, as they clarified to her the nature of work processes, methods of communication and interactions between the female and male sections in relation to ODE at KAU.

During her visit, the researcher also used this opportunity to meet a KAU Vice Presidency in the female section. She asked to be issued an official permission letter to gather research data remotely from male participants. After this visit, she regularly followed up the issuing of the letter over the phone and drew up a list of ODE stakeholders as well as one of potential problem owners at KAU who she could possibly engage in a later stage of her enquiry.

#### ***Cycle 2: Access cycle – a shift to SSM Mode 2 and experiential learning***

After the aforementioned letter of access to KAU participants was finally issued by one of KAU's deanships (it took several months), the researcher was made aware of the need to have another letter from the male dean to be able to remotely interview male participants. This could also take potentially more time and resources than the researcher could possibly afford for her project. In addition, her other requests for initially planned activities (i.e. to organise workshops with female participants, attend an online course or observe how ODE systems and tools were used in practice by students and staff) were denied by the male deanship office.

To this situation, the researcher decided to focus her enquiry on *her own learning about learning*; she thus declared explicitly to her research supervisors that she was to use SSM in Mode two: she was to learn about both the 'internalised' use of SSM in this mode, as well as about ODE at KAU. From this point onwards, she then also

assumed the role of client of the situation (Checkland and Winter, 2006). She updated her initial conceptual model of activities (SSMp) and its corresponding data collection activities plan to reflect a shift of her foci from synchronous and direct interactions (workshops, face-to-face interviews) to feasible and technology-mediated others (phone, emails, own elaboration of rich pictures and conceptual models, support from supervisors to her individual reflection work from her part). She incorporated these access-related insights into a rich picture that she had already started elaborating in the previous learning cycle, which included structures, processes and issues related to hierarchy, gender and power separation at KAU.

Moreover, the researcher considered at this point in time the inclusion of complementary intellectual devices to help herself 'express what was going on' as a way of enhancing her experiencing of the situation (Kolb, 1984; Gold, 2001). She therefore decided to incorporate Kolb's experiential learning theory in her (F) framework of conceptual ideas. Her aim was to better organise different learning insights using the main stages of a) experiencing, b) reflecting, c) conceptualising and d) experimenting in order to learn more about SSM use itself as well as ODE at KAU. The updated framework is shown in figure 6 below.

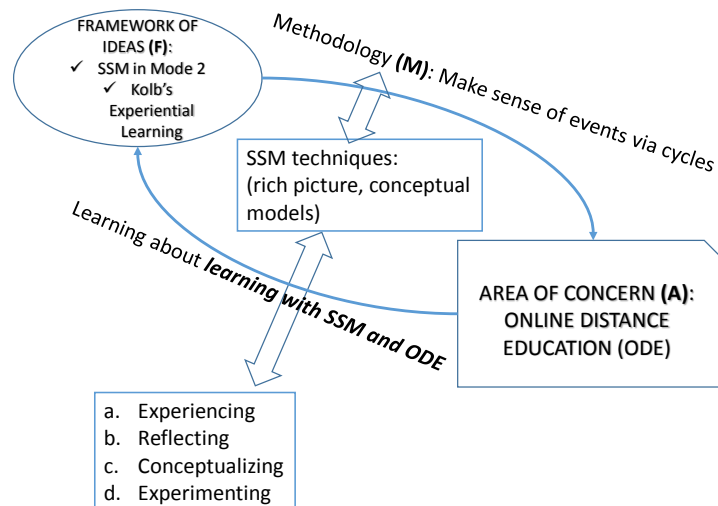


Figure 5. A refined framework

From this moment onwards, and with the information that she was allowed to gather from some KAU ODE female participants, the researcher continued updating her rich picture (see figure 6 below). The picture was now depicting a complex situation where structures and cultural norms, together with ODE systems implementations activities were influencing her learning. In the researcher's view, there were now issues of *access* to ODE understandings; interestingly, these issues were *also* experienced by other female participants and students and being reflected in some specific (content) ODE-related ones: challenges for ODE co-ordination, communication and sustainable rollout of educational content (Basahel and Basahel, 2018).

In the rich picture, the researcher, some participants and students appear in a bottom corner or low levels, suggesting a reduced degree of access to relevant decisions and conversations about ODE. The picture also reflects how the researcher became more focused on her own learning, and how other participants in her research also expressed a need to learn more about ODE, given that there were also additional concerns about the recognition of ODE-based degrees outside KAU and in the graduate job market in Saudi Arabia. These echoed

some students' perceptions about the benefits accrued by ODE in providing access to education and credentials to previously marginalised or excluded groups in society.

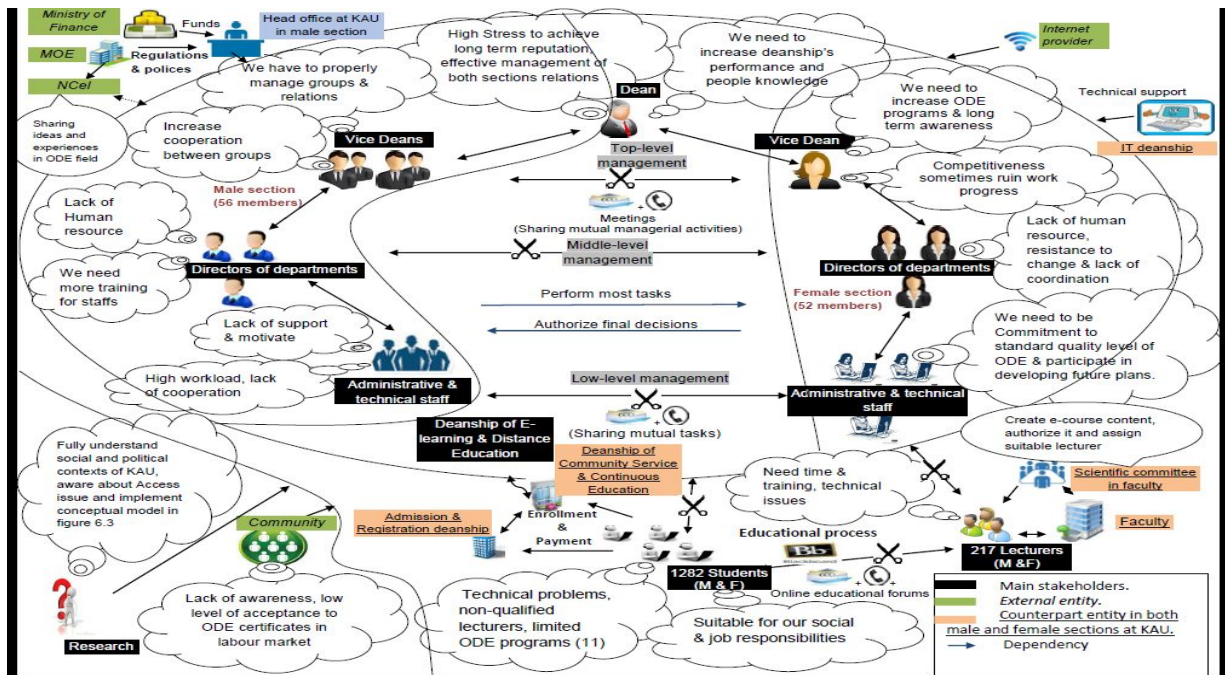


Figure 6. A rich picture of ODE at KAU by the researcher

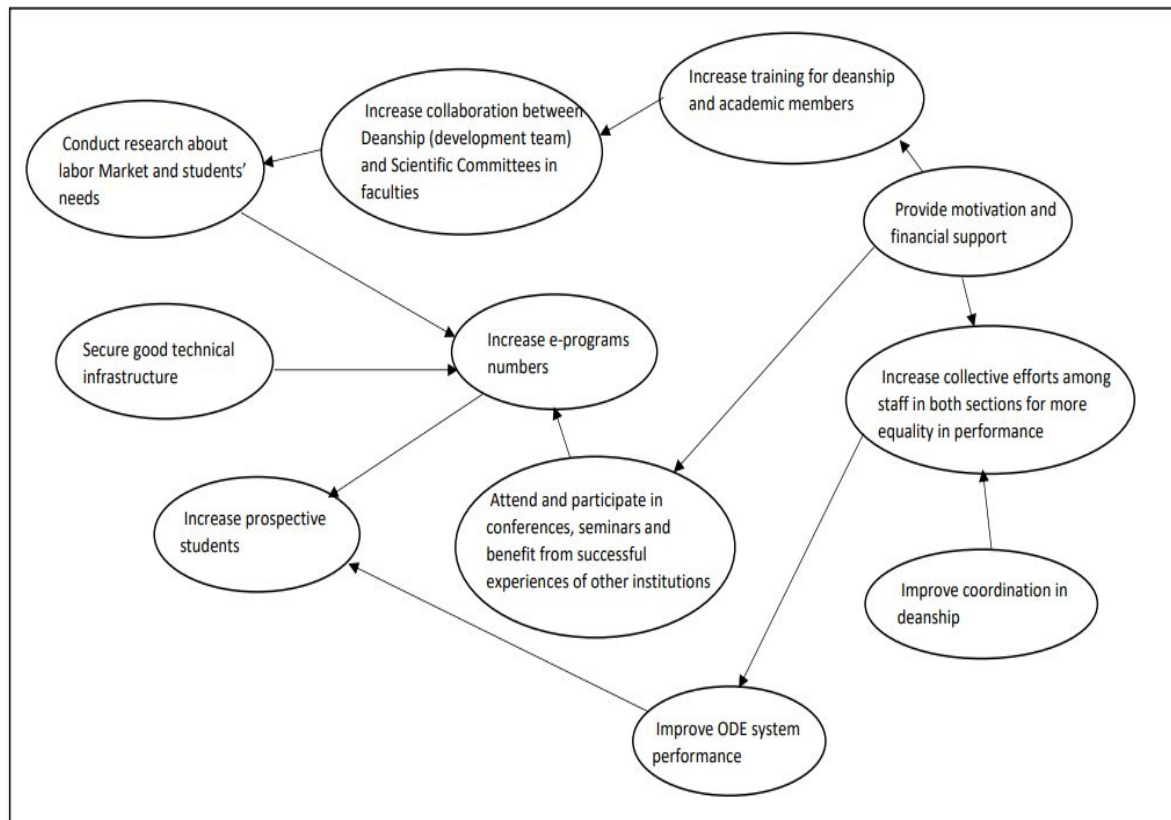
### Cycle 3: ODE 'contents analyses' cycle

After reflecting on her initial conceptual model of activities, and enriching the picture with the above and other insights, it was clear for the researcher that the use of SSM in Mode 2 was helping her to gain valuable insights about the situation as well as expertise in the use of SSM methods (Hindle, 2011). Moreover, she was also noticing that some of her insights could also be helpful to others. According to Brockbank and McGill (2007), experiential learning could lead to transformation in knowledge, which can be beneficial *for both* reflective learners and their social environments. ODE authors like Moore and Kearsley (2012) and Murugaiah and Thang (2010) state that effective experiential learning requires the interaction of different types of activities: examination, exploration and understanding through direct observation, active participation and *engagement*. In the case under study, it seemed as if the use of SSM in Mode 2 was generating rich knowledge that could also be directly or indirectly passed on to situation stakeholders in a more educational, less time consuming or threatening manner (i.e. Checkland and Scholes, 1990; Gold, 2001; Córdoba-Pachón and Farquharson, 2008).

To the above, the researcher decided to undertake a new (3<sup>rd</sup>) learning cycle, focusing now on her *active experimentation about ODE*. She continued adding content to the rich picture and developed a set of conceptual systems models whose activities would respond to concerns identified by herself and others. This was now a more content-focused mode of use of SSM (SSMc) (Checkland and Winter, 2006). The researcher arranged to discuss her insights in a further round of semi-structured and technology (online, telephone) mediated meetings with fewer (female) KAU participants who were willing to help. After obtaining the corresponding permission and consent, the researcher would explain at the meetings what she had done with the 'data' that she had been collecting. She would optionally show the picture and conceptual models if participants wanted to see them, and probe for the desirability and feasibility of key recommendations for improvement.

Recommendations were now presented by the researcher adopting the role of *a learner*. She made it explicit to participants that the outcomes of her learning could potentially help participants learn something new about ODE and their situation at KAU.

The aforementioned conceptual systems models addressed issues like KAU decision making processes, awareness about ODE within and beyond KAU organisational boundaries, interaction and communication shortcomings between KAU ODE stakeholders, or tensions between the quality vs quantity of ODE programmes. One of the models referring to the latter issue is presented in figure 7 below. This model contains two possible learning insights which could also be considered as possibilities for improvement. The first insight, which was fully supported by all of the participants during one-to-one remote discussions, was the need to increase communications, conversations and interactions between the KAU Quality and Development Department and the different KAU Colleges, in order to conduct field and market research to meet the needs of ODE labour markets and students. This is something that in a systems model of ODE (Moore and Kearsley, 2012) is generically stated, but in a prescriptive and isolated rather than holistic way. Technology could play a pivotal role to address cultural constraints of physical-gender separation.



**Figure 7. Conceptual model for a proposed ODE improvement at KAU: the number of ODE programmes**

The second insight came from the above model to improve the provision of distance education programmes at KAU. This model shows how a more holistic assessment of student needs and markets needs should be preceded by appropriate allocation of resources as well as an increase in both internal and external collaborations with relevant ODE stakeholders. From this model, the researcher proposed to allow more female ODE KAU staff to attend international conferences and events, so that they could benefit from experiences at other universities and thus increase their learning and sharing opportunities. This idea was initially rejected by the female KAU ODE deanship due to limited funds available. Later on, it was felt by research participants that with her learning experiences, methods and strategies, the researcher was setting a valuable example for them to follow. After presenting and discussing this and other ideas, the researcher brought her final learning cycle and enquiry to a close.

## Discussion

Adopting a Mode 2 (less explicit and participative) use of SSM and its techniques or activities like elaborating a rich picture and conceptual models helped the researcher to become more reflective and focus on learning, allowing her to consider other ways of achieving such learning, potentially different from what was perceived by stakeholders in the situation. Moreover, and also different from what Checkland and Scholes (1990) state in relation to learning occurring during fluxes of events in organisational/workplace settings, the case study has shown that learning *within and outside* physical boundaries can also be mapped and through different cycles, with the researcher acting as a source of enquiry. Such cycles could be considered as initially different in their SSM process or content orientations (Checkland and Winter, 2006). The use of SSM in Mode 2 allowed for these orientations to emerge, and also for the mapping of learning activities in each.

1  
2  
3  
4  
5 Furthermore, the researcher's learning yielded valuable insights about both the cultural/political context and  
6 content of learning about ODE at KAU. The inclusion of Kolb's experiential learning ideas and stages helped her  
7 to structure and organise her understandings of a complex situation (Mingers and Taylor, 1992) and generate  
8 knowledge that could be considered valuable to herself but also to other stakeholders (Boud et al, 1985, Xie et al,  
9 2007; Hindle, 2011). With such an inclusion, the proposed framework also provided a socially relevant and  
10 defensible account of learning about the situation.  
11

12  
13 In the last twenty years, the literature on the use of SSM in Mode 2 presented earlier in the paper suggests that the  
14 flexibility offered by this mode is to benefit practitioners to map, reflect and deal with fluxes of daily events, but  
15 that they have to be aware of potential (power, political, timing) challenges in a situation. A process-based use of  
16 SSM could initially help in this regard (Checkland and Winter, 2006) as it did in the case under study. However,  
17 researchers' learning(s) could be unattended or subordinated to obtaining access to a situation. In our case, once  
18 access issues were experienced by the researcher, the use of SSM in Mode 2 provided her with opportunities for  
19 flexibility. Learning became thinking and doing something about her own situation. And although this flexibility  
20 needed to be supported with the inclusion of other theoretical ideas (Kolb's, something that perhaps Checkland  
21 would see as unnecessary), it also opened up new opportunities. For instance, AE ('active experimentation') was  
22 done by the researcher in a form of active and technology mediated discussion with some stakeholders in the third  
23 'contents analysis' cycle presented above.  
24

25  
26 The above reflections hint at the possibility of adding **other methods, ideas or techniques** in enquiry beyond  
27 those suggested by SSM so that learning (appreciating, conceptualising and acting about situations) can be  
28 enhanced. As an initial proposal to move forward, Table 2 contains our reflections on how Kolb's experiential  
29 learning theory/model was incorporated in the different learning cycles of our study, *as well as* some questions of  
30 how it could have also occurred from the beginning of a learning process and in order to foster the inclusion of  
31 additional ideas, perspectives or methods.  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Kolb learning cycle**

Focus: Researcher's own learning	Concrete experience	Reflective observation	Abstract conceptualisation	Active experimentation
<b>Cycle 1: Process orientation</b>	✓ Document reviews (ODE and Saudi Arabia literature) analysis	✓ Initial interactions with other participants	✓ Conceptual models of the planned intervention	✓ Initial interactions with other participants, consultations with external stakeholders (i.e. SSM experts), requests for approval ✓ How else could interaction be developed and supported?
<b>Cycle 2: Process/Content orientation</b>	✓ Delays or denials of direct access.	✓ Reviews of conceptual models of planned intervention. What meaning could be attributed to the situation? How else can learning continue?	✓ Evolving rich picture(s) ✓ What other learning perspectives or methods could be added to the enquiry to directly benefit researchers?	✓ Follow ups via emails, email and phone interviews. ✓ What other technologies could support (remote) engagement with participants? ✓ What other experiences outside the research setting could be considered



				for learning by researchers? ✓
<b>Cycle 3: Content orientation</b>	✓ (In) direct semi-structured interviews ✓ How else could active experiences be developed by researchers?	✓ Enriching rich picture	✓ Conceptual models of proposed actions to improve ODE ✓ How else could learning of the researcher and others be conceptualised?	✓ (In) direct (including technology mediated) conversation to present findings, further interviews of ODE models ✓ How else could engagement or active experimentation be developed?

**Table 2.** Use of Kolb experiential learning stages to enhance the use of SSM in Mode two.

In a nutshell, table 2 above proposes that concrete experiences (including that of experiencing rejections when trying to access people), reflective observations, abstract conceptualisations and active experimentations could be identified, reflected upon and enriched in different learning cycles and with different methods for researchers engaging with SSM in Mode 2. As presented in the table, [Kolb's learning cycle suggests a structure to help SSM in Mode 2 researchers consider the inclusion of other ideas, perspectives or technologies to help enhance their learning. In this regard, our study reveals the opportunity of allowing for a multiplicity of perspectives to complement the use of SSM in learning situations.](#) In the final section of the paper we conclude with some possibilities to capitalise on this opportunity.

### Concluding remarks

This paper has developed a framework that enhances the use of SSM in an internalised mode of use or mode 2. It has done so in a research context, that of online distance education or ODE, and also resulted in a structured inclusion of and reflection upon experiential learning as a conceptual lens to help in dealing with access issues.

It can be said that an enhanced use of SSM in Mode 2 could help individuals engage in meaningful and relevant experiences with themselves and others. The social construction of reality proposed by SSM and well-articulated so far with the use of techniques like the ones presented above could also include different types of learning for researchers, who would need to adopt simultaneously roles of clients/problem owners/solvers *and* learners in situations. There might be relationships between how these roles are distributed in an intervention, how learning is conceived of or allowed to take place according to such roles, and which (other) techniques might better suit such learning.

1  
2  
3 It therefore can be posited that the flexible learning that SSM proposes via its Mode 2 of use could therefore be  
4 enhanced with other learning elements to help researchers be more creative when adapting or reacting to situations.  
5 With the incorporation of Kolb's learning theory and stages, we have discussed proposed an initial set of activities.  
6 These could also be complemented by others, for instance, the practising of mindfulness, the borrowing of ideas  
7 from other disciplines or the interconnecting of learning experiences (Córdoba-Pachón, 2019). For further  
8 research, a cognition-based perspective of introversion/extroversion (Cain, 2012) could also be helpful to address  
9 potential issues of timing when researchers want to cover all of Kolb's stages of learning. Moreover and from the  
10 insights of our case study and the 'soft' discussions/technology mediated interactions that the researcher designed  
11 and engaged with, it could be said that introverts (and the researcher seems to have many introvert personality  
12 traits!) have a form of soft power that allows them to listen, observe or creatively and quickly analyse and talk  
13 about situations more than 'speaking out' their minds in extrovert-driven activities like workshops (Cain, 2012).  
14  
15  
16

17 In this regard, we would like to continue exploring combinations of SSM in its Modes 1 and 2 of use, incorporating  
18 new insights about learning and learners, their use of online or educational technologies within or outside  
19 established organisational settings. We hope that the insights of this paper could encourage further discussions  
20 about the renewed importance of human learning in the fields of operational research and systems thinking.  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## References

- Abdulwahed, M., & Nagy, Z. K. (2009). Applying Kolb's experiential learning cycle for laboratory education. *Journal of Engineering Education*, 98, 283-94.
- Adams, P.(2006). Exploring social constructivism: theories and practicalities. *Education*, 34(3), 243-57.
- Al-Asmari, A. M., &Rabb Khan, M. S. (2014). E-learning in Saudi Arabia: past, present and future. *Near and Middle Eastern Journal of Research in Education*, 2014(2), 1-11.
- Al-Shehri, A. M. (2010). E-learning in Saudi Arabia: 'to e or not to e, that is the question.' *Journal of Family and Community Medicine*, 17(3), 147-50.
- Aljabre, A. (2012). An exploration of distance learning in Saudi Arabian universities: current practices and future possibilities. *International Journal of Business, Humanities & Technology*, 2(2), 132-37.
- Armitt, G., Slack, F., Green, S., &Beer, M. (2002). The development of deep learning during a synchronous collaborative on-line course. In G. Stahl (Ed.), *Proceedings of the conference on computer support for collaborative learning: foundations for a CSCL community* (pp. 151-159)Lawrence Erlbaum Associates, Inc.
- Bandura, A. (1971). *Social learning theory*. General Learning Press.
- Bandura, A. (1986). *Social foundations of thought and action: a social cognitive theory*. Prentice-Hall.
- Barros-Castro, R., Córdoba-Pachón, A., &Pinzón-Salcedo, J. (2014). A systemic framework for evaluating computer-supported collaborative learning—mathematical problem-solving (CSCL-MPS) initiatives: insights from a Colombian case. *Systemic Practice and Action Research*, 27(3), 265-85.
- Basahel, S. (2017). *A Soft Systems Framework for Online Distance Education - the Case of Saudi Arabia*. Ph.D. thesis. Royal Holloway, University of London.
- Basahel, S., &Basahel, A. (2018). An empirical study of challenges in online distance education in Saudi Arabia. *International Journal of Information Technology*, 10, 289-302.
- Beard, C. M., &Wilson, J. P. (2006). *Experiential learning: a best practice handbook for educators and trainers* (2nd ed.).Kogan Page Publishers.
- Bergvall-Kareborn, B., Mirijamdotter, A., &Basden, A. (2004). Basic principles of SSM modelling: an examination of CATWOE from a soft perspective. *Systemic Practice and Action Research*, 17(2), 55-73.
- Bernardo, H., Gaspar, A., & Hengeller-Antunes, C. (2018). A Combined Value Focused Thinking-Soft Systems Methodology Approach to Structure Decision Support for Energy Performance Assessment of School Buildings. *Sustainability*, 10 (7), 2295. <https://doi.org/10.3390/su10072295>
- Boud, D., Keogh, R., &Walker, D., (Eds.). (1985). *Reflection: turning experience into learning*. Kogan Page. 18-40.
- Brockbank, A. &McGill, I. (2007). *Facilitating reflective learning in higher education* (2nd ed.).Open University Press.
- Cain, S. (2012). *Quiet: The Power of Introverts in a World that Can't Stop Talking*. Penguin.
- Checkland, P. B. (1981). *Systems Thinking, Systems Practice*. John Wiley and Sons.
- Checkland, P. B. (1999). *Systems thinking, systems practice: includes a 30 year retrospective*. John Wiley and Sons.
- Checkland, P. B. (2000). Soft systems methodology: a thirty year retrospective. *Systems Research and Behavioural Science*, 17, S11-S58.
- Checkland, P.B, &Holwell, S. (1998). *Information, Systems and Information Systems – Making Sense of the Field*. John Wiley and Sons.
- Checkland, P. B., &Poulter, J. (2006). *Learning for action: a short definitive account of soft systems methodology and its use for practitioner, teachers and students*. John Wiley and Sons.
- Checkland, P. B., &Poulter, J. (2010). Soft systems methodology. In M. Reynolds & S. Holwell (Eds.) *Systems approaches to managing change: a practical guide* (pp. 191-242). Springer-Verlag.
- Checkland, P. B., & Scholes, J. (1990). *Soft Systems Methodology in Action*. John Wiley and Sons.
- Checkland, P. B., & Winter, M.(2006). Process and content: two ways of using SSM. *Journal of the Operational Research Society*, 57(12), 1435-41.
- Churchman, C.W. (1968). *The Systems Approach*. Dell Publishing.
- Clark, J., & White, G. (2010). Experiential learning: a definitive edge in the job market. *American Journal of Business Education*, 3(2), 115-18.
- Córdoba-Pachón, J.R. (2011). Abstracting and engaging: Two forms of systems thinking education. *INFORMS transactions on education*, 12 (1), 43-54. <https://pubsonline.informs.org/doi/abs/10.1287/ited.1110.0072>.
- Córdoba-Pachón, J.R. (2019). *Managing Creativity: A Systems Thinking Journey*. Routledge.

- 1  
2  
3 Córdoba-Pachón, J.R., & Farquharson, F. (2008). Enquiring into skills development with SSM: A South African  
4 experience. *Systems Research and Behavioural Science*, 25(1), 81-97. <https://doi.org/10.1002/sres.856>.
- 5 Córdoba-Pachón, J.R.; Midgley, G. (2006). Broadening the boundaries: An application of critical systems  
6 thinking to IS planning in Colombia. *J. Oper. Res. Soc.*, 57, 1064–1080,  
7 doi:10.1057/palgrave.jors.2602081.
- 8
- 9 Cundill, G. (2010). Monitoring social learning processes in adaptive co-management: three case studies from  
10 South Africa. *Ecology and Society*, 15(3), 28.
- 11
- 12 Davies, S. (2012). Embracing reflective practice. *Education for Primary Care*, 23(1), 9-12.
- 13 Dewey, J. (1910). *How we think*. D.C. Heath & Co.
- 14 Finlay, L.(2008). *Reflecting on 'reflective practice'*. (Practice-Based Professional Learning Centre (PBPL) paper  
15 52.) The Open University. [http://www.sencer.net/Symposia/SSI2015/documents/Finlay-2008-](http://www.sencer.net/Symposia/SSI2015/documents/Finlay-2008-Reflecting-on-reflective-practice-PBPL-paper-52.pdf)  
16 [Reflecting-on-reflective-practice-PBPL-paper-52.pdf](http://www.sencer.net/Symposia/SSI2015/documents/Finlay-2008-Reflecting-on-reflective-practice-PBPL-paper-52.pdf)
- 17 Flood, R. L. (2000). A brief review of Peter B. Checkland's contribution to systemic thinking. *Systemic Practice*  
18 *and Action Research*, 13(6), 723-31.
- 19 Fosnot, C. T., & Perry, R. S. (2005). Constructivism: a psychological theory of learning. In C. T. Fosnot (Ed.).  
20 *Constructivism: theory, perspectives and practice* (2nd ed.). Teachers College Press.
- 21 Franco, A., & Hamalainen, R. (2015). Behavioural operational research: Returning to the roots of the OR  
22 profession. *European Journal of Operational Research*, 249(3), 791-795.
- 23 Gold, J. (2001). Storying systems: Managing everyday flux using mode 2 soft systems methodology. *Systemic*  
24 *Practice and Action Research*, 14(5), 557-573.
- 25 Hamdan, A. K. (2014). The reciprocal and correlative relationship between learning culture and online education:  
26 a case from Saudi Arabia. *International Review of Research in Open and Distance Learning*, 15(1), 309-  
27 36.
- 28 Helyer, R. (2015). Learning through reflection: the critical role of reflection in work-based learning (WBL).  
29 *Journal of Work-Applied Management*, 7(1), 15-27.
- 30 Hindle, G. A. (2011). Case article-teaching soft systems methodology and a blueprint for a module. *INFORMS*  
31 *Transactions on Education*, 12(1), 31-40.
- 32 Hindle, G. A., & Franco, L.A. (2009). Combining problem structuring methods to conduct applied research: a  
33 mixed methods approach to study fitness-to-drive in the UK. *Journal of the Operational Research*  
34 *Society*, 60(12), 1637-1648. <https://doi.org/10.1057/jors.2008.125>
- 35 Howick, S., & Ackermann, F. (2011). Mixing OR methods in practice: Past, present and future directions.  
36 *European Journal of Operational Research*, 215(3), 503-511. <https://doi.org/10.1016/j.ejor.2011.03.013>
- 37 Jackson, M. C. (2003). *Systems thinking: creative holism for managers*. John Wiley and Sons.
- 38 Jones, L., & Jones, A. (2013). Teaching reflective practice: implementation in the teacher education setting. *The*  
39 *Teacher Educator*, 48(1), 73-85.
- 40 Kingston, J. K. (1995). *Modelling business processes using the soft systems approach*. In (Ed.) *The International*  
41 *Symposium on the Management of Industrial and Corporate Knowledge* (pp. 1-12 ). The University of  
42 Edinburgh.
- 43 Kolb, A., & Kolb, D. A. (2005). Learning styles and learning spaces: enhancing experiential learning in higher  
44 education. *Academy of Management Learning & Education*, 4(2), 193-212.
- 45 Kolb, A., & Kolb, D. A. (2009). *Experiential learning theory: a dynamic, holistic approach to management*  
46 *learning*. In S. J. Armstrong & C. Fukami (Eds.). *The Sage Handbook of Management Learning,*  
47 *Education and Development* (pp. 42-68). Sage Publication Ltd.
- 48 Kolb, D. A. (1984). *Experiential learning: experience as the source of learning and development*. Prentice-Hall.
- 49 Kumar, M. R., & Sankaran, S., 2006. From east to west—has the twain met? linkages between context sensitivity  
50 and soft systems methodology. *Systemic Practice and Action Research*, 19(4), 365-81.
- 51 Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge University  
52 Press.
- 53 Lewis, L. H., & Williams, C. J. (1994). Experiential learning: past and present. *New Directions for Adult and*  
54 *Continuing Education*, 1994(62), 5-16.
- 55 McLeod, S. A. (2013). *Behaviourist approach*. Simply Psychology.  
56 <http://www.simplypsychology.org/behaviorism.html>
- 57 Mingers, J. (1984). Subjectivism and Soft Systems Methodology: a critique. *Journal of Applied Systems*, 11, 85-  
58 104.
- 59 Mingers, J. (2000). An idea ahead of its time: the history and development of soft systems methodology. *Systemic*  
60 *Practice and Action Research*, 13(6), 733-55.
- 61 Mingers, J., & Taylor, S. (1992). The use of soft systems methodology in practice. *The Journal of the Operational*  
62 *Research Society*, 43(4), 321-32.

- 1  
2  
3 Mingers, J., & White, L. (2010). A review of the recent contribution of systems thinking to operational research  
4 and management science. *European Journal of Operational Research*, 207(3), 1147-61.  
5 Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*,  
6 80(4), 252-83.  
7 Moon, J. A. (1999). *Reflection in learning and professional development: theory and practice*. Kogan Page.  
8 Moore, M., & Kearsley, G. (2012). *Distance education: a systems view of online learning* (3rd ed.). Wadsworth,  
9 Cengage Learning  
10 Murugaiah, P., & Thang, S. M. (2010). Development of interactive and reflective learning among Malaysian  
11 online distant learners: an ESL instructor's experience. *The International Review of Research in Open  
12 and Distributed Learning*, 11(3), 21-41.  
13 Paucar-Caceres, A., & Rodriguez-Ulloa, R. (2007). An application of Soft Systems Dynamics Methodology  
14 (SSDM). *Journal of the Operational Research Society*, 58(6), 701-  
15 713, DOI: 10.1057/palgrave.jors.2602188  
16 Powell, K. C., & Kalina, C. J. (2009). Cognitive and social constructivism: developing tools for an effective  
17 classroom. *Education*, 130(2), 241.  
18 Reed, M. S., Evely, A. C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond,  
19 C., & Stringer, L. C. (2010). What is social learning? *Ecology and Society*, 15(4), r1.  
20 Rodgers, C. (2002). Defining reflection: another look at John Dewey and reflective thinking. *Teachers College  
21 Record*, 104(4), 842-66.  
22 Senge, P. M. (1990). *The art and practice of the learning organization*. Doubleday/ Currency.  
23 Sharlanova, V. (2004). Experiential learning. *Trakia Journal of Sciences*, 2(4), 36-39.  
24 Tomei, L. A. (2010). *Lexicon of Online and Distance Learning*. Rowman & Littlefield Publishers, Inc.  
25 Tomkins, L., & Ulus, E. (2016). 'Oh, was that experiential learning?!' Spaces, synergies and surprises with Kolb's  
26 learning cycle. *Management Learning*, 47(2), 158-178. <https://doi.org/10.1177/1350507615587451>.  
27 Vince, R. (1998). Behind and beyond Kolb's learning cycle. *Journal of Management Education*, 22(3), 304-319.  
28 Vygotsky, L. S. (1986). *Thought and language* (A. Kozulin, Ed.). MIT Press.  
29 Wals, A. E. J. (2007). Learning in a changing world and changing in a learning world: reflexively fumbling  
30 towards sustainability. *Southern African Journal of Environmental Education*, 24, 35-45.  
31 van de Water, H., Schinkel, M., & Rozier, R. (2007). Fields of application of SSM: a categorization of  
32 publications. *Journal of the Operational Research Society* 58(3), 271-287.  
33 DOI: 10.1057/palgrave.jors.2602156  
34 Xie, Y., Ke, F., & Sharma, P. (2007). The effect of peer feedback for blogging on college students' reflective  
35 learning processes. *The Internet and Higher Education*, 11(1), 18-25.  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Appendix 1. Some examples of SSM use between 2000 and 2020

Authors and year	Description	Dominant and less dominant mode(s) of SSM use
Bernardo, Gaspar and Antunes (2018).	Combining SSM with a value focused thinking approach to assess and improve energy performance in school buildings.	<i>Mode 1:</i> Use of rich pictures to map stakeholders and CATWOE to define and debate upon energy performance criteria and possibilities to improve energy management, policies and investments via literature reviews, school visits/meetings, formal questionings.
Wang, Liu and Mingers (2015)	Generate a SSM based methodology to identify stakeholders, their functions and relationships in organisations at different levels.	<i>Mode 1:</i> Define conceptual models and root definitions to agree on key activities at a Chinese University Language School.
Hindle (2011)	SSM as a participative learning process within a teaching context.	<i>Mode 1:</i> Individual or group experiencing of the logical stream of analysis of the methodology, with less attention to or emphasis on the cultural stream.
Hindle and Franco (2009)	Collaborative identification of issues related to fitness-to-drive in the UK using SSM and causal mapping.	<i>Mode 1:</i> Building a rich picture with participants, identifying possible issues and improvement actions, modelling relationships between these with the support of computer software, generating baseline conceptual models to validate actions.
Córdoba-Pachón and Farquharson (2008).	Explore skills development via research and educational partnerships in post-apartheid South Africa.	<i>Mode 1:</i> Participative elaboration of rich picture of skills development situation as perceived by skills researchers. <i>Mode 2:</i> Elaboration of conceptual models by facilitator to later enable collective reflection and existing skills contracts negotiation by participants.
Paucar-Caceres and Rodriguez-Ulloa (2007)	A soft systems dynamics methodology (SSDM), an enhanced SSM framework to formulate and debate on systems dynamics models and their implementable suggested changes in a Peruvian business.	<i>Mode 1:</i> Following the principles and stages of SSM to arrive at conceptual and systems-dynamics based models with stakeholders.
Checkland and Winter (2006)	Defining an intellectual process, to be followed by its implementation, in a project in the UK National Health Service.	<i>Mode 1, potential use in mode 2:</i> Use of SSM to define the process of intervention (mode 2), to be carried out <i>and</i> to carry out the intervention itself (mode 1).
Gold (2001)	SSM used in conjunction with story-telling to promote individual reflection.	<i>Mode 2:</i> Use of SSM techniques to develop and reflect on rich and complex accounts of work related events.

Appendix 2. A conceptual model of the planned activities to investigate ODE at KAU



Only