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Teacher educators' simplex system in navigating the process of responding to disruptive education – a case from Qatar

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ABSTRACT

The study explored teacher educators' experiences in navigating the process of responding to disruptive education due to the COVID 19 pandemic. From a complexity theory lens, the concept of simplex system was used to examine three teacher educators' narratives on their teaching experiences prior to, during and post pandemic, as they responded to institutional top-down policy mandating the emergency shift from face-to-face to full-scale synchronised online teaching. Findings of the study suggested that the teacher educators all struggled within the intrapersonal space, consisting of beliefs, motivation, efficacy and emotions during the emergent transition to full-scale online teaching, while they also experienced change of interpersonal relationships with students and colleagues. The study also revealed variations in their individual coping strategies for self-organisation in response to the emergent policy change, utilising their individual sources and prior experiences. The study called for the need to better understand teacher educators' simplex system at both the individual level and institutional level. Further, it was highly recommended that teacher educators become actively involved in the policy making process and communications; in order to enhance their understanding of complex situations and support their agentic actions in accomplishing their goals.

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1. Introduction

Similar to the view of higher education as holistic, non-linear, complex and dynamic, teacher education programmes nowadays are also considered complex dynamic systems consisting of multiple interacting agents and elements (Clark and Collins, 2007; Ell et al. 2017; Garner and Kaplan 2021). The ongoing educational changes worldwide add to the complexity of education in that it involves interactions between diverse levels; including interactions between teacher education preparation programs (teacher

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educators, administrators, student teachers), schools (administrators, teachers), and communities (parents and children) (Van Geert and Steenbeek 2014). As important agents within the complexity of teacher education, teacher educators play a critical role in supporting student teachers to develop knowledge, skills, and competencies, which are necessary in meeting societal needs and the unpredictability of the future world (Garner and Kaplan 2021; Keay, Carse, and Jess 2019). Such a role can be even more crucial during times of crises, such as those caused by the COVID-19 pandemic. That is to say, it is important for teacher educators, in a context of educational change, to develop a simplex system which will allow them to understand the complex reality in which they are involved, to adjust their goals and concerns within the teacher education programme, and to accomplish these goals through new ways of practices (Van Geert and Steenbeek 2014). Such a process of adapting to change involves multiple and dynamic interactions between the teacher educators and their students, administrators, and the ongoing change of policies.

The current study took place within the context of teacher education at the college of education at the state university in Qatar during educational disruption due to the COVID-19 pandemic. A range of teacher education programs are provided at the college, including undergraduate and graduate programs, serving the needs of K12 teachers in the country. In Mid-March 2020, the university took an institutional emergency decision to shift teaching from a face-to-face mode to a full-scale online mode within one week. All instructors, including teacher educators, received a three-day condensed training program to learn how to conduct synchronised online teaching via platforms, such as BlackBoard Collaborate, MS Teams, and WebEX. Students were offered similar training sessions, in addition to support from course instructors. During the Spring semester (January to May, 2020), midterm exams were conducted in an online mode due to the emergency shift, while the final exams were conducted in a face-to-face mode with ensured social distancing. During the ensuing Fall semester (August to December, 2020), and following national government policy, all undergraduate courses were conducted in full-scale synchronised online mode, while all exams were conducted in a face-to-face mode with compulsory social distancing. These policies were mandated in a top-down approach, and both instructors and students received policy decisions via email.

In such circumstances characterised by change and emergency, teacher educators may go through a process of reaction and action in order to understand and respond to policy changes and the emergence of new conditions. They may develop or adjust new goals with varying skills and competencies for their student teachers, establish new pedagogical practices and activities, and evaluate the outcomes of their actions. This paper

discusses our efforts to link complexity theory to understanding teacher education, in particular in a context of disruptive education, as a complex system consisting of multiple interactive agents and elements (Cilliers 1998; Clarke and Collins 2007; Morrison 2008). As important agents in a complex teacher education program, teacher educators may develop their simplex systems to manage the complex system of their environment through understanding, taking agentic actions and accomplishing their goals in their given context (Van Geert and Steenbeek 2014). In particular, the study was guided by the research question: How do teacher educators navigate the process of responding to disruptive education? A narrative inquiry addressing features of life history strategies (Floyd 2012) was conducted empirically to analyse three teacher educators' experiences throughout the pandemic, with a particular emphasis on the concept of simplex systems.

2. Literature

2.1 Understanding teacher education in times of disruption from a complexity theory lens

Complexity theory addresses the change and evolution that result from multiple components interacting non-linearly in a system (Cilliers 1998). Developed in the fields of physics, chemistry and economics, complexity theory is recently gaining attention in educational research (Mason 2008). According to Morrison (2008), in an educational setting, complexity theory is useful in understanding change, adaptation, development, and evolution, providing an 'organic, non-linear and holistic approach to examine a phenomenon' (p. 22), instead of looking at the world in a cause-and-effect and linear way. Rather than parts, complexity theory emphasises wholes, relationships, and intricate interactions with environments (Byrne 1998; Cochran-Smith et al. 2014; Davis and Sumara 2006). Underlining ambiguity, instability and unpredictability of change, complexity theory opens windows to describing educational changes that can emerge from small, local interactions (Clarke and Collins, 2007). In understanding educational change, complexity theory focuses on mutually inter-dependent networks and nested relationships, and provides theoretical supports and implications for making positive educational change sustainable (Mason 2009).

Van Geert and Steenbeek (2014) suggested two co-existing ways to define and distinguish complexity: The first, termed *epistemic complexity*, refers to a situation which is 'hard to understand, difficult to manage . . . ' (p. 23), and the second refers to *system complexity* consisting of many interacting components, which lead to self-organisation and emergence. In highlighting the

connections among the components, the notion of system is also closely associated with the idea of dynamics, which means the way in which one state of a system changes into another state over time (Cilliers 1998). Thus, according to the second definition of complexity, self-organisation involves sustaining patterns over time, as the interactions among diverse components of a complex system spontaneously produce new phenomena, which ultimately connects self-organisation to emergence (Van Geert and Steenbeek 2014).

As important agents of such a complex system, teacher educators struggle to manage interactions among various aspects. They may try to simplify the situation and develop diverse strategies to respond to the complexity system at work. To do so, they will need to create 'a simplex system to use the term proposed by Van Geert and Steenbeek (2014), in the form of a simplex structure that allows them to understand the complex reality they participate in, to specify particular goals and concerns, and to accomplish things in accordance with those goals and concerns. Van Geert and Steenbeek (2014) further argued that the notion of a simplex system may be useful for both definitions of complexity. Thus, it can be defined as "the structure of connections between all sorts of simplifications that allow us to comprehend what is basically epistemically complex" (p. 24). In relation to the current study, the notion of simplex system pertains to the ways in which each teacher educator functions as a complex system consisting of diverse components that are dynamically connected to one another and to the various contexts in which they co-exist, and the only means to understand such complexity is to develop a simplex system. These interactions lead to self-organization, as teacher educators engage in agentic actions and navigate their responses to the emergence of disruptive education caused by the pandemic. In this process of developing a simplex system, teacher educators make efforts motivationally, emotionally, cognitively, and behaviourally. Meanwhile, in a context of emergent change, teacher educators' pedagogical beliefs and conceptions may be subjected to change through their interaction with the environment. For example, they may create new ways of communication within the institution, redesign new teaching practices, and manage mandated policies in creative ways (Englund, Olofsson, and Price 2018).

2.2. Connectedness and self-organisation in teacher educators' simplex systems

The notion of connectedness, a key feature of the simplex system, focuses on the idea that the parts in a complex system interact with each other to create a whole that is greater than the sum of its parts (Morrison 2008). In essence, connectedness is closely associated with a distributed and shared knowledge

system which plays an important role in communication and collaboration among the diverse agents in that system (Cilliers 1998; Morrison 2008). In particular, by centring on multilinear or curvilinear relationships (Cochran-Smith et al. 2014; Davis and Sumara 2006), connectedness addresses several layers of the agents' simplex systems.

The first important layer in teacher educators' simplex system is their intrapersonal level of cognition and affect (Morrison 2008). The teacher educators' attributes, such as beliefs, affect, motivation, and efficacy, explain and shape their behaviours and agentic actions interacting with other agents and elements in a complex system (Van Geert and Steenbeek 2014), such as a system of disruptive education. For instance, teacher educators' prior experiences with technology use in teaching and learning may influence how they respond to the emergent shift to full-scale online education in the current study.

Another layer of connectedness for teacher educators are their relationships with students, peers and institutions. The essence of the interpersonal dimension is that new behaviours emerge from the dynamic interactions of the elements within the networks where teacher educators are situated (Morrison 2008). Institutions also interact with individuals in the 'knowledge/knower's' (i.e., educator's) responsibility towards curriculum and pedagogy. The educational environment shapes and is shaped by individuals and groups (Keay, Carse, and Jess 2019). From this perspective, 'educators are assumed to straddle the two phenomena, and their role is typically described in terms of the dual responsibility of representing objective knowledge while fostering subjective knowing' (Davis and Sumara 2006, 52). A teacher educator's simplex system is inherently a complex system itself, embedded within the larger scope of teacher education, which is also a highly complex system. Generally speaking, teacher educators use their simplex systems to understand the emergent demands of their environment and develop strategies to handle their relationships with other elements in the complex system, and consequently adapt to the new and emerging situations through self-organisation.

In its close association with the concept of connectedness, self-organisation is another fundamental tenet of complexity theory. Self-organisation entails self-sustaining structures or patterns via the interactions between the components of the complex system emergently and spontaneously, which create new phenomena (Morrison 2008). Emergence, referring to the 'unpredictability' and 'uncertainty,' yet 'highly patterned' system change (Johnson 2001), is hand in hand with the notion of self-organisation. For instance, during the pandemic in which new policies were announced by the institution to shift to full-scale online teaching, teacher educators may need to adjust to new ways of organising their classroom management strategies and activities, which are self-organisation strategies that respond to the emergence of new situations. A self-

organising system is decentralised and influenced by environmental and historical factors, as well as personal values and attributes (Stacey, Griffin, and Staw 2000). This process of self-regulation in a self-organising system can lead to solving problems in a context where creativity, rather than conventional thinking, is demanded, and new relationships are needed to respond to the emergence of new situations (Naidoo 2004). Further, Haggis (2008) notes that new ways of organisation emerge from within the system if there is a sufficient number of interactions taking place over a sufficient period of time.

Following such definitions, the teacher education program in disruption; constituting the context of the current study, can be considered a complex system, which included the co-existence of both understandings of complexity – as a situation that is difficult to manage and a complex system that is dynamically self-organising. In both ways, the complexity system of the teacher education program involved various levels of interaction within the institution, including interactions among and between teacher educators and student teachers, as well as teacher educators' and student teachers' responses to the politics of policy making, and many other impact factors that influence educational practices such as the economic system, and the historical and cultural values of the country. In the given context of the pandemic, all agents further interacted with technologies related to online teaching and learning, given the mandated shift to full-scale online mode. For Van Geert and Steenbeek (2014), the work of agents on their simplex system is mainly to manage their control (in a soft way) over how they understand the environment, how they take agentic actions to accomplish adjusted goals, and how they evaluate such a process. Therefore, in the current study, we focused on how the three participating teacher educators worked on their simplex systems to manage emerging work-life situations, understand the novelty of circumstances throughout the pandemic, develop strategies and engage in agentic actions to accomplish their goals, and evaluate the process of responding to disruptive education. Equally important in this study was to explore how the development of their simplex system influenced and was influenced by the socio-cultural and institutional environment (Englund, Olofsson, and Price 2018). Teacher educators' responses to educational change may vary depending on individual characteristics and institutional factors, which shape their journey of professional growth differently (Taylor 2020). Dashborough, Lamb, and Suseno (2015) further identified three different attitudes towards institutionally-mandated initiatives and education change: welcoming by seeing it as promising, adapting by seeing it as inevitable, and feeling negative by seeing it as a threat. It may be necessary to find innovative ways to support teacher educators in playing an active role in educational change within higher educational institutions (Dashborough, Lamb, and Suseno; Englund, Olofsson, and Price 2018).

3. Methodology

3.1 Research design

A qualitative approach was employed in this study to understand teacher educators' lived experiences and explore how teacher educators understand and cope with the interactions among diverse agents and elements in a complex dynamic system of disruptive education. In particular, a narrative inquiry was used to illuminate a person's lived experiences and provide rich and subtle understanding of life situations (Punch and Oancea 2014). Suitable for studies aiming to explore perceived and subjective experiences and individuals, a narrative inquiry recognises the complex social relations emerging and evolving as narrated by those who have experienced them (Chase 2005). In particular, the life history approach to narrative inquiry, highlighting the biographical influences of human subjectivity and perceptions, underlines connections between the inner experience of individuals, changing events and phases, and the historical and social contexts of these events (Bryman 2008; Goodson and Sikes 2001). In particular, the life history approach to narrative inquiry has been well-used in higher education settings to study career trajectory (Floyd 2012).

3.2 Research procedures

3.2.1 Sampling and participants

First, a purposive sampling strategy, emphasising the importance of relevance of the participants to the research question (Bryman 2008) was used to identify appropriate participants. Sample size, as summarised by Floyd's review work (2012), can be from one single person to 10 participants, depending on the conditions and situations. An email was sent to all the teacher educators ($n \approx 40$) in the college, which gave information on purpose and anticipated plans of the study. Among the first teacher educators to respond, three were chosen to cover different genders and nationalities. Background information of the participants is presented in Table 1. Two of the participants were female and one was male; one was Qatari and the other two were Arabs. The participants had doctoral degrees in various fields, and had between 4 and 30 years of experience both at Qatar University and universities in neighbouring countries.

3.2.2 Data collection

Narrative interviews, a core approach to narrative inquiry and a life story approach, were conducted for data collection, which consisted of semi-structured interview questions, including questions concerning participants' biography, and other questions concerning their experiences, behaviours, and thoughts on particular events before, during and after the COVID 19

Table 1. Background information of the participants.

Participants	Gender	Age	Nationality	Academic ranking	Teaching experiences
Sarah	Female	Early 40s	Qatari	Assistant professor	Over 20 years in total, previously worked as a school teacher prior to becoming a teacher educator.
Abdullah	Male	50s	Arab	Assistant professor	Over 20 years of teaching experience in teacher education programs in several neighbouring countries.
Mouna	Female	Early 40s	Arab	Assistant professor	Over 15 years of teaching experience in several western as well as middle eastern countries.

pandemic. All the interviews were conducted individually via an online mode due to pandemic restrictions. Participants received the semi-structured questions prior to the scheduled interview so that they had the time to think through their experiences. During the interviews, the conversations between the interviewer (the first author) and the participants were guided by the interview questions, but with flexibility and no fixed order (Goodson and Sikes 2001). In the process, the interviewer, following suggested techniques by Kvale (2007), asked one question at a time, used open-ended questions, and tried not to interrupt the participant. The participants were offered sufficient space to elaborate their perceptions and experiences. The interviews, conducted in either English or Arabic, following the preference of the participants, took around 1.5 hours each, and were all audio recorded. The recordings were transcribed in their original language before Arabic transcripts were translated into English. Two researchers listened repeatedly to the recordings to compare them with the translated transcripts and ensure their precision. In addition, necessary revisions were made to the transcripts to ensure that initial meanings were reflected accurately (Kvale 2007).

3.2.3 Data analysis

Two main approaches to narrative analysis have been commonly used; one by reducing the data using coding and thematic techniques, and the other by analysing the data as a whole in narrative form (Floyd 2012). A multi-analysis approach combing both ways to make sense of the data has been commonly used in educational settings (Floyd 2012).

The data collection and analysis processes were conducted in an integrated and cumulative way (Kvale 2007). After the first participant was interviewed, the recording was transcribed and translated immediately. An initial analysis was conducted with the coding developed from literature study, reflecting connectedness (e.g. motivation, interest, efficacy, personal values, beliefs, etc.), self-organisation (e.g. goals, plans, strategies, practices, adjustment, reflection, evaluation, etc.), and emergence (e.g. change, new ways, etc.). Emerging themes that were identified from the first participant were used in the conversation with the next participant while adding codes to the data analysis. To illustrate the holistic narrative of the individual's life history constructed by him/herself, we created individual profiles from the stories of each participant, by selecting the most important and relevant information about the participants following the coding procedures (Silverman 2006). Further, these individual stories were cross-analysed to connect to theories and previous knowledge, and to 'identify interconnections within and between them' in their situated contexts of social and educational change (Floyd 2012, 7).

As noted by narrative researchers, the notions of validity and reliability are against the epistemological assumptions of the methodology (Lichtman 2010). Narrative scholars further argue that triangulation, a concept commonly used in qualitative studies, is also inappropriate for narrative inquiries due to its focus on subjectivity (Lichtman 2010). Following suggestions by Floyd (2012), we made efforts to minimise bias in the research process by 'supplements,' that is seeking further data from the cultural context, and through a collaborative process of analysis consisting of multiple rounds of discussions.

4. Findings

In this section, we discuss the simplex systems of the three teacher educators during the pandemic, and across the timeline of their personal history concerning the pandemic. Drawing on the concept of simplexity (Van Geert and Steenbeek 2014), we discussed the narratives of the three teacher educators through two interrelated features of complexity theories – connectedness, and self-organisation and emergence (Cilliers 1998; Cochran-Smith et al. 2014; Davis and Sumara 2006; Morrison 2008). Accordingly, the findings of the study are presented as stories pertaining to single participant analysis, and structured according to the timeline pertaining to before the pandemic affected educational practices (i.e., before Mid-Spring, 2020), during the emergency shift to full-scale online learning (ie., Spring, 2020), and post-emergency change (i.e., Fall, 2020).

4.1 Sarah's story

Sarah had a long history of teaching and working in the Qatari context. She began her work in 2002 and lived through the many changes and reforms which the country witnessed. She had extensive experiences in teaching at the school and university level, and also as a professional development specialist working with in-service teachers.

4.1.1 Pre-pandemic

Ahead of the pandemic, Sarah's main goals as a teacher educator was to prepare the future generation of teachers to have flexibility and accept change, and develop metacognition. She also wanted student teachers to think critically for themselves and question everything they encountered. She even tested their ability to ask questions which required higher-order thinking skills on the exam, and then answer them.

She celebrated the strength of her relationships with students. At the beginning of any new course, she created a WhatsApp group to communicate directly with all her students at all times. She believed that she was not only their instructor, but their facilitator and friend, trying to motivate students to learn, and offering encouragement and feedback.

She had an 'excellent' relationship with her colleagues as she claimed, although she also mentioned that she had many disagreements with some of her colleagues because they considered her as 'trouble maker' by pointing out negative aspects of institutional activities and suggesting other ways that may demand more efforts.

Among the challenges she faced before the pandemic were with her line mangers. She told the story of her experience in the practicum course. Several of her students had written about the challenges they faced in the practicum schools. She took these comments very seriously and tried to support her students. She summarised their comments in a PowerPoint presentation and took it to the Head of Department, who informed her that nothing could be done. She discussed these issues with those higher in the administrative hierarchy, and became convinced that they will never support any changes. With this disappointment, she decided that she will try to solve all her students' problems on her own instead of 'bringing troubles to others.' As she believed in the importance of life-long learning and constant change, she wished that the institution formed communities of practices which would allow teacher educators to collaborate. However, she tended to think the institution was static and unwilling to change.

4.1.2 During pandemic

Sarah's first reaction when the university closed was complete shock, she could not move, nor answer emails, nor respond to her students. She was unable to begin the transition to emergency online teaching for three days. The only positive aspect which she mentioned was that she already knew her students very well before the university closure, as they had completed a large portion of the course assignments and the midterm. Accordingly, she was able to connect with her students readily and asked them to give her some time to get ready. To bring herself out of this initial shock, she convinced herself that she had responsibilities and that it was not acceptable for her to lose control. She shook off the initial shock after three days and got back to work with full commitment.

She took many actions to respond to the confusion at the beginning of transition to online learning. She decided to learn new applications by watching YouTube videos. She even took the initiative to pay for several subscriptions, which she thought were important for reaching out to students. She made herself strong for her students because she was also very aware of her students' psychological states and their own family situations.

During the first weeks, she focused on discussions and meeting her students online. The transition to an online mode evoked memories of her previous experience learning online as a master student herself. With this inspiration and new learning, she resorted to the course material and tried to make her classes as interactive as possible.

Her relationship with her students became even stronger online. She had students taking the practicum course and they were devasted because the schools were closed and they were unable to take the course as previously delivered. Instead of following the new requirements from her line manager, she decided to support her students differently. She transformed the practicum experience into an experience of online teaching by the students. Working days and nights, she supported her practicum students to develop their online teaching skills. She exerted all her energy and effort into making the experience worthwhile for her students, and enjoyed the closeness of 'night chats' and 'pajama meetings' with her students.

With multiple opportunities becoming available for online academic work, she established new relationships both inside and outside the college, as well as internationally. She actively participated in many events to learn ways of teaching online, which helped her develop relevant conversations with close colleagues and got to know many international scholars who shared common interests. While many colleagues may have feared doing things in ways that contradicted college requirements, she felt more confident to pursue new ways of teaching.

At the institutional level, she believed the environment was 'negative and unhealthy', as she explained, 'the college administration's communication was very passive, we were not informed about many things, and we were left on our own with no direction in a Laissez-Faire like style.' She did not receive clear instructions on how assessmentprocedures should be changed, or how to continue with the practicum experience, or how the curriculum should be adapted, or how to grade students. She wished that the line managers played a more active role in checking in on the instructors and issuing clear guidelines on moving forward.

4.2.3 Post-emergency change

During Fall 2020, Sarah was already very confident in teaching online, and very well prepared. She modified the courses to make them suitable for active online learning, adopting a flipped classroom strategy. She still believed that top management did not have clear guidelines or procedures and things were left to the instructors to take decisions. She believed all instructors were leaders in their own right and were capable of accomplishing these tasks.

She maintained her strong relationships with students. She made sure to reveal her confidence in herself and in the material she was teaching, and this left a positive impact on her students as they trusted her

experience and knowledge in the topics discussed. This resulted in their feelings of confidence and comfort with the use of technology as a supportive tool.

She believed she had changed. She was different in the way she taught, in the way she thought, even with teaching online. She readily accepted change, which she attributed to her teaching experiences throughout the reform movement in Qatari schools. She was a 'change machine,' and was able to change quickly, to the extent that she considered change as her 'adrenaline,' and without it she would be bored doing the same thing every year.

She believed she had stronger relationships with her colleagues post-pandemic, as they communicated regularly. She believed the pandemic united them and made them communicate together more regularly, as they faced common challenges and had similar concerns.

She learned that she had to remain ready for any emergency. She had more conviction towards preparing her students for a time that may be different than current times, that they embrace change as a fact of life, and that they expect change at any time, accept it and adapt. She believed teacher educators specifically at the college of education have this responsibility to prepare students for these kinds of skills, through course work that teaches theories of change. She learned the importance of crisis management, and training for situations like this. She plans to raise these issues and concerns through her committee work in the near future.

4.2 Abdullah's story

Abdullah had a background in Arabic literature and Education, specialising in Arabic for non-native speakers. His degrees were from Egypt. He had been a teacher educator for 15 years. He had taught in several countries including, Egypt, UAE, Saudi Arabi, and Qatar.

4.2.1 Pre-pandemic

Abdullah's main goals included preparing future teachers who were capable of employing technology, adhering to curriculum standards in schools and interacting with their future students. He also believed future teachers should have extensive knowledge of their subject matter and were able to solve unanticipated problems. He saw his role as including an academic and educational aspect. In his academic role, he made sure students were competent in the subject-matter they were going to teach; and in his educational role, he was mostly concerned with how to motivate students and help them develop their critical thinking and creative thinking skills. He talked extensively about training students on using new technologies to keep them abreast with innovative tools, as well as training his colleagues on using these tools.

He believed in strong and close relationships with students. He maintained such healthy relationships with students by being compassionate about their needs and concerns. He did not limit his relationship with students to that of an academic, but extended that to developing humanistic relationships based on trust. He also had great influence on them, advising them beyond course requirements.

He enjoyed strong relationships with his colleagues and described the atmosphere at the college of education as being family-oriented, especially in comparison to other faculties at the university. He readily supported colleagues who asked for his help. The atmosphere was thus, far from disputes and dominated by cooperation and fair competition.

The challenges he faced pre-pandemic were classroom bound. He faced problems with large and overcrowded classes, which hindered his ability to focus on the practical aspects of his goals, and consequently his goal of preparing students well. Another issue was in a lack of educational material and resources, and so having to pay for technological equipment out of his own money. A final problem he faced was time constraints, as he found little time to engage in research activities because he had too many administrative tasks, and dedicated his time to teaching and establishing good relationships with students.

4.2.2 During pandemic

With travel restrictions in place, Abdullah was unable to return to Qatar from a home visit to Egypt. He suffered psychologically from this experience as his wife was a doctor, and hence more exposed to the virus, and his children would be left without care. He counted every passing day accumulating to a total of 5 months and ten day described as being difficult, and full of fear and anxiety. This frustrated and saddened him greatly. In Egypt, he faced the most difficult of events; the country was hit by strong torrents which caused the Internet and electricity to become scarce. He was obliged to miss weeks of classes, and communicate intermittently with his students.

His goals changed. He lost direct contact with his students, he no longer was able to communicate directly with any of them, and he simply could not recognise them. He could not conduct his classes in a synchronised way due to limited connection, so he video recorded them and uploaded them whenever the Internet allowed so. He felt cut off from his students and described it as experiencing the worst emotional state. He explained this situation as follows: 'while teaching online, I feel as if I am a train running on a track, no one stops me unless I stop to ask students a question in an attempt to engage them in discussion, dialogue and interaction.'

By midterms, he was constrained by customs in Qatar which did not encourage females to open their cameras or speak freely. His instructional methods also changed, as he did not know if the person behind the screen

was his student or not. Students communicated in writing, which restricted his ability to distinguish among them. He tried to remain flexible and provided formative feedback to students. But other challenges arising from this time were ethical and moral in nature. For instance, issues such as student plagiarism and cheating were exacerbated as he could not know whether students had completed their assignments or someone else had done them. Also during exams, he knew students would resort to cheating, so he made his exams all open-book.

In his reflections on the difficulties he faced, he felt deep disappointment from his colleagues while trapped out of the country alone. He felt isolated as his colleagues failed to contact him or return his emails. He lamented their previous strong relationships when he would do all he could to support them in need.

His relationships with students also suffered during this period. In the past, he would not face any difficulties in getting students to class or getting them to interact actively in class. But with online learning, students' enthusiasm and motivation declined, and he felt as though he was on a 'deserted Island.' He still suffered from the frustration as students would be logged in, yet totally silent, and perhaps not even available. He would continuously call out names, but none would answer; he felt 'like a soccer player who plays in an empty stadium, or a stage artist performing on an empty stage with no audience watching or encouraging him.' Despite not taking attendance before the pandemic, and attracting student attendance to class easily, this was not the case online. He felt as though he was talking to himself all the time, causing him deep frustration.

Though the university administration failed to contact his family during his absence, his direct line managers were very supportive and reassuring him of his job and giving him hope. They also tried their best to get him back into Qatar, along with another stranded instructor. Another challenge he faced was with the lack of coordination and decision making. Most of the times, he did not know what was going on at the university and only found out through news outlets and social media pages. To overcome some of this confusion, those instructors stranded abroad created a WhatsApp group to provide each other with information and updates. At this time, he began preparing himself for the worst case scenario of not being able to return to Qatar and moving his family back to Egypt, which affected his morale and exhausted him. This psychological state also affected his academic performance, as he also tried to stay strong for his students, who were also facing unprecedented times. He was thankful that his devastating experience was over, and that he was able to bring his students to complete the semester safely.

4.2.3 Post-emergency change

Abdullah claimed to have learned many lessons from the previous period, and returned to the university with great enthusiasm and readiness to overcome challenges. His solutions were technical in nature, as he made up for his lost goal of interacting with students by posting instructional videos on his YouTube channel and interacted more often with his students online. He felt the need to improve his online teaching and addressed the disadvantages of online learning. He believed online teaching could not replace face-to-face teaching, especially in education and teacher preparation. As a result, his previous roles (directly associated with his courses) were changed. He no longer was able to engage students in the friendly environment as in the past, specifically because of the cultural restrictions on female students, causing them to be timid in communicating with their instructors online. He respected and appreciated such social norms and did not pressure students to do otherwise, as he recalled: 'we must take into account the cultural and social aspect of female students, as some may feel shy to talk to their teachers while at home.'

His relationship with his colleagues returned to normal, yet in the back of his mind, he was still saddened by what had happened in the previous phase. He carried out his online classes from the university where he felt more comfortable and where he could feel a sense of accomplishment, unavailable at his home. He had an interactive type of personality who only strives in the presence of people.

The only challenge he currently faced was technical in nature, when the university's BlackBoard system broke down due to heavy load. He was able to convince his students to use WebEx, instead. In regards to the policies affecting him the most, those related to finance were the toughest. Many benefits were removed from the faculty, and he had to cut expenses and live on a smaller budget so that he could save up for when he returned to his country.

The lessons he learned were about his personal growth as an instructor. He was able to educate himself by exerting a lot of effort to learn new things. He learned many skills from watching YouTube videos. He felt pleasure as a result of learning so much and passing this learning on to his students. His passion for his work allowed him to exert all necessary effort and even pay from his pocket. He had learned self-reliance, self-development and how to use his time effectively and productively.

4.3 Mouna's story

Mouna had a PhD in teaching methods of social studies, and a masters in curriculum studies, and she was completing an EdD. She had over 15 years of experience in teacher preparation. She worked for 5 years in Jordan and in other countries including Saudi Arabia and the UK. Then she moved to Qatar and had been teaching in the current program for 6 years.

4.3.1 Pre-pandemic

Mouna believed her role as a teacher educator was to support student teachers to develop skills such as innovation, creativity, and entrepreneurship in a changing world. She emphasised that they should be prepared to identify problems and innovate solutions and become lifelong learners. She was concerned in building student teachers' character within three dimensions: the cognitive, psychological and social dimensions. She was dissatisfied with the situation that good performing students did not have the confidence to become teachers. Student teachers should develop character, be confident, know how to make decisions and communicate, as well as have technological skills. To achieve her goals, she worked on those skills with students and engaged students in teamwork, and she also required students to write reflections.

She believed that all educators were colleagues, whether student teachers, teachers, or teacher educators. These relationships must be based on trust, honesty, respect, love, affection, freedom, and commitment. In particular, with her students, she gave them all her time and they could reach her at any time without restriction. She wanted them to consider her as a mother, as she loved and trusted them. She appreciated her relationships with the male students, as one of the most amazing experiences at the university. They were a small class of 10 males, and she was teaching them classroom management, she considered the male students respectful and attributed this to cultural norms. She reinforced the idea that despite being a minority in the teaching profession, specifically in K6 education, the male students should be proud of being teachers. To her satisfaction, most of the male students performed well in her course.

Her biggest challenge was the workload. She taught 15 hours, including 4 courses and then she supervised approximately 16 students in the practicum experience, which was nearly twice the usual teaching load. She had to observe every student teacher 5 times during the practicum, which was approximately 200 hours in the field. This made her feel exhausted and fatigued. On the top, she served in a few committee work in the college. She also mentioned the limited autonomy in her work with institutional restrictions. For example, she could not change the predefined course contents, and assessments had to be done as previously described. She felt that she was only expected to be a transmitter of information within the current policy system, which conflicted and constrained her ideal goals to be a teacher educator. As she said, 'I do not have autonomy in my work, because our work is governed by the university's system of rules and general policies, and these restrict my autonomy as a university professor.'

4.3.2 During pandemic

Mouna remembered the day that the announcement was made for the lockdown. She was in class, and got the news from her students. She cried as she saw the fear and distress in her students' eyes. She would never forget that day, as she became dizzy and disoriented. She felt as though she was 'placed in a washing machine' and her world was spinning. Students' reactions caused her distress, accompanied by the numerous emails which were meant to inform faculty of changes in policies, specifically those related to assessment formats, which caused even more fear and imbalance.

She was not the same person before March. Her responsibilities became larger. She felt technologically prepared to conduct online teaching, supported by her prior experiences, although the students were not and everyone was in emotional distraction due to the uncertainty. In her initiatives, she prioritised the psychological aspects and provided extra support via tutorials for individual students, as she believed they would be able to learn content any time. She resorted to one-to-one sessions with students, and opening her doors to them at any time. In addition, to support students' concerns regarding new policies on assessment and how to pass the exams, she made efforts to offer more sessions to explain and encourage them. The first time she did exams online, she felt even more stress than the students, even though she had created a WhatsApp group and sent them instructional videos explaining thoroughly how to login and take the test. Despite all the support she offered, she still felt distressed over their skills and whether they would pass these exams. Also, she felt challenged to prevent students from cheating online.

Her relationship with colleagues also changed. Most of her colleagues did not know how to use technology and she had to spend time supporting them to learn from scratch. Sometimes she took 3–4 hours of her time a day to help them, which added to her exhaustion. Nevertheless, she experienced strengthened relationship with a few close colleagues from spending many hours together online.

In general, during the pandemic, the laptop 'became her baby,' as she answered all calls very quickly. She worked night and day to overcome all the emerging challenges. She recounted that the university did everything to support instructors; for instance, they designed workshops over 3–4 days in which multiple tools were taught. However, she believed that administration ignored the psychological aspect of faculty, and such support was provided only for students. Only by the end of the semester, the university sent an email of gratitude to all instructors.

4.3.3 Post-emergency change

In this semester, relationships with her colleagues were more at a distance, compared with that in the Spring semester. She contemplated that faculty had become accustomed to the situation, and their needs for talking together were reduced, in addition to the pressure of the workload.

A major challenge was when the institution decided to raise the number of students in the class from 40 to 60, which led to a 50% increase in workload and additional pressure for online management. It became more difficult to involve interactive activities in such circumstances, although student-centred learning was even further emphasised as a university strategy. Additional work for managing teaching in large classes, reduced motivation due to income reduction, and feeling lonely and isolated added to her emotional distress. She wished her line managers could hear her voice, without feeling threatened in her job. As she said, 'It is not because I want to complain, I love the university, I love my students and my job, I am just tired and I want someone to hear me and feel my pain.'

She believed faculty did not have an opinion in making decisions or participating in policy development, especially in the Arab world. Only high administrators take decisions, even when faculty object or provide perspectives on matters that influence them personally. She lamented the limited authority and autonomy to influence her work, as she did not participate in decision making. As she said, 'Unfortunately, as a university professor, I am undermined and have no influence in making a decision.'

The feelings she experienced were as though she were 'at war with uncertainty.' Nevertheless, she learned on a humanitarian level to be strong, brave and patient. She became a changed person, and even though she was capable of working under stress before the pandemic, she now became capable of working more productively under pressure. She knew her strengths better, and found out how much she loved her students, whom she considered her 200 daughters. She felt more like a mother because of this pandemic.

5. Discussion and conclusion

In the findings section, we reported stories of three teacher educators' experiences during disruptive education caused by the COVID-19 pandemic. The three stories revealed that teacher education in disruption is both epistemic and technical as a complex system consisting of many interactive agents and elements, and each of these agents and elements is a complex system on their own (Van Geert and Steenbeek 2014). During the start of the pandemic, due to emergent policy change from face-to-face to full-scale synchronised online mode, these teacher educators navigated their responses to the complexity system of teacher education (Clark and Collins,

2007; Cochran-Smith et al. 2014) with both similarities and differences. They all experienced some sort of struggle, both intrapersonally and interpersonally (Ell et al. 2017; Garner and Kaplan 2021; Morrison 2008; Stacey, Griffin, and Staw 2000). They were also emotionally shocked which influenced their motivation and efficacy in teaching (Stacey, Griffin, and Staw 2000), during the emergent situation. They also encountered changed conditions in their relationships with others, including their students and colleagues (Cochran-Smith et al. 2014; Davis and Sumara 2006; Naidoo 2004). These relationships changed from active interaction to communication through an online mode, which was largely restricted and influenced by cultural constraints (e.g., female students' reluctance to turn on the camera). With new policy developments, they made additional efforts to support student teachers in developing online learning strategies, passing their exams, and experiencing a modified practicum experience. In particular, they all highlighted their engagement to support student teachers' mental well-being through encouragement and being available for them in extended work hours. All these efforts illustrated their simplex systems (Van Geert and Steenbeek 2014), which comprised of the ways they developed self-organisation in an attempt to understand and adjust to their new goals of working as teacher educators (Haggis 2008), as well as the ways they developed agentic actions to accomplish their professional missions during the time of disruptive education. This suggests that simplex systems developed by agents, such as teacher educators, share a certain number of properties in a particular community (Van Geert and Steenbeek 2014), including concerns about the goals and methods of teaching in a pandemic situation, the evaluations of their accomplishments, and the relationships with their environment in response to the new institutional policies. Interestingly, the study observed their shared feelings of conflict between the new teaching practices intended to fulfil institutional requirement and their individual preferences or habits. Awareness of such shared concerns and trajectories through change processes may better support educational policy makers and administrators to structure professional development activities for the success of educational change.

Variation is a major feature of simplex systems pertaining to two main concepts of complexity theory, namely connectedness (intrapersonal values and interpersonally relationships) and self-organisation. In particular, Van Geert and Steenbeek (2014) asserted that 'agents participating in the complex system may have different kinds of simplex systems governing their understanding and praxis' (p. 22), and these intrapersonal and interpersonal variations lead to hidden conflicts within the individual's simplex systems. In the current study, we observed the variation at both the intrapersonal and interpersonal aspects (Stacey, Griffin, and Staw 2000) among the teacher educators.

At the intrapersonal level, despite their high engagement to their tasks as teacher educators, the lack of understanding of the emergent situation and constraints due to the new policies conflicted with their motivation and efficacy in managing their jobs. The feelings of being disoriented, and lacking trust and hope made them emotionally exhausted. According to Van Geert and Steenbeek (2014), there exists considerable variability in teacher educators' simplex systems, including their beliefs and practices, and the way they understand complexity, accomplish their goals and evaluate the results. This variability creates its own dynamics within the teacher educator community, which deserves attention for teacher education program organisers and policy makers. At the interpersonal level, different coping strategies were also observed among the three teacher educators. Based on their different understanding of the emerging situations, they each adjusted their goals and teaching practices. Sarah and Mouna relied on their prior experiences and familiarity with technology to support themselves and their students with new strategies for online teaching and learning. These prior experiences also enhanced their confidence and efficacy in coping with the emergent situation. While Abdullah, in a situation of being blocked outside of the country, experienced lack of technological resources which generated emotional frustration and different teaching strategies to communicate with students.

In terms of their reaction to institutional policies, all three participants expressed disappointment and confusion, yet Sarah tried to enact her own strategies in order to accomplish her personal goals in teacher education, while Abdullah and Mouna showed more passive responses which were attributed to their strong emotional exhaustion and low motivational levels. Teacher educators in this study reacted differently to the new institutional policies due to the different situational conditions they encountered. They experienced different feelings of conflicts between the new requirement and the old habit of teaching (Van Geert and Steenbeek 2014). Also observed was their different emotional reaction to the new communication modes and teaching practices in the environment, and new policies. Such diverse experiences may indicate that a process of emergent educational change consists of a highly complex system of interacting components, values, activities, and actions (Van Geert and Steenbeek 2014) which shall be considered in professional development activities for the support of individual teacher educators to support their growth professionally in a context of change (Keay et al. 2019.

Findings of the current study have practical implications for teacher education. In general, the narratives of the three teacher educators analysed in this study provided insights into their simplex systems with both similarities and differences becoming evident in their stories. These individually constructed systems may impact the complex system of the teacher

education program, where the teacher educators are considered important agents. The variability of their simplex systems suggested that each teacher educator navigated their responses to disruptive education in a personally different way. For instance, various sources and factors influenced their intrapersonal values such as beliefs and efficacy, as well as how they self-organised in response to the emergent situations. It is therefore important for teacher educators to have awareness of their own individual needs and the sources impacting them in order to become more conscientious in handling the uncertainty and unpredictability of complexity in teacher education (Johnson 2001; Keay, Carse, and Jess 2019). Peer support through interpersonal relationships is also a helpful source for individual teacher educators to become self-empowered and to take agentic actions. Establishing a community of practice may further support professional growth and management of the simplex system of each individual (Van Geert and Steenbeek 2014).

At an institutional level, a clearer understanding of teacher educators' simplex systems may help explain the process of intricate interactions occurring in a complex system of teacher education in particular and higher education in general. Change efforts should consider the institutional and cultural contexts in which change decisions and procedures impact all of the independent parts of the system (Bond and Samantha 2020). A few insights may be considered in the future professional development activities aiming to support teacher educators to become change agents in educational change. For one, professional development activities shall conceive teacher educators as professional complex learners, considering their learning process intrapersonally, interpersonally and environmentally (Garner and Kaplan 2021; Keay et al. 2019; Mason 2009; Taylor 2020). Activities highlighting the establishment of a learning community in which teacher educators can share experiences and empower each other is also suggested to better support teacher learning and positive attitudes towards change (Dashborough, Lamb, and Suseno 2015). Last but not least, findings of this study particularly highlighted the strong need for institutional support at the policy level to promote the autonomy of teacher educators and better support their agency towards accomplishing their goals as teacher educators. Involving and maintaining active communication with individual teacher educators in the process of policy making is an important way to empower agents in the complex system to be able to respond actively to disruptive education. These aspects have been considered important in previous studies, yet new insights have been provided via a complexity theory and the concept of simplexity (Morrison 2008; Van Geert and Steenbeek 2014).

The study has a few limitations. Firstly, focusing on subjectivity, the use of narrative inquiry with a life history angle offered us opportunities to provide in-depth insights of how teacher educators experienced the emergency in disruptive education, but the small size of participants did not support generalisability and transferability, suggesting there may have been many other stories that were not included in the account of the current study. Second, due to the debate in how narrative data can be analysed, we tried to combine both approaches of providing individual profiles in the forms of stories and then discussing the stories through comparison and in relation to theories. In this way we have hoped to provide space for readers to develop their own interpretations. Nevertheless, there may be aspects we have missed from having conducted the analysis differently (Floyd 2012). Third, the study relied on single sources of data and the findings may have been supplemented by other sources of data. Therefore, future studies may include more participants with different societal and cultural backgrounds and multiple sources of data to enrich anticipated findings. Further research focusing on teacher educators' and administrators' real-time trajectories may lead to a better understanding and more sustainable educational change (Van Geert and Steenbeek 2014). Further studies may also address different angles, for example by including the perspectives of student teachers and administrators, in order to provide further insights of the complexity system of teacher education.

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