

Exploring the complexity of clinical education: understanding lived experiences of clinical educators through audio diaries in a longitudinal study

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Abstract

Purpose – This study explored how audio diaries, within the framework of complexity theory, captured the evolving lived experiences of clinical educators (CEs) in clinical education. It examined how this qualitative methodology revealed nuanced changes over time and informed CEs' responsiveness to students' developmental needs.

Design/methodology/approach – A qualitative, longitudinal approach was employed. Over eight months, seven CEs provided weekly audio diary reflections documenting their experiences in a clinical education programme. Reflexive thematic analysis identified themes, and complexity theory was applied to interpret the adaptive and interconnected changes in CEs' practices.

Findings – Audio diaries provided insights into the evolving experiences of CEs, capturing how their approaches shifted in response to students' developmental needs. CEs documented the transition from structured support to fostering student independence, adapting their strategies to align with student progress and challenges. The diaries also revealed how CEs navigated emotional complexities, as they responded to students' academic emotions, which influenced engagement and required ongoing supervisory adjustments. By offering real-time perspectives, audio diaries enabled CEs to identify and respond to subtle shifts in student learning, refining their teaching approaches.

Originality/value – This study highlights the value of audio diaries in capturing temporal, nonlinear changes in clinical education. Complexity theory offers a novel perspective on how adaptive practices evolve to address clinical education's complexities.

Keywords Complexity theory, Lived experiences, Audio diaries, Clinical education, Speech-language pathology

Paper type Research paper

Background

Lived experiences are complex and dynamic, and clinical education is no exception. It is an essential component of healthcare education, where students practise and refine clinical skills within real-world settings. Distinct from clinical supervision, clinical education refers to the process through which healthcare students apply theoretical knowledge in clinical placements, developing practical competencies (Council of Academic Programs in Communication Sciences and Disorders [CAPCSD], 2013). Serving as a bridge between theory and practice, clinical education prepares students to become competent healthcare professionals by fostering critical thinking, professional behaviours and clinical skills. Coordinated by academic institutions, it ensures that theoretical instruction aligns with practice, while clinical educators – whether

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full-time or part-time, university-employed or community-based – play a pivotal role in guiding students through this process (Dudding *et al.*, 2017; McCallum *et al.*, 2019).

Clinical educators (CEs) play a central role in guiding students through the complexities of clinical education. Their responsibilities extend beyond teaching clinical skills to include deepening students' conceptual understanding, fostering critical thinking, modelling professional behaviour and supporting professional documentation. This preparation equips students to deliver effective, evidence-based, person-centred care and confidently transition into the workforce (CAPCSD, 2013; Forsgren *et al.*, 2022). The role of the CE is multifaceted, requiring them to balance clinical competence with effective teaching strategies. As competent clinicians, CEs model reflective practices, evidence-based decision-making and person-centred care, which emphasises the integration of patients' life goals into their healthcare journey. They also demonstrate clinical reasoning and practical skills essential for professional growth (DeRuiter and Ginsberg, 2020; McAllister, 2001).

In their teaching role, CEs must incorporate evidence-based pedagogies, active learning strategies and adult learning principles to foster students' progression from novices to critical thinkers capable of applying theoretical knowledge to patient care (DeRuiter and Ginsberg, 2020; Higgs and McAllister, 2007a). This dual responsibility requires constant reflection and adaptation to meet the unique needs of each student cohort while ensuring patients receive high-quality care. Additionally, CEs must navigate the tension between mentoring students and evaluating their readiness to practise independently. They must balance their clinical preferences and experience with their educational responsibilities, ensuring they promote both patient care and student learning (Higgs and McAllister, 2007b; McAllister *et al.*, 2008). Capturing the nuances of these lived experiences requires research methods sensitive to the dynamic and evolving nature of clinical education, as traditional approaches like interviews or focus groups may provide only cross-sectional snapshots (Collett *et al.*, 2017).

Audio diaries, however, provide a method that allows participants to engage in structured or unstructured responses to a specific aspect of their lives, prioritising what they want to share. Audio diaries are an underused tool that enables researchers to explore participants' experiences from their points of view. They encourage a think-aloud, critically reflexive process, allowing participants to narrate their own stories, thus providing novel insights into how individuals make sense of their world and experiences (Collett *et al.*, 2017).

Beyond capturing reflections, audio diaries facilitate a longitudinal exploration of changes in participants' lived experiences over time. This temporal lens allows researchers to observe how participants' thoughts, emotions and behaviours evolve, offering a deeper understanding of adaptive and dynamic processes (Verma, 2021). Additionally, audio diaries empower participants by fostering a reflective dialogue that integrates their professional and personal identities, helping them make sense of their evolving experiences as they occur. This tool is particularly useful in contexts where traditional methods, such as interviews, may not capture the complexity of ongoing change or allow for sensitive or nuanced reflections (Crozier and Cassell, 2016). For clinical educators, audio diaries serve as a pragmatic tool for continuous reflection, enabling them to adapt their teaching strategies to effectively meet students' evolving needs.

Complexity theory to explore audio diaries

Complexity theory is a theoretical lens that can provide a deeper understanding of the nuanced and evolving nature of participants' experiences as captured through audio diaries. In their seminal work, Plsek and Greenhalgh (2001) and Fraser and Greenhalgh (2001) define a complex system as a collection of agents that interact dynamically, resulting in interconnections and activities that unfold both in real-time and over periods of time, thereby altering the context, processes and outcomes for each agent within the system. Complexity theory explores such nonlinear systems, also known as complex adaptive systems, characterised by agents who possess the autonomy to act in unpredictable ways, with each agent's actions influencing the context for others (Plsek and Greenhalgh, 2001). This theoretical lens was chosen because it

supports the view, echoed by [Fraser and Greenhalgh \(2001\)](#) and [Grant et al. \(2023\)](#) that clinical education in the health sciences operates as a complex system. They argue that clinical education cannot be understood through a simple cause-and-effect approach. Rather, the complexity inherent in clinical education must be acknowledged and accounted for, especially when developing and implementing educational interventions.

Each CE's narrative produced in an audio diary can be viewed as a complex adaptive system where emotions, reflections and social interactions are dynamically interconnected, producing emergent themes and shifting interpretations over time. Complexity theory's emphasis on the nested nature of systems also acknowledges that these complex adaptive systems are embedded within broader contexts that both influence and are influenced by individual actions and reflections ([Sturmberg and Martin, 2012](#)). By adopting complexity theory, researchers can avoid a reductionist approach, focusing instead on how each aspect of participants' experiences – emotional responses, social interactions and reflective insights – adapted and self-organised in response to changing internal and external conditions ([Grant et al., 2023](#)).

Additionally, as [Braithwaite et al. \(2017\)](#) explained, the unpredictable outcomes that arise from interactions within complex systems highlight the tensions and paradoxes intrinsic to these systems, where interventions do not produce linear outcomes but rather produce adaptive and unpredictable processes. This unpredictability emphasises the need to approach clinical education with a framework that captures its multi-layered, dynamic qualities. Complexity theory thus provided the necessary lens to examine how CEs' narratives adapted over time, producing rich, nonlinear insights into their lived experiences that more traditional frameworks might neglect.

Therefore, this study aimed to use audio diaries within a complexity theory lens to explore the lived experiences of CEs in clinical education, to determine if and how these tools captured nuanced changes over time and how these changes influenced CEs' responsiveness to students' developmental needs.

Methodology

The audio diaries being reported on in this manuscript were part of a larger study exploring the role of inquiry-based learning in clinical education to promote the critical thinking skills of speech-language pathology students. The larger study was a longitudinal, theory-based impact programme evaluation. It was conducted at the Department of Speech-Language Pathology at the University of the Witwatersrand with second- and third-year students and the CEs who supervised them. At the University of the Witwatersrand, students pursue a Bachelor of Speech-Language Pathology through a structured four-year professional degree programme. The academic year is organised into two semesters, each divided into two seven-week blocks, labelled Block 1, 2, 3 and 4. Second years and third years complete clinical education across all the blocks of the year. This programme is accredited by the Health Professions Council of South Africa and follows the national standard for speech-language pathology degrees across the country. Ethical clearance was obtained from the Human Research Ethics Committee (Non-Medical) at the University of the Witwatersrand (H21/11/06). Due to the timing of obtaining ethical clearance, data were only collected from Block 2 onwards.

A mixed-method approach was employed to explore the programme evaluation, and one of the qualitative aspects of the study invited clinical educators to participate in providing a weekly audio diary for eight months to reflect on the process and outcomes of implementing clinical education. Seven clinical educators participated in the larger study, which included submitting audio diaries. They were not assigned a participant number as they selected pseudonyms to represent their identities whilst maintaining their confidentiality and anonymity ([Heaton, 2022](#); [Wang et al., 2024](#)). [Table 1](#) provides the CE demographics.

The years of experience as an SLP clinician were ($M = 13.12$ years, $SD = 8.27$) and as an SLP clinical educator ($M = 4.43$ years, $SD = 1.92$). The descriptive statistics show a variety of years of experience as a clinician with a standard deviation of 8.27 years, while there was less variation in years of experience as a clinical educator ($SD = 1.92$ years). The information

Table 1. Demographics of CE participants

Participant pseudonym	Level of education	Years of experience as a clinician	Years of experience as a clinical educator	Full-time/sessional staff
Nomkitha	Masters	8	4	Full-time staff
Megan	Masters	7	4	Sessional
Rachel	Masters	12	7	Full-time staff
Avashni	Masters	11	3	Full-time staff
Luyanda	Doctorate	11	6	Full-time staff
Layla	Masters	10	6	Full-time staff
Gayner	Masters	33	1	Sessional

Source(s): Author’s work

acknowledges the unique experiences and backgrounds that clinical educators bring to their clinical education process.

The CEs were provided with structured questions to guide them in their reflections on the clinical education for each week. Table 2 comprises the questions provided. These audio diaries were completed over WhatsApp voice notes on the participants’ personal phones. This choice was based on the premise that this recording method was convenient and easy. Using this recording method, audio diaries could be done between tasks or once the clinical educator had finished providing clinical education and was transitioning to their next task for the day. Research by Collett *et al.* (2017) identified that participants using their personal phones at any time during the day when it suited them to record their audio diary resulted in lower attrition rates. NB sent weekly email reminders to complete the audio diaries. She did not interrogate the information provided in the voice notes with follow-up messages. She responded to CEs weekly on WhatsApp, expressing gratitude for their shared insights.

A total number of 54 audio diaries were submitted via WhatsApp by the seven CEs over Blocks 2, 3 and 4. The audio diaries were downloaded and saved onto a password-protected laptop. They were deleted from WhatsApp. The audio diaries were then transcribed using [rev.com](#). NB checked the accuracy of the transcribed diaries and corrected any errors. NB then analysed each individual transcribed audio diary using reflexive thematic analysis as stipulated by Braun and Clarke (2021a). NB employed reflexive thematic analysis as it allowed her to actively generate themes that reflected the intersection of the data, the analytical process and her subjectivity (Braun and Clarke, 2021b). This approach recognises the crucial role of the researcher in theme development, where values, experiences, skills and training influence the analysis of the themes, rather than themes being passively derived from the data (Braun and Clarke, 2021a).

Table 2. Weekly audio diary prompts for CEs

Question prompts
(1) Has the implementation of inquiry-based learning (IBL) been challenging or easy this week?
(2) Please explain your answer to the previous question with specific information or situations
(3) What IBL strategies facilitated clinical supervision this week?
(4) What IBL strategies hindered clinical supervision this week?
(5) Other than using IBL strategies, what other strategies did you use during clinical supervision times?
(6) What are your observations regarding the students’ ability to think critically about the client they are working with?
(7) What do you think is hindering or facilitating the students’ ability to think critically about their clients?

Source(s): Author’s work

Reflexive thematic analysis followed six recursive phases rather than a strict sequence (Braun and Clarke, 2021a; Terry *et al.*, 2017). First, data were transcribed and repeatedly reviewed for immersion. Notable features were then identified, generating initial codes to organise meaningful patterns. These codes were analysed to develop broader themes, which were subsequently refined and assessed for coherence with the data set and research question. Each theme was then examined in detail to determine its scope and focus. Finally, a report was produced, integrating the themes into an analytic narrative that provided a comprehensive interpretation of the data.

NB is a millennial, white, female who is a first-generation university graduate with significant family and financial support. NB recognised the potential influence of her own biases during data analysis and interpretation (Patton, 1999). Reflexive thematic analysis was used to continuously examine underlying assumptions, their relation to her perspectives and their effect on data interpretation (Braun and Clarke, 2021a). NB is also known within the university setting due to her role as a clinical educator. NB remained aware of the social and power dynamics affecting data collection, particularly given her role within the SLP department at the University of the Witwatersrand. Critical theory highlights how knowledge production is shaped by social structures, power relationships and individual agency (Bhavnani *et al.*, 2014). Reflexive practices were therefore integrated throughout the research to assess their impact on participation and data generation (Bhavnani *et al.*, 2014).

Member checking, commonly used to validate researchers' interpretations of participant contributions (Varpio *et al.*, 2017), was not conducted. Motulsky (2021) and Goldblatt *et al.* (2011) question its value for data triangulation, noting that it rarely alters initial interpretations and presents ethical concerns. Given the substantial time demands already placed on clinical educators during the larger research project, member checking was deemed an unnecessary time burden with limited benefit. Intellectual and physical audit trails were completed to ensure the study's quality, transferability and trustworthiness (Hadi and Closs, 2016).

After generating the themes using reflexive thematic analysis, complexity theory was applied to understand the dynamic, interconnected themes that emerged from participants' audio diaries. Recognising each participant's narrative as a complex adaptive system, NB focused on identifying nonlinear patterns, adaptive responses and interconnected themes as well as the influence of contextual factors (Fraser and Greenhalgh, 2001; Plsek and Greenhalgh, 2001). This approach involved the analysis of the themes generated by reflexive thematic analysis to identify adaptive shifts in CEs' reflections over time. Complexity theory guided the identification of feedback loops, interdependencies and unexpected shifts, allowing NB to interpret CEs' experiences as adaptive and evolving rather than static (Grant *et al.*, 2023). This theoretical lens provided insight into the nuanced changes within the CEs' lived experiences, capturing the influence of broader, nested contexts and highlighting how themes developed through interaction and adaptation (Braithwaite *et al.*, 2017; Sturmberg and Martin, 2012).

Results

The results section first provides an overview of the evolving and multifaceted experiences of CEs during clinical education, highlighting themes that explain the initial challenges and the gradual progression towards student independence. The section is then structured to explore clinical education as a complex adaptive system, emergence and nonlinearity, sensitivity to initial conditions, adaption and self-organisation, interconnectedness and feedback loops as well as unpredictability and ambiguity to have a deeper understanding of the CEs' lived experiences and how the changes in their perceptions influenced the CEs' responsiveness to students' developmental needs. Complexity theory served as a guiding framework for the results to allow for an in-depth exploration of each clinical education.

Overview of thematic changes across blocks

The analysis of the themes from the CEs' audio diaries revealed a progression of the themes across Blocks 2, 3 and 4, illustrating the dynamic, adaptive and complex nature of clinical education. Complexity theory helped capture the nonlinear development of CEs' approaches and students' engagement during clinical education, highlighting the importance of responsive and evolving strategies. It was interesting to note that when CEs were required to reflect on their experiences in clinical education, they often reflected more on their perceptions of how the students were performing than on their abilities as CEs. This is an important consideration when reading the results and can guide the understanding of CEs' lived experiences.

In Block 2, the initial themes centred on foundational challenges in clinical education, where CEs focused on building confidence and providing structured support to address student dependence. These themes were the same for the CEs supervising the second- and third-year students. Luyanda reflected that she had to be very structured through modelling for students how to engage in therapy, saying she had to *"demonstrate for them on how do you implement therapy . . ."* Nomkitha echoed this sentiment by recognising the need for extended modelling, stating that she *"had to actually show the student. They need modelling for longer periods to actually grasp it."* However, she did reflect that through this block using these strategies to support students, she *"could see some lightbulb sort of coming on for them to understand what does it mean when we [clinicians] plan therapy"*. These comments from CEs demonstrated their awareness of the need for hands-on support to help students translate theoretical knowledge into practice within a scaffolded framework. To facilitate this, CEs had to adapt their clinical education approach by incorporating modelling to enhance students' understanding of therapy techniques.

The impact of student academic emotions was also evident in the themes for Block 2. Academic emotions, distinct from general emotions, specifically relate to learning and academic experiences (Pekrun *et al.*, 2002). While general emotions arise from various life events, academic emotions are directly tied to educational contexts, influencing students' engagement, motivation and performance. Pekrun *et al.* (2002) categorise these emotions as positive or negative, with the former – including confidence, enjoyment and hope-promoting academic success, while the latter – such as anger, stress, anxiety and boredom – can hinder learning.

Avashni noted that *"students are not able to join the dots in the tuts . . . and they themselves attribute this to exhaustion and stress"*. Layla also identified that *"it's difficult as a supervisor when students are just not there,"* pointing to the impact of stress on student engagement and their learning. Layla reconciled this statement by reflecting that as a CE, CEs need to *"understand that students are also going through a lot and you know, give them space in that time and [CEs] also just then being open to, you know, further discussions, if they [students] want to have a chat online or meet in person, is also quite helpful for that."* CEs reflected on the impact of students' academic emotions, recognising their influence on engagement in clinical education. They acknowledged the need to be mindful of these emotions when providing support. This awareness underscored the importance of CEs fostering a supportive environment that enables students to navigate challenges and receive the necessary guidance.

Amidst these dynamics, CEs reflected on practical aspects also played a role in clinical education in Block 2. Again, these reflections, spoke to the students' challenges and how these practical aspects influenced the CEs' experience of clinical education. CEs reflected that students' poor time management, lack of accountability in submissions, substandard work quality, challenges with professionalism and dependence hindered their ability to implement inquiry-based learning. Rachel expressed frustration, stating that she *"was frustrated as some students did not send me [her] sessionals [plans for the session]. So when supervising sessions, it was difficult to know what they were working on"*. This lack of accountability in submitting required tasks made it challenging for CEs to guide and supervise effectively. Avashni also highlighted the consequences of poor work quality, mentioning, *"Written work produced is subpar, lacking basics like format and grammar"*. CEs reflected that this

substandard quality detracted from implementing theory in clinical settings, as time had to be spent correcting written work instead.

In Block 3, divergent themes emerged between CEs supervising second- and third-year students. CEs of the second-year students reflected that they were still required to provide the students with explicit support. Megan acknowledged that she “*needed [to provide] quite a bit of guidance*” to her second-year students thus influencing her experience of clinical education requiring increased time spent scaffolding and supporting students. Nomkitha also reflected that her experience of supervising the second-year students was characterised by significant continued support in this block. She reflected that this influenced her experience and shaped the manner she engaged with students by needing to ask the students questions, and she could see that students did not understand what was required for the therapy session. These observations are evident in her comments to the students, asking, “*What is it that the children must do exactly? . . . What would you need? . . . She [the student] didn’t have a list of words. And yeah, you could see it’s just haphazard, not much planning . . . it just didn’t look like she did the sessional plan.*” This recognition for guidance emphasises the substantial support and direction that CEs experienced needing to provide to second-year SLP students during clinical education. Nomkitha also stated that during this block, she experienced that “*a lot more teaching has been happening and a lot of reminding them about what they already know*”. CEs experienced the need to increase the support they provided to students so that students could implement their theoretical knowledge in the clinical environment.

However, CEs of third-year students reflected that they had to decrease the support they were providing as they experienced that students had increasing independence in Block 3. Avashni reflected that the students are more independent in this block as “*they’re trying to think on their feet and then bring viable and practical solutions forward*”, and this led to her having to provide less scaffolding during the block. Clinical educators reflected on their experience of third-year students’ self-reflections that fostered clinical skill development and independence. Layla explained that these reflections were particularly useful in guiding students, as they helped her “*understand what it is they need to work on or find additional information on.*” She further described how reflections played a key role in her experience of clinical education, noting that they encouraged students to analyse their sessions by considering “*what worked and what didn’t*” and to think more critically about improvements. By prompting students to ask themselves, “*What could you do to maybe improve on that or do differently?*” and “*If it did work, why do you think it worked and how can you then carry that over into a future session?*”. Reflections enabled CEs to facilitate deeper learning. Through engaging with students’ reflections, clinical educators actively supported the emergence of clinical independence and played a central role in shaping students’ learning trajectories.

In Block 4, the CEs reflected on the themes of growth, confidence and professional independence for both second- and third-year students that then impacted the CEs’ experience of clinical education. Nomkitha reflected that she was “*quite pleased with the growth of my [her] students from where they were when they started to when we ended last week*”. Gayner also reflected that by “*just seeing the value of them [students] as people has really been great . . . And it’s so nice to see the changes, even in only a few sessions and in the children [patients], and I’m really proud of them*”. Avashni reflected that she is “*finding that the students are a lot more comfortable, particularly by the third week of the prac . . . They seem to be developing a lot more independence . . .*” Rachel reported that “*the students were motivated to ask questions . . . and engaged really nicely in the supervisory process*”. These reflections by CEs highlight that they were able to reduce scaffolding further as students showed greater autonomy in navigating clinical challenges. Gayner reflected on the effectiveness of developing clinical skills through questioning as she “*would say, what do you think?*” She reflected that she experienced this questioning as helping the students to then be “*much more open to think of possibilities.*” Furthermore, Gayner reflected on her practice of “*giving them [the students] some actual clinical tools, talking about it, helping them, showing them, asking them if something might be better*” resulted in the students being “*helped them in the clinical situation*”.

This overview of the changes in themes highlights the evolving and multifaceted nature of CEs’ experiences during clinical education, capturing both the initial challenges and the gradual development of student independence. By applying complexity theory as a guiding lens, the following sections delve into the themes from clinical education in detail, exploring how dynamic interactions, adaptive responses and emergent patterns reveal the nuanced changes that occurred across blocks. This lens enabled a deeper understanding of CEs’ lived experiences as they navigated the dynamic interplay of pedagogical, emotional and contextual factors influencing their approaches to clinical education. [Figure 1](#) outlines the key aspects of complexity theory that facilitated a deeper exploration of how complexity influenced the lived experiences of CEs and the impact on the CEs’ experiences. These key aspects are explained in further detail.

Understanding lived experiences as complex adaptive systems

Each CE’s approach to clinical education can be conceptualised as a complex adaptive system in which multiple factors – such as student engagement, academic emotions and practical challenges – interact in dynamic ways. In Block 2, for example, CEs reflected on the diverse strategies that they employed, including questioning, demonstrations and written feedback, to support students’ engagement during clinical education. Nomkitha reflected on her experience of using open-ended questions, saying, “*I would pose questions back – what do you think? What have you tried?*” She found that this method encouraged students to explore their own ideas, actively engaging them in the learning process. Luyanda similarly reflected that her experience of clinical education was characterised by having to “*demonstrate for them [students] on how do you implement therapy*”. This modelling emphasised the importance of CEs showing practical application and allowing students to observe and model behaviours in a clinical setting.

As the year progressed, these adaptive strategies evolved. By Block 4, CEs reflected that scaffolding and support were gradually reduced, with CEs reflecting that students had gained the confidence and skill to provide clinical skills more independently. Avashni reflected that “*students are a lot more comfortable, particularly by the third week of the prac . . . They seem to be developing a lot more independence*”. This highlighted the experience of CEs providing the initial structured support that students required, contributing to students’ self-directed learning over time.

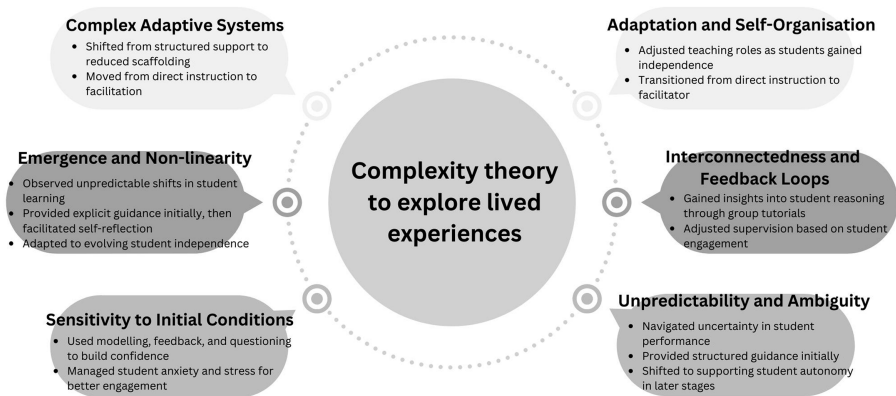


Figure 1. Key aspects of complexity theory that facilitated a deeper exploration of the lived experiences of CEs. (Source: Author’s work)

Emergence and nonlinearity

Complexity theory's focus on emergence facilitated the identification of themes that evolved nonlinearly, with insights and new patterns appearing organically as students progressed. For instance, in Block 2, themes emerged around the CEs' challenges with clinical education, particularly in terms of how student engagement and confidence impacted the CE experiences. Nomkitha reflected on the potential influence of confidence and how this influenced her experience of clinical education by suggesting, *"I wonder if it's a confidence issue. They don't want to make the final decision or do the thinking"*.

However, in Block 3, CEs reported a shift in their experiences of clinical education, noting the contrast between the structured, explicit guidance required for second-year students and the increasing independence demonstrated by third-year students. As students began to generate their own questions and engage more actively in self-reflection, CEs found their own roles evolving in response. Rather than directing students at every step, they adapted their teaching approaches to align with students' developmental levels, navigating the nonlinear progression of learning.

Layla described how this shift influenced her experience, explaining that reflections became a valuable tool in guiding students, as they encouraged them to *"think a bit more about what they're doing"*. As students developed their reflective skills, clinical educators observed an impact not only on students' engagement with clinical education but also on their emerging critical thinking and problem-solving abilities.

By Block 4, clinical educators increasingly recognised themes of professional growth and confidence, both in students and in their own teaching practices. They reflected that their adaptive guidance supported students' progression, highlighting the dynamic and reciprocal nature of clinical education.

Sensitivity to initial conditions

Complexity theory recognises that small, initial conditions can have significant long-term effects. In Block 2, CEs' early efforts to build students' confidence through modelling, feedback and guided questioning played a critical role in shaping later engagement during clinical education. For example, Luyanda reflected on the impact of this foundational work, stating, *"The modelling and reinforcement that I've been doing is working"*, suggesting that these early interactions created a foundation upon which students could build more complex inquiry skills.

Clinical educators experienced the impact of students' academic emotions on clinical education, particularly in the way stress and anxiety shaped students' engagement and skill development. In Block 2, academic emotional challenges were especially pronounced, with Layla describing the difficulty of supervising students who struggled to be fully present, stating that *"it's difficult as a supervisor when students are just not there"*. These emotional barriers influenced not only students' participation but also the educators' ability to facilitate learning effectively.

Recognising the need for early intervention, clinical educators adapted their approach to provide initial support that helped mitigate these challenges. By addressing students' academic emotional struggles, they were able to gradually build students' confidence, which, in turn, enhanced engagement and learning in subsequent blocks. This shift in experience highlighted the evolving role of clinical educators in balancing both emotional and academic support within clinical education.

Adaptation and self-organisation

CEs adapted their strategies based on students' needs, reflecting complexity theory's principle of self-organisation. In Block 3, CEs began to observe that third-year students required less guidance, allowing CEs to shift their roles from direct instructors to facilitators. Avashni noted

this adaptation, saying, “*This group is definitely showing a lot more independence*”. This reduced need for intervention enabled CEs to adjust their focus, providing less direct instruction and instead fostering an environment where students could self-organise and explore clinical problem-solving independently.

In Block 4, scaffolding became an explicit theme, with CEs using structured guidance but gradually withdrawing support as students grew more confident. Gayner observed, “*I say to them this is not working. Try this. Or I model something for them*”, highlighting the shift from explicit instruction to encouraging students to take ownership of their learning. This self-organising capacity illustrates the adaptive nature of the learning process, where CEs’ experiences helped them to tailor their scaffolding to meet students’ developmental needs, supporting their gradual independence.

Interconnectedness and feedback loops

Complexity theory emphasises the importance of interconnectedness and feedback loops in understanding complex systems. CEs experienced the interconnected nature of clinical education through the reinforcing feedback loops created by group discussions and student-generated questions. As they facilitated these interactions, they observed how engagement and critical thinking were not only enhanced for students but also shaped their own supervisory approaches. Avashni reflected on the value of these discussions, noting that “*the group tuts gave an opportunity to relate to peers, understand peers’ challenges, and it helped to problem solve with others*”. These sessions did not merely support student learning; they also provided CEs with insight into students’ reasoning processes, allowing them to refine their guidance in response.

As the blocks progressed, CEs recognised the dynamic interplay between academic emotions, confidence and professional growth. By Block 4, they experienced a shift in their role as students became more proactive and willing to ask questions. Nomkitha linked this change to growing confidence, explaining, “*So I think when they’re confident and they believe in themselves . . . they’re able to critically reason and think about certain things*”. This shift in student behaviour created a reciprocal learning process, where CEs adapted their teaching in response to evolving student needs. These feedback loops fostered a supportive clinical education environment, reinforcing the interconnected nature of learning and supervision.

Unpredictability and ambiguity

CEs experienced the unpredictability and ambiguity of clinical education as they navigated shifts in students’ engagement and critical thinking. In Block 3, they observed that third-year students initially struggled to think critically when faced with unfamiliar clinical contexts. Megan reflected on this challenge, explaining, “*The students haven’t worked with the autism population before . . . they’re struggling to think a bit more critically about what they’re doing*”. These unexpected difficulties required CEs to adjust their support strategies in real time, reinforcing the inherently dynamic nature of clinical education.

As students became more familiar with the clinical setting, CEs noticed a shift in their engagement, with ambiguity gradually decreasing. By Block 4, students demonstrated greater independence in navigating clinical challenges, which influenced how CEs approached their role. Gayner highlighted this change, noting that students have “*thought about what the clients need, not just what they need . . . they’re using the information that teachers give them to direct their therapy*”. This progression shaped CEs’ experiences, as they transitioned from providing structured guidance to supporting more autonomous student decision-making. The evolving nature of clinical education required CEs to continuously adapt, reinforcing the complexity of their role in fostering students’ confidence and problem-solving skills.

Discussion

This study’s use of audio diaries provided a unique lens through which to capture the evolving experiences of CEs within the complexity of clinical education. Audio diaries revealed subtle

changes in educators' reflections, strategies and responses to students, offering a longitudinal view that traditional data collection methods such as interviews and focus groups may overlook. Through the lens of complexity theory, the data illustrated how CEs adapted their approaches to meet students' needs, reflecting the nonlinear and interdependent nature of clinical education. This nuanced understanding emphasises the need for a research approach that accommodates the unpredictable, adaptive processes inherent in a complex educational environment.

Audio diaries used in this study provided a nuanced understanding of the changes in the clinical education provided to students over one year. The observed changes suggest that audio diaries can be a valuable tool in qualitative education research where nuanced, temporal shifts in experiences need to be monitored, as in longitudinal studies. However, ensuring that participants understand the value of continued diary submissions remains essential to mitigate attrition and capture these evolving insights over time.

A key insight from the audio diaries was the gradual progression of student independence over time. Initially, CEs employed foundational support strategies, such as explicit modelling and structured feedback, to scaffold students' clinical skills. As students' confidence and competence developed, CEs gradually reduced this scaffolding, allowing students to take on more responsibility in clinical decision-making. The audio diaries provided a nuanced view of these evolving needs, enabling CEs to gain deeper insights into the specific types of support each student required rather than applying generic support strategies. Complexity theory facilitated an understanding of this shift, viewing CEs not as static instructors but as adaptive guides who tailored their support based on students' developmental stages and emerging needs.

This shift towards targeted support and student independence aligns with [Anderson's \(1988\)](#) continuum model, which describes the evolving supervision style of clinical educators – from direct/active to collaborative and eventually consultative – as students advance through the stages of (1) evaluation-feedback, (2) transitional and (3) self-supervision. In the Evaluation-Feedback stage, CEs provide intensive guidance and detailed feedback to help students build foundational skills. During the transitional stage, students apply feedback with growing independence, though they still receive occasional support. The final stage, self-supervision, marks the transition to a highly autonomous clinician who self-evaluates and reflects on their practice with minimal external oversight. Through the use of audio diaries, CEs could better understand and respond to these nuanced shifts in student readiness, guiding students from close supervision to independent, self-directed clinical practice.

Additionally, academic emotions emerged as an unanticipated yet significant theme within the audio diaries. [Pekrun et al. \(2002\)](#) explored how various academic emotions impact students' academic engagement and performance, categorising them as positive or negative. Negative emotions, including anger, stress, anxiety and boredom, have been linked to learning challenges. In contrast, positive emotions such as confidence, enjoyment and hope are essential for academic success. Building on these insights, [Tan et al. \(2021\)](#) and [Hayat et al. \(2020\)](#) highlight the crucial role of positive emotions in fostering academic achievement. [Tan et al.'s \(2021\)](#) systematic review, in particular, emphasises how positive emotions enhance academic performance.

Aligned with this research, CEs in this study frequently noted students' stress, confidence and engagement levels, often identifying that these emotions were central to the students' ability to learn during clinical education. This emphasis on academic emotions emphasises the importance of a supportive environment to help mitigate students' emotional barriers to learning. The diaries revealed how CEs adapted their approaches in response to students' emotional states, further illustrating the complex interplay between educational strategies and individual needs in clinical education.

The audio diaries also appeared to serve an important reflective function for CEs, enabling them to critically examine their teaching practices and make adaptations based on these reflections. Although structured around questions related to inquiry-based learning and critical

thinking skills, CEs often used the diaries to reflect more broadly on the challenges and responses they encountered in clinical education. This reflexive engagement suggests a divergence between the diaries' intended role as a data collection tool and the educators' perception of them as a personal space for reflection. Such a shift underscores the versatility of audio diaries, which not only provide valuable insights into specific teaching strategies but also serve as a medium for emotional and intellectual catharsis.

Reflective practice, as noted by [Boud et al. \(2005\)](#) and [Caty et al. \(2015\)](#), involves actively examining one's experiences to integrate new learning with existing knowledge. This process allows CEs to deepen their understanding of their role and adapt their approaches based on evolving insights. In this context, the audio diaries enabled CEs to engage in a form of reflective practice that went beyond immediate teaching tasks, fostering a greater awareness of the complex dynamics within clinical education. This reflective function, embedded within the diaries, highlights their potential as tools for professional growth and insight, offering a personalised platform for CEs to refine their teaching practices continually.

These findings emphasise the potential value of audio diaries in longitudinal qualitative research, particularly within complex educational environments. By enabling researchers to observe changes in participants' experiences over time, audio diaries can provide a rich, temporally sensitive understanding of adaptive processes that unfold within clinical education. Such an approach not only captures the lived experiences of CEs but also highlights the multifaceted, responsive nature of clinical education itself. This study thereby contributes to the growing body of literature on the use of innovative qualitative methods to explore complex systems, reinforcing the importance of methodological flexibility in capturing the intricate realities of professional education.

Limitations

This study faced several limitations. Participant attrition was a potential challenge in the longitudinal design. Sustained engagement over time decreased, and CEs provided fewer audio diaries each block as the year progressed, impacting the consistency of the data. Although structured prompts were provided, the variability in diary responses indicated that participants sometimes used the diaries for broader personal reflection rather than strictly addressing inquiry-based learning and critical thinking skills. The study's focus on a specific group of clinical educators within one institution limited the generalisability of findings to broader contexts. These limitations suggest areas for future research, such as applying audio diaries in diverse settings and determining innovative, ethical ways to sustain participant engagement.

Conclusion

This study highlights the potential of audio diaries in capturing the complex and evolving experiences of CEs within a longitudinal framework. By documenting their reflections in real-time, CEs were able to articulate the shifting nature of their roles, including changes in support strategies, emotional responses and their adaptations to students' growing independence. Audio diaries provided a structured yet flexible means for CEs to explore their evolving supervisory approaches, revealing how their experiences were shaped by the dynamic nature of clinical education.

Complexity theory enriched this analysis, illustrating the nonlinear interactions and emergent patterns that influenced CEs' decision-making. As they responded to students' developmental needs, CEs navigated unpredictable challenges, adjusting their teaching strategies accordingly. The findings highlight the importance of responsive, emotionally attuned supervision, emphasising how CEs balanced structure and adaptability within clinical education. Moreover, audio diaries proved to be a valuable tool for capturing these intricate realities, offering insight into the continuous, reflective adjustments CEs made in their practice.

Despite limitations related to participant attrition, self-reported data and contextual generalisability, this study contributes to the growing literature on innovative qualitative methods in education. Future research could extend this approach across diverse settings to further examine how audio diaries enhance understanding of CEs' lived experiences and the complexities of clinical education in other medical and allied healthcare professions.

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