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Flipping Clinical Education for Speech-Language Pathology Students: A Mixed Method Study Exploring the Role of Inquiry-Based Learning in the Development of Critical Thinking Skills

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Flipping Clinical Education for Speech-Language Pathology Students: A Mixed Method Study Exploring the Role of Inquiry-Based Learning in the Development of Critical Thinking Skills

A THESIS

Submitted to the Faculty of Humanities

University of the Witwatersrand, Johannesburg

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By

Nancy Barber

University of the Witwatersrand, Johannesburg

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ABSTRACT

Introduction: In speech-language pathology (SLP) education, traditional teaching methods often fail to adequately equip students with the critical thinking and clinical reasoning skills needed to navigate the complexities of clinical practice. SLP students require clinical education that bridges the theory–practice gap by enhancing these essential skills. Set within the complex environment of South African higher education and healthcare, where the need for culturally appropriate and equitable services is required, this study explores the "flipping" of clinical education to better prepare SLP students for real-world challenges. By acknowledging and incorporating the complexities of clinical education and critical thinking, the study explores whether introducing an inquiry-based learning pedagogy promotes the development of critical thinking skills in second- and third-year SLP students in supervised clinical settings.

Methods: A longitudinal, convergent, multilevel, and multimethod mixed method research design was employed to conduct a theory-based impact evaluation. Multiple data sets were collected from 7 clinical educators, 16 second-year SLP students, and 11 third-year SLP students at one university. An adapted extended pillar integration process was developed to merge the multiple qualitative and quantitative data sources.

Results: The findings indicate that second- and third-year SLP students in the experimental group showed improved critical thinking skills, primarily through enhanced self-reflection skills. In contrast, the control group exhibited a decline in these skills across the year. The results indicate that while critical thinking skills among SLP students did change, inquiry-based learning was not the primary contributing factor. The integration of data from both students and clinical educators using the adapted pillar integration process provides strong evidence that self-reflection is an important factor for developing critical thinking skills. The study emphasises the

importance of self-reflection, feedback, the clinical educator–student relationship, positive academic emotions, professionalism, and a strong theoretical foundation for effective engagement in clinical education, leading to enhanced critical thinking skills.

Conclusion and implications: The findings contribute to the development of a proposed clinical education framework for the development of *critical thinking skills for SLP clinical education*. This proposed framework emphasises the importance of developing critical thinking skills through self-reflection, feedback, and the clinical educator–student relationship within the context of student-specific factors. This framework facilitates student and clinical educator engagement in clinical education regardless of the pedagogy employed and supports the development of critical thinking skills and clinical reasoning in SLP students. The study also validated the adapted extended pillar integration process as a reliable and effective tool for integrating multiple data sources in mixed methods research.

Keywords: speech-language pathology; clinical education; critical thinking skills; clinical reasoning

DECLARATION

I declare that this thesis is my own, unaided work. I utilised Grammarly, Quill Bot, and ChatGPT to check grammar and assist with reconstructing some grammatically incorrect sentences. This thesis is submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or for examination at any other university.

Signed: 

Nancy Barber

30 April 2025

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This thesis is dedicated to speech-language pathology clinical educators and students, past, present, and future.

"Teaching is ultimately an act of hope. Every time I teach a lesson, I hope it will inspire learning. Every time I intervene with a struggling student, I hope it will change the trajectory of their path. The temptation to fall into cynicism is alive and well in education. However, hope is a choice I make every day."

Rachel Jorgensen, educator, Edutopia Instagram page

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Abbreviations used in this thesis

CPD: Continuing professional development

ePIP: Extended Pillar Integration Process

HPCSA: Health Professions Council of South Africa

PIP: Pillar Integration Process

SLP: Speech-Language Pathology

Wits: The University of the Witwatersrand

Glossary of Terms

Active learning: A pedagogy that promotes skills and dispositions that facilitate a lifelong approach to learning. These skills and dispositions are developed through the active creation of knowledge. It is also important that there is active thought and reflection on the learning experience, and active engagement and collaboration with others (Drew & Mackie, 2011).

Adult learning theory: This theory encompasses principles that are important for ensuring adult learning is engaging and promotes critical thinking skills. Adults need to be actively involved in the learning process. Adults also need to know what they will be learning, how they are going to learn, and why that specific learning is important. Dialogue and social interactions that allow collaboration with other students are essential in the learning process (Noffs & Wilson, 2021).

Allied healthcare professional: This term is used to describe healthcare professionals who are not medical physicians or nurses (Snowdon et al., 2020). Allied healthcare professionals include physiotherapists, occupational therapists, speech-language therapists, audiologists, pharmacists, psychologists, dietitians, and radiographers.

Behaviourism learning theory: This theory states that learning is primarily a result of conditioning, where the environment shapes behaviour through reinforcement and punishment. Learning occurs when a response to a stimulus is reinforced, making that response more likely to occur in the future. Learning is influenced by the behavioural impacts of the educational context and the influence of the teacher on students, as teachers act as key agents in delivering reinforcement, whether positive or negative, to guide and modify student behaviour. This theory emphasises observable behaviour changes rather than internal cognitive processes, suggesting that learning is most effectively achieved through structured environments where desired

behaviours are consistently reinforced (Khalaf & Mohammed Zin, 2018).

Clinical curriculum: This is a structured educational programme that integrates theoretical knowledge with practical, hands-on experiences in clinical settings. It aims to develop the skills and competencies necessary for effective assessment, diagnosis, and treatment of speech and language disorders.

Clinical education: This term refers to the aspect of learning where students are required to provide clinical skills in a clinical environment. In some contexts, it is referred to as clinical supervision. However, for this thesis, I use the term clinical education to refer to the component of education that focuses on how the students learn to apply theoretical knowledge to develop their clinical skills in clinical placements (Council of Academic Programs in Communication Sciences and Disorders (CAPCSD), 2013).

Clinical educator: An individual who is "required to teach specific skills, clarify conceptual knowledge, facilitate critical thinking, role model professional behaviour, and develop professional writing for the student to provide proficient speech and language services and to be prepared to enter the workforce" (CAPCSD, 2013, p. 2).

Clinical reasoning: The process employed when assessing a patient and designing a treatment plan to manage the patient (Young et al., 2020). It comprises basic knowledge skills, clinical competence, and reflective skills that require critical thinking skills to be appropriately applied (Huhn, 2014; Young et al., 2020). The clinical reasoning process incorporates the application of critical thinking skills in a clinical context to problem-solve and make appropriate decisions regarding diagnosis and management (Victor-Chmil, 2013).

Cognitivism learning theory: A learning theory that emphasises the role of mental processes

such as thinking, memory, and problem-solving. It focuses on how learners acquire, process, and store information, positing that understanding and internalisation of knowledge are central to learning. Cognitivism contrasts with behaviourism by valuing the internal cognitive processes that underpin learning rather than just observable behaviours (Khalaf & Mohammed Zin, 2018).

Complex system: A complex system refers to an interconnected network of individual components, where each part interacts with others in ways that can produce outcomes not easily predicted by examining the parts in isolation. This concept recognises that the interactions and relationships between components can give rise to emergent properties—new behaviours or patterns that are not inherent in the individual elements but result from their interactions within the system. These emergent properties can lead to novel and often unpredictable outcomes, which may not be immediately apparent or intuitive. Understanding a complex system, therefore, requires a holistic perspective that considers the dynamic interplay between its components and the broader context in which they operate (Greenhalgh & Papoutsi, 2018; Tuffin, 2016).

Constructivism learning theory: Constructivism considers that knowledge is actively constructed by learners rather than passively received. According to this theory, learning occurs when students engage with new information, integrating it with their existing knowledge base to create new understanding. This process is highly individualised, as learners build meaning based on their unique experiences, prior knowledge, and interactions with their environment. Constructivism emphasises the importance of active participation in the learning process, where students are encouraged to explore, question, and reflect, leading to deeper comprehension and more meaningful learning. The role of the educator in this context is to facilitate and guide this construction of knowledge rather than simply transmitting information, thereby supporting students in becoming independent, reflective thinkers (Khalaf & Mohammed Zin, 2018).

Critically reflective practice: This practice goes deeper by examining the influence of personal biases, values, and social contexts on one's actions and decisions. It involves a continuous, dynamic process of self-examination that acknowledges how one's identity, beliefs, and external factors shape their behaviour. Reflexivity challenges professionals to question how their own assumptions and perspectives impact their work, leading to more critical self-awareness (Ng et al., 2020).

Critical thinking skills: These skills are not an isolated set of skills but rather a set of thought processes that are dependent on content knowledge, repetitive practice, and being able to apply the correct type of thinking at the correct time (Papir-Bernstein, 2018).

Decolonisation of the curriculum: This term refers to seeking ways to interrupt the dominant power/knowledge matrix evident in higher education (Morreira et al., 2020). Through interrupting the dominant power, decolonisation seeks to impact the knowledge produced through research, the content selected as part of curricula, how the content is presented and how teaching and assessment occur (Morreira et al., 2020).

Evidence-based practice: A framework and process that assists clinicians to make informed, rigorous decisions regarding the assessment, diagnosis, treatment, and management plan for patients (American Speech and Hearing Association (ASHA), 2020). Evidence-based practice includes being able to integrate the best internal and external scientific evidence with patient perspectives and the clinical expertise of the clinician (ASHA, 2020).

Framework: A framework is an organising structure that helps researchers make sense of the relationships between key concepts, variables, or constructs relevant to a study. It acts as a mental map that guides the research process by offering a coherent way to interpret and explain

complex phenomena within a specific context (Van der Waldt, 2020).

"Flipped" classroom: This pedagogy focuses on changing the classroom activities so that learning activities that usually occur within the classroom now occur outside the classroom and vice versa (Lage et al., 2000). Students can choose how they want to interact with coursework by being provided with a variety of learning materials, such as live lectures and multimedia. Learning is then facilitated through active learning strategies such as class discussions, peer learning, and group work (Lage et al., 2000).

Generation: This term refers to a group of people born within a similar timeframe, experiencing similar life events due to historical events, formative memories, and societal trends (Weston, 2001). Each generation is shaped by prevailing economic, cultural, and social conditions, which influence their unique characteristics and needs. While it is important to remember that generational descriptions are typically stereotypical and the characteristics attributed to each generation are based on averages (Seemiller & Grace, 2017), this understanding of the different generations can significantly enhance the approach to SLP education.

Higher education: Higher education refers to educational institutions that offer and award advanced qualifications (such as degrees) in a specific field or discipline (Benjamin & Dunrong, 2010).

Inquiry-based learning pedagogy: This educational approach emphasises the development of academic skills through student-driven and instructor-guided investigations of student-generated questions. It encourages learners to actively engage with real-world problems, develop critical thinking skills, and construct their own understanding by exploring, questioning, and researching (Pedaste et al., 2015).

Outcome evaluation: This type of evaluation refers to the frameworks that determine the effectiveness of a programme (Fynn et al., 2020). Outcome evaluation is used not only to determine what works and for whom but also why the programme works (White, 2009).

Patient: The term is used throughout this thesis to refer to the person who is engaging in speech-language therapy with an SLP clinician or student. This term was selected based on Costa et al. (2019), who showed that 'patient' is the preferred term of both healthcare professionals and those receiving healthcare services.

Pedagogy: This term refers to the method and practice of teaching. It involves the strategies, techniques, and approaches used by educators to facilitate learning and help students achieve their educational goals (Sandri, 2020).

Person-centred care: This term is used to rehumanise healthcare services. It highlights the importance of centring the patient and their life goals, not just their health, within the assessment and therapy process (Forsgren et al., 2022).

Process evaluation: This type of evaluation may be used to assess the quality of implementation, clarify the causal mechanisms of the intervention, and identify any contextual factors that may cause variations in the outcome (Craig et al., 2008).

Programme evaluation: This type of evaluation provides contributions to the initiation, documentation, and analysis of change in an organisation or community. Programme evaluation includes process and outcome evaluation (Potter, 2006).

Real-world interventions: Real-world interventions are practical actions or strategies implemented in everyday settings to address specific issues or achieve particular outcomes. They

are designed to operate within the complexities and constraints of actual environments, as opposed to controlled or experimental conditions. They aim to have tangible effects and solve real-life problems by integrating them into existing systems and practices (Wolfson & Venkatasubramaniam, 2023).

Reflective practice: Reflective practice, as defined by Caty et al. (2015) based on the foundational work of Dewey (1910), Osterman and Kottkamp (1993) and Schön (1987), "involves the active, persistent, and careful consideration about what one does in practice, with the goal of facilitating more awareness and skill in one's clinical performance" (p. 411). The emphasis is on self-awareness and personal growth by assessing one's actions and decisions. This approach encourages professionals to analyse past events to make better choices in the future (Chan & Lee, 2021).

Self-reflection: Self-reflection in clinical education refers to a written or verbal process through which students critically examine their own experiences, reasoning, and decision-making in clinical contexts. It serves as a tool to demonstrate and develop critical thinking and clinical reasoning skills over time (Colley et al., 2012; Cook et al., 2019; Plack et al., 2005).

Student-centred pedagogy: This pedagogy emphasises students' active role in their learning, which supports the development of problem-solving, critical thinking skills, and autonomous learning (Patel et al., 2021). This term was selected for the thesis as it centres the students being active learners which is necessary for learning in clinical education.

Student factors: An umbrella term defined by Thomas and Maree (2022) to encompass the elements contributing to a student's academic success. These factors include a wide range of characteristics, attributes, and circumstances that influence a student's learning experience and

academic performance. Student factors can be individual, such as prior knowledge, learning styles, motivation, and self-efficacy, or contextual, including cultural background, socio-economic status, access to resources, and the educational environment (Thomas & Maree, 2022).

Theoretical knowledge base: This term is defined as the knowledge that is based on research and theory that the SLP students have learnt throughout their academic curriculum (Higgs, 2009; Higgs & Titchen, 2001).

Theory-based impact evaluation: This type of programme evaluation aims to understand a programme's impact and the reasons for this impact. It achieves this by investigating the underlying assumptions of the theory of change (White, 2009).

Theory of change: This is the model that depicts how an intervention is meant to work. The components of theory of change include activities, outputs, reach and reaction, capacity changes, behavioural changes, direct benefits, and well-being changes. It also considers external influences and unanticipated results (Donaldson, 2022).

Theory-practice divide: This divide refers to the difficulty that people have applying the theoretical knowledge they learn to real-world scenarios (Arteaga et al., 2024). Jiang et al. (2020), and Magnusson (2020) referred to this divide as a difficulty in planning and implementing knowledge in practical situations. For the purpose of this study, it refers to the ability of SLP students in being able to apply the theoretical knowledge they have learnt to patients in clinical scenarios.

Thinking dispositions: These are the habitual patterns of thought that influence an individual's approach to learning, problem-solving, and decision-making, particularly in how they form, evaluate, and adapt their beliefs (foundational ideas or convictions that shape how an individual

interprets information and experiences) and perspectives (Stanovich, 2009).

Traditional pedagogy: This is a teacher-centred pedagogy that emphasises the role of the teacher in learning rather than the student. The teacher is seen as the source of knowledge, and students are seen as passive vessels that absorb knowledge (Patel et al., 2021).

Tutorial group: A tutorial group is a small, interactive learning group led by a clinical educator. Participants engage in discussions, problem-solving, and collaborative activities to deepen their understanding of a subject related to clinical education (Chan et al., 2024).

CHAPTER 1: INTRODUCTION

1.1. Thesis Overview

In speech-language pathology (SLP) education, there is growing concern that traditional pedagogies for clinical education do not adequately prepare students for the complexities of clinical practice, particularly in culturally and linguistically diverse contexts (Leahy & Supple, 2002; Ness et al., 2021). This thesis explores the potential of inquiry-based learning to develop critical thinking skills essential for effective clinical reasoning, in SLP students. This study is closely aligned with one of the primary objectives of SLP education, namely to ensure that graduates possess clinical expertise that integrates evidence-based practice with the best interests of their patients and the profession (Leahy & Supple, 2002; Ness et al., 2021). Evidence-based practice serves as a framework and a process that guides clinicians in making informed, rigorous decisions regarding patient assessment, diagnosis, treatment, and management plans (American Speech and Hearing Association, 2020). To effectively use this framework and its process, SLP students must be able to apply their theoretical knowledge to make and justify clinical decisions in novel situations, thereby enhancing their clinical reasoning skills (Mok et al., 2008; Rose, 2005).

Clinical reasoning, which integrates basic knowledge, clinical competence, and reflective skills, is essential for effective service provision in SLP (Huhn, 2014; Young et al., 2020). It involves the application of critical thinking skills in a clinical context to problem-solve and make appropriate decisions regarding patient diagnosis and management (Victor-Chmil, 2013; Young et al., 2020). To develop clinical reasoning skills and thus implement evidence-based practice, the education of SLP students must involve the acquisition of knowledge, clinical competence,

reflective skills, and critical thinking skills (Mok et al., 2008).

Critical thinking skills are central to clinical reasoning in speech-language pathology (SLP), enabling students to effectively apply theoretical knowledge in diverse, real-world clinical scenarios. These skills comprise interpretation, analysis, evaluation, inference, explanation, and self-regulation (Facione, 1998). Such skills are highly metacognitive, involving reflection on one's own biases and decision-making processes to improve clinical judgments (Dwyer et al., 2014; Facione, 1998). Critical thinking is complemented by thinking dispositions, such as open-mindedness, analyticity, systematicity, and inquisitiveness, which shape how individuals approach learning and clinical problem-solving (Facione & Facione, 2007). Together, these skills and dispositions support the development of clinical reasoning, an essential competency for delivering evidence-based and contextually appropriate patient care (Papir-Bernstein, 2018; Victor-Chmil, 2013). Given the complexity of healthcare and clinical practice, explicitly developing critical thinking skills in SLP students is essential for bridging the theory–practice divide and fostering effective clinical reasoning (Mok et al., 2008).

In SLP clinical education, traditional pedagogies typically involve structured, educator-led supervision approaches that prioritise the transfer of theoretical knowledge and clinical techniques directly from educator to student, often through direct observation and feedback (Anderson, 1988; Barnum et al., 2009; Dudding et al., 2017). These conventional approaches commonly include models such as Anderson's (1988) continuum model, which outlines a progression of clinical supervision from direct supervision in the Evaluation-Feedback stage through collaborative and consultative approaches, ultimately leading to student autonomy.

Additionally, the Cognitive Apprenticeship Model (Collins et al., 1989, cited in Dudding et al., 2017) and the Supervision, Questioning, and Feedback Model (Barnum et al., 2009) similarly exemplify traditional clinical education practices, emphasising modelling, structured feedback, scaffolding of clinical skills, and incremental progression towards student independence.

While these methods provide a systematic approach to clinical skill development, these traditional pedagogies often place greater emphasis on knowledge transmission rather than actively developing students' critical thinking and reflective skills. As a result, this can inadvertently widen the theory–practice divide (Arteaga et al., 2024). In this study, this divide specifically refers to the difficulty that SLP students face when applying their extensive theoretical knowledge to complex, real-world clinical scenarios. McAllister and Rose (2008) explain that traditional pedagogies often assume that increasing students' knowledge will automatically improve their clinical reasoning. This assumption is problematic because it does not adequately prepare students to apply their knowledge critically in different clinical contexts (McAllister & Rose, 2008).

Reflective practice is increasingly recommended in SLP education as an alternative or complementary approach (Caty et al., 2015; Cook et al., 2019; Dunne et al., 2019). However, it remains underexplored in traditional pedagogies. Historically, these traditional approaches relied primarily on direct instruction and structured feedback led by clinical educators (Caty et al., 2015; Cook et al., 2019; Dunne et al., 2019).Wolford et al. (2021) underscore this gap in clinical education research, noting that current pedagogical practices often fail to provide comprehensive frameworks that effectively integrate critical thinking, reflection, and clinical reasoning in SLP-

specific contexts. They emphasise the importance of developing evidence-based clinical education strategies tailored explicitly to the needs of SLP students, rather than uncritically adopting approaches from other healthcare disciplines (Wolford et al., 2021).

Given these limitations and gaps within traditional pedagogies, my study investigates the potential of inquiry-based learning. This approach represents an intentional shift away from conventional teaching methods, with the aim of addressing the theory–practice divide and fostering deeper critical thinking and clinical reasoning skills among SLP students (Pedaste et al., 2015).

In practice, the transition from learning theory to implementing that theory in a clinical setting tends to be challenging for students due to the theory–practice divide (Ness et al., 2021). The theory–practice divide is particularly concerning in the South African context, where students need to be able to apply theory in clinical settings but also ensure that their services are culturally and linguistically appropriate. To be able to do this, SLP students need to be equipped with critical thinking and clinical reasoning skills. In response to these concerns, Ness et al. (2021) recommend that SLP students be taught critical thinking skills so that they can apply their theoretical knowledge in novel, culturally and linguistically diverse clinical situations and implement practices that are evidence-based.

The role of clinical educators is crucial in the development of the clinical skills of student speech-language therapists. The clinical educator role involves more than just watching and observing the therapy that students provide (Council of Academic Programs in Communication

Sciences and Disorders (CAPCSD), 2013). The type of clinical education provided does, however, depend on the pedagogy chosen by the clinical educator. The definition of effective clinical education provided by the CAPCSD (2013) notes that "individuals are required to teach specific skills, clarify conceptual knowledge, facilitate critical thinking, role model professional behaviour, and develop professional writing for the student to provide proficient speech and language services and to be prepared to enter the workforce" (p. 2). Due to the holistic nature of this role, the term clinical educator, as opposed to clinical supervisor, is adopted for this research project.

Clinical education is not only about the clinical educator. The student also plays an important role in the clinical education relationship. Ossenberg et al. (2019) highlight that a clinical education relationship needs to be characterised by reciprocity, an actively engaged learner, and bidirectional learning interactions. A positive and safe relationship allows the student to learn more, both theoretically and clinically, from a clinical educator (O'Brien et al., 2019; Ramani et al., 2020; Tavares et al., 2020). Therefore, clinical education is a complex process with a variety of factors that need to be considered when exploring clinical education and its impact on the development of critical thinking skills.

SLP clinical education in healthcare is complex and challenging, influenced by factors such as individual clinical educators, SLP students, clinical placement sites, the patients they serve, and the specific context of healthcare provision in South Africa. Complexity emerges not only from the interactions between these elements but also from their involvement in other interconnected systems. Therefore, in this study, I framed clinical education within complexity theory to better

understand the influence of numerous factors when investigating clinical education and aiming to improve the critical thinking skills of SLP students to bridge their knowledge–practice divide.

Building on this theoretical foundation, I incorporated elements of programme evaluation into my research design to structure the exploration of both outcomes and processes associated with the pedagogical shift. While my study is not a full-scale programme evaluation, it adopts an evaluative orientation to document how inquiry-based learning was implemented and what impact it had on students' development of critical thinking skills. This approach aligns with complexity theory by acknowledging the dynamic and context-sensitive nature of educational change (Patton, 2015), and it complements the study's broader theoretical framing. The Adapted ePIP framework (Barber et al., 2024) was used to integrate the data analysed across multiple stakeholder groups, enabling a structured method for understanding both what changed and how that change occurred.

This understanding of complexity, alongside the integration of evaluation principles, underscores my desire as a speech-language therapist and clinical educator to explore how SLP students translate academic knowledge into clinical practice. Over the past few years, I have developed a keen interest in education and the transformation of traditional educational pedagogy to a more student-centred, active learning pedagogy. Given the challenges associated with developing critical thinking skills through traditional pedagogies, my study explores how "flipping" clinical education through inquiry-based learning could better prepare students for clinical practice.

The pedagogical approach of a flipped classroom offers a useful foundation for this shift. Lage et al. (2000) introduce the concept of a "flipped" classroom in higher education, focusing on shifting to a student-centred pedagogy. This approach allows students to choose how they engage with coursework through various learning materials and emphasises active learning strategies like discussions, peer learning, and group work instead of traditional lectures. Such strategies encourage students to engage with course content using higher-level cognitive skills, such as analysis, synthesis, and critical thinking (Werfel & Reynolds, 2020). Lage et al. (2000) suggest that the "flipped" classroom fosters student ownership of learning, increasing motivation and facilitating knowledge integration.

In 2020, when the COVID-19 pandemic first disrupted learning environments, I developed an interest in pedagogies for teaching and learning. The pandemic, often described as a disruptor of traditional educational practices (Thurston, 2021), necessitated a rapid shift to student-centred, active learning approaches for online education, with little time for preparation. Even before the pandemic, educators recognised the need for transformation in teaching practices (Pillay & Kathard, 2015; Thurston, 2021), but the pandemic accelerated this change more swiftly. With the shift to remote learning and the current emphasis on blended learning, educators now face the challenge of using pedagogies that foster meaningful interactions to promote deep learning experiences (Thurston, 2021). The pandemic also identified the importance of exploring and implementing pedagogical approaches that support active learning and the development of critical thinking skills in SLP students within clinical education.

In the South African context, COVID-19 has not been the only disruptor of higher education in

recent years. The #RhodesMustFall movement in 2015 and the #FeesMustFall movement between October 2015 and October 2016 also significantly disrupted higher education (Morreira et al., 2020). The #RhodesMustFall movement raised concerns about curricula content, institutional cultures, and pedagogical practices that perpetuate the exclusivity of higher education (Morreira et al., 2020). The #FeesMustFall movement called for reducing or eliminating university tuition fees, highlighting broader issues of economic inequality and advocating for more affordable, accessible education, especially for economically-disadvantaged students (Greeff et al., 2021). Both movements highlight the need to decolonise and transform curricula and pedagogies in South African higher education, as well as make higher education accessible to economically-disadvantaged students.

Although the need for change has been acknowledged by the academy in higher education, Morreira et al. (2020) and Vandeyar (2020) note a disparity between the theory of transformation of the curricula and its implementation in higher education in the South African context. The request for decolonised and transformed curricula in South African also highlights the need for pedagogies that co-construct knowledge and diminish the power relationships in knowledge creation, and equip students with the critical thinking skills necessary to navigate knowledge-building and complex environments. Furthermore, as Mzangwa (2019) highlights, South Africa has a history of denying marginalised populations equitable access to education. During apartheid, higher education was reserved for white individuals, while other race groups were excluded and subjected to “Bantu education”, which provided a low level of schooling, preventing progression to higher education. Although post-apartheid reforms have aimed to make education more equitable, challenges remain in providing quality primary and secondary

education to ensure that all students can succeed in higher education (Mzangwa, 2019).

This historical context in South Africa reflects a broader global movement in higher education towards decolonising curricula and pedagogy. Shahjahan et al. (2022) note that the ongoing transformation in higher education is driven by a critical examination of colonial legacies within academic institutions, aiming to make knowledge production and dissemination more inclusive and equitable. This shift, while varying by geography, discipline, and institution, underscores the political and epistemological challenges of decolonisation (Shahjahan et al., 2022). As the discourse around decolonising curriculum and pedagogy evolves, it reveals the context-specific nature of this transformation. In line with these global trends, the University of the Witwatersrand (Wits) in Johannesburg, South Africa, has prioritised transforming student demographics to ensure broader access to higher education and appropriate support for diverse students (University of the Witwatersrand Senior Executive Team, 2018). This transformation has led to students needing varying types of support based on their secondary schooling experience and readiness for higher education (Tewari & Ilesanmi, 2020).

The transformation of the student cohort in the SLP department has foregrounded the need to transform the pedagogies historically employed by using pedagogies that promote the development of critical thinking skills and clinical reasoning that are required for the academic and clinical environment. Several papers have been written highlighting the need to transform and decolonise the SLP curriculum in the South African context (Adams et al., 2019; Kathard & Pillay, 2013; Khoza-Shangase & Mophosho, 2018, 2021; Moonsamy et al., 2017; Pillay & Kathard, 2018; Watermeyer & Neille, 2022), so that clinical practice can be equitable and just.

An awareness of this need is integral to a comprehensive understanding of the context of Wits' SLP department.

Khoza-Shangase and Mophosho (2021) provide an in-depth discussion regarding the need to transform the SLP curriculum in South Africa to ensure it is culturally and linguistically appropriate. However, many graduate therapists lack the skills to implement such therapy effectively. Abrahams et al. (2019) also point out that SLP services in South Africa remain inequitable, partly due to a shortage of SLPs and a continued focus on one-to-one therapy instead of community-based approaches. They suggest that changes in student training are necessary to address these issues. Both studies emphasise the importance of exploring pedagogies that bridge the theory–practice divide in SLP education to promote equitable service provision through clinicians capable of critical thinking in diverse settings.

The inequities within South Africa's two-tiered healthcare system also need to be considered when training SLPs. The public system, serving approximately 84% of the population, faces challenges like staff shortages and resource constraints (Burger & Christian, 2020; Gordon et al., 2020). In contrast, the private system, catering to 16% of the population, generally offers better resources. Individuals with higher socio-economic status typically access private healthcare, while those with lower socio-economic status, often Black South Africans in rural areas, face barriers such as accessibility and affordability, leading to delays in seeking care (Burger & Christian, 2020; Mayosi & Benatar, 2014). Pillay et al. (2020) found that 86% of SLP clinicians work in the private sector, leaving only 14% in the public sector. This disparity underscores the need for equitable service delivery in the public system to meet the community's needs

effectively.

In response to these challenges, pedagogies such as inquiry-based learning offer a potential solution. By fostering active engagement and critical thinking, this approach may bridge the gap between theory and practice in SLP education, enabling students to better apply their knowledge in diverse clinical settings. However, there is limited research, both internationally and locally, regarding evidence-based pedagogies that support the development of critical thinking skills during clinical education in the field of SLP to aid the transformation agenda.

Wolford et al. (2021) reveal that even though there are studies that have explored teaching methods for SLP clinical education, they were surface-level explorations and did not provide deep knowledge about the pedagogies used to facilitate SLP clinical education. The lack of in-depth research regarding clinical educator pedagogies results in limited knowledge to inform the development of courses to teach clinical educators pedagogies grounded in research (Wolford et al., 2021). Further in-depth knowledge regarding effective clinical education pedagogies is needed to support effective clinical education. None of the studies in the scoping review by Wolford et al. (2021) focuses specifically on the use of inquiry-based learning in SLP clinical education. It is important to consider whether this specific pedagogy would impact clinical education, the development of critical thinking skills, and, consequently, clinical reasoning.

My study intended to explore the “flipping” of clinical education as a means to contribute to the theoretical knowledge that supports effective clinical education practices for SLP educators. Recognising the need for clinical education practices embedded in robust theory, as highlighted

by the CAPCSD (2013) and Quigley et al. (2020), my study aimed to address the gap in published studies regarding clinical educator training within the South African context. Specifically, it sought to investigate the role of inquiry-based learning in developing critical thinking skills among second- and third-year SLP students at the University of the Witwatersrand. By attempting to "flip" the traditional clinical education pedagogy, my study planned to explore the process and outcomes of this pedagogical shift for both educators and students. The objective was to enrich the knowledge base on pedagogies that could facilitate the development of critical thinking skills, thereby enabling students to apply theoretical knowledge more effectively in clinical practice within diverse and challenging environments.

This study investigates whether the introduction of an inquiry-based learning pedagogy promotes the development of critical thinking skills in second- and third-year SLP students during supervised clinical education. The research aims to explore the impact of this pedagogical shift on students' critical thinking skills, while also considering the perspectives of both students and clinical educators. Specifically, it examines how clinical educators implement inquiry-based learning over the course of a year and how students experience and respond to the pedagogies used before and after its implementation. Furthermore, the study seeks to map the profile of critical thinking skills in these cohorts and track any changes over time following the pedagogical intervention. To achieve these aims, the study employs multiple data collection strategies, including self-assessments, audio diaries, surveys, focus groups, Likert scales, and analysis of students' critical thinking assessments and written reflections. Together, these objectives guide the inquiry into how inquiry-based learning may enhance students' ability to think critically and engage meaningfully in clinical education.

1.2. Positioning my Research Study

Researchers hold a position that shapes their observations, interpretations, and conclusions. As an active participant, the researcher must acknowledge their positionality due to its impact on the research process and relationship with participants (Bryman, 2016; Bukamal, 2022). I recognised how my own positionality influenced my interest in the research topic and affected how I conducted the research, analysed the data, and drew conclusions.

When I reflected on my positionality for my study, I had to consider that I am a White, millennial, first-generation university graduate female in the post-apartheid South African context. Therefore, I am a woman from a minority group in a country that was historically biased towards the minority (the White population) and historically oppressed the majority (the Black population). Thus, I have experienced privilege regarding access to health services, education, and opportunities. Even though I am a first-generation university graduate, my family has provided me with educational opportunities, financial assistance, and emotional support throughout all my degrees. This support has been beneficial to my success. Capannola and Johnson (2022) identify that educational, financial, and emotional support from families who had not attended higher education promoted the academic success of first-generation university students.

Beyond these aspects of my positionality, I reflected on the complexity of my positionality that influenced my bias during this research due to me being (1) an experienced SLP, (2) an SLP

clinical educator, and (3) an insider researcher. Each of these aspects influenced my study differently.

1.2.1. My Position as an SLP

My 18 years of experience as an SLP have significantly shaped my understanding of the complexity of SLP assessment and therapy. Patients often present with multiple speech-language and medical diagnoses, requiring a holistic view that considers their personal context. As an SLP, I must think critically about assessment, diagnosis, treatment, and the priorities of patients and their families. This involves reflecting on my own knowledge and skills, integrating diverse information, and making clinical decisions within specific environments. This critical thinking highlights the complexity of therapy sessions, and the skills required.

I approached this research with an awareness of the complexities SLPs face in diverse clinical settings. I understood that SLPs do not work in isolation with a single diagnosis and that these complexities influence clinical decision-making. I also recognised that such complexities would be present in the clinical education context, affecting students and their supervisors.

During clinical education, SLP students learn to navigate these complexities, often encountering them for the first time. While academic courses teach diagnoses, assessment, and treatment in isolation, real-life patients present with multiple needs and varied personal and contextual factors. This practical experience differs greatly from theoretical learning and can challenge students as they adapt to unfamiliar situations.

In the clinical environment, SLP students must integrate patient complexities, diagnoses, and contextual factors, which shape their clinical decision-making and reasoning skills. Recognising this, I became interested in clinical education and how we can better support students in applying their theoretical knowledge, fostering critical thinking, and managing these complexities.

1.2.2. My Position as an SLP Clinical Educator

My career has included the role of clinical educator, which has influenced my positionality. I have worked as a clinical educator for about seven years throughout my career. I first became a clinical educator after five years of working as an SLP. Initially, when I started working as a clinical educator, it was for another university in South Africa. I did not receive any training on how to be a clinical educator. I based the clinical education I provided on my experience as an SLP student.

When I was completing my undergraduate SLP degree, I had a clinical educator I perceived as an excellent SLP and who I wanted to emulate. I appreciated the clinical education style she employed. Her style was not particularly relationship-based. She encouraged me to find academic literature and apply it to my cases. She did not model any therapeutic techniques but expected me to apply what I read in the literature to the clinical environment. Through these strategies, she promoted active learning and allowed me to take ownership of my patients, while expecting evidence-based practice.

As an inexperienced clinical educator who based my supervisory role on this previous clinical educator, I did not develop a relationship with students beyond the role of being a clinical

educator. I expected SLP students to source their own academic literature and to apply what they had read without any modelling from me. I expected students to attend supervisory meetings prepared with resources and ideas, not just dependent on me as the clinical educator. However, as a clinical educator from 2013 to 2015 at Wits, I realised that my clinical education style was not working as well as it previously had. I was confused and frustrated. I blamed the students and stopped working as a clinical educator because of this experience.

In 2020, I became involved with clinical education again. I was faced with the realities of providing clinical education during the restrictions of COVID-19. COVID-19 disrupted my role as a clinical educator, affecting my approach to teaching and learning. During this time, I investigated different pedagogies and was exposed to different strategies for clinical education. This experience made me realise that in my previous role as a clinical educator, I had not been viewing clinical education with the complexity it deserved. I had viewed it as me being the knowledgeable "other" who needed to pass on my knowledge to students. I did not understand the value of co-constructing knowledge, likely because of my educational experiences of knowledge building in primary, secondary, and higher education being generally unidirectional. I viewed students as being able to "magically" apply their theoretical knowledge to a clinical setting without guiding them over the theory–practice divide. I also realised that I was framing students in the same manner that I had viewed myself when I was a student in 2003–2006. I did not consider that the students I was working with were of a different generation to me, a millennial, and had different values and contextual factors impacting them and their education.

In 2021, as a part-time academic intern and clinical educator, I became more involved in

lecturing academic courses and began my PhD proposal. During this time, I read extensively on clinical education, which led me to rethink my approach to knowledge building, clinical education, the current student cohort, and the pedagogies used. I came to appreciate the complexities involved in clinical education—those brought by educators, students, and the challenges of applying theoretical knowledge in clinical settings. I also gained a deeper understanding of pedagogies that support learning, feedback, self-reflection, and critical thinking skills.

Within my positionality as a clinical educator, I also considered my perspective as an SLP. I expected SLP students to share my passion for the field, be proactive, research evidence-based practices, and apply them in therapy. However, I had to remain mindful of my biases and avoid interpreting my findings through a solely positive lens—seeing only growth and improvement among participants. It was crucial to let the data speak for itself, without allowing my perspective to influence the results. Additionally, I aimed to identify a pedagogy that could bridge the theory–practice divide for SLP students. Thus, I needed to critically assess whether the approach I identified was effective in achieving this goal.

1.2.3. My Position as an Insider-Outsider Researcher

My positionality as a researcher was shaped by the complexity of navigating the continuum between being an insider and an outsider researcher. An insider researcher shares characteristics with the group they are studying (Yin, 2015), but as Bulk and Collins (2024) explain, it is more than just shared traits; it also involves managing the intricate, value-laden dynamics between the researcher and participants. The degree of connection to both the topic and the community adds

further complexity to insider research, making it as much about shared experiences as shared characteristics. Toy-Cronin (2018) highlights the challenges of being an insider, such as perceived bias and the difficulty of managing dual roles.

In my study, I viewed myself on the continuum of being an insider researcher due to my academic intern role in the Department of Speech-Language Pathology at the University of the Witwatersrand, my shared experiences with clinical educators, and my connection to the research topic, which directly impacted my role as a clinical educator. My colleagues seemed to view me as an insider, yet I was concerned that our relationship might influence their participation. Aburn et al. (2021) faced similar concerns, but their experience showed that relationships did not limit participation, which reassured me.

Conducting research with colleagues, some of whom were also friends, made them vulnerable as they shared their teaching practices, and I felt a deep sense of empathy. This empathy reinforced my insider role, as Bulk and Collins (2024) note. However, I was mindful of not resenting those who chose not to participate and worked to guard against interpreting their decisions negatively.

Being an insider researcher posed the risk of assuming I fully understood participants' perspectives. Bulk and Collins (2024) and Aburn et al. (2021) caution against this assumption because it can lead to incomplete data collection. To avoid this, I sought clarification during interviews and focus groups, carefully balancing my understanding with the participants' perspectives. I used techniques like rephrasing participants' statements to ensure accuracy without imposing my own views.

In contrast, I did not identify as an insider with the students, who viewed me as distant due to my roles as a lecturer and clinical educator. Although I shared some challenges with them, such as workload and fatigue, the power dynamics between us prevented me from fully aligning as an insider. To reduce these dynamics, I refrained from supervising students during data collection.

At the end of the data collection, I was concerned about social bias in participants' responses. Thus, I employed a research assistant to conduct the final focus groups. The assistant, also an SLP and previous clinical educator who has research experience, was unknown to the participants, which allowed them to speak more openly, as noted by Bulk and Collins (2024).

Ultimately, I agree with Bulk and Collins (2024) that conducting insider research requires balancing insider and outsider identities while managing perceptions. This emotional labour adds complexity to the researcher's positionality and necessitates continuous self-reflection throughout the research process.

1.3. Introduction to the Structure of the Thesis

Chapter 1 provides an overview of my thesis, contextualising it in the South African context. It also provides insight into my positionality as a researcher.

Chapters 2 and *3* review the literature that provides the background to my study. *Chapter 2* explores the complexity of clinical education through a literature review. This chapter aims to give insight into the numerous complexities that influence SLP clinical education. First, clinical

education is framed within allied healthcare professions. Second, this chapter explores clinical education, specifically within SLP. Furthermore, the chapter highlights the pedagogies used in SLP clinical education, emphasising reflective practice. The complexities of clinical education due to the role of the clinical educator, the current cohort of students, and the higher education context of South Africa are also explored. The South African higher education context and its implications for SLP education needed to be extrapolated to understand the further complexities for SLP clinical education.

Chapter 3 provides an overview of the literature to highlight the complexity of critical thinking skills. A definition of critical thinking skills is provided for the context of this research. Critical thinking skills in allied healthcare education and SLP education are then contextualised. I needed to have a thorough understanding of critical thinking skills in healthcare education, and of the pedagogies being employed to develop critical thinking skills in this context. This understanding helped me to understand the gap in the research regarding pedagogies to develop critical thinking skills in SLP clinical education. After exploring the pedagogies used previously to develop critical thinking skills, I explain inquiry-based learning in higher education and its potential to develop critical thinking skills within the SLP clinical context.

Chapter 4 explains my ontological and epistemological assumptions. I then explain programme evaluation and complexity theory as the theoretical framework for my study. Complexity theory in healthcare education was an important component for framing and making sense of my study. Complexity theory frames the whole as greater than the sum of the individual parts, which was pivotal for framing my study.

Chapter 5 details the methodology, which includes the aims, objectives, and an explanation of the research design. The longitudinal convergent multilevel and multimethod mixed method research design is described regarding the stages of data collection, the data collection process, the data analysis procedures, and the integration of the qualitative and quantitative data. The trustworthiness, reliability, validity, and ethical considerations of my study are also detailed in this chapter.

Chapters 6 and *7* describe the results of my study. I divided my results chapters based on the results of the research outcomes and the research process. It was important for my study to provide the results of not only the outcomes and potential impact on critical thinking skills, but also the process that occurred that may have contributed to the outcomes.

Chapter 6 provides the study's outcomes regarding the development of the SLP students' critical thinking skills. The changes in critical thinking skills are described from the perspectives of the clinical educators and the SLP students. The results of the analysis of the SLP students' self-reflections are also shared as evidence of change in their critical thinking skills, and the impact of self-reflection on the development of critical thinking skills is also presented.

Chapter 7 then unravels the process of SLP clinical education and the impact that the process potentially has on the development of critical thinking skills. This chapter explores the relationship between the clinical educator and the SLP student, the structured engagements during clinical education, feedback in clinical education, and student-specific factors that appear

to influence the development of critical thinking skills during clinical education.

Chapters 8 and *9* discuss the results. To make sense of my results, I embedded them in current literature. *Chapter 8* describes the Adapted Extended Pillar Integration Process as a novel method for integration in mixed method research. This novel method is provided as a discussion chapter because it adds to the methodology literature and provides a unique synergy when the results are integrated. This synergy supports complexity, connection, and coherence.

Chapter 9 discusses a novel framework for clinical education developed from the theory of change and embedded within critical thinking skills development. This chapter explores critical thinking skills development through self-reflection, feedback, relationships, and Generation Z student-related factors. Factors that could impact critical thinking skills development in the SLP clinical education framework are also explored.

Chapter 10 concludes my study. It provides a summary and critical overview of the research, exploring implications for practice, curriculum, theory, and future research. The limitations of the research are also highlighted.

1.4. Chapter Summary

This chapter has provided an overview of the thesis. In SLP education, concerns have arisen about the effectiveness of traditional teaching methods in adequately preparing students for the demands of clinical practice, particularly in culturally and linguistically diverse settings. This research investigated how inquiry-based learning could support the development of critical

thinking abilities, which are important for clinical reasoning. Additionally, I have detailed my positionality, shaped by my experience as an SLP, SLP clinical educator, and insider researcher. Furthermore, I provided a comprehensive description of the thesis structure. In this study, I have attempted to "flip" the clinical education pedagogy to an inquiry-based learning approach, exploring the process and outcomes of this change for both clinical educators and SLP students. This research aimed to contribute to the knowledge base of pedagogies that underpin and facilitate "flipping" the clinical education pedagogy to develop critical thinking skills that can promote SLP students' ability to apply theoretical knowledge in clinical practice within the diverse South African context.

CHAPTER 2: THE COMPLEXITY OF CLINICAL EDUCATION

2.1. Introduction

Clinical education aims to develop students' professional behaviours, knowledge, and skills for their healthcare profession across various settings and with different patients (Dudding et al., 2017). It is typically coordinated by the academic department to align theoretical learning with clinical practice, but the actual clinical education is provided by part-time and full-time clinical educators (McCallum et al., 2019). These educators, who can be university-employed or community-based clinicians, help students apply their theoretical knowledge in clinical settings (Dudding et al., 2017). This process is similarly structured in South Africa.

Clinical education is complex, influenced by factors related to clinical educators, students, and the educational context (Dudding et al., 2017). It requires students to bridge the divide between theory and practice, often in unfamiliar environments, while applying clinical skills in front of a clinical educator (Leahy & Supple, 2002; Ness et al., 2021). Within the field of SLP, clinicians strive to deliver evidence-based, person-centred care to enhance patients' quality of life through swallowing, speech, and communication interventions (American Speech and Hearing Association, 2020). Globally and in South Africa, SLP students must be committed to lifelong learning and evidence-based practice to ensure continued growth for the benefit of their patients (Rose, 2005).

This chapter explores clinical education in allied healthcare internationally, then focuses on SLP clinical education. It reviews pedagogies used, including reflective practice, the role of clinical educators, and the characteristics of Generation Z students. Finally, it discusses the complexity

of SLP clinical education in the South African context, addressing the impact of the broader higher education landscape.

2.2. Overview of SLP Clinical Education: A comparison with medicine and other allied health disciplines

Models of clinical education in the various fields of medicine and allied healthcare professions are nuanced to the specific profession (Wolford et al., 2021). To understand clinical education in SLP, it is helpful to contrast it with approaches in medicine and allied healthcare education in general. Clinical education for medical physicians typically emphasises competency-based education (Albanese et al., 2008; Burgess et al., 2020). The competency-based education model centres on identifying a diagnosis through data collection and diagnostic reasoning. Based on the diagnosis, the physician is then required to determine appropriate interventions.

Consequently, medical education often prioritises clinical reasoning, timely diagnosis, and competent clinical skills within authentic clinical experiences (Yazdani & Hoseini Abardeh, 2019). This process of diagnosis and intervention requires medical students to be able to critically apply their theoretical knowledge to clinical skills embedded in good communication skills and professional behaviour in a clinical environment (Burgess et al., 2020). Their clinical skills are deemed appropriate based on the medical students' competence in performing them, and there are different competencies required at different stages of their education (Albanese et al., 2008). Students' consultations with patients tends to be episodic and short-term (Albanese et al., 2008).

Allied healthcare professions' clinical education also aims to bridge the theory–practice divide by engaging students in authentic, real-life experiences (McCallum et al., 2019). This approach helps students better understand theoretical knowledge, enhances clinical reasoning, and builds professional self-confidence (McCallum et al., 2019). However, students often struggle to apply theoretical knowledge to complex clinical cases, highlighting the challenge of integrating theory with practice (Benson et al., 2013; Hakim et al., 2014).

SLP clinical education reflects many of these broader challenges while also presenting unique demands. It adopts a holistic and integrated care model within an evidence-based practice framework, emphasising the importance of extended, ongoing relationships between clinicians and patients (Dudding et al., 2017). SLP interventions are typically delivered over longer periods than medical interventions, allowing students to provide therapy to the same patient for up to a year as part of their clinical practicals, thereby gaining a comprehensive understanding of the patient's progress and needs (Dudding et al., 2017). This continuous interaction contrasts with the episodic, short-term patient encounters typical in medicine. Consequently, SLP clinical education requires clinical education that integrates both clinical and relational skills within an evidence-based practice framework (Dudding et al., 2017).

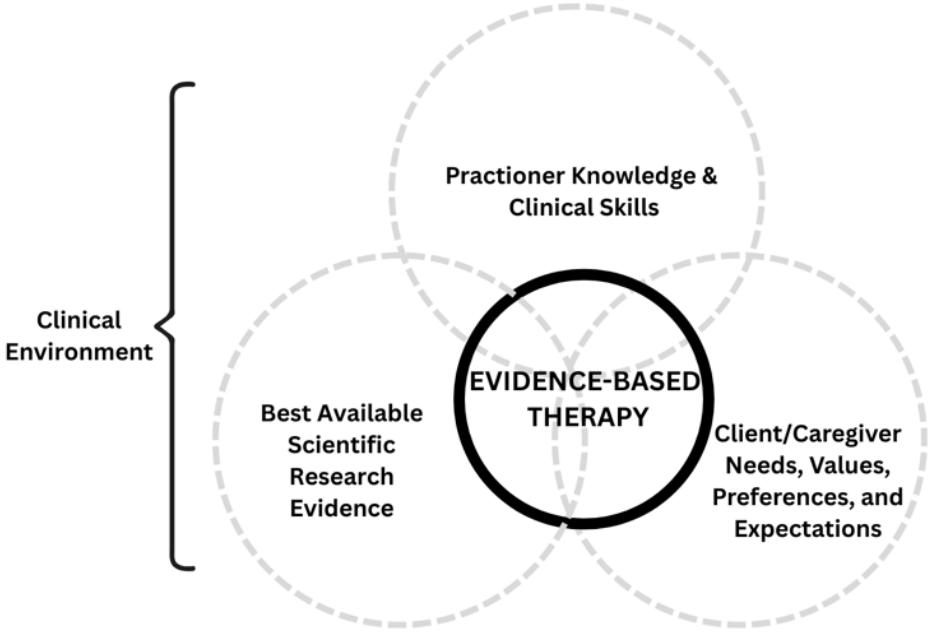
2.2.1. Evidence-Based Practice in SLP

Evidence-based practice is an important aspect to clinical practice and clinical education that needs to be understood by clinical educators and students so that SLP clinicians are able to integrate the best internal and external scientific evidence with patient perspectives and the clinical expertise of the clinician (ASHA, 2020). Clinicians must integrate scientific information with their knowledge, clinical skills, and expertise, and their understanding of the clinical context

(cultural, linguistic, and socio-economic), as well as the patient and caregiver expectations (Orlikoff et al., 2015). Figure 2.1 depicts the interplay between the components of evidence-based practice within the clinical environment.

Figure 2.1

The interplay between the components that comprise evidence-based practice



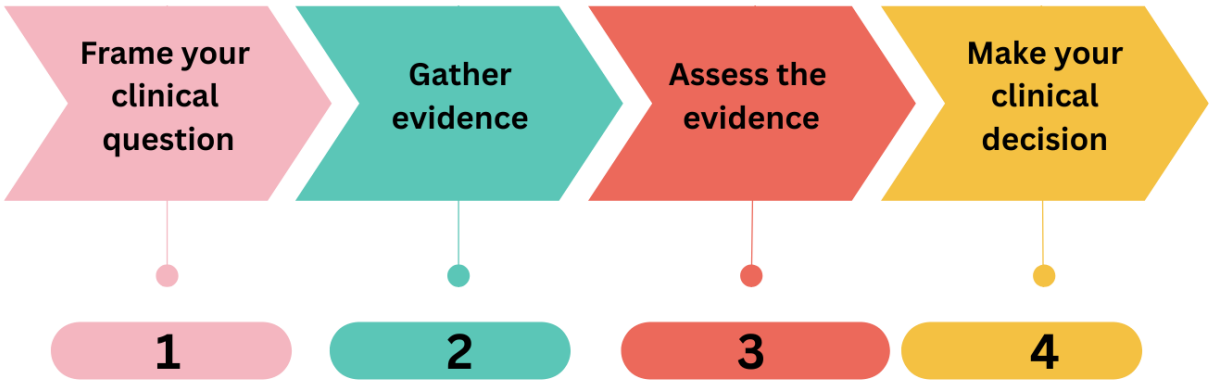
Note. The model is based on and adapted from Orlikoff et al. (2015).

Evidence-based practice is defined not only as a framework but also as a process of initiating and implementing evidence-based practice in clinical practice (Orlikoff et al., 2015). It is a framework because scientific information regarding the assessment and treatment of communication disorders is continuously evolving (Orlikoff et al., 2015). But it is also a process because patients and contexts are different and individualised, and thus, an SLP must frame a specific clinical question for their patient, gather evidence for that patient, assess the evidence

they have gathered and then make the best clinical decision for that specific patient (Orlikoff et al., 2015). Figure 2.2 illustrates this process. The process occurs within the context illustrated in Figure 2.1, so that all components of evidence-based practice are included in the clinician's implementation of the process (ASHA, 2020).

Figure 2.2

The process of evidence-based practice



Note. This model of the evidence-based practice process is based on ASHA (2020).

Evidence-based practice integrates the clinical context, patient and caregiver expectations, and the patient's cultural, linguistic, and socio-economic background (Orlikoff et al., 2015). This requires SLPs to apply critical thinking skills actively. SLP students must think critically to address the complexities of their context and provide locally relevant, equitable, and just services (Battaglia, 2020; Finn, 2011; Finn et al., 2016; Morris et al., 2018). Therefore, training approaches must equip students to develop person-centred assessments and intervention plans that follow the evidence-based practice process (ASHA, 2020).

2.2.2. Approaches to SLP Clinical Education

While evidence-based practice is central to clinical education, the way clinical education is implemented in SLP varies depending on the clinical educator and the specific context (Dudding et al., 2017). Dudding et al. (2017) identify four main approaches to clinical education in SLP. The first approach is Anderson's (1988) continuum model, which describes the clinical educator's style of supervision (direct/active, collaborative, consultative) and how it changes as the student progresses through the stages of (1) *Evaluation-Feedback*, (2) *Transitional*, and (3) *Self-Supervision* to become an independent clinician. The *Evaluation-Feedback* stage involves intensive supervision and detailed feedback to help learners build foundational skills. In the *Transitional* stage, learners gain more independence, applying feedback to improve their practice while still receiving periodic support. The *Self-Supervision* stage represents the pinnacle of this development, where learners perform with high autonomy, self-evaluate, and reflect on their practice with minimal external supervision. This model guides learners from close supervision to independent, self-directed clinical practice.

The second approach incorporates reflective practice into clinical education for SLP students (Aronson, 2011; Caty et al., 2015; Cook et al., 2019, 2022; Dunne et al., 2019). Reflection has an impact on improving clinical practice, clinical decision-making, problem-solving, and critical thinking skills (Caty et al., 2015). Cook et al. (2019) and Dunne et al. (2019) investigated specific strategies for SLP students and clinical educators to support the development of students' reflective practice.

The third approach is the Cognitive Apprenticeship Model by Collins et al. (1989), as cited in

Dudding et al. (2017). This model employs instructional strategies such as modelling, coaching, scaffolding, reflection, and exploration to enable students to learn clinical skills in the clinical environment. The fourth approach that Dudding et al. (2017) identify is the Supervision, Questioning, and Feedback Model of Clinical Teaching by Barnum et al. (2009). This approach promotes a higher level of critical thinking by integrating supervision, questioning, and appropriate feedback based on the needs and skills of the students.

Although Dudding et al. (2017) identify clinical education models, there is limited research on their implementation in SLP education and whether they improve students' clinical skills. However, literature increasingly explores reflective practice in SLP education (Caty et al., 2015; Cook et al., 2019, 2022; Dunne et al., 2019). Reflective practice became a key focus in my study once I had started data collection and analysis, prompting a more detailed discussion in the next section. Wolford et al. (2021) highlight the need for ongoing research in SLP clinical education, which forms the basis for ensuring that clinical educators provide evidence-based clinical education.

Wolford et al. (2021) consider that most of the research investigating clinical education in SLP has a superficial approach to teaching methods. These authors are also concerned about the quality of the research as the outcomes of studies were measured predominantly using self-report scales. Only using self-report scales to measure outcomes is questionable because such scales are not always a reliable reflection of performance (Eva & Regehr, 2011). Wolford et al. (2021) acknowledge substantial gaps in the literature regarding clinical education in SLP, specifically the need for in-depth analysis of the pedagogy being investigated and the need for robust

outcome measures.

SLP clinical educators should be informed about educational strategies from other allied healthcare disciplines but should recognise ones that specifically support SLP students in clinical settings (Ginsberg et al., 2017; Wolford et al., 2021). However, Wolford et al. (2021) caution against uncritically applying educational strategies from other fields, as they may not always be relevant to SLP education. Ginsberg et al. (2017) similarly note that while clinical educators can benefit from teaching and learning research, these findings are often context-dependent, varying by factors such as timing, stakeholders, and discipline. Although there are promising strategies from other healthcare fields, Wolford et al. (2021) stress the importance of investigating their applicability to SLP, revealing gaps in the literature and underscoring the need for a deeper understanding of SLP clinical education. Additionally, Wolford et al. (2021) identify a gap in the literature regarding a specific clinical education pedagogy that supports the development of critical thinking skills and clinical reasoning in SLP students. To address this, educators must thoroughly understand clinical reasoning in SLP education to identify an effective pedagogy for fostering these skills (Wolford et al., 2021).

2.2.3. Clinical Reasoning in SLP Clinical Education

A deeper understanding of clinical reasoning is therefore essential to inform pedagogical approaches aimed at developing critical thinking and clinical decision-making skills in students (Dudding & Pfeiffer, 2018). Clinical reasoning involves the integration of theoretical knowledge, clinical competence, and self-reflection, with critical thinking skills playing a key role (Papir-Bernstein, 2018). SLPs use clinical reasoning to identify, integrate, and evaluate information

from their knowledge base, the patient, and the context, continuously evolving as new information emerges (Tiffen et al., 2014). These skills are essential for high-quality care in assessment and treatment (Dudding & Pfeiffer, 2018), making the development of clinical reasoning a priority in clinical education.

Historically, it was assumed that students would naturally develop clinical reasoning through academic learning and clinical experiences (Arum & Roksa, 2010; Crebbin et al., 2013). Although these skills do improve over time (Crebbin et al., 2013; Furze et al., 2015), exposure to theoretical knowledge and clinical practice alone is insufficient (Crebbin et al., 2013; Dudding & Pfeiffer, 2018). Students need explicit instruction in clinical reasoning (Abrami et al., 2015; Finn, 2011; Ginsberg et al., 2017), along with repeated practice and feedback in diverse clinical environments (Norman, 2005).

In addition to varied clinical experiences, students must develop critically reflective skills to effectively engage in clinical reasoning (Ng et al., 2022). Reflective practice enables clinicians to navigate "unique, uncertain, unstable, and value-conflicted moments" in their work (Ng et al., 2022, p. 1269). However, Wolford et al. (2021) identify a gap in the literature regarding the best methods for fostering clinical reasoning in SLP students, suggesting that further research into reflective practice and its role in clinical reasoning is needed.

2.2.4. Reflective Practice in SLP Clinical Education

To address this gap, it is important to develop a clear understanding of how reflective practice functions within SLP clinical education. Reflective practice in SLP education involves students

actively examining their experiences, reflecting on their actions, and planning for future improvement (Caty et al., 2015). This process helps students integrate new learning into existing knowledge (Boud et al., 2005; Caty et al., 2015; McAllister & Lincoln, 2004) and is crucial for applying theoretical knowledge in complex clinical situations (Ng et al., 2022). Critically reflective practice also encourages clinicians to examine how personal biases, values, and social contexts influence their decisions, leading to deeper self-awareness (Ng et al., 2020). Reflective and critically reflective practices have been extensively researched across healthcare professions, with recent studies showing their benefits in improving clinical reasoning and critical thinking in fields such as nursing (e.g., Lubbe & Botha, 2020; Patel & Metersky, 2021), audiology (e.g., Lee, 2024; Watermeyer & Kanji, 2022), occupational therapy (e.g., Brown et al., 2022; Guy et al., 2020), physiotherapy (e.g., Kurunsaari et al., 2022; Seddon, 2024), and the medical profession (e.g., Artioli et al., 2021; Karnieli-Miller, 2020).

Several studies, such as those by Cook et al. (2019), Cook et al. (2022), Dunne et al. (2019) and Dunne et al. (2024) show that reflective skills of SLP students develop over time, especially when students are taught the importance of reflective practice and provided with frameworks to guide their reflections. Dunne et al. (2019) found that SLP students who embraced reflective practice as a learning strategy improved, while those who viewed it as merely a requirement did not. This highlights the importance of internalising reflective practice for skill development.

Cook et al. (2019, 2022) made significant contributions by introducing a coda schema to assess SLP students' written reflections, providing a tool for clinical educators to offer specific feedback. Nichols et al. (2023) further explored SLP students' perceptions of reflective

exercises, finding that reflective writing enhances awareness of personal strengths and weaknesses. Studies also show that the effectiveness of reflective practice depends on consistent, timely feedback from clinical educators rather than the way feedback is delivered (Dunne et al., 2019). In the workplace, Cook et al. (2023) found that SLPs value reflective practice for promoting person-centred care, problem-solving, and lifelong learning. The study by Cook et al. (2023) emphasises the importance of time for reflection throughout a career, noting that SLPs' engagement with reflective practice evolves with experience.

The growing body of research on reflective practice in SLP clinical education highlights its importance in developing clinical reasoning and critical thinking (Cook et al., 2019; Cook et al., 2022; Dunne et al., 2019; Dunne et al., 2024). The relationship between clinical educators and students plays a key role in promoting reflective practice, serving as a catalyst for its development (Schmutz et al., 2021). Understanding this relationship is vital to ensure that clinical educators effectively support the growth of reflective skills in SLP students (Schmutz et al., 2021).

2.2.5. The Relationship Between Clinical Educators and Students in SLP Clinical Education

Effective clinical education is a collaborative process that focuses on developing students' professional and clinical skills within the context of patient care and clinical placement (Dudding et al., 2017; McAllister, 2005). In medical education, it has been identified that a strong relationship between clinical educators and students fosters reflective practice (Launer, 2014), which is essential for developing lifelong, self-directed learners (Kauffman & Mann, 2014). In

medical education, this relationship has the potential to have a greater impact on student learning than the specific pedagogical methods used in clinical education (Schmutz et al., 2021).

As Wolford et al. (2021) cautioned against uncritically applying educational strategies from other fields to SLP clinical education, this section critically explores the roles of clinical educators and SLP students in their educational relationship. While the educator–student relationship is central to learning, it is also important to consider the significant role that generational differences play. The students in this research are from Generation Z. Understanding their unique characteristics can help refine clinical education strategies to better meet their needs. Given these complexities, exploring the role of clinical educators within the context of Generation Z students provides important insights into how educators can effectively support student learning and professional growth.

2.2.5.1. The Role of Clinical Educators in SLP Clinical Education

The role of the SLP clinical educator is multifaceted and complex. McAllister's (2001) research on the lived experiences of SLP clinical educators forms the foundation for understanding these roles. Her work encourages clinical educators to reflect on their roles and grow as both competent clinicians and effective teachers.

A competent clinician must model professional behaviours, reflective skills, evidence-based practice, person-centred care, clinical skills, and clinical reasoning for students. Person-centred care, which emphasises the patient's life goals alongside their health (Forsgren et al., 2022), is key for students learning to apply theoretical knowledge in clinical environments. However, the

role of clinical educators extends beyond clinical competence to include effective teaching. Effective teaching requires awareness of teaching strategies, including active learning and adult learning principles, and evidence-based pedagogies in clinical education (DeRuiter & Ginsberg, 2020; Higgs & McAllister, 2007a).

In South Africa, academic lecturers often serve as clinical educators, but clinical educators typically do not hold academic lecturer positions. While lecturers provide theoretical instruction, clinical educators guide students in applying this knowledge in practice. Clinical educators play a critical role in supporting students' progression from novices to critical thinkers capable of applying theoretical knowledge to patient care (Higgs & McAllister, 2007a). They must balance their role of clinician with their personal preferences for therapy, understanding of evidence-based practice, and clinical experience with their role as educators (DeRuiter & Ginsberg, 2020). Reflecting on and adjusting their performance in both roles is essential for promoting both patient care and student learning (Higgs & McAllister, 2007b).

A key tension as a clinical educator is balancing the needs of patients with those of students. Clinical educators must ensure that patients receive evidence-based, person-centred care while also fostering student learning. This requires continuously assessing the benefits of clinical education for both patients and students (Higgs & McAllister, 2007b; McAllister et al., 2008). Additionally, clinical educators must manage the dual role of being a supportive mentor while also evaluating students' competence and determining their readiness to treat patients (Higgs & McAllister, 2007b; McAllister et al., 2008). To do so, educators need insight into the characteristics and expectations of the current student generation, which may shape how they

engage in clinical learning.

2.2.5.2. The Generation Z SLP Student

Understanding the SLP student and the potential impact of generational differences on clinical education is important for the relationship between the clinical educator and the SLP student. An SLP department at a university typically includes several generations. Baby boomers (born between 1946 and 1964) are typically in leadership roles and near retirement. Generation X (born between 1965 and 1980) are typically senior employees in positions of leadership or established in their role at the university. Generation Y, or millennials (born between 1981 and 2001), also form part of the employee cohort and may be establishing themselves in their role and entering positions of leadership. Meanwhile, Generation Z (born 2001–2015) typically comprises the younger clinical educators and the current cohort of students (Pew Research Centre, 2019).

Hernandez-de-Menendez et al. (2020) provide a concise description of the general differences between these four generations, regardless of context. Table 2.1 outlines the differences related to teaching and learning between the four generations. These generational differences can impact the dynamics of theoretical and clinical education in SLP, as educators and students from different generations may have varying expectations and approaches to teaching and learning both in theoretical modules and clinical placements.

Table 2.1

The differences between the four generations regarding teaching and learning (adapted from Hernandez-de-Menendez et al., 2020)

	Baby Boomers	Generation X	Millennials	Generation Z
Behaviour	Challenges rules	Changes the rules	Creates the rules	Customises the rules
Training	Preferred in moderation	Required to keep me at my place of employment	Continuous and expected	Ongoing and essential
Learning style	Facilitated	Independent	Collaborative and networked	Technology-based
Communication style	Guarded: Cautious and reserved communication involves limiting information sharing, typically due to concerns about privacy, trust, or possible repercussions.	Hub and spoke: Communication arises from a central point, and each spoke only communicates directly with the hub.	Collaborative: Communication arises when participants collaborate, openly share information, and strive for mutual understanding to achieve shared goals.	Face-to-face and information sharing through visuals, emojis and acronyms (Raslie, 2021)
Problem-solving	Horizontal	Independent	Collaborative	Entrepreneurial
Feedback	Once per year	Weekly/daily	On-demand	Instantaneous, consistent and frequent

Research has been undertaken on the characteristics of millennial (Plexico et al., 2017) and Generation Z (Byrne, 2018) SLP students. However, I did not find published research specifically pertaining to the later Generation Z SLP students who form the current cohort of students. Research has explored the teaching and learning needs of Generation Z in medical students (e.g., Li et al., 2023), nursing students (e.g., Chicca & Shellenbarger, 2018), pharmacy students (e.g., Isaacs et al., 2020), general higher education (e.g., Hernandez-de-Menendez, 2020; Miller & Mills, 2019; Nicholas, 2020; Seemiller & Grace, 2017), and the workplace (e.g.,

Deluliis & Saylor, 2021; Schroth, 2019). Consistent characteristics were determined across these contexts, defining the characteristics of Generation Z students and their teaching and learning needs.

Generation Z has been raised in times of uncertainty and change, influenced by the increased growth in technology and digital devices, leading them to be digital natives. They also tend to be a cautious cohort of students, as they have been raised by sceptical and pragmatic parents (Seemiller & Grace, 2017). Even though they are digital natives, they require support to learn how to use technology for educational purposes (Watermeyer et al., 2024).

Generation Z students have nine specific attributes that influence their teaching and learning (Hernandez-de-Menendez, 2020; Seemiller & Grace, 2017; Shatto & Erwin, 2017). First, they tend to be regular and avid consumers of technology and the digital world. They rely on technology for knowledge curation, communication, and interaction. However, this reliance on technology and the digital world has created the second attribute, which is that they tend to be individualistic. The reliance on the digital world has also resulted in a third characteristic, namely, that this generation tends to have underdeveloped social and relationship skills. The fourth attribute of Generation Z students is their increased risk for mental health concerns such as isolation, anxiety, insecurity, and depression. Their fifth characteristic is also based on their use of and access to technology, leading to them generally having a decreased attention span and requiring convenience and immediacy. Sixth, they are pragmatic, wanting to learn through experiential learning and incorporate real-life experiences into course content. Due to the environment in which they were raised, the seventh characteristic is being cautious and

concerned with emotional, physical, and financial safety. Being sedentary activists is the eighth characteristic, as they would rather post on social media than actively engage with an event or a concern. Their ninth characteristic is favourable: they tend to be more open-minded, diverse, and accepting of differences than previous generations (Hernandez-de-Menendez, 2020; Seemiller & Grace, 2017; Shatto & Erwin, 2017).

These characteristics result in a generation of students who require a nurturing, reassuring learning environment where they are provided with immediate, regular, and transparent feedback. However, it also needs to be a learning environment where they are listened to, and their values and perspectives are considered. Educators need to be cognisant of facilitating the development of healthy social and relationship skills through the teaching and learning strategies employed (Chicca & Shellenbarger, 2018; Isaacs et al., 2020; Miller & Mills, 2019; Nicholas, 2020).

However, educators should heed Sriprom et al.'s (2019) caution in applying generational stereotypes to Generation Z students. Sriprom et al. (2019) identify that their university students in Thailand have different characteristics from the general characteristics of Generation Z in the literature. They encouraged educators to be aware of the different characteristics Generation Z students may exhibit in different contexts. Swanzen (2018) recommends that when teaching Generation Z university students within the South African context, educators need to consider prioritising the students and their specific needs in education by ensuring the student is visible and present during the learning process and that the learning process focuses on knowledge, skills, and self. Swanzen (2018) also recommends that the relationship with Generation Z

students should be prioritised over goals and outcomes through the educator being committed to dialogue, self-awareness, and critical reflective practice. Clinical educators may need to be cognisant of the general characteristics of the Generation Z SLP students that they are supervising, as these characteristics shape how they will interact with the students, how the students interact with them, and ways to successfully learn and bridge the theoretical–clinical gap.

2.2.5.3. General SLP Student Factors

Apart from the general characteristics of Generation Z SLP students, clinical educators also need to acknowledge that students have complexity in their personal lives, and this complexity can impact their learning and engagement at a clinical site (DeRuiter & Ginsberg, 2020). SLP students also have preferences for how they learn and acquire knowledge, and clinical educators need to be aware of these learning preferences (DeRuiter & Ginsberg, 2020). To encompass these aspects that influence students and their learning, I have used the term 'student factors' for my study. Thomas and Maree (2022) define student factors as the characteristics and circumstances that influence a student's academic success. These factors include individual elements like prior knowledge, learning styles, motivation, and self-efficacy, as well as broader contextual factors such as cultural background, socio-economic status, access to resources, and the educational environment.

In South Africa, the student factor of socio-economic status plays an important role in shaping a student's educational experience. Socio-economic status in this context is typically classified as low, middle, or high income (Gordon et al., 2020), affecting access to resources and significantly impacting a student's sense of belonging at university, which in turn influences retention and

degree completion rates. A lower socio-economic status has been shown to negatively impact a student's sense of belonging and their likelihood of staying at university (Ahn & Davis, 2023). Research by Mpofu (2015) at a South African university further highlights the importance of socio-economic status, linking it directly to academic outcomes and emphasising its critical role in understanding and investigating tertiary education success.

In clinical education, student factors also encompass academic emotions, professional skills, adaptability, and interpersonal communication, which are critical in shaping the student's ability to apply theoretical knowledge in practical settings (Tan et al., 2021). Pekrun et al. (2002) identified a range of academic emotions that significantly influence students' academic performance and engagement. These emotions are broadly categorised into negative and positive emotions. Negative academic emotions, such as anger, stress, anxiety, and boredom, have been shown to hinder learning. In contrast, positive academic emotions, such as confidence, enjoyment, and hope, are important for academic success. Tan et al. (2021) and Hayat et al. (2020) further emphasise the importance of these positive emotions, noting that they play a key role in promoting academic achievement. Tan et al.'s (2021) systematic review highlights that positive academic emotions are essential for improving academic performance.

It is important to understand these personal and learning factors within the context in which they occur. Thus, it is important to understand the South African context, and the specific context of Wits, where additional layers of complexity further influence clinical education and practice.

2.3. The Complexity of SLP Clinical Education in South Africa

South Africa has a context of inequitable and polarised access to healthcare services, shaped by

the country's socio-political history (Burger & Christian, 2020; Gordon et al., 2020). This situation significantly impacts the healthcare available to the majority of the population (Burger & Christian, 2020; Gordon et al., 2020). The healthcare system is divided into a polarised two-tiered structure, comprising both public and private healthcare systems (Burger & Christian, 2020; Gordon et al., 2020). People with a higher socio-economic status and educational level tend to have medical schemes and access to private healthcare (Burger & Christian, 2020; Gordon et al., 2020). However, those with a lower socio-economic status with less education tend to access public healthcare services and are typically Black South Africans who live in rural areas (Burger & Christian, 2020; Gordon et al., 2020). This population often has challenges accessing and affording healthcare due to transport costs and thus, they tend to prolong seeking healthcare services (Burger & Christian, 2020; Gordon et al., 2020).

This inequitable, polarised, and unfair access to healthcare is a significant factor that needs to be acknowledged not only for the healthcare system but for the education of healthcare professionals in South Africa (Dudley et al., 2015; van Heerden, 2013; Van Staden, 2021).. In the South African context, students must be aware of both their knowledge and the application of evidence-based practice tailored to specific patients in specific contexts (Dudley et al., 2015; van Heerden, 2013; Van Staden, 2021).. Additionally, they must remain mindful of the disparities in access to healthcare services (Dudley et al., 2015; van Heerden, 2013; Van Staden, 2021).. Healthcare education in South Africa must be positioned to train students to provide services that are relevant to the healthcare context and meet the needs of the community they serve (Dudley et al., 2015; van Heerden, 2013; Van Staden, 2021). If healthcare education in South Africa prioritises these factors, students can learn to provide healthcare services that are globally

informed and locally responsive (van Heerden, 2013).

In addition to the inequities in the healthcare system, there have been inequities in the higher education system of South Africa (Morreira et al., 2020). I first explain higher education in South Africa to provide a broad overview of complexities that are experienced. I then relate these broad complexities to the context of providing SLP clinical education in the South African context and then specifically to the Department of Speech-Language Pathology at the University of the Witwatersrand.

2.3.1. Higher Education in South Africa

In recent years, there has been a call to decolonise South African higher education through students initiating the #RhodesMustFall and #FeesMustFall movements (Morreira et al., 2020; Vandeyar, 2020). These movements emphasise the need to decolonise curricula and pedagogies within South African higher education systems and ensure that higher education is accessible to students who are economically disadvantaged (Morreira et al., 2020; Vandeyar, 2020).

Decolonisation in this context entails challenging the dominant power and knowledge structures in higher education to transform curricula, teaching methods, assessment practices, and research design (Morreira et al., 2020). Despite the recognition of this need, Morreira et al. (2020) highlight the gap between the theoretical discussions on curriculum transformation and its practical implementation in South African higher education. Vandeyar (2020) emphasises that the need to decolonise higher education has been instigated and led by higher education students, but to truly decolonise higher education, educators and university administration also need to be involved in actively engaging with the decolonisation of the curriculum.

In addition to the need to decolonise the curriculum, transformation is required for higher education. South Africa has a history of inequitable higher education with limited access and participation for marginalised populations, which continues to influence higher education (Mzangwa, 2019). Transformation in the South African higher education context refers to removing barriers to higher education so that it is inclusive, achieves widening access, and has improved throughput (Mzangwa, 2019). Transformation in higher education has been identified as essential because it is an indicator of social progress. It requires all stakeholders to change their social thinking, leading to meaningful social transition (Akoojee & Nkomo, 2007).

In response, Wits has developed policies to improve access to higher education for previously discriminated and disadvantaged communities in the South African context (University of the Witwatersrand Senior Executive Team, 2018). However, there is a high dropout rate and a high failure rate in South African higher education, which is a concern for policymakers and higher education institutes (Tewari & Ilesanmi, 2020). Unfortunately, many students entering higher education institutions for the first time do not have the required skills or knowledge for successful learning in higher education due to the poor quality of their secondary education (Tewari & Ilesanmi, 2020). Therefore, transformation has led to a need for different types of support for student success to ensure quality education with quality graduates (Tewari & Ilesanmi, 2020).

The COVID-19 pandemic also had a profound impact on global higher education (Moodley, 2022). Studies from around the world have shown that the pandemic has affected higher

education in different regions unevenly due to their distinct contexts, particularly concerning student access to online resources (Moodley, 2022). Developed countries generally adapted to online learning more effectively than developing ones (Moodley, 2022). However, Aristovnik et al. (2020) highlights that even in developed nations, not all students have equal opportunities for effective online study due to varying living conditions, domestic responsibilities, and other factors.

In less developed regions, the pandemic exacerbated existing challenges in higher education institutions, which often lacked adequate learning resources and technical support. Aristovnik et al. (2020) found that many students from lower-income backgrounds in Africa attributed poor academic performance to a lack of computer skills, high workloads, and inadequate internet connectivity. In South Africa, Mpungose (2023) identifies the digital divide as a major challenge for higher education students using online learning platforms. Students from impoverished communities also face unsuitable home environments, inadequate online learning devices, poor internet connectivity, and insufficient data (Mishra et al., 2020; Moodley, 2022). These issues, compounded by a lack of relevant computer skills, further hinder students' transition to online learning (Mishra et al., 2020; Moodley, 2022).

Learning during the pandemic was not only impacted by the digital divide when shifting to online learning, but was affected by the students' experiences during this time (Tuğtekin, 2023). The pandemic resulted in psychological and physical fatigue among students, attributed to factors including excessive screen time, unintentional technology use, and limited technology literacy (Tuğtekin, 2023). In the South African context, Moodley (2022) identified that students

tended to feel alienated and unmotivated during the pandemic. SLP students at Wits identified certain contextual factors that impacted their engagement in learning (Barber & Sher, 2022). These factors included contracting COVID-19, deaths of family or friends, intermittent power supply due to government-implemented load shedding, and the impact of fear and stress exacerbated by the pandemic (Barber & Sher, 2022).

Furthermore, it is important to remember that education across the levels of schooling was also impacted by the transition to emergency online learning during the pandemic (Reimers, 2022). Secondary school learners had to navigate their final years of secondary school via online learning (Reimers, 2022). Historically, the adjustment from secondary school to higher education has been challenging for students, especially in a context like South Africa, where there are still inequities in the quality of education that different communities receive (Lekena & Bayaga, 2018). At a secondary school level, the pandemic also restricted student engagement, participation, and learning (Reimers, 2022), which consequently had significant implications for the transition into higher education. Thus, the effect of the pandemic on secondary students' learning may exacerbate their challenges to adjust to higher education (Reimers, 2022).

The need for student support due to the complexity of higher education in the South African context has been observed in the SLP department, and highlights the importance of adapting pedagogical approaches. Therefore, it is essential to understand SLP clinical education in South Africa, focusing on how students and educators can be supported through the lenses of decolonisation, transformation, and the impact of the COVID-19 pandemic to enhance critical thinking skills and clinical reasoning.

2.3.2. SLP Clinical Education within the South African Context

Much of the existing research on SLP education in the South African context has focused on the need to reform academic pedagogies to ensure that clinical practice is both equitable and just. Khoza-Shangase and Mophosho (2021) emphasise the importance of ensuring the SLP curriculum in South Africa is culturally and linguistically appropriate. Watermeyer and Neille (2022) highlight that when decolonising the curriculum, the curriculum needs to remain relevant and appropriate to the context where it occurs. Despite these insights, there is concern that graduate therapists may lack the necessary skills to provide effective and relevant therapy to the communities and patients they serve (Khoza-Shangase & Mophosho, 2021).

The gap between curricular content and clinical application reflects a broader challenge in SLP education. Rapillard et al. (2019) acknowledge that SLP students often struggle with the disconnect between their academic classrooms and the clinical settings in which they find themselves. While the clinical environment demands an understanding of patients' stories, emotional intelligence, and practical skill application, academic classrooms tend to focus on knowledge building with limited practical engagement (Rapillard et al., 2019). Mupawose et al. (2021) similarly identify concerns among clinical educators of second-year SLP students at Wits regarding the difficulty of bridging the theory–practice divide.

Abrahams et al. (2019) highlight that SLP services in South Africa remain inequitable and suggest that these disparities should be addressed through improved student training to bridge the theory–practice divide in a manner that is contextually relevant. To achieve this, clinical educators and SLP students need an understanding of the inequitable service provision in their

context and the challenges faced in SLP service provision given linguistic and cultural inequities that arise through the demographics of South African SLPs (Abrahams et al., 2019). To understand these inequities in SLP service provision in South Africa, Pillay et al. (2020) identify that 86% of SLP clinicians work in the private healthcare system, while the remaining 14% work in the public healthcare system. This fact highlights the significant difference in the number of SLP clinicians servicing different populations and that those in government who service most patients who need SLP services need to provide services in an equitable manner that meets the needs of the community (Pillay et al., 2020) . The limited number of SLP posts available in public healthcare also contributes to this skewed provision of services (Pillay et al., 2020).

The need to transform and decolonise the SLP curriculum became more pressing when SLP clinical education experienced disruptions due to the COVID-19 pandemic. During the pandemic, SLP students and clinical educators were faced with the emergency transition to telepractice (Watermeyer et al., 2024). In the South African context, telepractice was not routinely used before the pandemic as a mode of service delivery (Watermeyer et al., 2024). There was a radical shift to emergency telepractice to ensure that patients continued to receive therapy and to ensure SLP students were able to engage in clinical practice (Watermeyer et al., 2024). This caused significant disruption to the skills that SLP students needed to develop during clinical education, in addition to their clinical skills (Watermeyer et al., 2024). It also caused a dramatic shift in how teaching and learning were conducted for clinical education and academic courses during the pandemic (Watermeyer et al., 2024).

A study by Watermeyer et al. (2024) in South Africa highlighted the challenges that the COVID-

19 pandemic introduced to clinical education, particularly with the use of telepractice. Their study found that telepractice required extensive preparation, especially in contexts with limited digital literacy. Students had to master both technology management and task adaptation for online therapy (Watermeyer et al., 2024). Telepractice also demanded greater caregiver involvement, and building rapport, sustaining attention, and providing reinforcement online became essential but difficult tasks (Watermeyer et al., 2024). Additionally, connectivity issues played a significant role in the success of telepractice sessions (Watermeyer et al., 2024). The study emphasised the need to explicitly teach SLP students the skills required for effective telepractice, adding another layer of complexity to clinical education in the South African context (Watermeyer et al., 2024).

Therefore, different pedagogies for SLP clinical education in the South African context need to be explored that are relevant and appropriate to the context. Pedagogies are required that promote decolonisation of the curriculum and develop students who can think critically and provide therapy in an equitable and just manner. These pedagogies should also consider the complexity of the specific context where they will be implemented. Thus, further knowledge of the structures of SLP education at Wits is required.

2.3.3. SLP Clinical Education in the Department of Speech-Language Pathology at the University of the Witwatersrand

To be able to explore a different clinical education pedagogy in the context of the Department of Speech-Language Pathology and Audiology at Wits, I needed an in-depth understanding of the clinical education currently being provided for that specific degree programme. The Department of Speech-Language Pathology and Audiology at Wits was the first department in South Africa

that trained SLPs. The training began in 1937 as a diploma and was converted to a four-year degree in 1946 (Aron, 1991). The degree initially trained speech-language therapy and audiology as a dual degree. Since 2018, the degree has split, and a student can either obtain a Bachelor's degree in Speech-Language Pathology or Audiology.

The current degree is a four-year professional degree that comprises a theoretical and a clinical education component. Clinical education in this department starts at a second-year level. The degree is followed by a year of mandatory community service in South Africa's Health Department after graduation. During this year, graduates are in the employ of the Department of Health. Some graduates are placed in well-established hospital departments with senior therapists. While others are deployed to hospitals or clinics where they need to establish and develop an SLP department, and there are no senior therapists to provide mentorship. Therefore, these graduates need to have critical thinking skills and clinical reasoning skills to be able to provide SLP services that are equitable, just, and responsive to their context.

Clinical education in the Wits context occurs between an SLP clinical educator and an SLP student or a group of SLP students. Interprofessional clinical educators are not used for SLP clinical education. Clinical education occurs in a variety of private and public healthcare settings, public schools, not-for-profit organisations, non-governmental organisations, and the university speech and language clinic.

I have discussed clinical education at Wits as opposed to the South African context, as each university department for SLP is slightly different in the implementation of their degree, even

though all universities are aligned with the outcomes stipulated by the Health Professions Council of South Africa (HPCSA). An audit of the clinical education provided at universities across South Africa has not been completed. The typical clinical education provided in our context is described in Table 2.2, which gives an overview of the structure of clinical education for second- to fourth-year SLP students.

Table 2.2

Overview of the structure of clinical education in the Department of Speech-Language Pathology at the University of the Witwatersrand

Aspects of clinical education	SLP Department at Wits
Clinical educator	Traditional clinical education of SLP clinicians supervising SLP students. Clinical educators are part-time or full-time members of the department.
Student-clinical educator ratio	Group supervision, where one clinical educator supervises a group of students.
Mode of clinical education	Direct clinical education is used. This mode of clinical education refers to clinical education in which the clinical educators read student sessional plans, observe the students providing therapy and engaging with the carer or other healthcare professionals, and then give feedback to the students.
Placement model (duration)	Weekly and block placement models. At some sites, students provide weekly or biweekly therapy for a block of seven weeks. At other sites, students provide therapy for a maximum of four out of five days per week for a block of seven weeks.
Placement model (Focus)	A combination of specialist placement for some clinical sites (e.g., a frail care facility where elderly persons post cerebral vascular accidents or with neurodegenerative diseases are seen) and more general placement for other clinical sites (e.g., a public hospital where a variety of age groups, diagnoses, and treatments are assessed and treated).

The challenges in clinical education at Wits and in the South African context include increasing student numbers, a shortage of clinical placements, and a shortage of clinical educators, all of which are in line with international trends, as noted by Sheepway et al. (2011). There are increased student numbers due to the need for more SLP clinicians in the South African context, as highlighted by Pillay et al. (2020). The South African government signed a healthcare bill into law earlier this year to restructure the South African healthcare system and thus provide national healthcare services (Pillay et al., 2020). This bill has been designed to decrease the difference in services provided between the current two-tiered healthcare system (Pillay et al., 2020). The implementation of this bill will need significantly more SLPs to provide the services that will be required (Pillay et al., 2020).

Increasing student numbers mean there is a need for more clinical education placements. Clinical education placements are limited and managers at most sites request that the university department provide clinical educators to supervise the students because they are typically short-staffed or do not have appropriate staff to fulfil that role. The HPCSA requires that clinical educators are HPCSA-registered and have two years of experience post-community service (HPCSA, 2012).

The number of clinical educators available in our context is limited. Most SLPs in South Africa work in full- or part-time employment as clinicians, and these jobs may not provide the flexibility required to supervise students on specific days of the week at certain times. There also tends to be a high turnover of part-time clinical educators. At Wits, the part-time clinical educators are typically SLP clinicians who are not immersed in the clinical education

environment (Mupawose et al., 2021). At times, this situation has led to discrepancies between what students are taught at a departmental level and during clinical education (Mupawose et al., 2021). Clinical educators receive some orientation and are invited to attend clinical educator development sessions that occur throughout the year (Mupawose et al., 2021). Historically, clinical educator training took place during biannual meetings, which were not compulsory, and included discussions about student issues and practical sites (Mupawose et al., 2021). Clinical educators tended to learn on the job and through other clinical educators (Mupawose et al., 2021).

Mupawose et al. (2021) identify that clinical educators at Wits would feel more confident in supervising students if they had further training, in addition to what was provided at the university. McAllister (2005) also identifies an international and chronic lack of training and support for clinical educators. Therefore, the need to develop clinical educators is not unique to Wits or South Africa. The need for development must be considered when wanting to explore a different pedagogy to improve critical thinking skills and clinical reasoning within SLP evidence-based practice.

2.4. Chapter Summary

This chapter explored the complexities of clinical education, focusing on the roles of clinical educators, student characteristics, and pedagogies that support the development of professional knowledge and clinical skills. It highlighted the challenges students face when applying theoretical knowledge in new clinical settings under the supervision of a clinical educator, emphasising the importance of evidence-based practice and person-centred care. The chapter reviewed the use of reflective practice in SLP clinical education, stressing the importance of the

educator–student relationship, especially in meeting the needs of Generation Z. *Chapter 2* also discussed the broader context of allied healthcare, with an emphasis on evidence-based practice, person-centred care, and fostering lifelong learning in SLP students. The chapter addressed the complexity of clinical education in South Africa, shaped by events like #RhodesMustFall and the COVID-19 pandemic, and their impact on SLP education. The next chapter will delve into the complexity of critical thinking skills in clinical education and the development of clinical reasoning in allied healthcare and SLP education. It will explore pedagogies for fostering critical thinking in SLP students, with a focus on inquiry-based learning in SLP clinical education.

CHAPTER 3: THE COMPLEXITY OF CRITICAL THINKING SKILLS

3.1. Introduction

In the previous chapter, the context and importance of clinical education, along with factors influencing students' ability to apply their knowledge in clinical settings, were presented. To bridge the theory–practice divide, students need critical thinking skills, which are not isolated abilities but thought processes that rely on content knowledge, practice, and context-appropriate application (Papir-Bernstein, 2018). These skills help reveal underlying assumptions, biases, and beliefs that shape clinical reasoning (Berg et al., 2023).

Clinical reasoning involves healthcare professionals gathering information, such as diagnostic, procedural, scientific, ethical, and patient narrative information, to make therapeutic decisions (Rogers, 1983). It is often shaped by personal experiences and biases, which can reinforce assumptions. Critical thinking is essential for analysing and evaluating these thought processes to ensure informed decisions (Paul & Elder, 2006). As such, critical thinking is a prerequisite for clinical reasoning (Victor-Chmil, 2013), though evidence suggests students do not always develop these skills naturally through their training (Brudvig et al., 2013).

SLP students must develop critical thinking to foster their clinical reasoning in order to be able to deliver contextually relevant interventions across diverse patient populations (ASHA, 2020). The literature highlights the importance of fostering these skills and explores pedagogies that support their development in healthcare professionals, including SLPs. This chapter begins by defining critical thinking, examines its role in allied healthcare and SLP education, and explores pedagogies that promote these skills, with a focus on inquiry-based learning as a potential

approach for SLP students.

3.2. Definition of Critical Thinking Skills

Several authors have described the components of critical thinking skills (Facione, 1998; Finn, 2011; Pascarella & Terenzini, 1991). Berg et al. (2023) highlight challenges in defining critical thinking, noting that definitions range from general higher-order thinking processes to specific skill categories. To establish conceptual clarity in my study, Facione's (1998) widely recognised model of critical thinking skills was adopted. This model comprises six fundamental skill categories: interpretation (clarifying meaning), analysis (examining arguments), evaluation (assigning value claims), inference (drawing conclusions), explanation (presenting arguments), and self-regulation (self-examining biases).

Facione's 1998 model was selected specifically due to its integration of self-reflection within the self-regulation category, aligning closely with this thesis's emphasis on reflective practices as essential to critical thinking development. Critical thinking skills are acknowledged as highly metacognitive, functioning both as precursors to and facilitators of self-monitoring during clinical encounters (Dwyer et al., 2014). Consequently, Facione's 1998 model provides both a theoretical framework for conceptualising critical thinking and an analytical lens applied throughout the thesis. Rather than explicitly addressing each category of the model separately, this study employs the framework holistically. The six categories collectively inform the analysis and interpretation of student reflections, clinical educator feedback, and pedagogical interventions explored in subsequent chapters. This holistic application maintains coherence and captures the nuanced interplay of the model's components within authentic clinical education contexts.

Facione and Facione (2007) recommend that thinking dispositions be included when studying critical thinking skills. Thinking dispositions refer to habitual patterns of thought that influence an individual's approach to learning, problem-solving, and decision-making, particularly in how an individual forms, evaluates, and adapts their beliefs and perspectives (Stanovich, 2009). Several thinking dispositions are believed to be moderators of critical thinking skills (Stanovich, 2009), and these tend to influence the strength and direction of one's thinking (Nickerson, 2008). Table 3.1 provides a list of thinking dispositions and their definitions.

Table 3.1

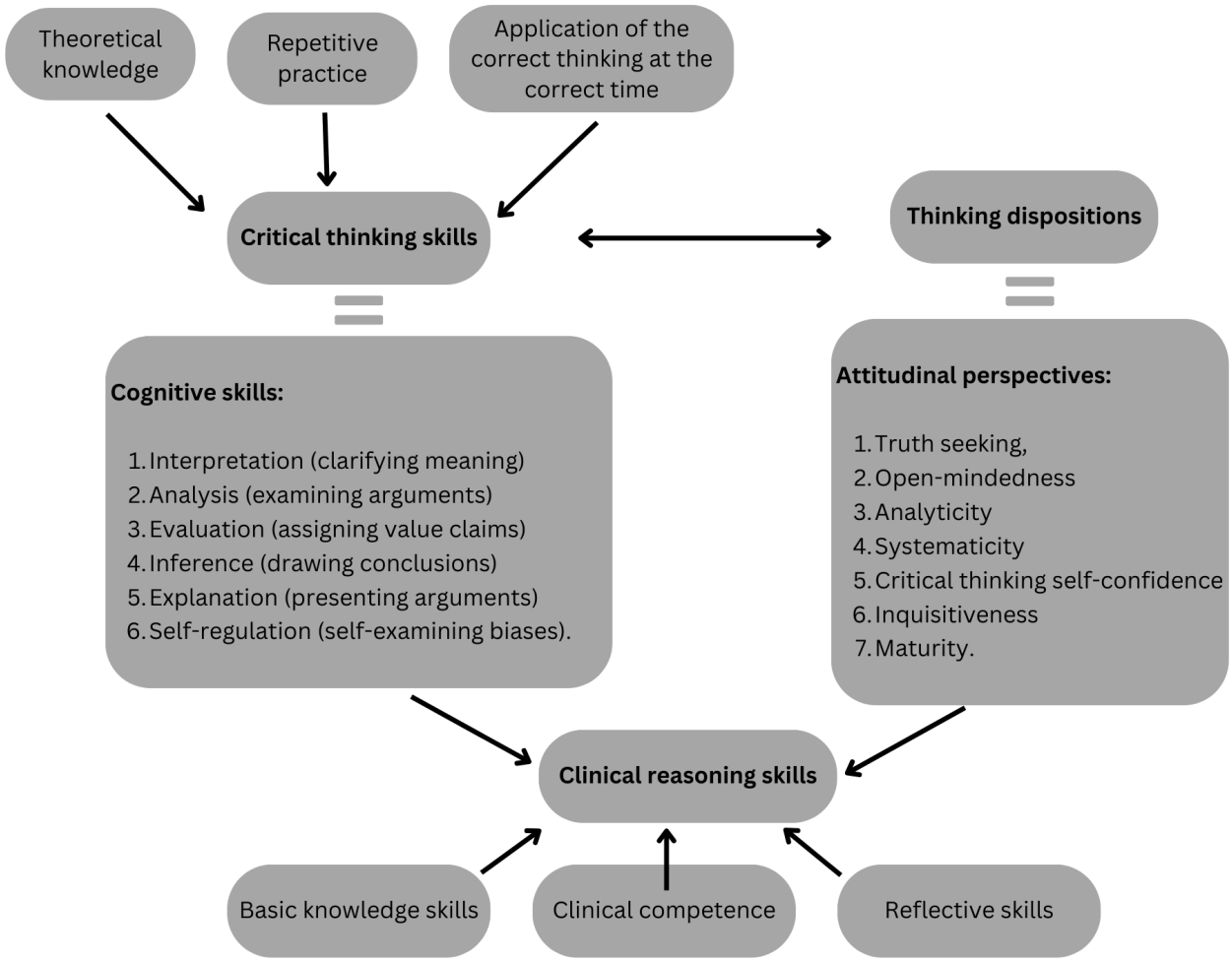
Thinking dispositions and their definitions (Facione & Facione, 2007)

Thinking Disposition	Definition
Truth-Seeking	The ability to ask challenging questions and then seek the best knowledge to answer the question.
Open-Mindedness	The willingness to consider and be tolerant of new evidence, ideas, and possibilities.
Analyticity	The ability to be alert to potential difficulties and the ability to solve these difficulties.
Systematicity	The ability to be organised.
Critical Thinking Self-Confidence	Trust in one's reasoning and ability to make rational decisions.
Inquisitiveness	The intellectual curiosity one presents with learning new things.
Maturity	The ability to identify the complexity of a problem and the desire to make decisions to solve the problem despite uncertain conditions.

The integration of critical thinking skills with thinking dispositions enables the clinical reasoning process in students (Huhn et al., 2014). Figure 3.1 represents the interaction of critical thinking skills with thinking dispositions and how they integrate to ensure effective clinical reasoning.

Figure 3.1

The interaction of critical thinking skills and thinking dispositions to develop clinical reasoning skills



Note. This model is based on my integration of the models proposed by Facione (1998), Facione and Facione (2007), and Papir-Bernstein (2018).

The integration of critical thinking skills and thinking dispositions not only enhances the clinical reasoning process but also emphasises the necessity for intentional educational strategies and pedagogies in healthcare training to develop critical thinking skills (Huhn et al., 2014).

3.3. Critical Thinking Skills in Allied Healthcare Clinical Education

Berg et al. (2023) note that effectively preparing healthcare students for clinical practice requires consistently prioritising the development of critical thinking skills through evidence-based teaching methods, intentional learning strategies, and ongoing evaluation of their effectiveness. Their scoping review revealed two key themes that are central to my study: (1) instructional approaches, and (2) the measurement of critical thinking skills.

The first theme, instructional approaches, includes various methods being used in healthcare education and their impact on critical thinking skills in healthcare professionals (Berg et al., 2023). Most of this research focuses on the academic classroom rather than the clinical education setting, revealing a lack of literature on pedagogies used specifically in clinical education to foster critical thinking skills (Berg et al., 2023). In the academic context, lectures are not ideal for developing these skills (Berg et al., 2023). Instead, case studies with structured outcomes discussed in small groups or class are preferred (Berg et al., 2023). However, beyond case studies, there is limited detail about effective instructional strategies, making it difficult to determine their impact on developing critical thinking skills in students in clinical practice (Berg et al., 2023).

Within the theme of instructional approaches, Berg et al. (2023) also identify limited evidence of the application of best practices in instructional strategies to support critical thinking skills' development. These best practices include setting the stage for learning, fostering a growth mindset, active learning, elaboration, and metacognition (Berg et al., 2023). *Setting the stage* involves connecting new concepts to students' prior knowledge. A *growth mindset* encourages students to embrace challenges and develop resilience (Yeager & Dweck, 2020). *Active learning* engages students in constructing knowledge (Ambrose et al., 2010; Lang, 2016). *Elaboration* helps students link new learning to existing knowledge (Lang, 2016), and *metacognition* enables self-regulated learning through critical reflection on their thinking (Ambrose et al., 2010; Magno, 2010). Therefore, when investigating a different pedagogy to use for clinical education, I needed to be mindful of these best practices for teaching and learning. I had to be aware of whether the pedagogy I wanted to implement incorporated these instructional strategies that are identified as best practice.

The second theme Berg et al. (2023) identify involves measures for assessing critical thinking skills in healthcare students. While the assessments can predict performance on specific skills, they may not capture students' ability to apply critical thinking in real-life, complex situations. Huang et al. (2016) suggest using multiple assessment measures to observe critical thinking across different contexts. In designing my study, I considered this advice to assess critical thinking skills in SLP students.

3.4. Critical Thinking Skills in SLP Clinical Education

As discussed in *Chapter 2*, I recognised that the general principles for clinical education derived

from other healthcare disciplines could not be directly applied to the field of SLP. This realisation prompted a thorough review of the literature related to critical thinking skills in SLP clinical education to better understand this area. Research has shown that SLP students, like those in other healthcare fields, need to develop critical thinking skills (Abrami et al., 2015; Battaglia, 2020). Notably, most of these studies have focused on the academic curriculum rather than clinical education.

Kamhi (2011) emphasises the need for SLP students to develop critical thinking skills to evaluate their decisions and the biases influencing their decision-making, enabling them to make more objective clinical choices. Finn (2011) echoes this sentiment, stressing the importance of teaching critical thinking from the outset of students' studies and careers, so they routinely apply these skills when implementing evidence-based principles. Teaching critical thinking is essential for SLP students to enhance their cognitive abilities, allowing them to appropriately apply theoretical knowledge and evidence-based treatment principles in novel clinical settings (Battaglia, 2020; Finn, 2011; Finn et al., 2016; Morris et al., 2018).

Abrami et al. (2015, 2008) and Ennis (1989) provide a useful description of instructional approaches that support the teaching of critical thinking skills generally in higher education. Table 3.2 details the four instructional approaches. A meta-analysis of the instructional approaches by Abrami et al. (2008, 2015) reports that all four are effective in the development of critical thinking skills. However, the strongest effect occurred when critical thinking skills were taught explicitly within content-specific subjects and active learning approaches were also employed.

Clinical educators and academic lecturers in the Department of Speech-Language Pathology at Wits currently use an immersion approach, as I identified through an analysis of course outlines for the clinical and academic courses of second- and third-year students. Based on this, I decided to trial the explicit teaching of critical thinking skills in the clinical curriculum using an inquiry-based learning framework.

Table 3.2

Four instructional approaches to teach critical thinking skills

Instructional Approach	Explanation
General	Critical thinking is taught explicitly. Critical thinking skills comprise the course content and are the course goals.
Infusion	Critical thinking is taught explicitly within the context of a specific subject area. Students learn to practise critical thinking skills within the course curriculum. These skills are the course goals.
Immersion	Critical thinking is taught implicitly. It is inferred that due to the nature of the course and learning, students will learn how to think critically without overt teaching of the skills. Critical thinking skills are not part of the course goals.
Mixed	Critical thinking is taught explicitly and then applied to specific subject content and non-specific subject content. Critical thinking skills are course goals.

Note. This table was formulated by synthesising the work of Abrami et al. (2015), Abrami et al. (2008), and Ennis (1989).

There appears to be a gap in the literature regarding the outcomes of the pedagogies used to

promote critical thinking in SLP clinical education. Existing research often addresses general outcomes of clinical education or explores the perceptions of students and clinical educators during clinical education. However, there is limited focus on specific pedagogical approaches that foster critical thinking within SLP clinical education. The scoping review by Wolford et al. (2021) identifies research on general clinical education, while studies by Battaglia (2020) and Grillo et al. (2015) explore the development of critical thinking skills within the academic context for SLP students.

Several other pedagogical approaches have been employed to enhance critical thinking skills in SLP students, including simulations (e.g., Carter, 2019; Ellis, 2017), service learning (e.g., Jenkins & Sheehey, 2022; Mpofu, 2007), and problem-based learning (e.g., Chan et al., 2024; Erickson & Serry, 2020). I specifically analysed these studies that describe different pedagogies as they have investigated the specific impact of those pedagogies on the development of critical thinking skills of SLP students. These studies primarily examined academic outcomes or perceptions of the pedagogy rather than the impact of the pedagogy on the development of critical thinking skills in clinical settings. To better understand the research in the SLP field regarding pedagogies and critical thinking skills, I provide a summary of the studies and their results that are important for SLP students and clinical educators.

Battaglia (2020) investigated the development of critical thinking skills in SLP students during coursework on autism, using active learning principles and a mix of immersion and infusion strategies. Her results show no change on a Likert scale assessing students' perceptions of their critical thinking skills before and after the intervention. However, qualitative feedback from

students highlights positive impacts, including expanded knowledge of critical thinking, increased empathy and perspective-taking, and improved critical thinking in implementing evidence-based practice.

Grillo et al. (2015) explored how to teach SLP students to think critically, apply evidence, and write professionally through a one-time, explicit instruction on critical thinking, evidence-based practice, and professional writing skills. Their findings indicate positive effects on applying evidence-based practice principles but not on critical thinking or professional writing. They suggest that longitudinal instruction is necessary for developing critical thinking skills, a recommendation supported by Battaglia (2020).

Research on simulation-based learning in SLP education, such as by Carter (2019) and Ellis (2017), explores its impact on critical thinking skills. However, this research focuses on academic outcomes rather than clinical settings. Carter (2019) compared traditional learning experiences with computer-based simulations among SLP students. Post-experience, the simulation group outperformed the traditional group in skills relevant to clinical outcomes, such as diagnosis and decision-making. However, the results are based on assessments rather than practical use of critical thinking in clinical environments. Ellis (2017) offers a model for using simulations in SLP clinical education to enhance critical thinking. The model includes strategies for debrief sessions focusing on interpretation, evaluation, and metacognition, key elements of critical thinking (Finn, 2011). However, the study lacks objective evaluation of students' critical thinking skills or reflection on the pedagogy's impact on their clinical reasoning.

Service-based learning as a pedagogy for improving SLP students' critical thinking skills has been examined by Jenkins and Sheehey (2022) and Mpofu (2007). Jenkins and Sheehey (2022) propose a model for implementing service learning, arguing that it helps students apply critical thinking to real-world problems, though they do not assess its practical effectiveness. Mpofu (2007) studied service learning's impact on critical thinking through case-based assessments, finding potential benefits. Yet again, this study focuses on academic settings and does not explore the transfer of these skills to clinical practice.

The impact of problem-based learning on developing SLP students' critical thinking skills has also been studied. Chan et al. (2024) offer a framework for using problem-based learning to enhance critical reflection, particularly for providing services to culturally diverse populations. The framework emphasises incorporating critical thinking in problem-based learning, but it does not present evidence of improved critical thinking skills among students. Erickson and Serry (2020) explore recent SLP graduates' perceptions of problem-based learning, noting its importance for developing critical thinking and clinical skills. However, their study relies solely on students' perceptions without objective measures of skill improvement.

Based on these studies investigating the different pedagogies of active learning, simulation, service learning, and problem-based learning, the literature often provides frameworks, student perceptions, clinical educator perceptions, or changes in critical thinking skills based on academic performances rather than on clinical learning environment outcomes. Therefore, there is a gap in the literature regarding the effectiveness of these pedagogies in fostering critical thinking skills specifically within clinical settings, and their direct impact on student

performance and patient care outcomes.

3.5.Inquiry-based Learning as a Pedagogy for Critical Thinking Skills Development in SLP Students

3.5.1. Definition of Inquiry-Based Learning

Educators may employ a variety of pedagogies during SLP clinical education. Traditional pedagogy and inquiry-based learning will be explained in this section to position the use of inquiry-based learning as a pedagogy for supervising SLP students in my study. Traditional pedagogy is teacher-centred, where the teacher serves as the primary source of knowledge, and students passively absorb information (Khalaf et al., 2018; Patel et al., 2021). Rooted in behaviourism, this approach suggests that learning occurs through the teacher's influence on students. However, cognitive and constructivist learning theories have criticised this model. Cognitivism emphasises that knowledge is constructed through mental processes, while constructivism focuses on students actively constructing knowledge during learning. Both cognitive and constructivist approaches are, therefore, student-centred (Khalaf et al., 2018).

Student-centred pedagogies emphasise the active role that a student plays in their learning. Through active learning, the development of critical thinking skills, problem-solving, and autonomous learning occurs (Drew & Mackie, 2011; Patel et al., 2021). Inquiry-based learning is an instructional pedagogy that is underpinned by constructivism learning theory (Khalaf et al., 2018) and thus moves towards a learning-oriented approach in pedagogy and assessment. Inquiry-based learning is designed to promote the development of decision-making, problem-solving, and critical thinking skills through student-driven and instructor-guided investigations of

student-generated questions (Friedel et al., 2008; Justice et al., 2009; Procaccini et al., 2016). The active learning strategies embedded into inquiry-based learning can promote a "flipped" method of learning in the clinical curriculum (Lage et al., 2000). As a pedagogy, inquiry-based learning involves critical examination and deconstruction of knowledge creation (Levy, 2012) while shifting the power between the educator and the student (Little, 2010). It allows the student to have an active role in the knowledge created, transforming the notion of knowledge creation into knowledge being cocreated between the student and the educator rather than in a passive, hierarchical manner from the educator to the student (Buckner & Kim, 2014).

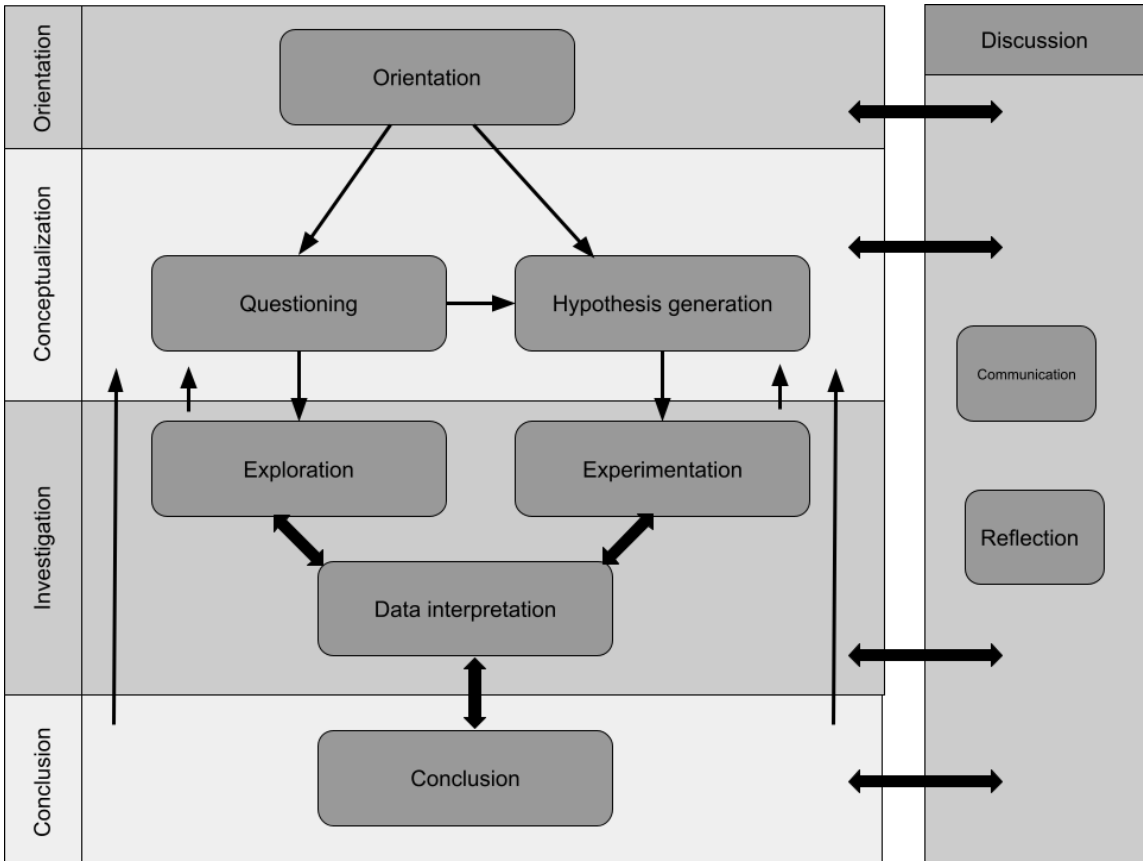
Inquiry-based learning occurs through a cycle of phases (Mikroyannidis et al., 2013; Pedaste et al., 2015). The approach encourages students to engage in an authentic learning experience by taking a complex learning task and dividing it into smaller phases that guide students' thinking skills throughout the learning process (Mikroyannidis et al., 2013; Pedaste et al., 2015). Pedaste et al. (2015) provide a comprehensive understanding of the inquiry cycle. Figure 3.2 represents the phases and their subphases that interact within an inquiry cycle. The phases of inquiry-based learning need to be understood to implement and facilitate learning through this approach (Pedaste et al., 2015). Although each phase is presented in an ordered sequence, inquiry-based learning does not generally progress through a prescribed, uniform, linear process (Pedaste et al., 2015). A student can move between phases and go back to previous phases to ensure sufficient learning (Pedaste et al., 2015). There is self-reflection on learning during each phase throughout an inquiry cycle (Mikroyannidis et al., 2013).

Within an inquiry cycle, the role of the educator varies based on the level of support a student

requires, the need of the student to reflect, the feedback a student requires, and the need for collaboration (Mikroyannidis et al., 2013). Inquiry-based learning is a framework that is not constrained to a curriculum and can be used to guide a student in a cycle of how to orientate to a problem, conceptualise questions and hypotheses, investigate by exploring the research and gathering appropriate data, draw a conclusion, and discuss/employ findings (Pedaste et al., 2015). These are skills that SLP students require to think critically about a patient and their own biases and then make clinical decisions regarding assessment and treatment planning.

Figure 3.2

The inquiry-based learning framework



Note. The framework is based on Pedaste et al. (2015, p.56).

The first phase of the inquiry cycle is the *Orientation phase*. It is the initial stage of the process where curiosity about a topic is stimulated, and the main variables required for the problem statement are identified (Mikroyannidis et al., 2013; Pedaste et al., 2015). The second phase is *Conceptualisation*, which is the process of understanding the concepts underlying the problem statement (Mikroyannidis et al., 2013; Pedaste et al., 2015). This second phase consists of two subphases. *Questioning* is a subphase of *Conceptualisation* that refers to the generation of questions based on the problem statement (Mikroyannidis et al., 2013; Pedaste et al., 2015). *Hypothesis generation* is the other subphase of *Conceptualisation*, which refers to the generation of hypotheses based on the problem statement (Mikroyannidis et al., 2013; Pedaste et al., 2015). The outcome of the *Conceptualisation phase* is to have a set of research questions and/or hypotheses that can be investigated (Mikroyannidis et al., 2013; Pedaste et al., 2015).

The third phase is the *Investigation phase*. This phase consists of the process of turning curiosity into action through the three subphases of *exploration*, *experimentation*, and *data interpretation* (Mikroyannidis et al., 2013; Pedaste et al., 2015). *Exploration* refers to systematically exploring the research related to the questions and hypotheses that have been generated (Mikroyannidis et al., 2013; Pedaste et al., 2015). *Experimentation* uses the information obtained in the exploration subphase to plan and conduct an experiment to answer a question or test a hypothesis (Mikroyannidis et al., 2013; Pedaste et al., 2015). The *Data Interpretation* subphase then makes meaning out of the information collected and the results of experimentation (Mikroyannidis et al., 2013; Pedaste et al., 2015). The phase of *Interpretation* leads to the *Conclusion phase*. The *Conclusion phase* is part of the inquiry cycle, where conclusions are made regarding the original

questions or hypotheses and to determine whether the information gathered during the *investigation phase* answers the question and provides insight into the hypothesis (Mikroyannidis et al., 2013; Pedaste et al., 2015). This process of conclusion can lead to new theoretical insights (Mikroyannidis et al., 2013; Pedaste et al., 2015).

The *Discussion phase* includes the subphases of communication and reflection (Pedaste et al., 2015). This phase is identified as an external phase that has a reciprocal influence on each phase of the inquiry cycle (Pedaste et al., 2015). Students need to communicate and reflect on their findings at each phase of the inquiry cycle, discuss results with clinical educators and peers, receive feedback, and reflect on their own understanding and implementation of the statement problem (Pedaste et al., 2015). Students' reflections can be supported through role-play, journal writing, and the use of guided questions (Pedaste et al., 2015). The discussion phase can occur in relation to each phase of the inquiry cycle as well as regarding the inquiry cycle as a whole (Pedaste et al., 2015).

3.5.2. Inquiry-Based Learning in Higher Education

Inquiry-based learning can be used at a tertiary level as it incorporates principles of adult learning (Mikroyannidis et al., 2013; Pedaste et al., 2015). Noffs and Wilson (2021) outline principles of adult learning, emphasising that adults must be actively involved in the learning process. They need to understand the connection between what they are learning and its application to future problems (Noffs & Wilson, 2021). Adults should also be aware of what they will learn, how they will learn it, and why this learning is important (Noffs & Wilson, 2021). Moreover, learning should take place in a collaborative, respectful, and informal environment that encourages experimentation rather than solely theoretical instruction (Noffs & Wilson,

2021). Dialogue and social interaction, which facilitate collaboration among students, are essential to the learning process (Noffs & Wilson, 2021).

A growing body of evidence in international higher education highlights positive impacts of inquiry-based learning on student outcomes. Research indicates that it fosters greater student engagement (Archer-Kuhn et al., 2020; Caswell & LaBrie, 2017; Justice et al., 2009; Levy, 2012; Little, 2010) and boosts students' confidence (Little, 2010; Woolf, 2017). Cooner (2011) argues that to create effective course designs that engage students and move beyond traditional lecture-based teaching, the focus should be on inquiry-based learning approaches.

The literature also identifies several outcomes associated with skill development through inquiry-based learning, including improved critical thinking (Aditomo et al., 2013; Caswell & LaBrie, 2017; Woolf, 2017), enhanced problem-solving abilities (Justice et al., 2009), reflective practice (Gilardi & Lozza, 2009; Kirwan & Adams, 2009; Woolf, 2017), and stronger collaboration skills (Justice, 2009). Additionally, inquiry-based learning supports the acquisition of specific skills, including interviewing, active listening, writing, communication, and independent work (Woolf, 2017), research skills (Yesudhas et al., 2014), and improved information and technology literacy (Buckner & Kim, 2014).

Problem-based learning should not be confused with inquiry-based learning. Problem-based learning differs from inquiry-based learning as it emphasises a problem-solving response in students during an activity, using small groups to solve problems to learn and develop problem-solving skills (Prosser & Sze, 2014). Problem-based learning has been explored in SLP teaching

and learning in Hong Kong (Ho et al., 2014; Mok et al., 2008; Prosser & Sze, 2014; Whitehill et al., 2014) and Sweden (Lyberg-Ahlander et al., 2014; McAllister et al., 2014). These studies investigated and described the process of implementing problem-based learning in SLP but did not provide the effects of problem-based learning on developing critical thinking skills or clinical reasoning skills. In the South African context, problem-based learning has been implemented at Wits in the Occupational Therapy (Jay, 2014) and Nursing degrees (Lack & Bruce, 2014). At the time of writing this thesis, there were no articles exploring the use of problem-based learning in SLP at Wits or in the South African context more generally.

In contrast, inquiry-based learning focuses on fostering curiosity-driven exploration, where students actively investigate, critically reflect, and remain receptive to various explanations and potential solutions (Prosser & Sze, 2014). In inquiry-based learning, the student as an individual engages in answering a question or solving a student-generated problem and, through gathering information, integration, discussion, and reflection, is then able to answer or solve the question or problem (Prosser & Sze, 2014). To date there appear to be no published articles investigating inquiry-based learning in SLP curricula internationally.

Inquiry-based learning at primary and secondary school levels in South Africa has been investigated (Botha, 2016). However, there appears to be limited application of inquiry-based learning at a tertiary level in the South African context. Exploring the use of inquiry-based learning as opposed to problem-based learning at a tertiary level in South Africa could add to the theoretical underpinnings of inquiry-based learning in facilitating learning in clinical practice.

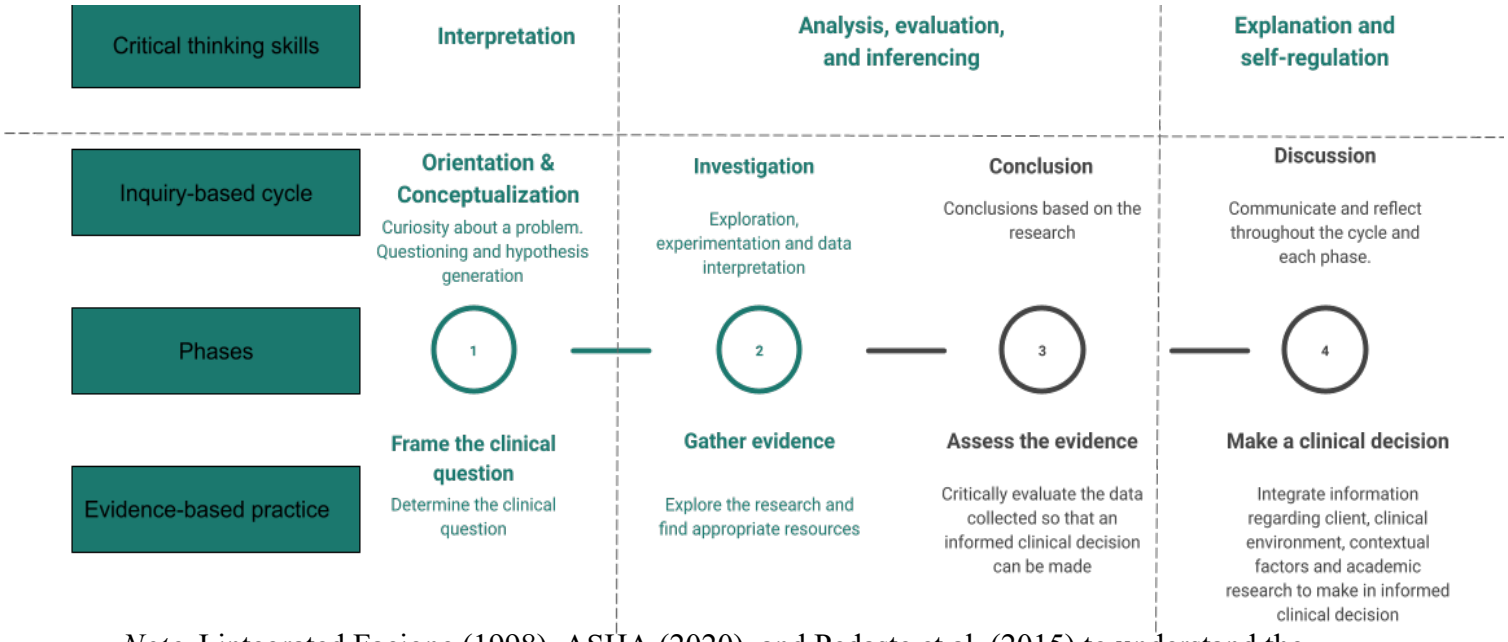
Based on a review of current course outlines for the second- and third-year clinical practicals, teaching strategies in the SLP department at Wits comprise one-on-one clinical education, tutorials, observation, and modelling by clinical educators. There does not appear to be an explicit pedagogy in the course outline, and the tasks tend to comprise more passive learning strategies than active learning strategies. The extent to which active learning is evident in practice is dependent on how individual clinical educators implement the learning strategies.

3.5.3. Inquiry-based learning as a pedagogy for developing critical thinking skills in SLP

Although it has not been used previously as a framework for teaching in SLP clinical curricula, inquiry-based learning can support adult learning and critical thinking skills development (Prosser & Sze, 2014). Thus, it could lead to the desired outcome of SLP students incorporating evidence-based principles in their clinical work. Figure 3.3 highlights the parallels that exist between critical thinking skills, inquiry-based learning, and the process of evidence-based practice (as outlined in section 2.2.1. Evidence-Based Practice in SLP), which inspired the use of inquiry-based learning as the pedagogy for clinical educator training that was explored in this research project.

Figure 3.3

The parallels between critical thinking skills, inquiry-based learning, and evidence-based practice process



Note. I integrated Facione (1998), ASHA (2020), and Pedaste et al. (2015) to understand the parallels between these different phases, processes, and skills.

When I apply the inquiry cycle to clinical education to flip clinical education, each phase can be associated with evidence-based practice and critical thinking skills. In the *Orientation Phase*, SLP students can be orientated to the outcomes of the clinical practical and the types of patients that they will be working with at that particular site. Their orientation to their own patients at the clinical site can also form part of the *Orientation Phase*.

In the *Conceptualisation Phase* where questions are formed, students could be encouraged and guided to ask questions regarding their patient's diagnosis, history, previous therapy, context (familial and social), and how to ensure person-centred care. Students could also be encouraged

and guided to ask themselves questions regarding their knowledge base of the diagnosis, assessment, and information required to develop an appropriate treatment plan that is just, equitable, and globally informed, yet contextually relevant.

These two phases of the inquiry cycle align with the first phase of the evidence-based practice process, where the SLP is encouraged to determine a clinical question that they need to answer (ASHA, 2020). These first two phases of the inquiry cycle also promote the critical thinking skill of interpretation. Interpretation involves understanding and explaining the meaning of information or data, clarifying its significance, and identifying its implications (Facione, 1998).

The inquiry cycle phase of *Investigation*, with *Exploration*, *Experimentation*, and *Interpretation*, correlates with the second phase of the evidence-based practice process, which is gathering evidence (ASHA, 2020). In this phase, SLPs are encouraged to explore the research and find appropriate resources. Clinical educators could direct SLP students to resources that will be appropriate, or they could assist students with the skills to research and identify resources that would be appropriate for use with a specific patient. This phase in the inquiry cycle can promote the development of the critical thinking skills of analysis, evaluation, and inferencing (Facione, 1998). These critical thinking skills require a student to be able to examine arguments, assign value claims, and draw conclusions (Facione, 1998).

In the *Conclusion Phase* of the inquiry cycle, SLP students can be encouraged to make sense of the resources they have accessed, and make judgements about whether the information they have obtained is appropriate for their patients. This *Conclusion Phase* could align with the third and

fourth phases of the evidence-based practice process. The third phase includes the assessment of the evidence, in which SLPs are encouraged to critically evaluate the data collected so that they can make an informed clinical decision (ASHA, 2020). The fourth phase is where the SLP is encouraged to make a clinical decision based on integrating information regarding the patient, the clinical environment, contextual factors, and academic factors (ASHA, 2020). The *Conclusion Phase* of the inquiry cycle, as well as assessing the evidence and making a clinical decision, also relies on the critical thinking skills of analysis, evaluation, and inferencing (Facione, 1998). Thus, I hypothesised that SLP students' critical thinking skills would be developed by engaging in these kinds of activities in a clinical environment.

The *Discussion Phase* of inquiry-based learning requires SLPs to be able to communicate their orientation, conceptualisation, investigation, and conclusions as they work through the phases of the inquiry cycle (Pedaste et al., 2015). They are also required to self-reflect at each phase of the cycle to determine what is working, what is not working, what else they could do, what other knowledge they require, and whether what they are investigating and concluding is appropriate for their patient (Pedaste et al., 2015). These self-reflection skills need to be taught, and thus, a set of guiding questions could be used to develop the student's ability to reflect critically through this phase (Dunne et al., 2019). This phase would require and lead to the development of the critical thinking skills of explanation and self-regulation (Facione, 1998). Explanation refers to students being able to present their arguments and decisions, while self-regulation refers to a student's ability to self-examine any biases they may have during the clinical decision-making process (Facione, 1998).

3.6. Chapter Summary

This chapter defined critical thinking skills based on Facione's (1998) model of critical thinking skills. This model aligns with the metacognitive nature of critical thinking, which emphasises the importance of self-reflection. Additionally, it was important to acknowledge that critical thinking is influenced by thinking dispositions, which shape how individuals' approach and modify their beliefs, further impacting critical thinking skills (Facione & Facione, 2007; Stanovich, 2009).

The literature review suggests limited application of inquiry-based learning for clinical education in the SLP field both locally and internationally. This lack of literature highlights the novel and transformative nature of my study in its investigation of the use of inquiry-based learning when training SLP students in clinical education. Thus, my study aimed to add to the theoretical underpinnings of pedagogies that could support the development of critical thinking skills in SLP students through a specific pedagogy. The intervention in this study moved beyond the implementation of teacher-centred traditional pedagogies and the more narrowly focused problem-based learning to explore the potential effects of a student-centred and comprehensive form of inquiry-based learning for critical thinking skills.

CHAPTER 4: THEORETICAL FRAMEWORK

4.1. Introduction

This chapter explains the theoretical framework used for my study, exploring the impact of inquiry-based learning on the development of critical thinking skills in second- and third-year SLP students in a supervised clinical setting. My theoretical framework is structured according to Creswell and Plano Clark's (2018) four levels of framing a study. These levels include (1) the paradigm worldview, (2) the theoretical lens, (3) the methodological approach, and (4) the data collection methods. This chapter explains the paradigm worldview, theoretical lens, and methodological approach to frame my study and connect it to the methodology chapter.

Haji et al. (2013) highlighted the complexity of educational interventions by stating, "Educational interventions are not singular entities. They consist of a myriad of dynamic components, non-linear ways, influenced by ever-changing contexts, in which unpredictability is the rule" (p. 346). Initially, when I planned my study, I framed my paradigm worldview within the ontological framework of a reality-oriented correspondence theory perspective and post positivism with an epistemological framework of social dualism constructionism. When I planned my study, I researched complexity theory for my theoretical lens, but my understanding of complexity theory at this stage was limited. During the planning phase, I chose a programme evaluation approach as my methodological framework. This approach allowed me to acknowledge the various stakeholders in my study and the need to explore both the process and the outcomes of my study. As I progressed through the data collection and data analysis of my study, I started to understand the 'messy complexity' of my study with regards to the context and concepts I was investigating. I finally understood the importance of using complexity theory as a

theoretical lens to help me understand my results and their implications within the study.

My study involved multiple participant groups whose interactions with each other and their environment caused changes within them and towards their engagement with clinical education, which established the complexity of my study. I did not want to control for this complexity. I rather wanted to embrace it and understand how it plays a role in the exploration of the impact of inquiry-based learning on the development of critical thinking skills in SLP students. When choosing the theoretical lens, I needed to select one that also aligned with my ontological assumption of reality-oriented correspondence theory perspective and post positivism as well as my epistemological assumption of social dualism constructionism. Therefore, complexity theory was chosen as a theoretical lens to help me understand and interpret my results within my chosen ontological and epistemological perspectives, as well as the complexity of my study.

In this chapter, I explain my paradigm worldview through my ontological and epistemological views. Based on my paradigm worldview, I then explain my theoretical lens of complexity theory that assisted me in understanding and interpreting my results within the South African context. Lastly, I explain how I used programme evaluation as the methodological approach for my study.

4.2. Paradigm Worldview of the Study

4.2.1.Ontological Assumptions

I assumed a reality-oriented correspondence theory perspective for my ontological assumption. This perspective is a combination of a correspondence perspective and a common-sense realism

approach. A correspondence perspective implies that reality is based upon the real world, which has verifiable patterns that can be observed and predicted (Patton, 2015). This observation of verifiable patterns allows the researcher to describe reality and determine truth, which in turn assists in establishing results that correspond with the real world (Patton, 2015). In addition, I assumed a common-sense realism approach for my study because this approach recognises that knowledge is socially and historically constructed within everyday experiences (Patton, 2015). Therefore, I combined these two assumptions, which led to me assuming a reality-oriented correspondence theory perspective for this research project. Additionally, this perspective recognises both general characteristics and personal interpretations of how we understand the world, emphasising the importance of specific ideas created by individuals (Patton, 2015). My ontological assumption are also based on post positivism, as it acknowledges that I, as the researcher, am influenced by context, which can, therefore, influence the research and the reality constructed (Braun & Clarke, 2013).

I believe that reality is constructed through the observation of verifiable patterns, with social and historical contexts shaping everyday experiences. In addition to examining the whole to determine reality, I needed to consider the individual perspectives that contribute to this construction. However, throughout the research process, I remained aware that my context and positionality could influence the research and the realities being constructed. As my study progressed to the data analysis and interpretation stage, I realised that while I can identify verifiable patterns, these patterns are often unpredictable. Furthermore, the reality defined by context is more complex than merely listing social and historical factors; interactions among contexts and participants also impact and transform one another. I recognised that it was

essential not just to be mindful but to strive for a deeper understanding of the context and the intricacies of individual realities. Although I aimed to understand each individual's constructed reality, I realised that separating the research into individual components hindered a holistic interpretation of the results. Instead, I needed to grasp how the whole is greater than the sum of its parts to fully understand my findings, which would subsequently inform research-led implications and recommendations.

4.2.2. Epistemological Assumptions

In line with my ontological assumption, I assumed a social dualism constructionism approach for the epistemological assumption of my study. In this approach, knowledge is assumed to be socially constructed, and cultural context impacts and moulds one's viewpoints and knowledge (Braun & Clarke, 2013; Patton, 2015). This approach also assumes that knowledge is relative to time and place. Through this approach, I acknowledged that stakeholders have different experiences and perceptions. In this study, the stakeholders were the SLP students and clinical educators. The experiences and perceptions of all stakeholders deserve to be investigated, and each stakeholder's knowledge, as constructed through their experience, is valid and real (Patton, 2015). This epistemological positioning was endorsed because it defines knowledge production as empirical and grounded in the data one collects and in understanding the data (Braun & Clarke, 2013). Critical theory was also incorporated into my epistemological assumptions. In qualitative research, critical theory highlights that the researcher needs to be aware of how knowledge created is firmly grounded in the understanding of social structures (social inequalities), power relationships (power inequalities), and the agency of people (how people actively think about their worlds) (Bhavnani et al., 2014).

I recognised the dualism of this approach as I aimed to differentiate between the objective characteristics of the domains under investigation and the stakeholders' perceptions of these characteristics (Patton, 2015). This differentiation required an objective analysis of critical thinking skills and their potential connections to clinical measures, such as self-reflections, alongside an exploration of how stakeholders, including clinical educators and SLP students, perceived and represented these features (Patton, 2015). This epistemological perspective necessitated the mixed methods approach I employed for this research project. However, while I sought to understand each stakeholder's experience of implementing inquiry-based learning in clinical education to enhance the critical thinking skills of SLP students, I realised that, consistent with my ontological perspective, I needed to understand how their experiences and perspectives were interwoven and influenced one another (Patton, 2015). I had to interpret the results with the understanding that the whole is greater than the sum of its parts, as identified in my ontological assumption. This recognition led me to incorporate complexity theory as the theoretical lens through which I made sense of my results and their implications.

4.3. A Theoretical Lens of Complexity Theory in Clinical Education

Clinical education in the health sciences is a complex and multilayered system (Fraser & Greenhalgh, 2001; Grant et al., 2023). When analysing and interpreting my findings, I realised that this system must be viewed through the lens of complexity theory. In this section, I define complexity theory and explain its relevance to my study. Specifically, I contextualise complexity theory within the clinical education of SLPs and within the South African context of healthcare service provision and education transformation.

Fraser and Greenhalgh (2001) and Grant et al. (2023) support my view of clinical education in the health sciences being a complex system. They acknowledge that complexity in clinical education needs to be considered and accounted for, especially when developing and implementing education interventions. In the seminal work by Plsek and Greenhalgh (2001) and Fraser and Greenhalgh (2001), they define a complex system as a system that comprises different groups of agents that interact with one another, resulting in interconnections and activities that occur in real-time and over periods of time, which then alter the context, the process, and the outcomes for themselves and others. Complexity theory explores nonlinear systems, which are also termed complex adaptive systems (Plsek & Greenhalgh, 2001). A complex adaptive system is formally defined as "*a collection of individual agents with freedom to act in ways that are not always totally predictable and whose actions are interconnected such that one agent's actions change the context for other agents*" (Plsek & Greenhalgh, 2001, p. 625).

A complex adaptive system is typically nested within other complex adaptive systems (Plsek & Greenhalgh, 2001). It is important for a researcher to consider these nested complex adaptive systems when investigating complexity (Sturmberg & Martin, 2013). Therefore, complexity theory does not break a system into its individual parts and attempt to analyse the individual parts to understand the whole system (Grant et al., 2023). In complexity theory, breaking a system into individual parts is seen as reductionist (Grant et al., 2023). Such an approach would not allow me, as a researcher, to understand how the parts interact with one another and impact one another (Grant et al., 2023). In a complex environment, there is generally not a straightforward outcome from implementing a certain intervention, procedure, or process (Braithwaite et al., 2017). Unanticipated processes and outcomes can occur due to the

unpredictable nature of the participants and the environment in which they interact with each other (Braithwaite et al., 2017). This unpredictability forms the tensions and paradoxes inherent in complex adaptive systems (Braithwaite et al., 2017).

The student learning that occurs in clinical education is a nested complex adaptive system that occurs within a broader nested complex adaptive system of healthcare service provision and healthcare systems (Fenwick & Dalhgren, 2015). Thus, student learning in clinical education illustrates how multiple complex systems interact with one another (Fenwick & Dalhgren, 2015). The interaction between these two complex systems also made me aware of the need to use complexity theory as a theoretical lens to understand my results. Therefore, when I explored the use of a different pedagogy for transforming teaching and learning in the South African context, complexity theory allowed me to understand my study, which occurred within nested complex adaptive systems. Bleakley (2010), Fenwick and Dahlgren (2015), and Jorm et al. (2016) used complexity theory as a theoretical lens to explore healthcare education interventions in previous research studies.

The healthcare education system of SLP clinical education is complex due to the individual clinical educators, the individual students, the placements where they complete their clinical practicals, the individual patients that they work with, and the South African context of healthcare service provision. Complexity arises not only from these agents engaging with one another but also from the other systems with which they are involved (Fenwick & Dalhgren, 2015). These other systems include the academic environment, which includes the institutional context, culture, and ethos at the university, the student experience of other clinical placements

with different clinical educators, and additional life circumstances that could impact and change an agent within this complex healthcare education system.

At Wits, SLP clinical education is further complicated by the Department of Speech-Language Pathology being situated within the Faculty of Humanities, unlike most other universities where it is part of the Faculty of Health Sciences. Officially, students are required to meet the expectations of the Faculty of Humanities, as that is where they are registered. However, the nature of their training means they are also expected to develop competencies typically emphasised in health sciences. This unofficial dual expectation means that students must balance the health-focused skills needed for clinical practice with the broader, contextually-oriented perspectives emphasised by the humanities.

The way in which all these agents interact could lead to unintended and unpredictable outcomes within the healthcare education system (Plsek & Greenhalgh, 2001).. When these outcomes arise, the system and/or the individuals involved adapt to them over time, and the adaptations that occur are unpredictable (Plsek & Greenhalgh, 2001).. Due to all these interactions, the whole needs to be understood as it is different from the individual aspects that create the clinical education system in the health sciences (Grant et al., 2023; Plsek & Greenhalgh, 2001; Thompson et al., 2016). Therefore, using a complexity theory perspective helped me avoid fragmenting the various participant groups and timelines in the programme evaluation of implementing inquiry-based learning with SLP students.

Furthermore, I had to recognise that complex systems are inherently unpredictable, requiring

flexibility and openness to new insights that may not follow a straightforward pattern (Grant et al., 2023; Plsek & Greenhalgh, 2001; Thompson et al., 2016). Embracing this aspect of complexity allowed me to appreciate that real-world phenomena often lack simple explanations and demand a broader perspective (Grant et al., 2023; Plsek & Greenhalgh, 2001; Thompson et al., 2016). Many aspects of the study were beyond my control, including how clinical educators implemented inquiry-based learning, the dynamics between educators and SLP students, the students' experiences, their clinical placements, and the patients they encountered. Despite this unpredictability, patterns emerged from the social structures, enabling me to understand the complex system and the impact of inquiry-based learning on developing critical thinking skills in the South African context.

Awareness of complexity is important in the South African context because students must adapt to the specific settings where they provide services, especially in a country marked by inequitable access to healthcare and limited resources. This inequity, rooted in South Africa's socio-political history, has had a significant impact on healthcare services, particularly for the majority of the population (Dudley et al., 2015; van Heerden, 2013; Van Staden, 2021). The complexity of this inequity adds another layer to an already complex healthcare system. Therefore, SLP students must not only provide person-centred care to individual patients but also remain aware of the disparities in service provision across the country (Pillay et al., 2020). They need to ensure that the therapy services they provide are relevant to the healthcare context and meet the needs of the communities they serve (Dudley et al., 2015; Pillay et al., 2020; van Heerden, 2013; Van Staden, 2021).

In South Africa, SLPs often work in under-resourced environments, providing therapy to patients from varied cultural and contextual backgrounds (Pillay et al., 2020). Working in these environments requires SLPs to be flexible, adaptive, and innovative in their approach (Pillay et al., 2020). A further generator of complexity in the South African context is the need for higher education institutions to transform the teaching and learning of healthcare professionals so that they produce healthcare professionals with locally relevant skills that address community needs (Van Staden, 2021).

In my study, I acknowledged that the context of South Africa and the inequitable access to healthcare services that many patients face are generators of complexity that add to the nested complex adaptive systems. The South African context is also a further generator of complexity with the need to transform teaching and learning for SLP students so that they know how to provide services in the different, evolving, and inequitable contexts where they may provide services as students and future clinicians. Developing critical thinking skills in SLP students aligns with the Department of Speech-Language Pathology's broader vision at Wits, which aims to transform and equip students to be contextually relevant and community-oriented. This objective also supports the Wits 2033 Strategic Framework, which highlights the university's commitment to promoting social justice and equitable healthcare service provision (University of the Witwatersrand, 2022).

Therefore, to integrate this complexity into my study, I employed programme evaluation as a framework so that I could understand the outcomes and processes that occur during an SLP clinical education intervention. The next section details the methodological framework of

programme evaluation for my study.

4.4. Programme Evaluation as a Methodological Framework for a Clinical Education Intervention

Programme evaluation is a well-documented theoretical framework that contributes to initiating, documenting, and analysing organisational or community change (Donaldson, 2022; Skivington et al., 2021). Moving beyond simply determining whether a programme is effective, it explores how and why an intervention works and what other factors arise during implementation (Donaldson, 2022; Skivington et al., 2021). Additionally, programme evaluation enables educators to understand how students learn, making it an appropriate method for assessing the education of healthcare professionals (Haji et al, 2013). Haji et al. (2013) suggest that researchers should use programme evaluation more frequently when evaluating educational programmes.

I chose programme evaluation as my theoretical framework so that the outcomes and processes within the second and third-year clinical education community could be documented and analysed. I did not merely want to determine whether the use of inquiry-based learning changed the critical thinking skills of SLP students. I wanted to have a contextualised understanding of how the programme induced change. Understanding this change provides details of enablers and constraints of implementation (Skivington et al., 2021).

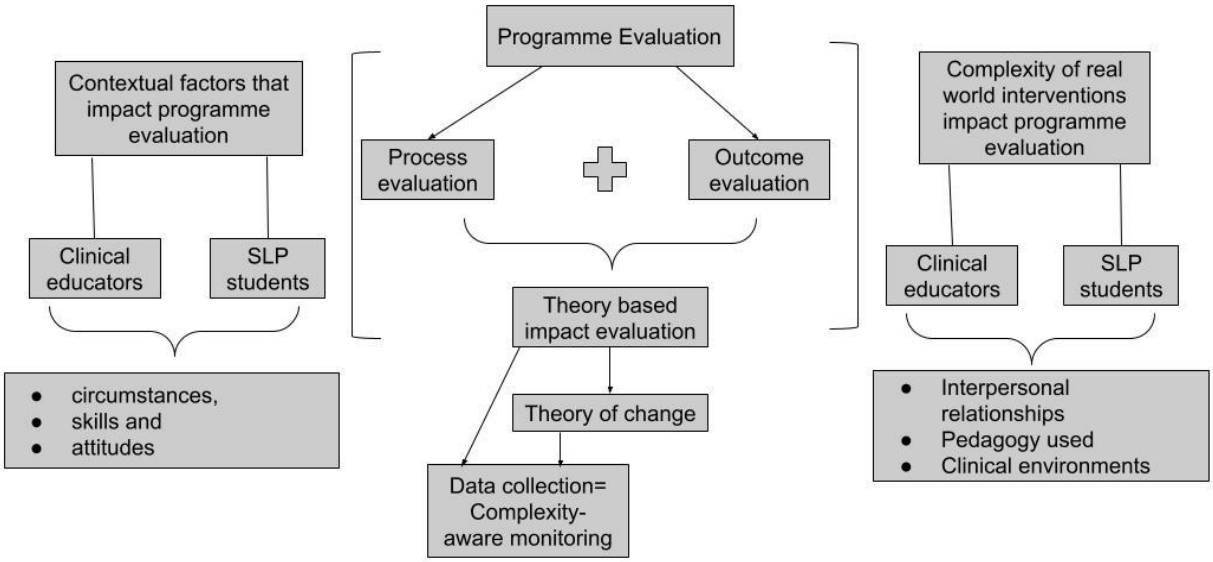
Programme evaluation is guided by a theory of change and requires attention to complexity during data collection (Donaldson, 2022; Skivington et al., 2021). While evaluating the process and outcomes, I remained aware of the contextual factors affecting both clinical educators and

SLP students. I also considered the complexities inherent in real-world interventions, including interpersonal relationships, the pedagogies employed, and the clinical environments in which education took place (Donaldson, 2022; Skivington et al., 2021).

Viewing the clinical education process of SLP students with their clinical educators as a complex system allowed me to acknowledge the connections between individual components and that their interactions and relationships might lead to novel, unpredictable outcomes that might be intended or unintended (Moore et al., 2014; Tuffin, 2016). To ensure the results from this study could be used to inform future developments and the application of this intervention in another setting or population, complexity needs to be acknowledged and incorporated into the methodological framework (Skivington et al., 2021). Figure 4.1 provides a contextualised understanding of the programme evaluation in my study.

Figure 4.1

Overview of the programme evaluation employed for my research



Note. Based on Skivington et al. (2021)

The contextual and demographic factors of the participants in this study added to the complexity of my study (Skivington et al., 2021). Contextual factors included several clinical educators, several SLP students, and a variety of clinical education sites during the implementation of the inquiry-based learning programme. Demographic factors, including age, type of schooling provided, socio-economic status, and beliefs about healthcare and rehabilitation, also add to this complexity (Skivington et al., 2021). The contextual and demographic factors comprise factors that were present before and during the intervention and ones that emerged due to the intervention (Skivington et al., 2021). They may have influenced the implementation of inquiry-based learning and the outcomes thereof (Skivington et al., 2021). I have detailed the demographic factors that I needed to consider for this research in Table 4.1.

Table 4.1

Demographic factors that impact inquiry-based learning implementation

Clinical educators	Students
Training institution where training was received	Academic curriculum (previous years and current)
Clinical SLP experience	Clinical exposure and experience
Own experiences of clinical education as a student	Prior clinical educator experiences
Socio-economic factors	Socio-economic factors
Skills and attitudes	Skills and attitudes
Cultural factors	Cultural factors

Clinical educators	Students
Life experiences, e.g., being a parent, having a child with a disability	Life experiences, e.g., having a family member with a disability, being a parent
Previous learning experiences	Previous learning experiences

There are several approaches to programme evaluation. I chose a method called theory-based impact evaluation, which is an established framework used in numerous programme evaluations (Donaldson, 2022; Gertler et al., 2016; Rogers, 2009; Stern et al., 2012; Ton, 2012). Theory-based impact evaluation aims to understand a programme's impact and the reasons behind it by investigating the underlying assumptions of the theory of change (Donaldson, 2022). I detail the six fundamental principles of theory-based impact evaluation in Table 4.2. These principles assisted in building the theory of change for the evaluation, and I used them as a guide for analysing the data collected (Rogers, 2009; Stern et al., 2012; White, 2009).

Table 4.2

Six key principles of theory-based impact evaluation (Mayne, 2015; Rogers, 2009; Stern et al., 2012; White, 2009)

Key Principle	Explanation
Develop a theory of change	The theory of change refers to the model that depicts how an intervention is meant to work. To establish if and how an intervention works, researchers need to understand how the intervention's activities are expected to result in the desired outcomes. The components of the theory of change include activities, outputs, reach and reaction, capacity changes, behavioural changes, direct benefits, and well-being changes. It also considers external influences and unanticipated results.
Understand context	Contextual factors, as defined and discussed above, are important for impact evaluation, as all contextual factors can influence the theory of change and the outcomes. Context is also understood by reading a broader range of literature to comprehend the contextual influences. Understanding context will also support understanding the generalisation of the impact evaluation results.
Anticipate possible impact heterogeneity.	The impact of the intervention can vary according to its design, characteristics of stakeholders, or socio-economic setting. By analysing the underlying theory, possible heterogeneity can be exposed and anticipated. A researcher must also be aware of heterogeneity, as impacts vary over time and do not generally occur linearly. The impact of an intervention may change over time, and the findings may be sensitive to the time the impact is measured. Hence, being aware of possible heterogeneity will

Key Principle	Explanation
	allow one to consider this when interpreting results.
Rigorous evaluation of impact through a credible counterfactual argument	The counterfactual argument seeks to determine what would have happened without the intervention. It compares what practically happened with a theoretical model. The theoretical world is described as counterfactual as it cannot be observed empirically. A counterfactual argument is helpful in an evaluation where the researcher is unable to have an experimental design.
Rigorous factual analysis	The links in the theory of change are generally based on factual analysis. Targeting analysis is a type of factual analysis present in all evaluations. It occurs using a representative sample. The researcher must decide who benefits from the programme. In the case of this research, a representative sample needs to be drawn from clinical educators and SLP students. Targeting analysis should occur at varying levels. This analysis aids in understanding the results acquired. A solid empirical analysis is required to explain the impact of an intervention.
Mixed methods	Using qualitative and quantitative approaches is essential to monitor implementation and determine outcomes and impacts.

Theory-based impact evaluation predominantly comprises two tendencies for the underlying structure of its evaluation (Stern et al., 2012). The first tendency is process oriented. Developing a theory of change for my study was critical to understanding and evaluating the programme's process (Stern et al., 2012). The second tendency is mechanism-oriented, which refers to determining and defining what makes the intervention work (Stern et al., 2012). It queries what mechanisms are required to be present for the intervention to have an impact (Stern et al., 2012). I constructed a theory of change based on a set of assumptions that explain how the intervention achieves its goals and the conditions that facilitated or hindered the desired goals. The theory of change allowed the collected data to be analysed to determine the process of implementation, the impact of the intervention, and the underlying causes for the impact (Donaldson, 2022).

A theory of change, as described by Mayne (2015), has an impact pathway with causal assumptions. The impact pathway has several components including *activities*, *outputs*, *reach and reaction*, *capacity changes*, *behavioural changes*, *direct benefits*, *well-being changes*, and *external influences* (Mayne, 2015). The *activities* refer to the actions that are performed by those individuals participating in an intervention (Mayne, 2015). In my study, the *activities* were the clinical educators participating in the training on clinical education and the use of inquiry-based learning. *Outputs* refer to the direct output that is produced from the activity (Mayne, 2015), and thus for this study, the output was the workshop and information used for training SLP clinical educators to implement inquiry-based learning. The *reach and reaction* refer to the target group of the *outputs* (Mayne, 2015), and in this study, the clinical educators and the SLP students were the target groups for the output. The training was targeted at clinical educators, but it also had to be cognisant of the SLP students as they were the ones who would also be a part of the

intervention. *Capacity changes* refer to changes in knowledge, attitudes, skills, aspirations, and opportunities among those who have engaged with or benefited from the intervention's outputs. These changes are essential for facilitating new actions (Mayne, 2015).

Behavioural changes involve modifications in actual practices, where individuals in the target group alter their actions or use the intervention products (Mayne, 2015). For instance, in my study, this might manifest as clinical educators using inquiry-based learning principles during clinical education. There is often a feedback loop between capacity and behaviour (Mayne, 2015). *Direct benefits* refer to the positive changes in the condition of individual beneficiaries (Mayne, 2015). In my study, *direct benefits* would include SLP students developing their critical thinking skills. *Well-being changes* involve the longer-term, cumulative enhancement of the overall well-being of individual beneficiaries (Mayne, 2015). In my study, well-being refers to the students' ability to bridge the theory–practice divide and thus be able to implement their theoretical knowledge in a clinical environment. This ability to implement theoretical knowledge is a longer-term, cumulative enhancement of the SLP students' skills as clinicians. *External influences* are events and conditions not related to the intervention that might affect the achievement of the intended outcomes (Mayne, 2015). These can include broader economic and social trends, and are not included in the intervention's theory of change (Mayne, 2015).

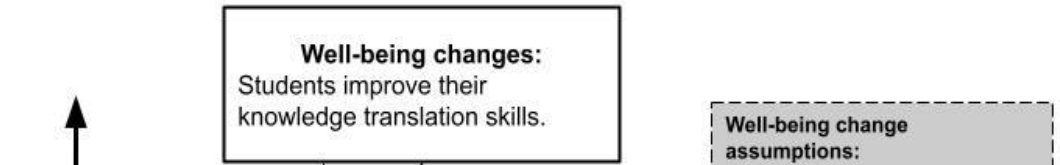
The assumptions in a theory of change are causal assumptions that explain what needs to happen for the links between different elements to be established (Mayne, 2015). The causal link assumptions, depicted in the dotted boxes in Figure 4.2, outline the key events and conditions that must occur for each link in the causal pathway to occur as anticipated (Mayne, 2015). *Reach*

assumptions are the conditions and events necessary for the outputs to effectively reach and be positively received by the target groups (Mayne, 2015). *Capacity change assumptions* are the conditions and events required for the outputs that reach the target populations to lead to changes in their knowledge, attitudes, skills, aspirations, and opportunities, essentially, their capacity to act differently (Mayne, 2015). These assumptions may include the need for the outputs to be understandable, realistic, culturally acceptable, perceived as useful, aligned with the target population's prior abilities and values, and relevant to the reach group (Mayne, 2015).

Behaviour change assumptions are the conditions and events necessary for the changes in the target groups' capacities to translate into actual changes in their practices (Mayne, 2015). *Direct benefits assumptions* are the conditions and events required for practice changes to translate into tangible benefits for the targeted beneficiaries (Mayne, 2015). These might include ensuring that the practice changes lead to the implementation of inquiry-based learning by clinical educators and the development of critical thinking skills in SLP students (Mayne, 2015). *Well-being change assumptions* are the conditions and events necessary for direct benefits to result in improvements in the beneficiaries' overall well-being (Mayne, 2015). In this case, the overall well-being of SLP students for this theory impact programme evaluation is that they can apply theoretical knowledge in clinical practice so that they can be clinicians who provide equitable, just, and efficient SLP services appropriate for the community they serve.

Figure 4.2 depicts the theory of change (impact pathway with assumptions) that was developed for my study using Mayne's (2015) framework.

Figure 4.2



The theory of change used in my study

Note. CTS refers to critical thinking skills. IBL refers to inquiry-based learning. The theory of change is based on Mayne (2015).

4.5. Chapter Summary

This chapter has provided the theoretical framework for my study by describing the paradigm worldview that influenced the theoretical lens of complexity theory for healthcare education.

This theoretical lens then influenced the methodological framework of theory-based impact programme evaluation for my study. This theoretical framework has provided an understanding of why I chose programme evaluation within complexity theory to explore my research question within the South African context. The use of programme evaluation and complexity theory frames the study within the realms of reality-correspondence theory perspective and post positivism as well as social dualism constructionism. In the following chapter, I present the methodology that I used based on this theoretical framework.

CHAPTER 5: METHODOLOGY

5.1. Introduction

This chapter outlines the methodological framework used to investigate the research question. It begins by stating the aims and objectives of the study, followed by a detailed explanation of the research design, which includes the research setting, participant profile and sampling strategy, research strategy, data collection methods, and data analysis procedures. Notably, although an experimental and control group was not originally planned, one emerged serendipitously during my study. As both clinical educators and students opted into participation voluntarily, some students were supervised by participating educators (forming the experimental group), while others were supervised by non-participating educators (forming the control group). This unintended division provided an additional lens through which to explore the potential impact of the pedagogical intervention (McCulloch, 2022). The chapter then outlines the steps taken to ensure scientific rigour, including trustworthiness, reliability, and validity, and concludes with a discussion of the ethical considerations relevant to the study.

5.2. Research Question, Aims, and Objectives

5.2.1. Research Question

How does introducing an inquiry-based learning pedagogy promote the development of critical thinking skills in second- and third-year speech-language pathology students in supervised clinical settings?

It must be noted that in reflecting on the formulation of the research question, it became apparent that the initial phrasing, framed as *"Does introducing an inquiry-based learning pedagogy promote the development of critical thinking skills?"*, implied a binary outcome that did not

adequately capture the complexity of the research. Given the exploratory and context-sensitive nature of this study, the research question was reframed as *"How does introducing an inquiry-based learning pedagogy promote the development of critical thinking skills in second- and third-year speech-language pathology students in supervised clinical settings?"* This shift aligns more closely with recommendations from qualitative methodologists (Creswell & Poth, 2018; Maxwell, 2013; Patton, 2015), who emphasise the importance of open-ended questions that explore processes, meanings, and contextual influences rather than seeking definitive, binary outcomes. Formulating the research question as a "how" inquiry better reflects the study's interpretive paradigm and facilitates deeper exploration of the conditions, mechanisms, and experiences underpinning changes in students' critical thinking skills (Agee, 2009; Mason, 2018).

5.2.2. Research Aims

1. To explore whether introducing inquiry-based learning pedagogy promotes the development of critical thinking skills in second- and third-year SLP students in supervised clinical settings.
2. To explore the implementation of inquiry-based learning pedagogy from clinical educators' perspectives when supervising second- and third-year SLP students in a clinical setting.
3. To explore the second- and third-year SLP students' perspectives of clinical education pedagogies to which they are exposed during the clinical curriculum before and after the implementation of inquiry-based learning, and the potential impact of this approach on their critical thinking skills.
4. To determine the profile of critical thinking skills present in second- and third-year SLP

students and how this profile evolves over a year with the introduction of an inquiry-based learning pedagogy.

5.2.3. Research Objectives

1. To explore the pedagogies employed by clinical educators for clinical education before and after implementing inquiry-based learning through self-assessment and focus groups.
2. To explore the implementation of inquiry-based learning by clinical educators for the duration of a year through weekly audio diaries and a Likert scale at the end of each block.
3. To explore student SLPs' perspectives of clinical education pedagogies to which they are exposed during the clinical curriculum before and after the implementation of inquiry-based learning through an initial open-ended online survey and then a focus group at the end of the year.
4. To explore student SLPs' perspectives of clinical education based on inquiry-based learning by analysing Likert scales at the end of each block.
5. To investigate the change in critical thinking skills profiles of SLP students across one year of study employing critical thinking skills assessment measures.
6. To investigate the critical thinking skills observed in student self-reflections and how these changed over a year.

5.3. Research Design

As detailed in the previous chapter, complexity theory was the primary theoretical lens underpinning the development of the research design. Programme evaluation served as the

overarching methodological framework guiding the study, particularly through a theory-based programme evaluation approach. This approach facilitated the exploration of both outcomes and processes associated with introducing inquiry-based learning into clinical education. Aligned with the complexity-informed nature of the research, this framework acknowledged the dynamic, context-sensitive interactions between students, clinical educators, and educational environments (Donaldson, 2022). Additionally, a theory of change was developed to conceptualise the intended pathway of impact, which later guided the interpretation of results in the discussion chapter. (Mayne, 2015)

To support this evaluative approach, the study employed a longitudinal, convergent, multilevel, and multimethod mixed methods design. The convergent design, as described by Creswell and Plano Clark (2018), enabled qualitative and quantitative data to be collected concurrently and then integrated to provide a comprehensive understanding of the research problem. A mixed methods design is particularly effective in theory-based programme evaluation, as it allows the integration of diverse data sources to capture both the depth and breadth of insights (Bamberger, 2012; Creswell & Plano Clark, 2018). The design was pragmatic, reflecting the intention to examine real-life educational practices without artificially controlling contextual or moderating variables (Eccles et al., 2003).

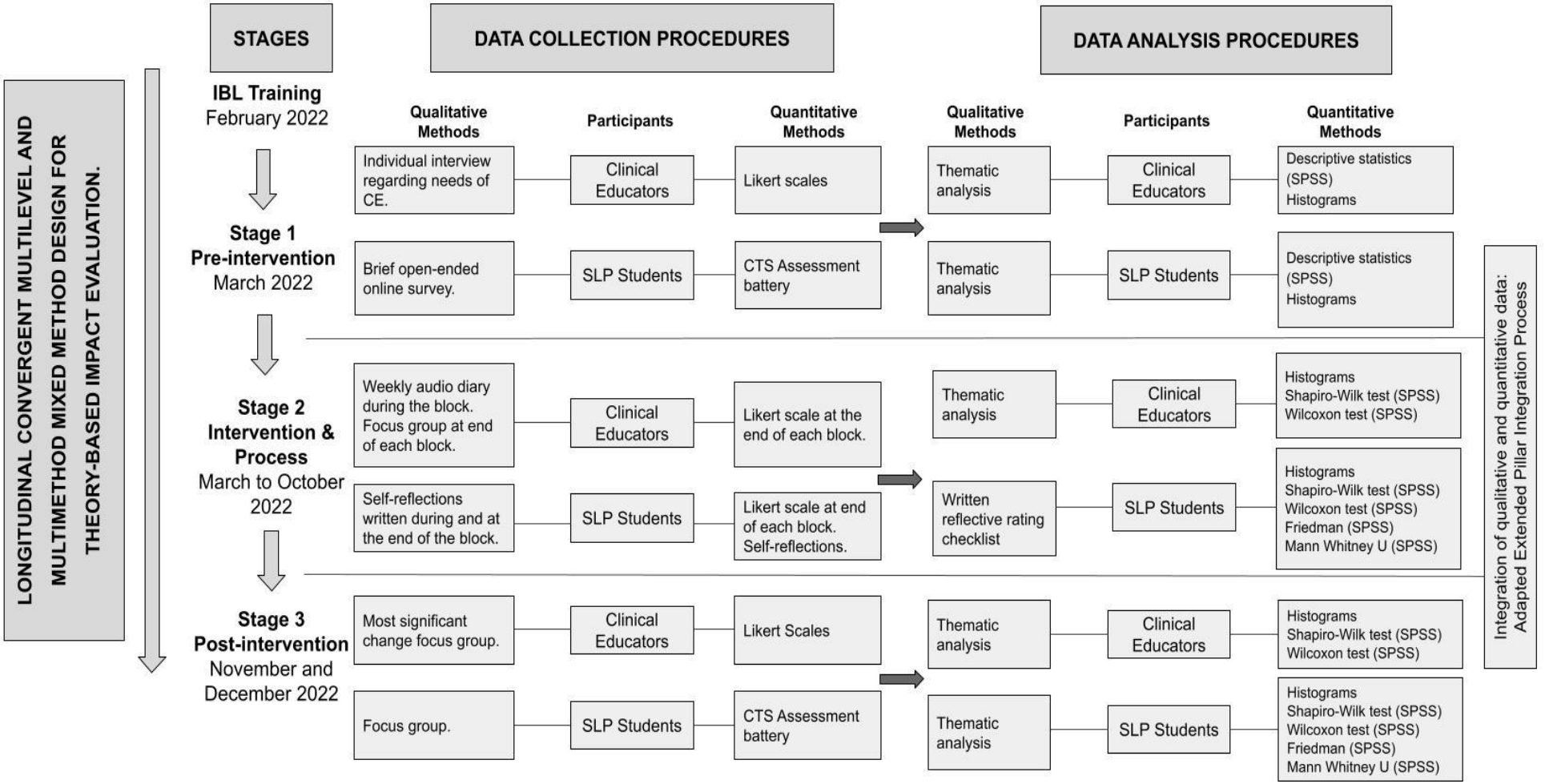
Given the complexity inherent in investigating the impact of inquiry-based learning, data collection and analysis procedures are presented systematically, organised by participant group (students and clinical educators), timing (pre-, during, and post-intervention), and data type (qualitative or quantitative). Similarly, analysis methods are categorised into qualitative

and quantitative approaches to simplify understanding. Figures 5.1, 5.2, 5.4 and 5.5 visually illustrate these procedures, providing clarity regarding how multiple datasets and analyses contribute to addressing the research question.

The research was structured into three stages: Stage 1 (pre-intervention), Stage 2 (during intervention), and Stage 3 (post-intervention), conducted throughout 2022. Prior to Stage 1, clinical educators received training on implementing inquiry-based learning in clinical education, with additional training and support provided throughout the year. Quantitative and qualitative data were collected at each stage from clinical educator participants and SLP students. Figure 5.1 offers an overview of the research design. The following sections detail the research setting, strategy, participants, sampling approach, data collection methods, and data analysis techniques.

Figure 5.1

Overview of the research design



5.3.1 Setting

At Wits, a four-year professional degree is offered to students to obtain a Bachelor of Speech-Language Pathology. The year is divided into two semesters, and each of those semesters is divided into two blocks. Thus, across the year, there are four blocks, named Block 1, 2, 3, and 4. One block is typically seven weeks in duration. This degree and its structure are approved by the HPCSA, and the curriculum aligns with the SLP degrees offered throughout South Africa, where a four-year degree is standard, followed by one year of compulsory community service work.

The students complete theoretical work across the first to fourth year. From the second to final year of the degree, they provide speech-language therapy in a variety of contexts. In the second year, students typically provide therapy for articulation and phonological disorders and preschool and school-age language. They also provide early communication intervention. In the third year, students are required to provide therapy for more complex paediatric cases such as stuttering, autism, cerebral palsy, and language learning disorders. Third-year students are also exposed to learning how to engage with adults who have had a stroke, head injury, or a neurodegenerative disease. However, they do not provide intervention at this stage. In their fourth year, students are expected to provide therapy in a hospital setting as well as with outpatients. They are required to provide therapy to paediatric and adult patients with dysphagia. They are also required to provide therapy for adults with motor speech disorders, aphasia, dementia, cognitive-communication difficulties, and dysphonia. The paediatric caseload ranges from early communication intervention to providing therapy for children with more complex needs.

Multiple clinical settings are used for clinical education in this degree programme. These settings

include government schools, schools for children with complex communication needs, places of safety for children such as orphanages, and care facilities for older persons who require care due to a stroke, traumatic brain injury, and/or neurodegenerative disease. Different clinical educators are present at each clinical setting where the practicals are conducted, thus exposing students to a variety of clinical educators.

5.3.2. Research Strategy

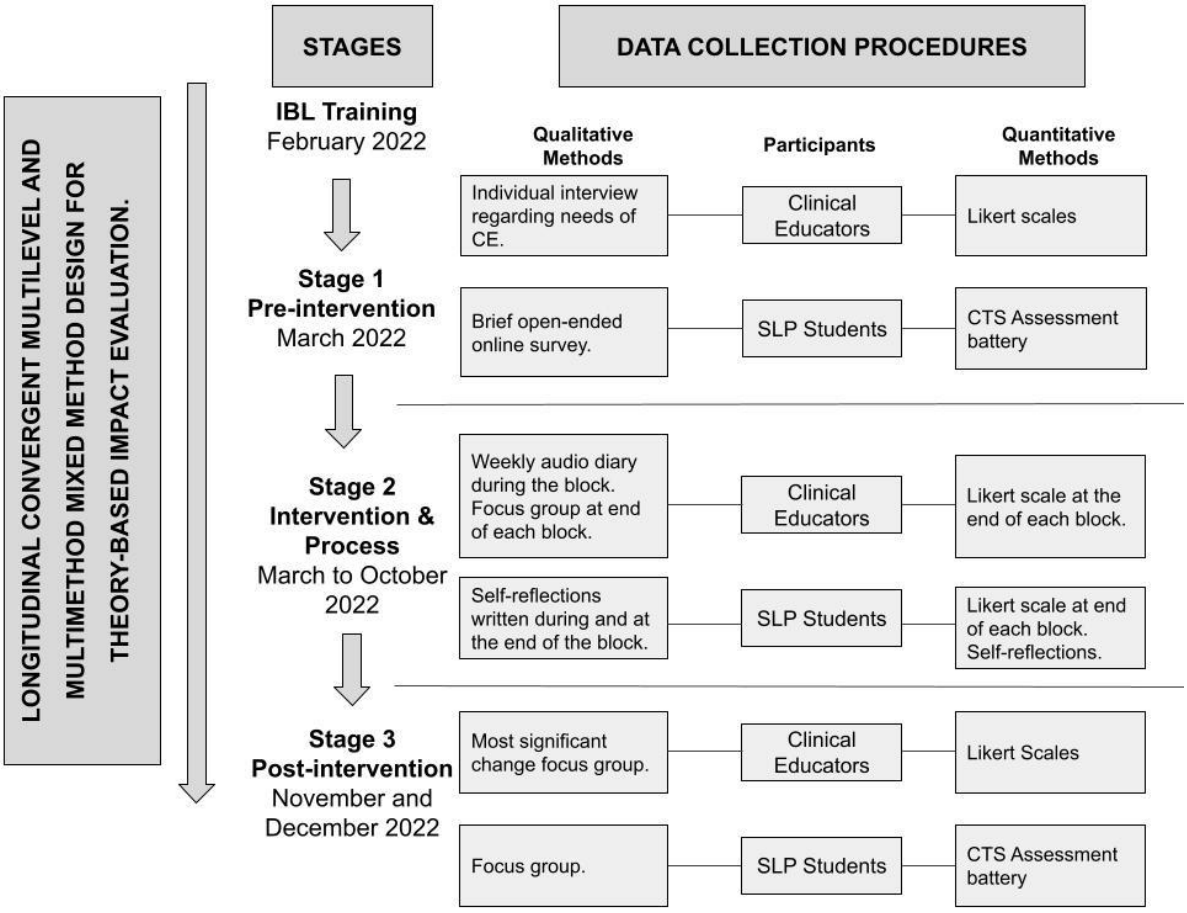
Initially, when drafting my research proposal, I considered using an experimental design with a control group. However, logistical and ethical concerns arose, and this design did not align with my ontological and epistemological assumptions. Therefore, I needed to choose a more compatible methodology. After consulting a research design expert, I explored the literature on programme evaluation. I initially aimed to investigate whether inquiry-based learning improved students' critical thinking skills, but I soon realised that this approach was overly simplistic and did not account for the real-world complexities of the clinical education process and would not have accounted for the process which would lead to the potential changes.

Therefore, I also had to research more on the complexity of real-world interventions and their impact on research so that I could weave this into my research design. I selected theory-based impact programme evaluation to investigate the processes and outcomes of inquiry-based learning for clinical educators and SLP students in their everyday experiences. This approach focused on how individuals constructed their realities while participating in clinicals, considering the perspectives of both clinical educators and students (Donaldson, 2022). The emphasis on participant realities and experiences was crucial in my decision to use this evaluation method.

Figure 5.2 provides an overview of the research strategy. Each stage of the research strategy is introduced below.

Figure 5.2

Overview of the research strategy



5.3.2.1. Inquiry-Based Learning: Training for the Clinical Educators

Prior to the data collection in Stages 1, 2, and 3 of the research, clinical educators were trained in the use of inquiry-based learning as a pedagogy for providing clinical education for SLP students in a variety of clinical settings. The training was conducted by an inquiry-based learning educational expert and me. This training program was an intervention developed in collaboration with the inquiry-based learning educational expert. She is accomplished in the educational field

and in implementing inquiry-based learning, which made her suitable to assist in developing and facilitating the inquiry-based learning training intervention.

In collaboration with the educational expert, the inquiry-based learning training intervention was developed during the proposal phase. Three planning meetings were held prior to commencing data collection. These sessions included information sharing regarding the roles and responsibilities of clinical educators, SLP students, clinical education needs, the development of critical thinking skills in SLP students, and current clinical education pedagogies. She also received input from me on how SLP clinical training was structured regarding practical sites and the general input provided by clinical educators, for example, in tutorial groups and written feedback on sessional plans and after sessions had been observed. An inquiry-based learning training intervention that was specific to SLP clinical educators was developed through the meetings and information sharing.

The training intervention followed an inquiry-based learning cycle comprising orientation, conceptualisation, investigation, conclusion, and discussion so that clinical educators experienced inquiry-based learning for themselves (Pedaste et al., 2015). The outcome of the inquiry-based learning training was co-creating a tool to assist clinical educators in implementing inquiry-based learning and providing students with feedback during clinical practicals. Co-creation of the tool was essential to facilitate ownership of the project and ensure it met the needs of the clinical educators (Kaminskienė et al., 2020).

The synthesised inquiry-based cycle developed by Pedaste et al. (2015) was used as the

framework for the clinical educator training. Each phase of the inquiry-based learning cycle was explored and then discussed regarding application during clinical education of SLP students. Synchronous training was completed via an online platform given its convenience for the clinical educator participants. This training occurred for three hours on one morning in March 2022.

Bell and Loon (2015) and Bailin and Battersby (2015) suggest that to "flip" the SLP classroom and employ a pedagogy to stimulate critical thinking skills, active learning strategies must be incorporated into the course design. Thus, clinical educators were trained using principles that "flip" learning. For each phase of the inquiry-based learning cycle, clinical educators were provided with strategies for its implementation with the students they supervised. In the *Orientation phase*, clinical educators were encouraged to introduce students to the topic that would be investigated (Pedaste et al., 2015). For example, at the beginning of the second year of study, this might have been an investigation into the appropriate assessment of articulation and phonology. In contrast, at the beginning of the third year of study, the assessment of a learner with complex communication needs was the focus.

In the next step, *Conceptualisation*, clinical educators encouraged students to form key concepts that needed to be studied during the inquiry-based learning process (Pedaste et al., 2015). These key concepts needed to be student-inspired and student-driven based on the case they were working with (Pedaste et al., 2015). Each student was encouraged to develop their own hypothesis or question (Pedaste et al., 2015). For example, how and why does one assess literacy in a teenager with complex communication needs? The clinical educator was encouraged to assist students in thinking of open questions that could guide them to investigate the chosen

phenomenon to provide appropriate SLP assessment and intervention for the clinical site.

During the *Investigation phase*, clinical educators encouraged students to explore the data, gather appropriate data, and then interpret the data to answer the student-generated hypothesis or question (Pedaste et al., 2015). This investigation phase occurred when clinical educators provided students with a collaborative space in tutorials and feedback sessions to share what they were investigating and what data they had been able to gather and interpret (Pedaste et al., 2015). The clinical educators guided their conclusions through questions and statements that engaged the students' critical thinking skills (Pedaste et al., 2015). Clinical educators were provided with suggestions for the types of questions and activities that facilitated this process. Implementing inquiry-based learning could occur during tutorial times or via the electronic feedback provided to students. It depended on the time demands of the specific clinical site. Using the inquiry-based learning model encouraged students to be active learners responsible for their learning and engaged critical thinking skills with the support of the clinical educator to translate knowledge into clinical skills (Pedaste et al., 2015).

5.3.2.2. Stage 1 – Pre-intervention

Stage 1 of the research took place in March 2022. This stage explored clinical education experiences of the clinical educator and the student SLP before implementing inquiry-based learning. Recruitment was initiated at this stage. The research project was presented to the students and clinical educators in March 2022 once faculty approval and ethics clearance were obtained.

During stage 1, a detailed analysis of clinical educator and student demographics was obtained from those who consented to participate, and their previous clinical education experiences were explored. This was also the stage where the initial assessment of students' critical thinking skills and thinking dispositions occurred.

5.3.2.3. Stage 2 – Intervention and Process

Stage 2 of the research occurred from March until October 2022. The process of implementing inquiry-based learning from the perspectives of clinical educators and student SLPs was explored. At the end of blocks 2 and 3, there were training times when clinical educators could share what was working regarding the implementation of inquiry-based learning and how they thought the implementation of inquiry-based learning could be improved. Participation of stakeholders was important as it increases buy-in and the understanding of the purpose and need to implement the intervention and the evaluation tasks (Brandon & Fukunaga, 2014; Cousins & Whitmore, 1998; Odera, 2021). During the implementation process, clinical educators and student SLPs reflected on the process and their perceptions of the influence of inquiry-based learning on developing critical thinking skills.

5.3.2.4. Stage 3 – Post-intervention

Stage 3 occurred in November and December 2022. This stage explored the influence of implementing inquiry-based learning on students' critical thinking skills development and their clinical education experience for the year. It also explored the clinical educators' experiences of implementing inquiry-based learning across the year and their perceptions of the influence of the learning approach on students' critical thinking skills.

5.3.3. Participants and Sampling Strategy

This section discusses the participants by group and describes their demographic and contextual factors, followed by a discussion of the sampling strategy employed. Presenting demographic data in *Chapter 5* was a deliberate choice to provide a clear and contextualised overview of the participant groups prior to the interpretation of findings. This structure highlights the relevance of participant characteristics, such as year of study, role, and demographic profile, to both the qualitative and quantitative components of the study. Presenting this information at the beginning ensures that the results are interpreted with appropriate attention to context, which is particularly important in research involving programme evaluation, where participant background may influence engagement with the intervention and the outcomes observed. (Cohen, Manion, & Morrison, 2018) .

5.3.3.1. Clinical Educators

In 2022, there were 9 second-year clinical educators and 10 third-year clinical educators. Some clinical educators provided clinical education for both second- and third-year students, while others focused solely on one year group. This overlap resulted in a total of 16 second- and third-year clinical educators, a number that was lower than the sum of those working with each individual year group. All clinical educators were invited to participate. There were no exclusion criteria for clinical educators, as I wanted to ensure a wide range of clinical educators participated in my study to avoid a homogenous group. If a clinical educator declined to participate in this study, they were welcome to attend the training on the inquiry-based learning pedagogy if they wished, without participating in the data collection.

The sample size required for the quantitative analysis was a minimum of 14 participants. This number was based on a sample size calculation of a population of 16 clinical educators with a confidence level of 90%, a margin of error of 10%, and a response distribution of 50%. Since the ideal number for the quantitative study was 14 participants, the provisional anticipated range that was aimed for was 12–16 participants so that adequate data could be collected. This sample size was calculated to be sufficient for the requirements of the planned statistical tests and to provide a good estimate of the parameters of the population being sampled (Creswell & Plano Clark, 2018). The sample size needed to be adequate to provide a precise and representative estimate of key characteristics of the larger population, such as means, variances, and proportions. By achieving this, the research aimed to ensure that the findings could be generalised with confidence to the broader population, enhancing the validity and robustness of the study conclusions (Creswell & Plano Clark, 2018).

The sample number for the qualitative data collection was based on Braun and Clarke's (2013) recommendation. They recommended that if a researcher is using thematic analysis of interviews, six to ten participants are needed. Therefore, if 14 clinical educators participated, I would have sufficient participants for the quantitative and qualitative samples. Seven of the 16 clinical educators employed in the department agreed to participate. Therefore, the 7 clinical educators who participated were sufficient for the qualitative aspect of my data collection but not for the quantitative aspect and thus, statistical analysis of the results had to be considered cautiously.

Of these 7 clinical educator participants, 5 work full-time for the Department of Speech-

Language Pathology at the University of the Witwatersrand, while 2 work part-time as sessional clinical educators. This disparity in participants who are full-time versus part-time employees of the university reflects the obstacles encountered during the recruitment phase. These obstacles could include a lack of interest, availability, time and/or resources required to participate in this research. Not being paid for their time to participate in the research study may have also impacted the involvement of part-time staff members. Appendix C provides detailed information on the clinical educator participants.

Specific demographic and contextual factors that added to the complexity of the clinical educator–student education relationship and implementation of inquiry-based learning included the level of clinical educator education, the training institutions where their degrees were obtained, life experiences (e.g., a family member with a disability), years of experience as a clinician and as a clinical educator, and the training they have received as a clinical educator. Huhn et al. (2014) report that a therapist's demographic and contextual factors (life circumstances and clinical experience) interact with their cognitive factors (critical thinking skills and metacognitive skills) when making clinical decisions. These demographic and contextual factors may have influenced the implementation of inquiry-based learning and the outcomes (Moore et al., 2014). I acknowledge their potential influence on my study.

In line with current guidance on the ethical reporting of race and ethnicity in health and medical research (Flanagin et al., 2021), my study did not collect or correlate participant race data. The decision was underpinned by my recognition that race is a social construct with no biological basis, and that its use in research without careful contextualisation risks reinforcing stereotypes

or misrepresenting findings (Borrell et al., 2021). Given the study's primary focus on pedagogical approaches in clinical education, analysing outcomes by race would not only have lacked conceptual alignment with the research aims but may also have introduced potential ethical concerns related to misinterpretation or unintentional bias (Flanagin et al., 2021). Furthermore, leading guidance suggests that the reporting of race and ethnicity should not occur in isolation but must be situated within broader sociodemographic and structural determinants, such as systemic racism, and socioeconomic inequities (Flanagin et al., 2021). These contextual complexities were beyond the scope of this study. Consequently, the decision not to include race as a variable supports the aim of conducting equitable and socially responsible research. Appendix D details the questions asked to obtain the clinical educators' demographic details.

Table 5.2 provides the descriptive characteristics of the clinical educators. All the clinical educators had postgraduate degrees, and it should be noted that they had obtained their undergraduate and postgraduate degrees from various universities. Table 5.2 also describes the years of experience as an SLP clinician (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 presented in the table also acknowledges the unique experiences and backgrounds that clinical educators bring to their clinical education process.

Table 5.2

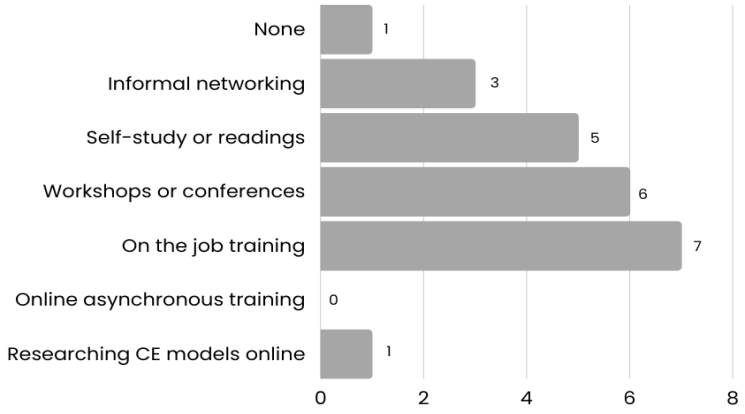
Description of clinical educator demographics

Demographic	Number ($N = 7$)	%
Education		
Masters	6	86%
Doctorate	1	14%
Undergraduate qualification		
University of the Witwatersrand	4	57%
University of Cape Town	2	29%
University of Pretoria	1	14%
Postgraduate qualification		
University of the Witwatersrand	1	14%
University of Cape Town	1	14%
University of Pretoria	1	14%
University of Stellenbosch	1	14%
Trinity College Dublin	1	14%
University College of London	1	14%
	Mean (SD)	Range
Years of experience as an SLP	13.12 (8.27)	7–33
Years of experience as a clinical educator	4.43 (1.92)	1–6

It was also important to consider the clinical educator training the participants had previously received, as that would shape how they provide clinical education. All the clinical educators reported that they had received training on the job and a wide variety of input has been received. Most of the clinical educator training has been informal, with training listed as informal networking, self-study, on-the-job training, and online researching of models. The majority (6 of 7 clinical educators) reported receiving training through formalised workshops and/or conferences. Therefore, the clinical educator participants received a mixture of informal and formal clinical educator training. Figure 5.3 summarises the type of training the clinical educators received.

Figure 5.3

Description of the training that clinical educators reported having received



Note. CE: Clinical education

Acknowledging the diverse backgrounds, experiences, and knowledge bases of clinical educators, shaped by their education, training, and life experiences, is crucial, as these factors can significantly influence the clinical education they provide and impact research outcomes

(Huhn et al., 2014; Moore et al., 2014). This recognition allows for a more comprehensive understanding of their perspectives and expertise (Huhn et al., 2014; Moore et al., 2014).

5.3.3.2. Second- and Third-Year SLP Students

The student participant group comprised two years of study because academic teaching and exposure to realistic clinical scenarios assist in developing students' clinical reasoning skills (Schmidt & Rikers, 2007). Second-year students were selected as they were beginning their clinical curriculum journey. Third-year students had had one year of clinical experience but still required support in developing clinical skills, critical thinking skills, and clinical reasoning.

In 2022, the year of data collection, 34 students were registered for the second year and 34 students for the third year of study in the degree programme. There were no exclusion criteria because I wished to ensure a wide range of students participated in this research study to avoid a homogenous group. The sample size per year of study for the quantitative analysis required a minimum number of 23 participants. This number was based on a sample size calculation of a population size of 34 students with a confidence level of 90%, a margin of error of 10%, and a response distribution of 50%. Since the ideal number for the quantitative study was 23 participants per year of study, the provisional anticipated range was 18 to 28 participants per year of study to ensure that adequate data could be collected.

Sixteen second-year students and 11 third-year students agreed to participate in the research, for a total of 27 student participants. Braun and Clarke (2013) recommend that if a researcher is using thematic analysis of interviews, the researcher needs six to ten participants and two to four focus groups. Therefore, the number of students who agreed to participate was sufficient for the

qualitative analysis but not for the quantitative analysis. Thus, again, statistical results had to be interpreted cautiously.

A review of the second- and third-year academic and clinical course outlines for 2021 revealed that case-based learning was employed during the semesters of academic teaching and clinical education, with a focus on incorporating academic journal articles and reflexive exercises. For the third-year students, it is acknowledged that in 2021 they experienced different clinical educator styles at a second-year level and that the COVID-19 pandemic impacted their clinical practicals. Their clinical practicals in 2021 involved telepractice with minimal face-to-face therapy. They rotated through different sites and had different clinical educators. Due to their varied experiences in 2021, baseline data collection was essential.

Demographic information for the SLP student participants was collected using Google Forms, including questions based on the contextual factors discussed in Table 4.1, which may influence the research. Race and gender were not included in the demographic information collected for SLP students in this study. This omission was deliberate, as I believed that these factors would not significantly impact the ability of students to provide therapy and engage within a clinical setting. As with the clinical educators, I made a conscious decision to exclude race and gender analyses from this research project. This choice was aimed at avoiding any insinuation of disparities among racial groups in therapy provision, which could potentially foster inappropriate discrimination (Flanagin et al., 2021).

In South Africa, socio-economic status, typically classified as low, middle, or high income, plays

a critical role in shaping a student's sense of belonging at university, which in turn affects retention and degree completion (Ahn & Davis, 2023). Students who participated in this study were asked to self-report their socio-economic status, given that it impacts on academic outcomes, and thus I needed to ensure that this was not a contributing factor to my results (See Appendix G for the questions asked to obtain this information, and Appendix H for the detailed information collected).

Students who agreed to participate were supervised by clinical educators who were either participants or not. This resulted in a serendipitous moment in the research as it unintentionally generated an experimental and control group for the study. Serendipity in research is defined as "occurring when advantage is found in a chance occurrence" (McCulloch, 2022, p. 262). In the proposal stage of my study, I did not plan for an experimental and a control group due to the practical and ethical challenges of assigning students to groups and the expected limited number of clinical educators and student participants who would participate. This serendipitous moment was an advantage as I wanted to explore the impact of inquiry-based learning on the development of critical thinking skills in a clinical setting, and this ability to divide students into an experimental and a control group gave me an added advantage to explore my research aim further. Thus, I asked student participants to disclose who their clinical educators were for each block so that I could assign them to either the experimental or the control group based on their clinical educators. If a student had a clinical educator participating in my study, they were in the experimental group. Students with clinical educators who were not participating in this research were thus in the control group.

Table 5.3 provides the demographics of the experimental and control groups of the student participants. I relied on students voluntarily agreeing to participate, therefore, I could not control how many second- and third-year students would participate, and I could not control how many students per year were in the experimental and control groups. I accepted any students who agreed to participate. Thus, whether their clinical educator was a participant or not, was randomised.

The experimental group had fewer students (n = 11) than the control group (n = 16). There was also a very different number of students in each year in the experimental (second years n = 4; third years n = 7) and control groups (second years n = 12; third years n = 4). There was a higher number of third years in the experimental group, while in the control group, there was a higher number of second years. However, there was no statistical significance between the mean age of the two groups (experimental group M = 21.3, SD = 1.4; control group M = 20.7, SD = 1.5). Most participants in both the experimental and control groups were in the medium socioeconomic range (experimental n = 9 (81.8%) and control n = 14 (87.5%). Thus, socioeconomic status should not have influenced the two groups. I was aware of these differences between the experimental and control groups. These differences, however, add to the real-world complexity and messiness of research.

Table 5.3

The demographics of the experimental and control groups of SLP students

	Demographic	Number		Percentage
Experimental	Second-year	4		36.4%
	Third-year	7		63.6%
	Socioeconomic status (self-perceived)	Low	0	0%
		Medium	9	81.8%
		High	1	9.1%
		No answer	1	9.1%
Control	Second-year	12		75%
	Third-year	4		25%
	Socioeconomic status (self-perceived)	Low	0	0%
		Medium	14	87.5%
		High	1	6.25%
		No answer	1	6.25%
		Mean (SD)		Range
Experimental	Age	21.3 (1.4)		20–25
Control	Age	20.7 (1.5)		19–25

Second-year students had had no clinical exposure to conducting assessments and providing

therapy to patients in their first year of study. Thus, they started their second year with no experience of clinical service provision. The third-year students had provided therapy in their second year of studies. Table 5.4 provides information regarding the third-year students' clinical experience in their second year of study, separated into experimental and control groups. All the students had clinical experience in educational settings only, and they had provided therapy for children with articulation errors, language differences, and language disorders.

Table 5.4

Clinical experience of third-year SLP students from their second year of study

	Number of patients treated in their second year. Mean (SD)	Number of hours assessing, treating, and screening in their second year. Mean (SD)	Clinical setting	Types of diagnoses
Experimental group	7.16 (2.14)	92.5 (27.7)	Education	Articulation errors, language differences, language disorders
Control group	5.25 (1.26)	97.5 (17.06)	Education	Articulation errors, language differences, language disorders

5.3.3.3 Sampling Strategy

For both participant groups, purposive sampling was employed due to the small population size. I wanted to include as many SLP students and clinical educators as possible from the original population at the University of the Witwatersrand. This sampling technique was decided upon

due to the perceived variance that a group of students and clinical educators brought to the research (Rapley, 2014). They were not a homogeneous group other than the fact that they were members of the SLP department at a university. Second- and third-year SLP students and the clinical educators who supervised their clinical practicals were invited to participate in the study. Routine teaching and clinical education continued regardless of whether students and clinical educators chose to participate in the study or not.

For both participant groups, the number of participants affected the statistical analysis of the data. This is detailed in the data analysis section. For qualitative data collection, predicting the sample size required the contemplation of the following factors: breadth and focus of the research question, the methods of data collection, and the likely depth of data that would be generated from a participant (Braun & Clarke, 2021a). It is important to remember that this study explored the use of inquiry-based learning in a specific set of students at a specific university. The intention was not to generalise to all SLP students and clinical educators across the country or internationally. Thus, the small sample size is representative of the specific population I wanted to research.

5.3.4. Data Collection Methods

Methodological pluralism was employed because it acknowledges the complexity of the system being investigated (Greenhalgh & Papoutsi, 2018). Methodological pluralism allows the collection of a range of data through creative methods that acknowledge real-world complexity (Greenhalgh & Papoutsi, 2018). Throughout the three stages of the research, a range of qualitative and quantitative data collection techniques were used. Figure 5.4 provides an overview of the data collection for each stage. This section describes each of the qualitative and

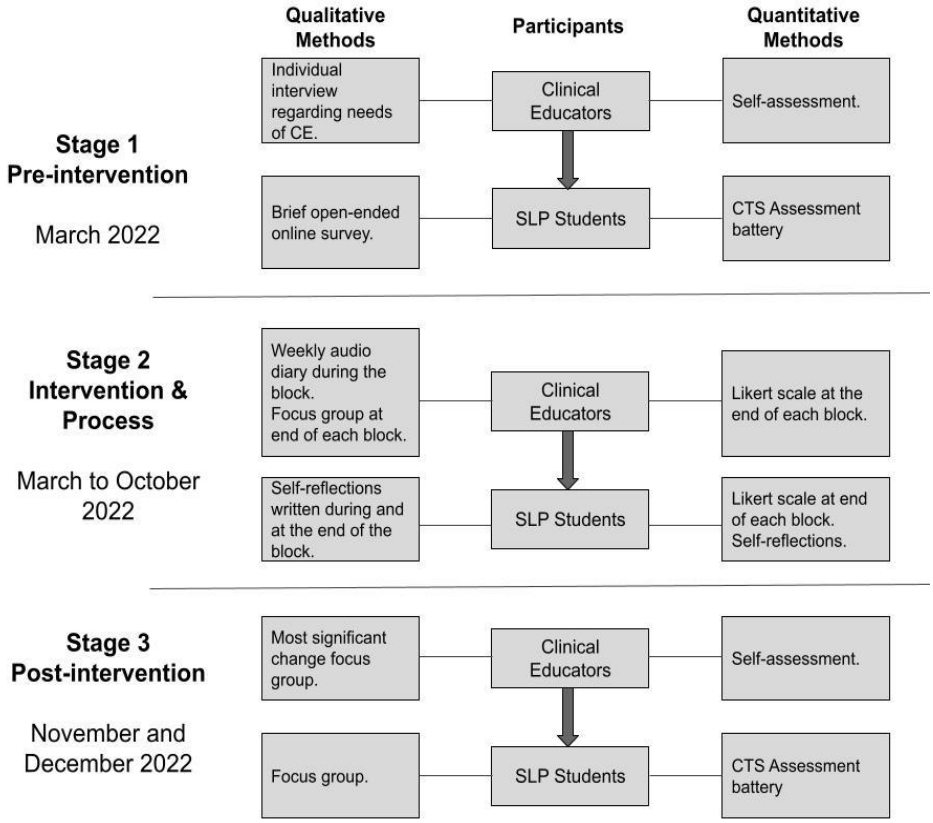
quantitative data collection methods in detail.

The qualitative data collection methods were selected because each one aimed to alter the power dynamics and change me from being the researcher and "supposed expert" to being the student learning about participants' experiences instead (Wang & Burris, 1997). The knowledge shared by clinical educators and students is an important source of expertise and supports them in being the experts of their experience (Wang & Burris, 1997). The data collection methods are described according to the participant group and the type of data collected.

The Microsoft Teams online video conferencing platform was used for qualitative data collection. This included the initial interviews with the clinical educators, the focus groups at the end of each block, and the final focus groups for clinical educators and SLP students. These were audio recorded for transcription. This choice was driven by its practical accessibility for clinical educators, students, the researcher, and the research assistant involved in the study.

Figure 5.4

Overview of the data collection methods for each stage of the research



5.3.4.1. Developing the Question Guides for the Qualitative Data Collection Strategies

As suggested by Roberts (2020), the questions for the (1) individual interviews, (2) audio diaries, and (3) focus groups were designed based on the research questions , my in-depth knowledge of clinical education and critical thinking skills, and prior study. I aimed to gather insights into clinical education from the perspectives of clinical educators and SLP students, uncovering their lived experiences (Mashuri et al., 2022). To achieve this, I created question guides with open-ended questions that facilitated conversation and allowed participants to explore their understanding of clinical education and critical thinking skills. I was mindful to avoid leading questions that could bias the data, aligning my approach with the recommendations of Mashuri et

al. (2022) and Roberts (2020) and the principles of social dualism constructionism.

The interview guides for the individual interviews included questions aligned with the research aims and were designed to help the researcher explore and understand the answers in greater depth, as recommended by Magaldi and Berler (2020). In the individual interviews of clinical educator participants, an opening question was used: "Tell me about the characteristics of your favourite clinical educator or tell me about a clinical educator who made a good impression on you without saying their name." This question was used so the clinical educators could start with a narrative that illustrates their personal clinical education experience. They were then probed with further questions to understand and relate their experience to clinical education and critical thinking skills. The rest of the questions asked were divided into sections about clinical education, training as a clinical educator, and critical thinking skills relating to students and speech-language therapy so that each aspect could be further probed.

The questions on clinical education probed what clinical educators enjoyed about being a clinical educator, what they found challenging, what strategies they enjoyed using during clinical education, and the clinical educator behaviours that they think are facilitators or barriers to learning. These questions were open-ended to limit biases I may have. Probes were also employed for these questions so that I could verify the information provided and clarify the meaning (Mashuri et al., 2022; Roberts, 2020). To limit interviewer bias, the questions were developed with the mindset that the participant could respond in a free-minded manner (Mashuri et al., 2022). The use of probes was important so that when I analysed the interviews and focus groups, I could analyse their meaning and understanding of concepts and not impose my biases

on the data they had provided (Mashuri et al., 2022; Roberts, 2020). Appendix J provides the questions used in the initial interviews of clinical educators.

Questions for the clinical educator audio diaries and focus groups concentrated on the implementation of inquiry-based learning as I wanted to learn more about the process. I needed to ask specific questions aligned with my research questions and objectives of understanding the process and outcomes of implementing inquiry-based learning. Probes were also used, and space was provided to ask participants for more information and clarification of their answers so that an in-depth understanding could be obtained (Mashuri et al., 2022). I also included questions that accessed positive and negative aspects of the information I wanted to obtain (Roberts, 2020). Thus, I did not bias my results with only a certain aspect of implementing inquiry-based learning and the critical thinking skills observed in students. I wanted a holistic understanding of the process and outcomes of implementing inquiry-based learning.

The clinical educators' initial interview questions and focus group questions were based on the questions developed by Lyberg-Ahlander et al. (2014). Appendix M provides the questions for the focus groups for the clinical educators. The questions for the clinical educator focus group that occurred at the end of the year focused on the most significant change. These questions were based on the questions developed by Davies and Dart (2005). Appendix O details the questions used in the Most Significant Change focus group. The questions asked in the audio diaries were designed based on the questions developed by Crozier and Cassell (2016). Appendix L provides the prompts for the audio diaries.

My research supervisors, who are clinical educators within the department, pre-tested the questions and provided extensive feedback. They suggested clarifying terms, ensuring the questions were open-ended, and minimizing any predisposition towards specific answers. Roberts (2020) noted that if supervisors provide sufficient input, a pilot study may not be necessary. With their input, I refined the questions and reflected on my biases, aiming to structure the questions to capture the participants' genuine experiences and insights.

5.3.4.2. Stage 1 – Pre-intervention

5.3.4.2.1. Data Collection Methods for Clinical Educators

1. Quantitative method: At the beginning of the research, a self-assessment questionnaire based on the ASHA (2016) self-assessment measure for clinical educators was used to help clinical educators identify their strengths and weaknesses as clinical educators. ASHA (2016) states that the questionnaire may be adapted based on the context and reason for its use. The sections most appropriate for this research were selected (See Appendix I for the self-assessment scale of clinical educator competencies).

2. Qualitative Methods: An initial individual interview was conducted with clinical educators at the beginning of the study to discuss the needs of clinical educators and how they perceive clinical education and critical thinking skills in SLP students. Identifying their needs and perspectives was important to foster a cooperative partnership between the clinical educators and myself (McAllister, 2005). Using the individual interview also ensured that power was given to clinical educators to share their perspectives (See Appendix J for the individual interview questions).

5.3.4.2.2. Data Collection Methods for SLP Students

1. Quantitative method: Students' critical thinking skills profiles were measured using a formalised assessment. Table 5.5 provides an overview of the assessment measures that I employed. A pilot study was completed at the end of 2021 to determine the most appropriate assessment tool for the context of my study. However, there were so few participants in the pilot study that the results were insignificant. Therefore, I decided that two assessment methods predominantly used in health sciences research would be used for my study: one critical thinking skills assessment (Health Sciences Reasoning Test) and one thinking disposition assessment (California Critical Thinking Disposition Inventory) were used to determine the students' pre-intervention critical thinking skills profile.

2. Qualitative method: I sent students a survey that included demographic questions and open-ended questions about their experiences and perceptions of clinical education (see Appendix G). Using these open-ended questions allowed me to gather information specific to the students' perceptions of clinical education and critical thinking skills required for clinical practice, as well as their perceptions of how it should be taught. Completing individual open-ended online surveys mitigated the challenges that could arise with a focus group, such as potential power dynamics, groupthink, and dominance.

Table 5.5

Overview of the assessment measures used to develop the critical thinking skills profile of SLP students

Assessment measure	Purpose	Question format	Time to complete	Validity and reliability	Test-retest timing
Health Sciences Reasoning Test **(Facione & Facione, 2007)**	Assess the critical thinking skills of health science students and professionals according to the following domains: (1) analysis, (2) inference, (3) evaluation, (4) deduction, and (5) induction.	33 multiple-choice questions. The scenarios are related to health science.	Timed test of 50 minutes	No Cronbach alpha for construct validity is available. Kuder-Richardson-20 for reliability: 0.77–0.84.	No recommended time between the test and retest is stated in the manual.
California Critical Thinking Disposition Inventory **(Facione et al., 1996)**	Assess thinking dispositions according to the seven subscales: (1) truth-seeking, (2) open-mindedness, (3) analyticity, (4) systematicity, (5) critical thinking, self-confidence, (6) inquisitiveness, and (7) maturity.	75 item statements that are answered using a 6-point Likert scale.	20–30 minutes, with a time limit of 30 minutes	Cronbach alpha for construct validity: 0.90. No Kuder-Richardson-20 for reliability is available.	Wang et al. (2019) determined the stability of test-retest results if the retest occurred two weeks after the baseline testing. Therefore, it is recommended that retesting for change occurs more than two weeks after the baseline assessment.

5.3.4.3. Stage 2 – Intervention and Process

5.3.4.3.1. Data Collection Methods for Clinical Educators

1. Quantitative methods: At the end of each block, clinical educators completed a Likert scale via Google Forms regarding the integration of inquiry-based learning into clinical education and their perception of the development of critical thinking skills in SLP students. Likert scales at the end of each block were employed to track the implementation process at a regular time interval. It also allowed clinical educators to reflect on implementing inquiry-based learning during clinical education and the critical thinking skills of their students for the prior block. I wanted to track the perceived implementation process and perceived changes that occurred. The 'check-ins' via the scales aimed to achieve this (See Appendix K for the rationale, instructions, and Likert scale statements used with clinical educators).

2. Qualitative methods: Clinical educators were required to submit weekly audio diaries and participate in a focus group at the end of each block. Audio diaries involved participants recording their reflections on a specific situation or theme with minimal researcher influence (Crozier & Cassell, 2016), providing valuable insights into their experiences. Audio diaries are widely used in social science research due to their ease of completion and lower attrition rates (Crozier & Cassell, 2016), and studies in 2021 confirmed their effectiveness across various disciplines, including education (Gupta & Howden, 2021; Wijbenga et al., 2021). Audio diaries also tend to have higher completion rates than written diaries, as they are more convenient for participants (Hislop et al., 2005), allowing for more in-depth self-reporting (Markham & Couldry, 2007). Each diary entry was three to five minutes long (see Appendix L for the prompts).

Focus groups were conducted at the end of each block with the clinical educators. These focus groups were structured so that the clinical educators could share what supported inquiry-based learning implementation and receive training to further facilitate the implementation of inquiry-based learning based on their needs and experiences. The focus groups were 60 minutes long (See Appendix M for the questions asked during the focus groups).

5.3.4.3.2. Data Collection Methods for SLP Students

1. Quantitative methods: At the end of each block, SLP students completed a Likert scale via Google Forms regarding their perception of the clinical education they received and their perception of their critical thinking skills development. This allowed SLP students to reflect on the clinical education they had received and its impact on their thinking skills. The regular check-ins using Likert scales helped me track the perceived implementation process and the perceived changes that occurred due to implementation (See Appendix N for the rationale, instructions, and statements for the Likert scales of SLP students).

2. Qualitative methods: Self-reflections that the students submitted weekly and at the end of each block were analysed. These were routine to clinical education and not specific to my study. Students are required by the department to write self-reflections at the end of their sessional plans to assist the learning process. The self-reflections were based on questions and prompts provided by the clinical educators. Currently, no standard self-reflection questions are employed in the Department of Speech-Language Pathology at the University

of the Witwatersrand. Concerningly, not all clinical educators seem to encourage students to complete self-reflections. Table 5.6 comprises examples of self-reflection questions used by clinical educators. These questions were obtained from the self-reflections submitted, and are not standard across students. Clinical educators asked all or some of these questions. The questions were also not always standard across all the blocks.

Table 5.6

The types of self-reflection questions that clinical educators generally provide

Types of self-reflection questions provided by clinical educators
What did I work on in today's session?
What did I learn today?
What worked and why?
What did not work and why?
What changes did I make when things did not work for the patient?
Did my plan match my outcome?
How would I plan differently for next time?
How did I feel about the experience?
How did the patient respond?
What additional information or support do I need from my supervisor?
What areas do I need to read up on?

Self-reflections can reflect the critical thinking skills of the students writing them (Colley et al., 2012; Cook et al., 2019) and have been identified as a method to track the development of critical thinking skills and clinical reasoning in health sciences students (Plack et al., 2005) and, more recently, in SLP (Cook et al., 2019, 2022). The analysis of self-reflections provided insights into the depth and breadth of self-reflections. Self-reflections were submitted throughout each block and at the end of the block. The number of self-reflections submitted across the year decreased, and some participants did not submit a single self-reflection in a block or for several blocks. This lack of written self-reflection required by certain clinical educators was concerning since the role of self-reflection in developing clinical skills is well established (Cook et al., 2019).

5.3.4.4. Stage 3 – Post-intervention

5.3.4.4.1. Data Collection Methods for Clinical Educators

1. Quantitative methods: Final Likert scales for the end of the year were completed by clinical educators.

2. Qualitative methods: The Most Significant Change technique is defined by Davies and Dart (2005) as a participatory tool for evaluating and monitoring interventions and programmes. The technique consists of collecting stories from stakeholders reflecting the most significant change they have experienced due to an intervention. The question posed is usually as simple as “In the past month/year, in your opinion, what are the most significant changes for participants that have occurred due to the intervention?” There is a growing body of literature

regarding the use of the Most Significant Change technique in programme evaluation (Choy & Lidstone, 2013; Hall, 2014; Kloosterman et al., 2012; Kraft & Prytherch, 2015; Wilder & Walpole, 2008; Willetts & Crawford, 2007).

I used the Most Significant Change technique to collect stories from clinical educators post-intervention to gather data regarding the impact and outcomes of the intervention and their clinical education experiences for the year. The technique gives a rich picture of what is happening instead of an oversimplified view, allowing for a deeper understanding of the impact and outcomes of a programme being evaluated (Davies & Dart, 2005) (See Appendix O for the questions used for this focus group).

5.3.4.4.2. Data Collection Methods for SLP Students

1. Quantitative methods: A repeat assessment using the critical thinking skills battery was completed. Final Likert scales for the end of the year were also recorded by SLP students.

2. Qualitative methods: Focus groups were conducted with students at the end of the year to reflect on their clinical education experiences for the past year (i.e., 2022). A focus group was chosen so students could share their experiences verbally, as more information may be shared in a verbal format than in writing. The focus groups for SLP students at the end of the year had a small number of participants. There were 3–4 participants per focus group, and three groups were conducted with a female research assistant who has an MA (Speech-Language Pathology). The research assistant is also a qualitative researcher with experience in facilitating focus groups. The small number of participants in each focus group allowed each participant to share their experiences. The duration of these focus groups was also sixty

minutes (See Appendix P for the questions used in the student focus group).

Regarding the data collection methods for student participants, the initial approach involved requesting students to submit their self-reflections after each academic block. However, this method garnered a limited number of responses at the end of each block. As a solution, a revised strategy was implemented to improve participation. At the end of the academic year, students were required to compile a portfolio containing all their session plans and self-reflections. For my study, they were asked to submit this portfolio for me to analyse their self-reflections. This strategy made participation easier and increased the number of participants. A standardised email, including the participant information sheet and consent form, was sent to all students. In the email, students were invited to submit their year-end portfolios, complete the Likert scales measuring their experiences, and participate in year-end focus groups.

This adjustment in data collection aimed to enhance the ease with which students could participate in the research to increase the number of participants. This adjustment did assist, and at the end of the year, more students submitted their self-reflections and completed the Likert scales for the research than students who participated throughout the year. There was also a larger number of students at the end of the year who then participated in the focus group.

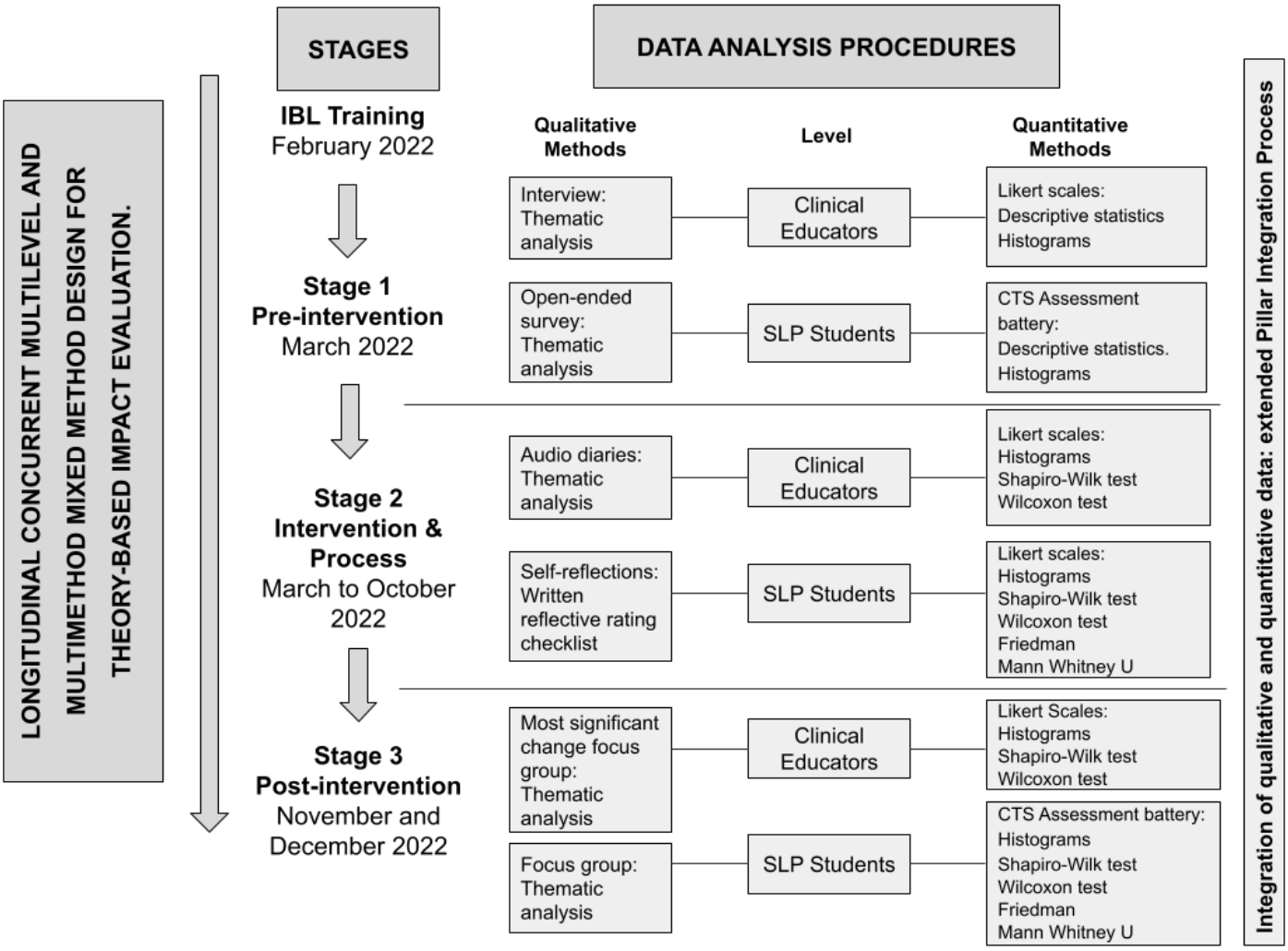
5.3.5. Data Analysis Methods

Figure 5.5 outlines the qualitative and quantitative data analysis methods employed during each research stage. Most methods were used to analyse data collected from both the clinical educator and the SLP students at the different stages of the research. Thus, the data analysis methods are presented according to the quantitative analysis and then the qualitative analysis. The method of

integrating the data using the extended pillar integration process is then explained.

Figure 5.5

Data analysis methods and time frames for the multilevel and multimethod mixed methods design



5.3.5.1. Quantitative Analysis: Analysis of Demographics, Likert Scales, and Student Written Self-Reflections

5.3.5.1.1. Analysis of Demographics

Descriptive statistics were employed to determine the parameters of the demographic data

obtained from clinical educators and SLT students. Measures of central tendency, including the mean and ranges for the participant demographics, were calculated (Mishra et al., 2019). Measures of frequency were also calculated to show the occurrence and percentage that the measured variable occurred in the group of either clinical educators or students SLPs (Mishra et al., 2019). Measures of dispersion, namely standard deviation, were also calculated to determine the variation in the data sets (Mishra et al., 2019).

5.3.5.1.2. Analysis of Likert Scales

The data collected from the clinical educator and student SLP Likert scales was tested for normality using the Shapiro-Wilk test (Mishra et al., 2019). The Shapiro-Wilk test is an appropriate method for determining the normality of a data set when the sample set is small ($n<50$). The data were not normally distributed, and thus, non-parametric tests were selected for the data analysis (Mishra et al., 2019).

I expected the most significant changes to occur on the Likert scales between block 2 and block 4 results for the SLP students and clinical educators. Thus, I used the Wilcoxon matched-pairs test to compare the changes between these two blocks for each item on the Likert scales used to collect data from the student SLPs and clinical educators.

5.3.5.1.3. Analysis of SLP Student Self-Reflections

The student self-reflections were analysed using the coding schema developed by Plack et al. (2005) and then adapted for research with SLP students by Cook et al. (2019, 2022). I chose this coding schema because researchers in SLP clinical education have been encouraged by Wolford et al. (2021) to use previously validated measurement systems rather than creating new tools.

Using a previously validated measurement system also allowed me to ascertain if the coding schema was appropriate for research in my context.

The breadth and depth of the reflections were analysed during the coding of the student self-reflections. Table 5.7 provides the coding schema used to analyse the breadth and depth of the written self-reflections submitted by the student SLPs. Each self-reflection was scored according to whether the breadth code was present, and then, based on the combination of breadth codes present for one self-reflection, the depth code was assigned. In the spreadsheet developed for analysing written self-reflections, 1 was assigned if the code was present, and 0 was given if the code was not present. I analysed the reflections blindly, i.e., I did not know the student's name or number, which group they were assigned to based on their clinical educator, or which block the reflection was from. The coding schema for the breadth and depth of written self-reflections was explicit, making analysing the written self-reflections more accurate and reliable (See Appendix Q for a sample of an analysed student self-reflection).

Table 5.7

Coding schema for the SLP students' written self-reflections based on Plack et al. (2005) and Cook et al. (2019)

Code	Definition of code	Examples
Breadth: the reflective practice elements that can be identified at a word, sentence, or paragraph level.		
Return to the experience (RETURN)	Describes the experience.	"Today we did…"; "In the session I did…"
Attends to feelings (ATTEND)	Acknowledges and begins to work with feelings.	"I felt… because…"
Reflection on action (ROA)	Occurs after the action has been completed.	"I did… and I learnt … from this."
Reflection for action (RFA)	Occurs before being faced with the situation; begins to plan for the future.	"I did… and next time I will…"
Process (PROC)	Describes the strategies used or available.	"I used… cues to…"
Reflection in action (RIA)	Occurs whilst during the action; on-the-spot decisions.	"I decided to change… in the session." "In the moment, I …"
Content (CON)	Explores the experience from a different perspective (beyond description).	"From my patient's/the parent's/the caregiver's perspective…"
Re-evaluate (RE-EVAL)	Réapprises the situation *vis-à-vis* past experiences.	"In the past, I have… and I did it

Code	Definition of code	Examples
		again and achieved…"
Premise (PREM)	Recognises and explores own assumptions, values, beliefs, and biases.	"I had thought all patients/parents/caregivers would want … as this is how I would do it… However, now I see from another side/understand that."
Depth: the overall level of the written reflection.		
Code	Definition and elements that contribute to depth	
Non-reflector	No evidence of reflection. Narration of event. Return and/or attend.	
Emerging-reflector	Demonstrate minimal and low-level elements of reflection, such as return and one other (ROA, RFA, PROC).	
Reflector	Consistently demonstrates lower-level reflective skills. More than one of the following (ROA, RFA, PROC) and any lower-level elements.	
Emerging-critical-reflector	Demonstrates some higher-level elements of reflection. Two or more of the following (RIA, CON, RE-EVAL) but not Premise.	
Critical reflector	Consistently demonstrate higher-level elements of reflection. Premise or 1 of (RIA, CON, RE-EVAL).	

To compare the data collected from the student self-reflection analysis, I employed a non-parametric Friedman test given the non-normal distribution, as indicated by the Shapiro-Wilk test. This non-parametric test was deemed suitable for evaluating changes over time and between groups (Mishra et al., 2019). Certain results from the Friedman test showed statistically significant differences. To identify the specific factors contributing to these differences within the experimental and control groups, I conducted post-hoc Wilcoxon tests. Additionally, post-hoc Mann-Whitney U tests were used to compare the experimental and control groups (Mishra et al., 2019). If the sample size per group was less than 20, the U value was used; if the sample size per group was greater than 20, the z value was used (MacFarland & Yates, 2016).

5.3.5.1.4. Histograms of Likert Scales and Self-Reflection Data

Histograms are valuable exploratory tools for visualising data, helping to identify the distribution's shape and compare subgroups. They allow data features to emerge visually, which can be especially beneficial with small sample sizes (Nuzzo, 2019), such as those in my study. I converted all data from the clinical educator and SLP student Likert scales, along with the analysis of self-reflections, into histograms. This approach enabled me to observe the data shape and visually compare subgroups. The visual representation proved particularly useful for examining the self-reflection analysis, as it facilitated comparison of the number of codes across each block and between the experimental and control groups.

5.3.5.2. Qualitative Analysis: Analysis of Initial Interviews, Online Surveys, Audio Diaries, and Focus Groups

Rev.com (a transcription website) and MS Teams transcription were both used to transcribe

qualitative data collected using different collection methods. I used Rev.com to transcribe the audio diaries. The transcription function on MS Teams was used to transcribe the initial interviews and focus groups. I then listened to the recordings, ensured the transcriptions were accurate, and made necessary corrections.

Reflexive thematic analysis was then used to analyse the transcribed recordings for the initial interviews, online surveys, and all the focus groups. Thematic analysis is a qualitative analytic approach typically used to explore participants' subjective experiences and sense-making (Braun & Clarke, 2021a, b; Terry et al., 2017). Thematic analysis is based on the premise that qualitative data analysis is used to tell stories and to interpret and create knowledge, not just about the discovery of knowledge but rather the generation of knowledge based on the rich, meaningful data that participants share (Braun & Clarke, 2019, 2021c).

Thematic analysis is not a singular, homogenous approach to qualitative analysis (Terry et al., 2017). For this study, reflexive thematic analysis was used. This approach is defined by the ideology that meaning is not inherent or self-evident in the data; rather, meaning is constructed at the intersection of the data and the researcher's contextual and theoretically informed interpretive practices. Braun and Clarke's (2022) further clarification of reflexive thematic analysis reinforced this study's philosophical alignment with an interpretivist paradigm. Their emphasis on the active role of the researcher in generating themes, and the centrality of reflexivity, resonates with the theoretical and analytical stance adopted here. Reflexive thematic analysis recognises research as generating knowledge embedded in situated, reflexive, and theoretical practices (Braun & Clarke, 2021c, 2022). Thus, identified themes cannot be separated from the

researcher, as the researcher actively constructs these themes, influenced by their values, skills, experiences, and theoretical orientation (Braun & Clarke, 2021a, 2022). Braun and Clarke's (2022) assertion that reflexive thematic analysis should not be treated as a rigid codebook or reliability-driven method guided my analytic approach, underscoring the importance of viewing theme generation as a flexible, creative process shaped by deep engagement with the data and the researcher's interpretive lens.

In addition, themes do not passively emerge from the data but are analytic outputs actively created by the researcher through their engagement with the data, analytical processes, and subjectivity (Braun & Clarke, 2019, 2022). The reflexive nature of thematic analysis required me to remain aware of my positionality and subjective experiences, and how these impacted the coding process and generation of themes. Being reflexive was therefore essential during coding and theme generation, prompting purposeful reflection on my assumptions, their origins, and their influence on the analytic outcomes (Braun & Clarke, 2019, 2021a, 2022).

Reflexive thematic analysis was employed to analyse the transcription of the audio diaries, the initial interviews, clinical educator focus groups, and end-of-year SLP student focus groups. Each data source was individually analysed, and the themes generated from each source were compared. This comparison allowed me to determine the themes generated by the different stakeholders regarding the implementation of inquiry-based learning in clinical education before the intervention, during implementation, and at the end of the programme. The themes that I generated from reflexive thematic analysis and the quantitative data results can be related to the theory of change to assist with understanding the impacts (intended and unintended) of the

intervention. Comparing the themes that emerged in Stage 1 versus Stage 3 assisted with determining how the stakeholders responded to the change in pedagogy.

The six phases of thematic analysis were used to analyse each data set collected. Appendix R provides an example of the coded transcriptions. Although these phases are sequential, analysis tends to be a recursive process with movement back and forth between phases. The six phases (Braun & Clarke, 2021a; Terry et al., 2017) include:

1. Familiarisation with the data: The data were transcribed and read repeatedly to facilitate immersion.
2. Coding: Features of the data that appear interesting were noted down to produce an initial code. This code generation assisted in determining meaningful groups within the data.
3. Generating initial themes: Codes and the collated data were examined to identify broader patterns of meaning (themes).
4. Reviewing themes: The initial themes were compared to the data set to determine whether they told a convincing story about the data and answered the research question. Themes were refined during this phase.
5. Defining and naming themes: During this phase, a detailed analysis of each theme was generated, where the scope and focus of each theme were determined and named.
6. Writing up: Once the themes were finalised, the report providing sufficient evidence of the themes was written. This was embedded within an analytic narrative that explains the story of the data set entirely and compellingly.

5.3.5.3 Integration of Qualitative and Quantitative Data from Multiple Sources

The Adapted Extended Pillar Integration Process (Adapted ePIP) was used to systematically combine the qualitative and quantitative data sets that had been analysed. I developed this integration method during my data analysis stage. I initially analysed the qualitative and quantitative data separately and then compared the two data sets for agreements or disagreements, as has been done in other mixed methods research (Campbell et al., 2020) and attempted to present them using a narrative discussion as recommended by Creswell and Plano Clark (2018). However, this led to disjointed results. In my search to integrate my data sets, I learnt about the Pillar Integration Process (Johnson et al., 2019) and the Extended Pillar Integration Process (Gauly et al., 2024). I chose to adapt these approaches as they provided a well-articulated, systematic, and replicable method of combining the qualitative and quantitative data that have been separately analysed and then need to be integrated. This Adapted ePIP is a novel methodological contribution to mixed methods integration. I provide an in-depth discussion of this method in my Discussion *Chapter 8B* and I have submitted the method for publication.

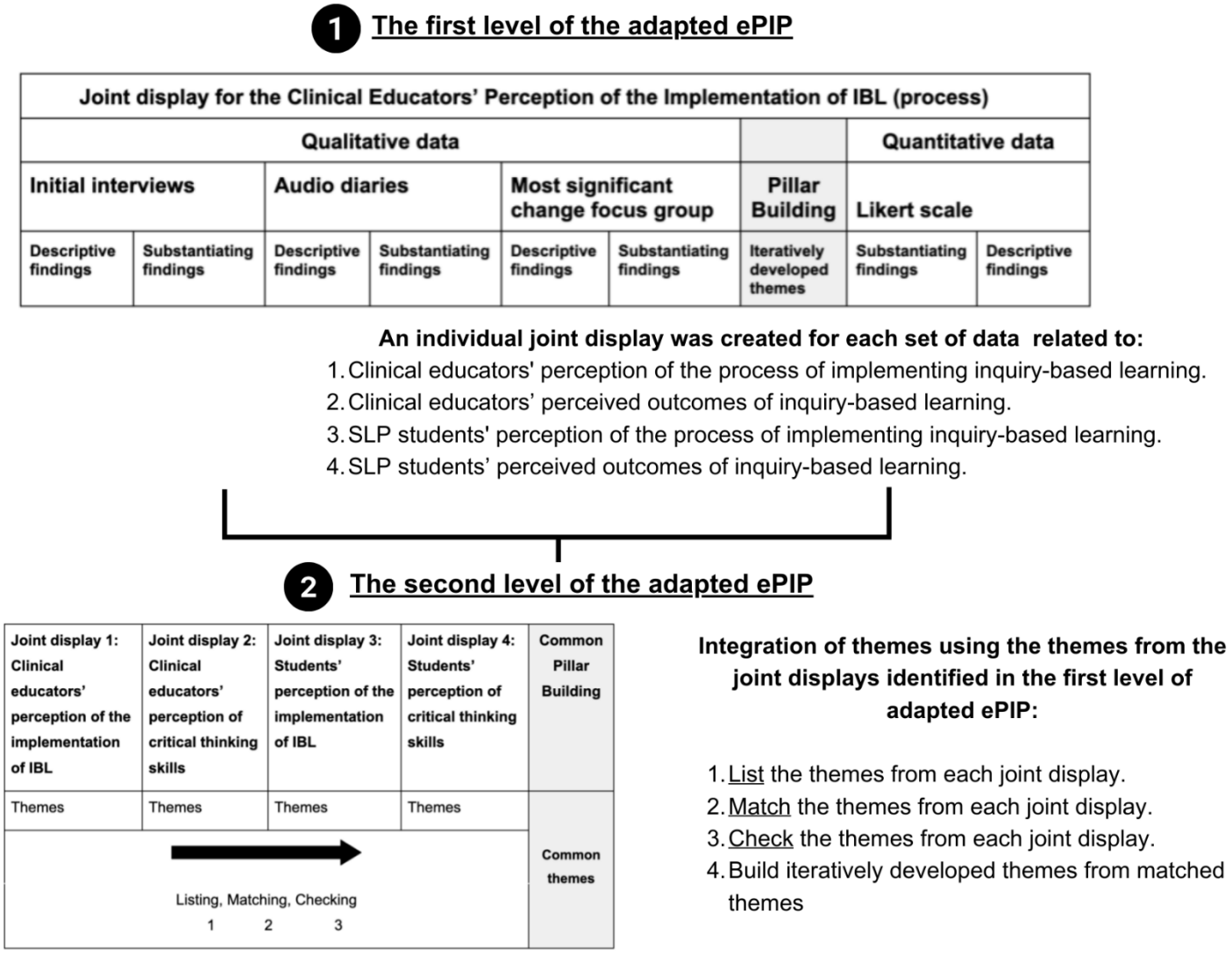
The Adapted ePIP was used to integrate the results for the outcomes of implementing inquiry-based learning, as there were multiple sources of quantitative data from the Likert scales, breadth of self-reflection, and depth of self-reflection, and there was one qualitative data source (the end-of-year focus group). Appendix S provides an example of the extended Pillar Integration Process tables developed to identify the themes for the outcomes of implementing inquiry-based learning. The adapted ePIP provided me with a structure to integrate the process and outcomes of the programme at a holistic level and when analysing specific case studies to understand the

nuanced differences that occur when implementing inquiry-based learning and its impact on critical thinking skills.

The Adapted ePIP, as described in Barber et al. (2024), comprises two levels illustrated in Figure 5.6. The first level has four stages: listing, matching, checking, and pillar building. Based on Johnson et al. (2019) and Gauly et al. (2024), the four stages of integration of different data sources include listing, matching, checking, and then pillar building. The stages that I used are the same as stipulated by Gauly et al. (2024) and Johnson et al. (2019). However, I added to the matching stage to provide a transparent explanation of how I matched multiple data sets.

Figure 5.6

Visual format illustrating the Adapted ePIP



The stages in the first level of the Adapted ePIP are as follows:

Stage 1 is *Listing,* which incorporates listing the raw data from the quantitative or qualitative results in a table format.

Stage 2 is *Matching*, which involves aligning qualitative and quantitative results displayed in the table. For instance, if the quantitative data are presented, the researcher will match the corresponding qualitative data to it. Given the multiple data sets for qualitative and quantitative research in my study, I needed to first match the qualitative sets with the different quantitative data sets. This process ensured that all relevant raw data could be organised as either qualitative or quantitative and then matched accordingly to build the pillars or itinerant themes. For example, if I recorded the raw data from the initial survey (qualitative), I needed to match it with focus group data (qualitative) and then correlate it with data from the Likert scales (quantitative) and breadth and depth of processing results (quantitative). The matching data are aligned horizontally in the table. If there are no corresponding data, the cell is left blank or marked as "no matching data".

Stage 3 is *Checking,* which ensures that columns are cross-checked for completeness and to ensure appropriate matching of qualitative and quantitative data. Where there are no matching data, this must be checked and verified to ensure that no raw data could have provided an appropriate match. This stage also requires reflection on the patterns that are emerging and consequently refines and modifies the lists of data in the table.

Stage 4 is *Pillar building,* which occurs in the central column of the table. Pillars are built by integrating the patterns, themes, and insights that have emerged when matching and checking the data. The pillar contains the integrated theme from each row of the table. This integration occurs through the visual and conceptual integration of the qualitative and quantitative data. Level 2 of

the Adapted ePIP comprised the integration of themes from the joint displays created in Level 1. The themes from each initial joint display were listed, matched, checked, and then a common pillar was built. Appendix T provides an example of the Adapted ePIP.

5.4.1. Trustworthiness of the Qualitative Data

The trustworthiness of the research was established using Lincoln and Guba's (1985) four criteria: credibility, transferability, dependability, and confirmability. I developed physical and intellectual audit trails, including reflexive audio diaries and written notes, to monitor and reflect on my decisions throughout the research process. The audio diaries were particularly helpful for examining my conclusions. After interviews and focus groups, I recorded self-reflections on key ideas, conversation flow, participant engagement, and my perceptions to identify potential biases, as recommended by Roberts (2020). When educators presented differing views on clinical education or critical thinking, I focused on understanding rather than dismissing them, which helped me acknowledge my biases. Thus, my audio diaries and journal formed a comprehensive audit trail, evidencing the decision-making processes throughout the project.

To collect data regularly, I used weekly audio diaries from clinical educators and self-reflections from students, providing insights into the implementation of inquiry-based learning and its outcomes. I employed initial interviews, weekly audio diaries, and end-of-block focus groups to develop a constructed reality of participants, alongside regular Likert scales for data triangulation using Adapted ePIP.

While analysing student self-reflections, I realised the need for a framework based on existing research in clinical education. I wanted to ensure that the patterns I was observing and using to

understand the student SLPs' reality were constructed in previous knowledge frameworks. The tools developed by Plack et al. (2005) and Hill et al. (2019) were helpful in identifying key components of self-reflection and monitoring changes over time. This framework refined my approach to analysing self-reflections and assessing critical thinking skills.

Throughout the research, my understanding of social dualism, constructionism, correspondence perspectives, and common-sense realism deepened. My understanding of these concepts evolved as I recognised how they shaped my thinking. Engaging with diverse participant perspectives added value to the research. Using a reflexive journal, both written and verbal, enabled me to critically examine how my dual role as researcher and clinical educator influenced my engagement with the data. For example, during the analysis phase, reflexive entries helped me recognise how my own assumptions about the effectiveness of inquiry-based learning might have shaped initial interpretations. These reflections prompted me to revisit the data with a more open lens, which ultimately led to a broader understanding of the role of other influencing factors, such as feedback, self-reflection, and educator–student relationships. As a result, the reflexive process contributed meaningfully to the analytical depth of the study and allowed for a more nuanced interpretation of how critical thinking skills developed in the clinical education context.

5.4.1.1. Credibility

Credibility was promoted through triangulation and prolonged engagement (Byrne, 2001; Stahl & King, 2020). Prolonged engagement strengthens credibility by allowing researchers to develop a deeper understanding of the context and participants. Extended time in the field, such as the full year that my study occurred, helps capture how events and influences unfold, ensuring more

authentic insights (Stahl & King, 2020).

Member checking, a method often used to establish credibility through validating how the researcher has interpreted the participants' contributions (Varpio et al., 2017), was not conducted. This decision was made based on Motulsky (2021) and Goldblatt et al.'s (2011) work that queried whether member checking is beneficial for the triangulation of data since it rarely changes the initial interpretations of the data and raises ethical questions. My study already placed significant time demands on clinical educators and SLP students. Member checking would have been more burdensome on the participants than beneficial.

5.4.1.1.1. Methodological and Data Triangulation

A concurrent triangulation strategy was employed for this research, as qualitative and quantitative data were collected simultaneously in each stage of the research project and for each participant group. The two sets of data collected at each stage per participant group were then compared to determine the presence of convergence, difference, or some combination (Creswell, 2009). Comparison of qualitative and quantitative findings strengthens the study's reliability due to the disciplined and creative interpretation when comparing the results (Patton, 1999). Data triangulation was completed using the adapted extended pillar integration process. The processes are described in detail in *Chapter 8*.

5.4.1.1.2. Theoretical Triangulation

My study employed reality-oriented correspondence theory, post positivism, social dualism constructionism, and critical social theory to understand a theory-based impact evaluation. The

impact of this theoretical triangulation is described in my intellectual audit in the previous section titled the audit trail and in *Chapter 4* of my theoretical framework.

5.4.1.2. Transferability

Transferability can be established through purposive sampling and thick descriptions (Byrne, 2001; Stahl & King, 2020). Thick descriptions were completed by providing richly described data, including significant detail about the data collection methods, the time frames of the study, the participants' experiences, and contextual information of the study site so that the reader can make judgements about the trustworthiness of the themes, categories, and constructs developed (Byrne, 2001; Stahl & King, 2020).

5.4.1.3. Dependability

The dependability of the research was established through reflexive auditing at each stage of the process. I considered the potential impact of students submitting their work to me as the researcher. Patton (1999) notes that such submissions can affect quality, either positively or negatively, and advises researchers to carefully observe and analyse this effect. Although my presence was not physical in this research, the direct submission of work by students may have influenced its quality. I reassured students and clinical educators that the data analysed and interpreted would not be shared with clinical educators or SLP department staff, except in an anonymised, aggregated format.

While engaging in reflexive auditing, I remained aware of the social and power dynamics at play during the data collection between myself as the researcher and the clinical educators and SLP

students. As the researcher, I am known to clinical educators and students in the SLP department at the University of the Witwatersrand. Therefore, based on critical theory, reflexive practices were integrated into every aspect of this research by reflecting on how the social and power dynamics may have impacted student and clinical educator willingness to participate, how the social and power dynamics may have affected the information provided in the qualitative data collection methods, and how the participants' agency may have influenced their participation in the study (Bhavnani et al., 2014).

Lastly, as part of reflexive auditing, I was aware of the impact of my predisposition, perceptions, and biases when analysing and interpreting results (Patton, 1999). Reflexive thematic analysis was selected as it requires constant questioning about the assumptions being made, how they relate to the subjective experiences of the researcher, and how these assumptions impact the data analysis (Braun & Clarke, 2021a).

5.4.1.4 Confirmability

Confirmability is achieved through a researcher's physical and intellectual audit trail. An audit trail for the techniques of data collection and data description, as well as any other decisions made and the influences of myself as the researcher, were recorded. The intellectual and physical audit trails were described at the beginning of the trustworthiness section so that readers can use them to judge the study's quality, transferability, and trustworthiness (Hadi & Closs, 2016).

5.4.2. Validity and Reliability of Quantitative Data

Validity and reliability are key components of quantitative research (Pesämaa et al., 2021). These

components were important for the self-report Likert scales employed and the critical thinking assessment tools used. The validity and reliability of the critical thinking skills assessments are provided in Table 5.4. This section addresses the reliability and validity of the self-report Likert scales developed for clinical educators and SLP students to complete at the end of each block.

5.4.2.1. Validity

Validity refers to how accurately a concept is measured and interpreted (Pesämaa et al., 2021), indicating the extent to which evidence and theories support the interpretations of test scores for their intended uses. It is a crucial aspect of developing and evaluating tests (Clark & Watson, 2019). Ensuring clarity of concepts was essential in developing the self-report Likert scales (Jebb et al., 2021), which focused on implementing inquiry-based learning and the development of critical thinking skills.

Inquiry-based thinking and its cycle were clearly defined in the research and during clinical educator training. Critical thinking skills were similarly defined, and statements relating to SLP students, and the clinical setting were developed. Readability is crucial for Likert scale items, with Jebb et al. (2021) recommending that statements be short and simple. This principle guided the development of the Likert scales. Jebb et al. (2021) also suggested using the Flesch-Kincaid grade level test to assess readability, expressed in grade levels. Table 5.8 shows that the test results confirmed the readability of the statements was appropriate for the participants' reading levels.

Table 5.8

Results of the Flesch-Kincaid grade level studies test for the Likert scales

Likert Scale	Score	Grade Level	Age range
SLP Student	25	Professional	18 years and older
Clinical Educator	29	Professional	18 years and older

Unfortunately, the 5-point Likert scale design used in this research may not have been sensitive enough to measure the perceived changes in critical thinking skills and the implementation of inquiry-based learning over the year. A 7-point scale might have been more effective in capturing these changes, thereby enhancing the reliability and validity of the collected data (Kusmaryono et al., 2022). I recognised this limitation only after the analysis, making it too late to modify the structure of the Likert scales.

5.4.2.2. Reliability

Reliability is established by assessing the internal consistency of an assessment measure. A common method for determining internal consistency is Cronbach's alpha coefficient. The closer the value is to 1, the higher the internal consistency (Sürücü & Maslakci, 2020). The reliability of the Likert scales developed for clinical educators and SLP students was evaluated using Cronbach's alpha coefficient for questions related to clinical education pedagogy and critical thinking skills. The results indicated sufficient internal consistency for the Likert scales used, which is essential for demonstrating reliability.

The student Likert scales consisted of critical thinking skills and clinical education subscales. The student critical thinking subscale consisted of 6 items (α=.63), and the student clinical education subscale consisted of 4 items (α=.77). These results indicate acceptable internal

consistency (Sürücü & Maslakci, 2020). The clinical educator Likert scales also consisted of critical thinking skills and clinical education subscales. The clinical educator critical thinking subscale consisted of 5 items (α=.91), and the clinical educator clinical education subscale consisted of 9 items (α=.84). These results indicate high internal consistency (Sürücü & Maslakci, 2020). The Cronbach's alpha coefficient results indicate that these Likert scales were reliable for measuring the reflections on critical thinking skills and implementation of inquiry-based learning for the student SLPs and the clinical educators.

5.4.3. The Quality of Mixed Methods Research

The Good Reporting of a Mixed Methods Study (GRAMMS) framework by O'Cathain et al. (2008) is recommended as a guideline for quality reporting in mixed methods research. However, I found the guidelines vague and limited, as they include only six criteria. In contrast, the criteria established through the systematic review by Fàbregues and Molina-Azorin (2017) were more detailed and thorough, making them preferable for assessing the quality of mixed methods research in this study. The criterion table, including page numbers for the criteria that support quality, is provided in Appendix U.

Given the lack of a published, common quality reporting guideline for mixed methods research, I also made use of the Consolidated Criteria for Reporting Qualitative Research (Tong et al., 2007) to ensure quality in the qualitative aspect of my mixed methods study. The quantitative aspect of my study also made use of a checklist to report on the quality of the quantitative aspect. The quality appraisal checklist by Symonds and Tang (2024) was employed. These reporting guidelines can also be found in Appendix U.

5.5. Ethical Considerations

I obtained ethical clearance from the Human Research Ethics Committee (Non-Medical) at the University of the Witwatersrand. The clearance certificate protocol number for this research is H21/11/06 (Appendix V). Permission to complete the research with university staff and students was obtained from the Head of the School of Human and Community Development and the University Registrar.

There was a social and power inequity present as I was both a researcher and had a teaching role in the department. In 2022, I was not involved with the clinical education of second- and third-year students. I ensured that I acted in the best interests of the less powerful, the students and potentially the clinical educators if I had once supervised them in the past or if they felt undermined by my study (Ferguson et al., 2004). To navigate the ethical dilemmas of my position, I adopted a deontological ethical framework, which emphasises treating participants with respect and ensuring that my actions are guided by moral agency (Ferguson et al., 2004).

Clinical educators and SLP students were provided with participant information sheets (Appendix A and Appendix E). They were also provided with consent forms (Appendix B and Appendix F). The following sections detail how these documents supported ethical research practices.

5.5.1. Recruitment, Voluntary Consent, and Participation Withdrawal

To ensure ethical recruitment and voluntary consent, I needed to mitigate the pressure on students and clinical educators to participate (Ferguson et al., 2004). This was achieved by emphasising that participation was voluntary and that they could withdraw from the research at

any time without explanation (Mumford et al., 2021). Participants did not receive any direct benefits, and there were no penalties for choosing not to participate or for withdrawing. After receiving ethics clearance, I presented the research project to students and clinical educators in March 2022. To avoid coercion or undue influence, I asked the school administrator to email the detailed participant information sheets to the second- and third-year students and clinical educators on my behalf. Coercion was further minimised as I had no direct contact with the clinical educators or students, except when I presented the research to the student group in the presence of their lecturer. Clinical educators received continuing professional development (CPD) points for the initial training and focus groups, as training occurred during these sessions. CPD accreditation was applied for through the Department of Speech-Language Pathology at Wits.

5.5.2. Confidentiality and Anonymity

Participant confidentiality was guaranteed. However, anonymity could not be ensured due to the design of this research project, which involved collecting quantitative and qualitative data pre-, during, and post-intervention. Matching data from each stage with complete anonymity would have been difficult. Student participants were asked to submit all data using their student number as an identifier, while clinical educators were asked to use their names when submitting data. Pseudonyms were employed during data analysis and the manuscript writing stage. Each clinical educator was assigned a codename based on their role and a number, for example, Clinical Educator 1. Students and clinical educators were reassured that no feedback would be shared with other clinical educators or SLP department staff, except in an anonymised, aggregated format.

Transcripts of all data collected from students and clinical educators were disguised with either codenames or student numbers when checking for accuracy and before analysis. The use of codenames helped organise the data and blinded me to the identities of the participants during data collection and analysis, preventing my perceptions from influencing the results. However, employing pseudonyms and codenames can dehumanise participants and obscure their identities (Heaton, 2022). To respect my participants and maintain their confidentiality, I allowed them to choose their pseudonyms for the manuscript, recognising that names represent a person's cultural and linguistic identity. By allowing participants to select their pseudonyms, I enabled them to express their identities as they wish (Heaton, 2022; Wang et al., 2024). During the writing phase of the thesis, both students and clinical educators provided the pseudonyms they preferred.

The participant information sheet was emailed to students and clinical educators, inviting them to participate via a Google Forms link. At the end of the form, they were asked to provide their email addresses for data collection. This process occurred in two stages to ensure responses were assigned codenames for confidentiality. The collected email addresses were not shared with any other parties and were deleted at the end of 2022. Participation in collecting weekly self-reflections, audio diaries, and focus groups compromised anonymity during data collection. However, once received, codenames were assigned, and names were removed for analysis and reporting. To protect the confidentiality of all participants, no raw data were or will be made available to other parties, and participants were informed of this.

I conducted focus groups with the clinical educators at the end of Blocks 2 and 3, which served not only to gauge the implementation process but also to provide further training based on their

feedback. This training focused on the implementation of inquiry-based learning. A research assistant conducted the focus groups with student participants to limit social desirability bias, ensuring students did not feel compelled to provide answers they thought I wanted to hear. The final focus group with clinical educators was also led by the same research assistant for the same reason. I wanted the clinical educators to accurately reflect on their experiences throughout the year regarding the use of inquiry-based learning principles in clinical education.

5.5.3. Sharing of the Results

The results will be shared with the staff of the SLP department as part of a workshop, as part of this thesis, in academic articles, and at academic conferences. Some of the results have already been shared with SLP clinical educators in the department during a workshop on 'growth mindset and self-reflections' at the end of 2023 and at local and international conferences. The SLP students and clinical educators who were participants will also be supplied with a document detailing a summary of the results. When the results are shared in any of the aforementioned ways, the confidentiality and anonymity of the participants will be maintained.

5.5.4. Data Management

The data from the critical thinking assessment measures were encoded and stored securely by the online company that provides the assessment measures. The company provided the results only to me and did not use the results for their own research. The Google Forms platform was used to collect participant consent and demographic details. Data collected on the Google Forms platform are encrypted in transit and at rest to ensure data security and privacy (Google, 2024). The results are also stored on a password-protected Google drive and on a password-protected

laptop to protect the data. The data will be stored for five years.

5.6. Chapter Summary

This chapter commenced by stating the research aims and objectives. Thereafter, the research design of a theory-based impact evaluation framework was presented in response to the research question. A longitudinal convergent multilevel and multimethod mixed method was explained as the research strategy to collect the qualitative and quantitative data required for a theory-based impact evaluation based on the study's correlational nature, access to data, and contextual appropriateness. In the next chapter, I present the results obtained.

CHAPTER 6A: INTRODUCTION TO THE RESULTS

The primary aim of this research was to assess how "flipping" the supervised clinical education pedagogy, through the introduction of inquiry-based learning, affected the critical thinking skills of second- and third-year SLP students. However, the results indicated that while inquiry-based learning had some impact, self-reflection skills and a strong clinical educator–student relationship were more critical for developing critical thinking skills. Both the experimental and control groups showed changes in critical thinking over the year, with the experimental group showing slightly better skills. These findings are detailed in *Chapter 6B*, where the data from clinical educators, Likert scales, self-reflections, audio diaries, and focus groups are integrated.

Given that the research question focused on whether inquiry-based learning could promote the development of critical thinking skills, the outcomes of the intervention are presented first to foreground what changes occurred. I deliberately structured the ordering to present the outcomes (results) first, followed by an exploration of the processes that may explain how and why these changes took place. As Creswell and Plano Clark (2018) suggest, presenting outcome-oriented results before delving into the explanatory aspects can support a clearer understanding of the impact of an intervention. Patton (2015) further reinforces the value of aligning the structure of findings with the primary aim of the evaluation, particularly when investigating the effectiveness of educational approaches.

The study found that inquiry-based learning alone was insufficient in shaping critical thinking skills. The students' development occurred within a multifactorial context involving clinical educators, patients, and practical experiences, alongside their academic programme. *Chapter 7*

discusses additional factors beyond inquiry-based learning that influenced the development of critical thinking skills, such as the clinical educator–student relationship, structured engagement, feedback, and communication. These factors, some intended and others unintended, emerged during the implementation of inquiry-based learning and contributed to enhanced clinical reasoning.

Furthermore, *Chapter 7* explores specific student factors that influenced clinical education and the development of critical thinking skills, including academic emotions, professionalism, and knowledge base. These factors played a significant role in shaping the students' ability to develop critical thinking skills during their clinical education.

Additionally, some interpretation of the results has been integrated into the results section itself. This approach allowed for greater clarity in presenting complex data, particularly where the findings were nuanced or multifactorial. This approach is consistent with recommendations for mixed-methods and qualitative research, which allow for flexibility in structuring findings when it enhances clarity and coherence (Mertens, 2020). As such, the placement of interpretive commentary within the results section is intended to support, rather than pre-empt, the more in-depth theoretical engagement that follows in the discussion chapter.

When reading the results chapters, it must be noted:

1. I did not observe the actual implementation of inquiry-based learning by clinical educators. I relied on their self-reports through the audio diaries and focus groups. I also relied on the Likert scales and focus groups from the SLP students to understand the

clinical education process.

2. I integrated the results from the clinical educators and the SLP students to understand the results holistically.
3. When I refer to the clinical educators' results, these results only refer to the clinical educators who agreed to participate in my study. Thus, the students they refer to are the students they supervised, and some of those students (but not all of them) would have been part of the student experimental group.
4. I integrated data from different sources, and I have referred to them with the following acronyms: CE (clinical educator); Stu2 (second year SLP student); Stu3 (third year SLP student); AD (audio diary); FGD (focus group discussion); In Int (initial interview); IS (initial survey); experimental and control. B refers to the block, and the number afterwards refers to the block from which I collected it. For example, B2 – block 2; B3 – block 3; and B4 – block 4. Thus, following a quote, if I use the acronym (CE, AD, B2), it means that the source of the quote is from a clinical educator's audio diary in block 2. If, following the quote, I use the acronym (Stu2, FGD, B4, experimental), this means that the source is a second year student from the experimental group during the focus group in Block 4.

CHAPTER 6B: THE DEVELOPMENT OF SLP STUDENTS' CRITICAL THINKING SKILLS ACROSS A YEAR

6.1. Introduction

In *Chapter 6B*, I provide evidence of how SLP students' critical thinking skills evolved over the year, focusing on the limited impact of inquiry-based learning on their development. Due to the complexity of clinical education, changes in critical thinking skills could not be attributed solely to inquiry-based learning.

To support these findings, I first present the results from the students' Likert scales, where they reflected on their critical thinking skills development. Next, I examine the depth and breadth of processing in student self-reflections from both the experimental and control groups. These results, combined with insights from the end-of-year student focus group, showed an overall positive change in critical thinking skills. I further validated these changes using data from clinical educators' Likert scale assessments and themes identified from their audio diaries and focus groups.

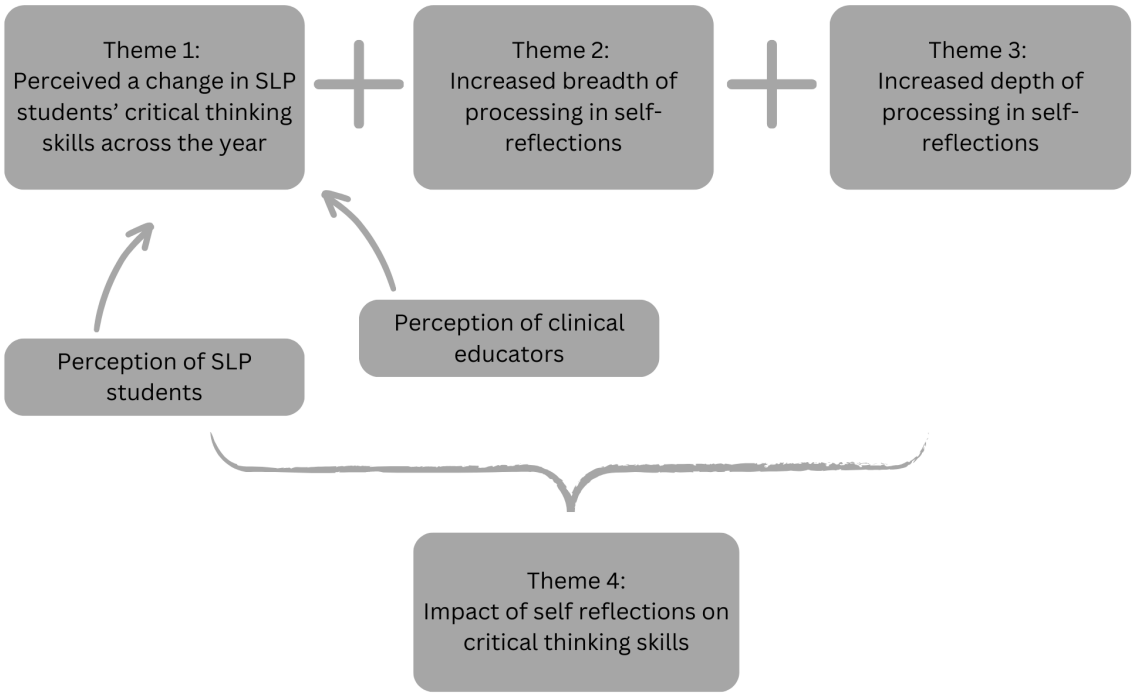
Although statistical comparisons were initially conducted across all three clinical blocks, no significant differences were found between Blocks 2, 3, and 4. Therefore, Block 2 and Block 4 were selected for focused comparison to explore developmental change over time. This decision was informed by literature in speech-language pathology education, which highlights that critical thinking and reflective skills tend to develop incrementally over time when explicitly taught and supported (Cook et al., 2019; Cook et al., 2022; Dunne et al., 2019; Dunne et al., 2024). Comparing the beginning and end of the year allowed for a clearer examination of growth in

these areas, especially in the context of a pedagogical intervention aimed at supporting such development.

The key themes highlighting the development of critical thinking skills include: (1) perceived improvements in critical thinking skills by both students and clinical educators, (2) increased breadth of processing in students' self-reflections, (3) greater depth in their reflections and (4) the impact of self-reflection skills on critical thinking skills development. I further elaborate on these themes, integrating both qualitative and quantitative data to support the conclusion that students' critical thinking skills improved over the year, influenced by multiple factors beyond inquiry-based learning. Figure 6.1 summarises these supporting themes.

Figure 6.1

Themes that support the claim that there was development in the critical thinking skills of second- and third-year SLP students across the year



6.2. Theme 1: The Participants Perceived Change in the SLP Students' Critical Thinking Skills Across the Year with Inquiry-Based Learning

To understand the outcomes of the programme evaluation, I examined the perceptions of students and clinical educators regarding the development of critical thinking skills over the year. Both groups observed changes in the students' critical thinking skills. I first explore the SLP students' perceptions of their own development, followed by the clinical educators' views on this progress.

6.2.1. Improved Critical Thinking Skills: The Perception of SLP Students

The Likert scale questions that probed the students' self-reported perceptions of clinical education at the end of each block were compared across the year to investigate the outcomes of implementing inquiry-based learning from the perspective of SLP students. The results of the Wilcoxon matched-pairs tests comparing Block 2 with Block 4 are provided in Appendix W. Ten students in the experimental group consistently completed the Likert scale at the end of each block. While 16 students in the control group consistently completed the Likert scale at the end of each block. I collected results from Blocks 2, 3, and 4. I expected the most significant difference between Blocks 2 and 4. Hence, I compared Blocks 2 and 4 in the Wilcoxon matched-pairs tests. These results indicated no significant changes in the student SLPs' perceptions of their critical thinking skills across the year. There was no difference between the experimental group and the control group. This lack of significant change could have occurred due to the Likert scale not being sensitive enough, as is discussed in the methodology chapter.

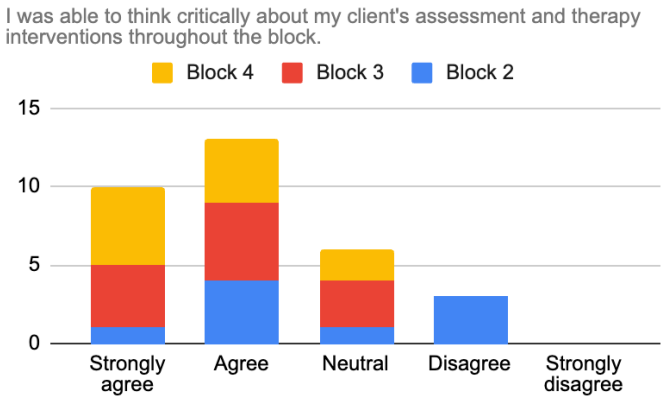
As there were no significant changes when analysing the results using the Wilcoxon test, I rather used histograms to understand the data further. The histograms provided the distribution's shape features and allowed for important data features to emerge in a visual representation, as explained by Nuzzo (2019). Figure 6.2 provides the histograms of the Likert scales relating to the students' perceptions of the clinical education outcomes for the experimental and control groups. When reviewing the changes in the histograms across the blocks, I observed a positive trend towards the students choosing more "agree" and "strongly agree" in Block 4 compared with Block 2.

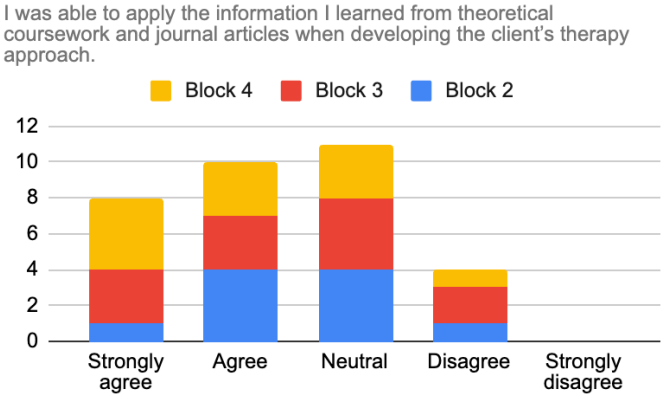
This result was consistent for both the experimental and control groups, with students reflecting positively on their growth in clinical skills, clinical reasoning, and critical thinking skills throughout the year, regardless of whether they were in the experimental or control group. As members of Generation Z, students may have viewed their growth positively due to their emphasis on achievement and skill development, as noted by Azimi et al. (2022), Sakdiyakorn (2021), and Schroth (2019). The feedback from clinical educators and the marks received for clinical practicals at the end of each block likely contributed to these positive reflections, reinforcing their insights into the changes and progress they had made over the year.

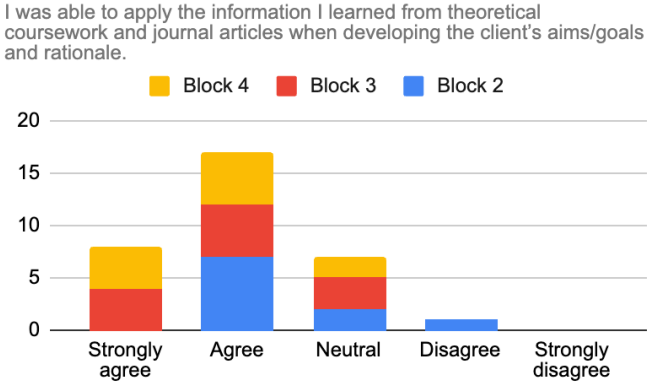
Figure 6.2

Histograms illustrating the Likert scale statements related to students' perceptions of developing critical thinking skills during supervised clinical education across Blocks 2, 3, and 4

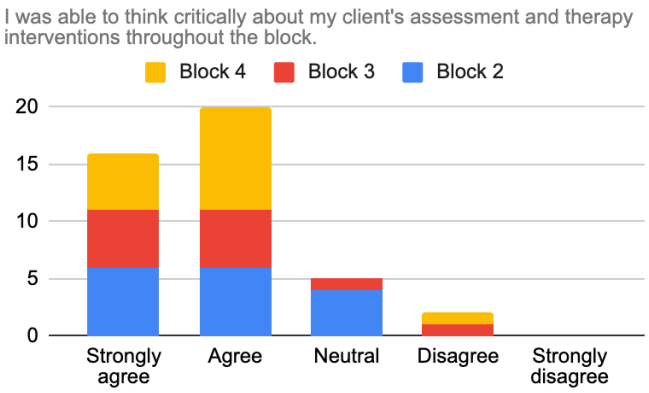
Experimental Group

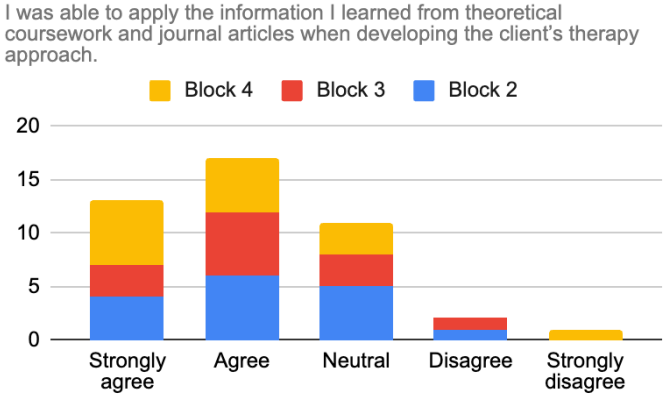






Control Group





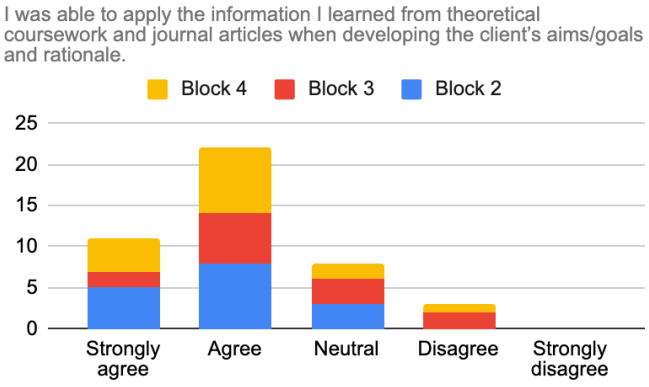
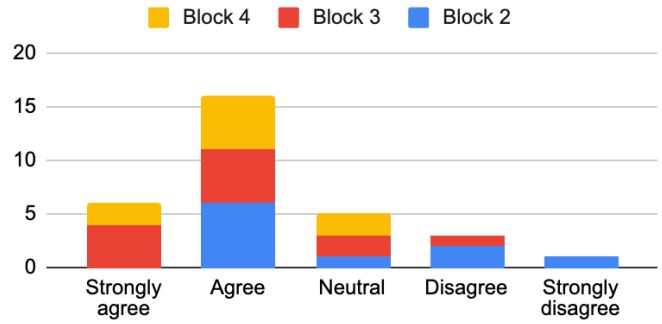


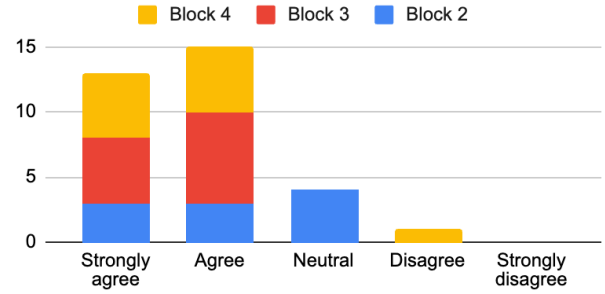
Figure 6.2 continued

Experimental Group

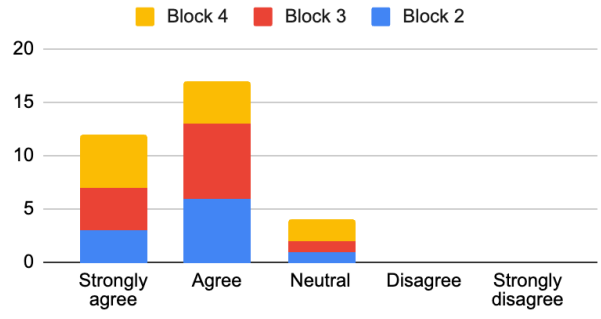
I was able to apply the information I learned from theoretical coursework and journal articles when determining the therapy procedures and therapy activities for the client's therapy sessions.



My clinical reasoning skills (thinking skills used during assessment and therapy planning) for the particular population group of the block improved throughout the block.

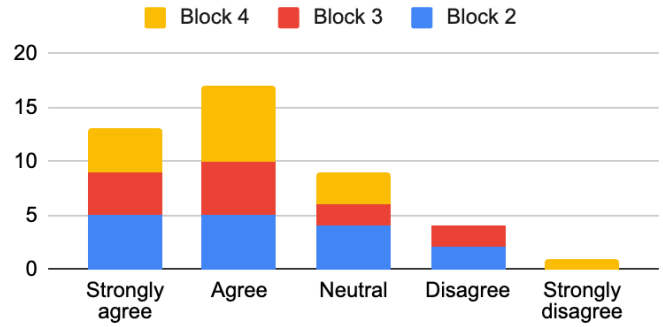


I was able to explain information that I learned to my clinical educator and peers during my clinical practical.

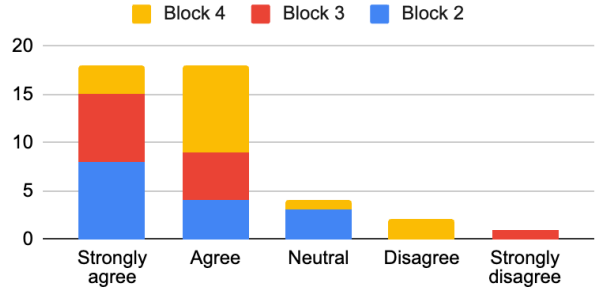


Control Group

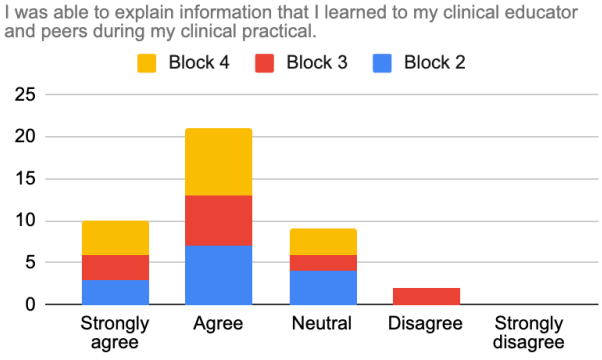
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I was able to explain information that I learned to my clinical educator and peers during my clinical practical.



During the end-of-year SLP student focus groups, experimental and control group students shared insights into their personal and professional growth. Selena (Stu3, FGD, B4, experimental) acknowledged the impact of her clinical educator, stating, "*I think, I mean, she helped me grow*". Ayesha (Stu2, FGD, B4, control) also recognised the transformative influence of her educator on their personal growth, stating that she "*really grew as a person, and my educator really shaped the way I view my patient*". In addition, Ayesha (Stu2, FGD, B4, control) emphasised the importance of being given the opportunity to grow rather than being dictated to as her clinical educator "*really give us that opportunity to grow and not just dictate what should be done and what we are doing wrong*". Similarly, Ashton (Stu3, FGD, B4, control) highlighted the role of the clinical educator's reassurance in building students' confidence, sharing, "*I felt that that really like built our confidence because she gave us much reassurance*". Rebecca (Stu3, FGD, B4, experimental) emphasised the practical benefits of clinical education over the year, as it "*was really helpful to develop my own skills as a therapist*".

These quotes, along with the data presented in the histograms, illustrate how students in both the experimental and control groups perceived their positive development in clinical skills, clinical reasoning, and critical thinking over the year. Despite the different pedagogies used, students reported positive growth. However, I acknowledge the potential for self-report bias, as students may have felt pressured to demonstrate improvement when completing the Likert scales and participating in the Block 4 focus group. Therefore, I needed to examine the data on the breadth and depth of processing in their self-reflections to assess any changes in critical thinking skills over the year and to identify differences between the experimental and control groups.

6.2.2. Improved Critical Thinking Skills: The Clinical Educators' Perspective

Clinical educators reflected on the changes in students' critical thinking skills over the year. It is important to note that the clinical educators mentioned in this section were those who agreed to participate in my study, and they supervised students from both the experimental group and students who did not participate. The clinical educators provided insights into the critical thinking skills they observed in the students across each block, particularly those exposed to inquiry-based learning, the pedagogy these educators were implementing. Based on the feedback gathered through Likert scales, audio diaries, and focus groups, clinical educators indicated that students improved their critical thinking skills throughout the year. They also noted that as students' self-reflection skills improved, so did their critical thinking.

Clinical educators observed a positive shift in the critical thinking skills of second- and third-year SLP students. Appendix X shows the results of Wilcoxon matched-pairs tests comparing the Likert scale data from Block 2 with Block 4. Only 5 of the 7 clinical educators consistently completed the Likert scales across Blocks 2, 3, and 4, and no significant differences were found between Block 2 and Block 4 results. Clinical educators did not perceive significant differences in students' critical thinking skills between Blocks 2 and 4, possibly due to the 5-point Likert scale not being sensitive enough to detect changes. The small number of clinical educator participants may have also impacted the test results. Thus, I used histograms to identify patterns in the clinical educators' perceptions of critical thinking skills over time.

Figure 6.3 presents histograms for each Likert scale related to students' critical thinking skills, as rated by clinical educators. The histograms show that clinical educators became more positive across the blocks regarding students' ability to use critical thinking in clinical settings. These

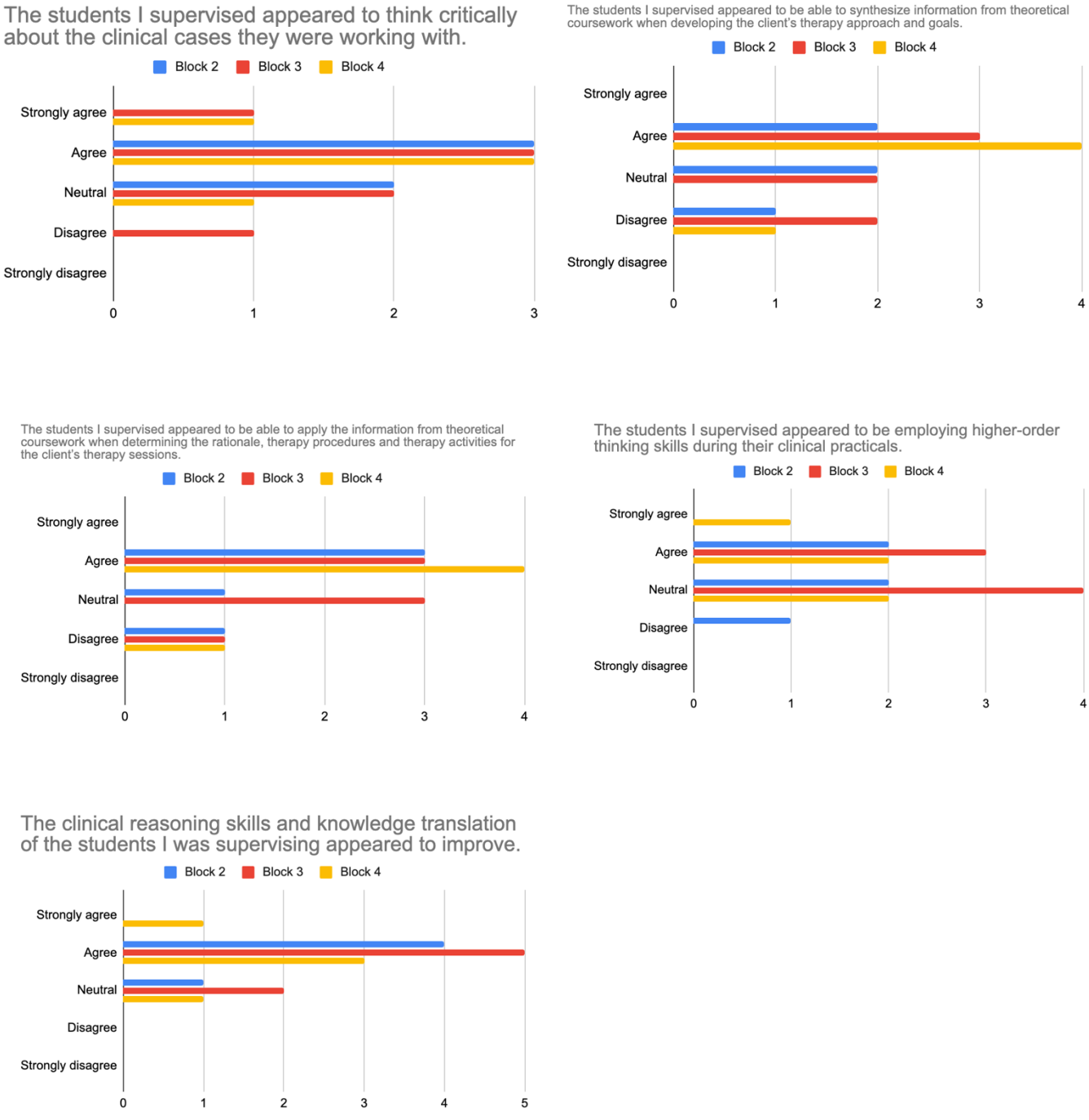
visual changes suggest improvements in students' critical thinking, application of knowledge, and use of higher-order thinking skills. This aligns with the previous section, where the experimental group reported positive changes in their critical thinking skills and showed a general trend toward deeper self-reflections. Thus, the clinical educators' perceptions aligned with the students' self-reported growth.

However, some clinical educators consistently disagreed about students' ability to apply critical thinking skills in clinical settings, expressing scepticism about their capacity to integrate theoretical knowledge and apply it effectively, particularly when planning aims, developing rationales, and generating suitable therapy activities. While some students improved, others struggled with bridging the theory–practice divide, a challenge documented in research (Mupawose et al., 2021; Rapillard et al., 2019).

As these challenges persisted, I questioned why some students struggled to bridge the gap between knowledge and practice. This complexity added depth to the research, as bridging the knowledge–practice divide is a multifaceted process. Understanding why some students succeeded in integrating knowledge while others did not, solely through an inquiry-based learning lens, was insufficient. *Chapter 7* offers further insights into the reasons behind these struggles.

Figure 6.3

Histograms of the Likert scale questions related to clinical educators' self-reported perception of students' critical thinking skills in a clinical setting across Blocks 2, 3, and 4



The themes from the audio diaries (AD) and end-of-block focus groups (FGD) provide further evidence that the clinical educators observed positive changes in the second- and third-year SLP students' critical thinking skills. Nomkitha (CE, AD, B2) highlighted that her students had moved beyond test administration and she recognised the emergence of critical thinking skills that informed clinical reasoning because the "*students are getting that it's not just about administering a test but troubleshooting, seeing what works*". Nomkitha also highlighted the importance of students moving beyond surface-level thinking and that "*it is starting to sink in that surface thinking is not enough. They need to think deeper about how they assess and their findings*". Avashni (CE, AD, B2) praised increased engagement and critical analysis during practical sessions as "*the prac was really good. One of the few that I have seen students engaging with material and thinking critically about their patients and therapy*". Moreover, Avashni observed increased creativity and innovative thinking because "*this group were willing, engaging, interactive, proactive, thinking outside the box*". This trend continued as Luyanda (CE, AD, B2) described a change in students' understanding of therapy planning. She described a moment of improved critical thinking skills by observing how she "*could see some lightbulb sort of coming on for them to understand what it means when we plan therapy*".

Megan (CE, FGD, B4) highlighted students' progression in independent problem-solving, noting their ability to "*come up with their own solutions and then implement them so that it worked*". Additionally, Avashni (CE, FGD, B4) emphasised "*that was one practical skill that definitely developed in our group, and it was nice to kind of note how they were able to kind of look at the children more holistically and also more like more functionally in terms of this applies for this child*". She observed the development of critical thinking skills in the students by observing a

shift towards them viewing patients more functionally and holistically. Luyanda (CE, FGD, B4) noted a transition in the students' critical thinking skills as they "*no longer e-mail you about every small little thing; they are able to sort of stop, think, analyse the situation or the challenge, and then come up with the solution*" and are thus being more independent in their clinical reasoning.

Clinical educators also noted further positive shifts in critical thinking skills across the year. Nomkitha (CE, AD, B4) praised students' growth in critical thinking, particularly in their adaptability and overall progress, by commenting that she was "*quite impressed with the growth that the students have from planning a session to even just saying, Oh, [Nomkitha], this child is quite distracted as the day goes, so can I please see this child first?*" Additionally, Gayner (CE, AD, B4) highlighted students' deeper critical thinking and better use of information for therapy planning because "*they've thought about what the patients need, not just what they [as students] need and what they want to achieve. And they're also using the information that the teachers are giving them to direct their therapy programs*".

Rachel (CE, FGD, B4) observed that students' "*problem-solving skills were the most significant change that I've seen*", and she also saw an improvement in "*the integration of what they've learnt theoretically and what they will learn through the practical*". Avashni (CE, FGD, B4) echoed that "*their critical thinking skills [had] developed, they were looking at information. They had good rationales*". Gayner (CE, FGD, B4) agreed with this development in critical thinking skills by stating that she observed "*that they're actually using their thinking skills and taking it one step ahead*". These improvements reflected growth in flexibility, problem-solving,

analytical skills, and the application of theoretical knowledge to clinical reasoning.

Despite the positive progression, some clinical educators noted challenges for certain students in applying knowledge in clinical settings. Megan (CE, AD, B3) acknowledged the struggle of implementing theoretical knowledge practically because "*the students haven't worked with the autism population before. And they have the theory, but implementing it practically takes them a huge step back*". Gayner (CE, AD, B3) agreed, observing that "*the thinking skills are there, but the application of what they have thought about does not always fall into place*". These perspectives highlighted the ongoing journey of students in translating theoretical knowledge into practical application.

6.2.3. The Differences between the Critical Thinking Skills of Second- and Third-Year SLP Students

While overall differences between second- and third-year students were minimal, Block 3 revealed a more distinct divergence in critical thinking skills. In Block 3, second-year clinical educators noted a disparity in critical thinking skills compared to their third-year counterparts, raising concerns about the depth of critical thinking among second-year students. Layla (CE, AD, B3), a second-year clinical educator, felt that she "*would expect much more critical engagement*" when asked to reflect on the critical thinking skills her students presented during the block.

Similarly, Avashni (CE, AD, B3) voiced concerns about her second-year students' ability to integrate theory and practice, indicating "*they struggle to like, you know, to integrate that theory*

with the practice, and that kind of goes with all the strategies". These observations highlight the ongoing need for active development in critical thinking skills. Cook et al. (2022) found that clinical experience impacts SLP students' depth of processing and critical thinking about their patients. As second-year students were providing assessment and therapy for the first time without prior clinical experience, their critical thinking about patients and therapy was limited. Having completed assessments in Blocks 1 and 2, they were expected to think critically about these assessments and plan therapy in Block 3. This transition likely required different critical thinking skills, including integrating information, reasoning, problem-solving, and applying assessment results to develop therapy plans. As second-year students had not yet implemented their theoretical skills in clinical scenarios, this may have contributed to differences in their critical thinking skills from Block 2 to Block 3.

In contrast, third-year students demonstrated different critical thinking skills in Block 3, as noted by their clinical educators. These educators observed improvements, particularly in reasoning, problem-solving, and integration of feedback. This enhancement may stem from the clinical education and experiences students gained during their second year, as identified by Cook et al. (2022), which influence their reflective and critical thinking skills.

Third-year students have had more exposure to the critical thinking required for assessing and treating patients than their second-year counterparts. Additionally, they received guidance and mentoring from clinical educators in their second year, preparing them for the challenges of the third year. Avashni (CE, AD, B3) noted growth in her third-year students' reasoning and problem-solving abilities, stating that prior experiences led to significant improvements because

"*when the students are just given that opportunity to get an understanding or exposure to the patients, I'm finding even their reasoning, the way they're sort of spotting things and trying to help immediately is a lot more, I would say, mature than from the paeds block in my experience of the students in that block*". Moreover, Avashni highlighted their ability to ask critical questions and implement feedback, indicating a deeper level of engagement through them "*asking very critical questions and really listening to the feedback. Because you can see how they improve. They change their behaviour in the next session*".

SLP students and clinical educators noted changes in critical thinking skills, but some educators expressed concerns that certain students needed additional support to think critically about their patients, assessments, and treatment plans. These observations helped identify the types of support needed throughout the different years to further develop students' critical thinking skills.

6.3. Theme 2: Increased Breadth of Processing in Self-Reflections

To assess whether critical thinking skills improved over the year, as perceived by the SLP students and clinical educators, I analysed the students' weekly self-reflections from Blocks 1 to 4. These reflections were coded using the schema developed by Plack et al. (2005) and later adapted for SLP students by Cook et al. (2019, 2022) (Appendix Q). The breadth of processing referred to reflective elements that could be identified at a word, phrase, or sentence level. They describe the specific reflective elements that should be present in a critical self-reflection (Cook et al., 2019; Plack et al., 2005).

Upon analysing changes within the experimental and control groups, I noted an increase in reflective elements (breadth of processing) throughout the year. The experimental group

exhibited more reflective elements in their self-reflections compared with the control group. The results of the Friedman test, along with the histograms, support the observed changes in breadth of processing within both groups. Similarly, the results of the Mann-Whitney U test, combined with the histograms, provide evidence for changes in breadth of processing between the experimental and control groups.

6.3.1. Within Experimental and Control Group Comparison to Highlight the Development of Breadth of Processing and Critical Thinking Skills

Each reflective element was evaluated across the four blocks using Friedman's analysis of variance to compare changes within the experimental and control groups, as detailed in Table 6.1. The differences across the blocks for most reflective elements were insignificant. However, some reflective elements showed significant differences within both the experimental and control groups over the year. There was a significant difference within the experimental group for *Process X(3)* = 8.85, $p<.005$. The change in *Process* reflected an increase in the amount of this reflective element produced. More production of the *Process* element across the year indicated that students reflected more on the clinical strategies they used or that were available to them.

There was a significant difference within the control group for *Reflect for action X(3)* = 8.23, $p<.005$ and for *Premise X(3)* = 8.6, $p<.005$. It is important to note that the control group experienced a decrease in reflective elements, indicating a decline in the breadth of processing over the year. Initially, I believed the changes in both groups were due to inquiry-based learning. However, considering the complexity theory underlying this research and the additional factors observed while using Adapted ePIP to integrate my results, I could not attribute the changes solely to inquiry-based learning.

Table 6.1

The results of the Friedman test for the breadth of processing elements when comparing Block 1 with Block 4 to determine if there was a change within the experimental and the control groups

The breadth of processing element		***N***	**df**	**Friedman χ2**	**Friedman *p*-value**
Return	Experimental group	18	3	2	0.51
	Control group	15	3	2	0.57
Attend	Experimental group	18	3	5.7	0.13
	Control group	15	3	3.23	0.36
Reflect on action	Experimental group	18	3	3	.
Reflect on action	Control group	15	3	1	0.8
Reflect for action	Experimental group	18	3	7.58	0.06
Reflect for action	Control group	15	3	8.23	0.04**
Process	Experimental group	18	3	8.85	0.03**
Process	Control group	15	3	1.8	0.62
Reflect in action	Experimental group	18	3	4.67	0.19
Reflect in action	Control group	15	3	2	0.57
Content	Experimental group	18	3	4.67	0.19
Content	Control group	15	3	0.81	0.85
Re-Evaluates	Experimental group	18	3	.	.
Re-Evaluates	Control group	15	3	3	0.39
Premise	Experimental group	18	3	6	0.11
Premise	Control group	15	3	8.6	0.04**

***P*< .05; reject the null hypothesis of no difference within groups between Blocks 1 and 4.

To further understand the differences in reflective elements between the experimental and control groups, I created histograms for each block. Figure 6.4 presents the histograms of the reflective elements for both groups, revealing distinct patterns. In the experimental group, there was an increase in *Attend*, *Process*, and *Content*, while *Reflect for action* and *Reflect in action* showed a slight decrease. *Attend* is a low-level reflective element that simply narrates an event with no evidence of self-reflection (Cook et al., 2022). In contrast, *Process* and *Content* are higher-level reflective elements. The statistical results and histograms for the experimental group indicated an increase in these higher-level elements, which contribute to critical thinking, as evidenced by the students' self-reflections and their enhanced depth of processing (as explained by Cook et al., 2022).

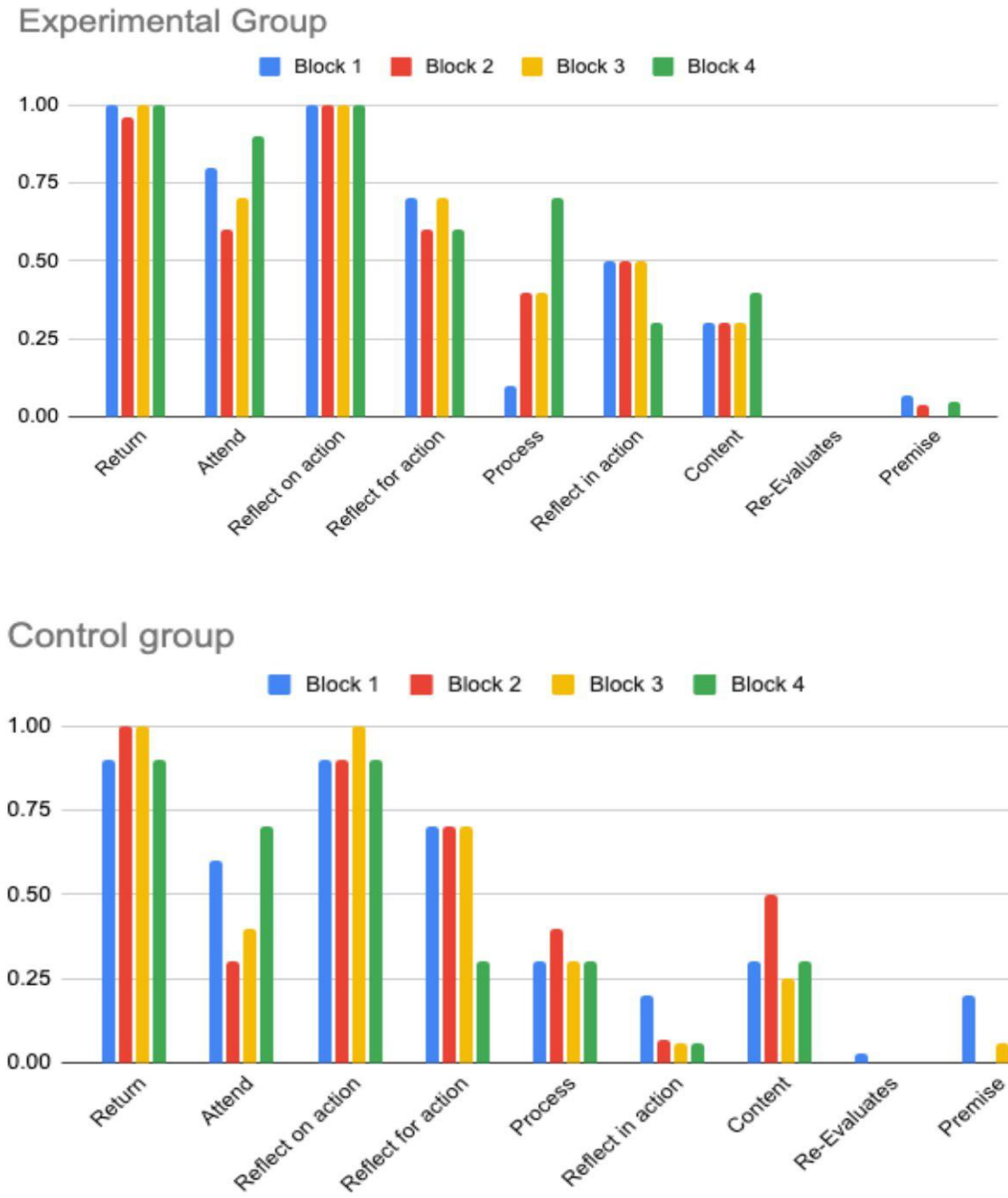
In the control group, as shown in Figure 6.4, there was only an increase in *Attend*, while *Reflect for action*, *Reflect in action*, and *Premises* decreased. This decline is concerning because these elements are higher-level reflections that contribute to the depth of processing in self-reflections. The decrease in these elements indicates that the critical thinking skills of students in the control group declined over the year. This decline cannot be attributed solely to a lack of exposure to inquiry-based learning. Additional factors related to the implementation of clinical education and student-specific factors must also be considered.

Furthermore, expanding on the concern of self-report bias from the student Likert scales regarding the development of critical thinking skills discussed in *Chapter 6B Section 6.2*, I observed that while students might rate their skills more positively over the year, their

perceptions do not always align with reality. Additionally, as Wolford et al. (2021) recommend, improvements due to clinical education cannot be assessed solely using self-report measures like the Likert scale. It is also necessary to evaluate direct measures of behaviours, such as the breadth of self-reflection skills.

Figure 6.4

Histograms illustrating the mean of each reflective element, which comprises the breadth of processing for the experimental and control groups across the year



6.3.2. A Comparison Between the Experimental and Control Groups to Highlight the Development of the Breadth of Processing and Critical Thinking Skills

Table 6.2 presents the Mann-Whitney U results comparing reflective elements between the experimental and control groups at the beginning and end of the year. This comparison aimed to determine differences in reflective elements at both time points and to assess whether the groups started with the same breadth of reflection. Additionally, it examined if either group exhibited greater breadth of processing by the end of the year.

Overall, there was no difference in the breadth of processing elements between the experimental and control groups at the beginning or end of the year. However, the experimental group had significantly more *Reflect in action* elements at the beginning of the year than the control group ($z = 2.09$, $p = .04$). This may be attributed to the types of questions posed by their clinical educators. During the analysis, I noted that not all clinical educators used the same questions for self-reflection. Some educators in the control group either did not prompt students for self-reflections or used very simple guiding questions, such as “What went well?” “What did not go well?” and “What can I do in the future?” These questions do not necessarily facilitate deep reflections and may indicate the clinical educators’ lack of awareness regarding the importance of self-reflection or their uncertainty about how to better support it.

Table 6.2

The results of the Mann-Whitney U tests for the breadth of processing elements when comparing the experimental and control groups at Block 1 and Block 4

Self-reflection code		***N* (E, C)**	***Z*-value**	***U*-value**	***P*-value**
Return	Block 1	26, 27	1.4		0.16
	Block 4	18, 15		126	0.27
Attend	Block 1	26, 27	1.69		0.09
	Block 4	18, 15		106.5	0.09
Reflect on action	Block 1	26, 27	1.4		0.16
	Block 4	18, 15		126	0.27
Reflect for action	Block 1	26, 27	0.08		0.94
	Block 4	18, 15		97.5	0.12
Process	Block 1	26, 27	1.5		0.13
	Block 4	18, 15		90	0.06
Reflect in action	Block 1	26, 27	2.09		0.04**
	Block 4	18, 15		99	0.07
Content	Block 1	26, 27	0.48		0.63
	Block 4	18, 15		118.5	0.47
Re-Evaluates	Block 1	26, 27	0.98		0.33
	Block 4	18, 15		1356	1
Premise	Block 1	26, 27	1.15		0.25
	Block 4	18, 15		127.5	0.36

***P*< .05; reject the null hypothesis of no difference between the experimental and control groups at Block 1 and Block 4

Note. E= Experimental group; C= Control group

A clinical educator's lack of knowledge about the importance of self-reflection or how to promote it effectively impacts students' perceptions of reflective practice (Chan & Lee, 2021; Uygur et al., 2019). Students need support to grasp the complexity, structure, learning outcomes, and expression methods of self-reflections (Aronson et al., 2012; Chan & Lee, 2021; Devi et al., 2017). I did not have access to, or knowledge of the guidance students receive from their clinical educators regarding self-reflections, as the role of self-reflection was not a priority when I initially planned my study. Its significance only emerged during data analysis. Literature suggests that both clinical educators' and students' knowledge and perceptions of self-reflection may contribute to the experimental group's higher *Reflect in Action* elements due to input from their clinical educators.

The differences in the breadth of processing in the experimental group may be linked to the use of inquiry-based learning, although other factors, discussed in the following chapter, likely influence these changes. From a complexity theory perspective, both the clinical education system and environment are complex systems, where interactions are unpredictable, leading to unforeseen outcomes. It would be valuable to know the clinical educators' perceptions of self-reflection and the specific teaching students receive, but this realisation came in hindsight, and suggests areas for future research.

6.4. Theme 3: Increased Depth of Processing in SLP Student Self-Reflections

Depth of processing refers to students' overall level of reflection and, as explained by Cook et al. (2022), is determined by a combination of breadth of processing elements, which I outline in the methodology chapter. To explore the depth of processing, I first compare changes within the

experimental and control groups over time in students' self-reflections. I then examine the differences in depth of processing between the two groups. Comparing both within and between the groups over time is necessary to assess whether inquiry-based learning contributes to the development of students' critical thinking skills. The second- and third-year self-reflections are combined for these comparisons due to the small sample sizes. Dividing them into the different year groups would make statistical analysis less meaningful (Mishra et al., 2019).

6.4.1. Within Experimental and Control Group Comparison to Highlight the Development of Students' Depth of Processing and Critical Thinking Skills

I completed a Wilcoxon matched-pairs signed rank test to determine if there was a difference when comparing *within* the experimental and control groups between Block 1 and Block 4. Table 6.5 displays the results of the Wilcoxon tests for the depth of processing when comparing Block 1 with Block 4. In the experimental group, the results indicate a significant difference in the depth of processing categories of *Emerging Reflector* ($z = 3$, $p = .003$) and *Reflector* ($z = 2.24$, $p = .025$). In the experimental group, there was a decrease in the number of *Emerging Reflector* self-reflections, while there was an increase in the number of *Reflector* self-reflections between Blocks 1 and 4. In the experimental group, the number of *Emerging Reflectors* decreased to none while the number of *Reflectors* increased, which indicates an increase in the depth of processing for self-reflections across the year.

In the control group, the results indicate a significant difference in the depth of processing category *Emerging Reflector* ($z = 3.41$, $p = <.001$). This result indicates that in the control group, there was a decrease in the number of *Emerging Reflector* self-reflections between Block 1 and Block 4. In the control group, there was a significant decrease in *Emerging Reflector* self-

reflections. However, there was no significant decrease or increase in the *Reflector* self-reflections, and there was an increase in the *Non-reflector* self-reflections in the control group at the end of the year. These results indicate a deterioration in the self-reflection skills of the students in the control group.

Table 6.3

The results of the Wilcoxon tests for the depth of processing when comparing Block 1 with Block 4 to determine if there was a change within the experimental and the control groups

Depth of reflection code	***N***	***Z*-value**	**Two-tailed *p*-value**
EXPERIMENTAL GROUP			
Non-reflector	18	0	1
Emerging reflector	18	3	0.003**
Reflector	18	2.24	0.025**
Emerging critical reflector	18	1.73	0.083
Critical reflector	18	1	0.320
CONTROL GROUP			
Non-reflector	15	1	0.320
Emerging reflector	15	3.32	<0.001**
Reflector	15	1.73	0.083
Emerging critical reflector	15	1	0.320
Critical reflector	15	1.73	0.083

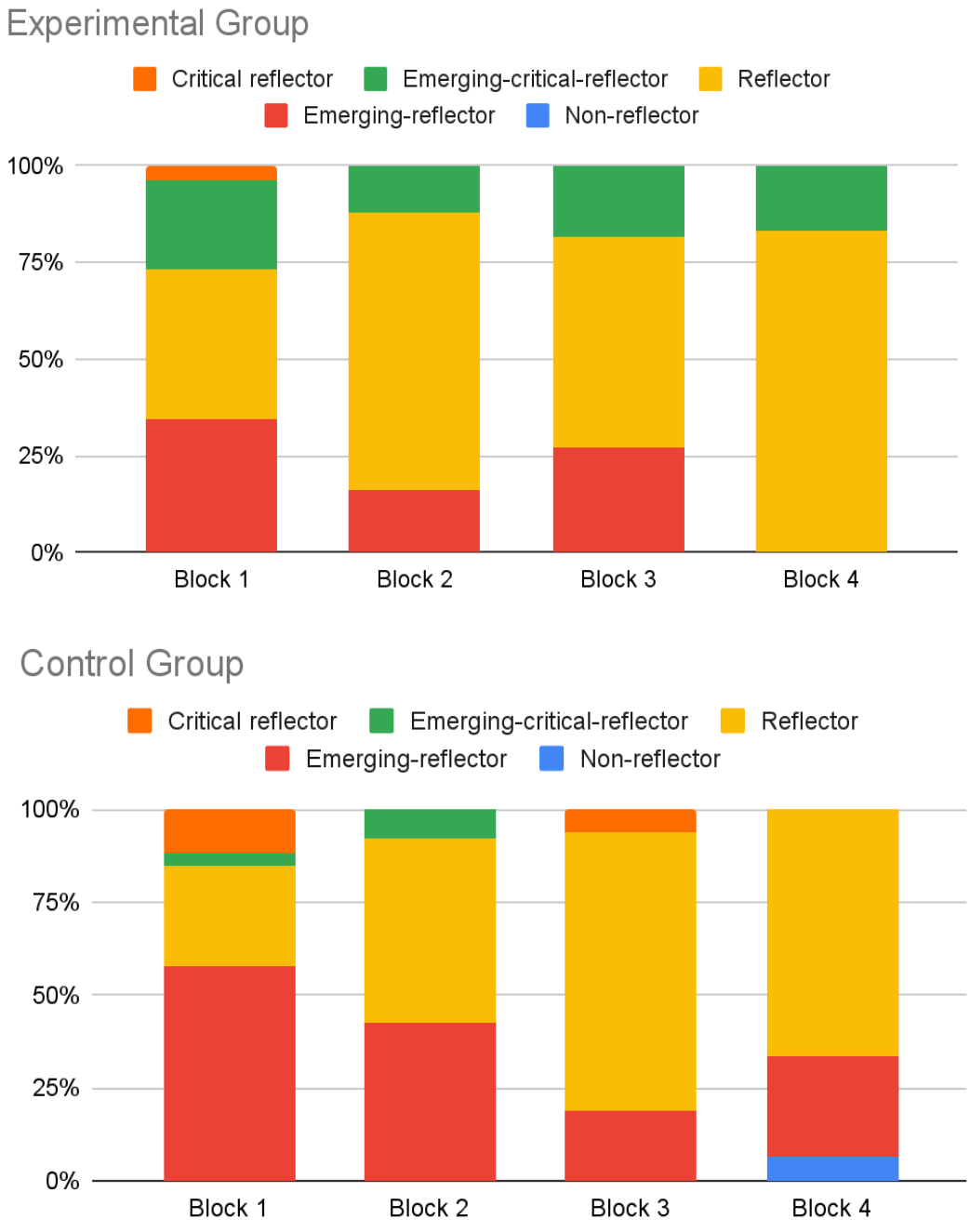
***P*< .05; reject the null hypothesis of no difference within the experimental and control groups between Block 4 and Block 1. Variations in *N* across tables reflect differences in response rates due to incomplete or missing data across blocks.

The Wilcoxon test results suggest that inquiry-based learning may have influenced the development of depth of processing and, consequently, critical thinking skills of the experimental group. Figure 6.5 presents a histogram representing the proportions of depths of processing in each block for the experimental and control groups. The findings from the Wilcoxon test and the histograms align with the results discussed in Theme 2 (*Chapter 6B, Section 6.3*), which indicate that while students perceived growth in their critical thinking skills, the self-reflections from the control group reveal a deterioration in the depth of their reflections and, potentially, their critical thinking skills.

The deterioration in self-reflection skills may stem from both clinical educators and SLP students not understanding the role of self-reflection in learning or how to adequately support its development. If clinical educators do not prioritise the importance of self-reflection for developing critical thinking skills, they may fail to provide the necessary teaching and support. Similarly, if students do not recognise the significance of self-reflection, they may produce superficial reflections that do not demonstrate growth or critical thinking. Chan and Lee (2021) identified this lack of understanding among clinical educators and students can negatively affect students' self-reflection skills. However, I further note that the issue also involves a lack of knowledge about how to effectively support the development of these skills and what constitutes the depth and breadth of self-reflection.

Figure 6.5

Histograms illustrating the proportions of each group to demonstrate the depth of processing at each block during the year



6.4.2. A Comparison Between the Experimental and Control Groups to Highlight the Development of the Depth of Processing and Critical Thinking Skills

I used the Mann-Whitney U test results to assess the difference in depth of self-reflection skills between the experimental and control groups. This analysis was conducted for Blocks 1 and 4 to determine whether the groups started with the same depth of reflection at the beginning and end of the year. The results indicate that there was no difference in Block 1 between the experimental and control groups ($U = 289.5$, $p = .24$). However, in Block 4, a significant difference emerged between the groups ($U = 126$, $p = .04$), as shown in Table 6.6.

In Block 1, students in both groups exhibited a similar depth of processing. By Block 4, the experimental group demonstrated an increase in depth of processing, comprising *emerging-critical-reflectors* and *reflectors*, while the control group included *non-reflectors*, *emerging-reflectors*, and *reflectors*. These findings suggest that the experimental group had a greater depth of processing in their self-reflections than the control group by the end of the year, suggesting that inquiry-based learning may have influenced the development of critical thinking skills. Nonetheless, I must also consider other factors, as discussed in the subsequent results chapter, which may have contributed to the changes in depth of processing between the two groups.

Table 6.4

Results of the Mann-Whitney U tests for the depth of processing when comparing between the experimental and the control groups at Block 1 and Block 4

Block	***N* (E, C)**	**Mann-Whitney *U*-value**	**Two-tailed *p*-value**
Block 1	18, 15	289.5	0.24
Block 4	18, 15	126	0.04**

***P*< .05; reject the null hypothesis of no difference between the experimental and control groups at Block 1 and Block 4. Variations in *N* across tables reflect differences in response rates due to incomplete or missing data across blocks.

Note. E=Experimental group; C=Control group

Implementing inquiry-based learning may have been a factor that positively impacted students' critical thinking skills, as observed in the improved breadth and depth of processing in the experimental group's written self-reflection. The interactions between students and clinical educators during clinical education were complex, and again, I could not relate these improvements in breadth and depth of processing directly to the implementation of inquiry-based learning. Therefore, it was important to interpret these changes in critical thinking skills within the complexity framework to understand the results more holistically.

6.5. Theme 4: The Impact of Self-Reflections on the Development of Critical Thinking Skills Across the Year

Self-reflection had an impact on students' critical thinking skills throughout the year when they experienced inquiry-based learning, which appeared to be an important factor in the development of students' critical thinking skills across various academic blocks. Clinical educators across

different blocks noted the positive effects of self-reflection and areas where it could be improved, particularly regarding its impact on critical thinking skills.

In Block 2, Avashni (CE, AD, B2) emphasised the importance of self-reflection through students being able to assess their own growth in the supervised clinical setting and that this positively impacted the development of their critical thinking skills. She remarked, "*it was nice to see how every student was able to critically evaluate themselves and see how they have grown*". Additionally, Avashni highlighted the development of students' self-reflection skills and, thus, critical thinking skills, remarking, "*they are growing and developing, and it is encouraging to see how they can self-critique and adapt in the moment as opposed to reliance on the clinical educator's input*". However, Layla (CE, AD, B2) from the same block highlighted a disparity in the depth of students' self-reflections, which impacted their ability to think critically, noting, "*I think, especially looking at their self-reflections, a lot of them don't have a lot of depth, they kind of talked broadly on, you know, what the patient did, and they don't really engage critically*".

In Block 3, Megan (CE, AD, B3) further recognised the role of reflections in developing critical thinking skills as they "*have been helpful just to try and guide the students and just trying to get them to think a bit more about what they're doing, but also that acknowledgement that if you don't know it's okay, but let's try and figure out why it's not okay and ask those questions and probe deeper*". Megan also found reflections to be beneficial in probing students more deeply about the therapy they provided. She found self-reflections "*have been helpful to use as kind of a probe. So, in the reflections, kind of getting the students to think about how the session went, what worked and what didn't, but then also to just go a bit beyond that and ask them what you*

could do to maybe improve on that or do differently". Avashni (CE, AD, B3) identified based on the students' self-reflections, that they are "*planning for what they need to read for or what they need to plan for the next session*". Due to the engagement in self-reflection, she noticed that "*they're able to become a little bit more confident, and I would say empowered to kind of manage their patients and to understand them a little bit more holistically*".

In Block 4, Avashni (CE, AD, B4) also emphasised the impact of encouraging reflection in multiple ways on enhancing critical thinking skills. She noted that "*the multiple opportunities really help in terms of them critically evaluating their own skills, where limitations are, what are the plus points, and where assistance needs to be provided*". Moreover, Gayner (CE, AD, B4) noted that discussing potential scenarios before sessions fosters a proactive mindset and allows the students to contemplate various possibilities and solutions, asserting that "*they're much more open to thinking of possibilities and to thinking of ways they could change it. It's still easier when they're talking about it before a session rather than when they find themselves in a situation that's not quite going the way they want to*". Rachel (CE, FGD, B4) highlighted the impact of self-evaluation and problem-solving during sessions, as she noticed a shift from dependency to independent critical evaluation because "*they're actually starting to critique critically, evaluate themselves to start problem-solving themselves. And I could see that during the session*". Students confirmed the role of self-reflection in the development of their critical thinking skills. Rebecca (Stu3, FGD, B4, experimental) acknowledged how self-reflection has supported her process of growth over the year as it gave her the opportunity "*to say I think I did this wrong, but I think I'm actually good at this, and you know, the whole self-reflecting part of it, I think, was really helpful to develop my own skills as a therapist*". This quote from Rebecca emphasises the

impact of self-reflection on her journey toward becoming a skilled and self-aware therapist.

These insights highlight the significance of self-reflection in developing students' critical thinking skills throughout the year. Self-reflection enables students to assess their progress, ask relevant questions, and proactively problem-solve, fostering a deeper understanding and engagement with their patients and clinical experiences. Although I did not include specific questions about self-reflection in the audio diary or focus group prompts, clinical educators consistently emphasised its importance. Notably, students in the experimental group showed improved breadth and depth of self-reflection skills. This improvement was likely influenced by clinical educators recognising reflective practice as a key component of the learning journey. However, it is not enough for educators to understand the importance of self-reflection. They must also be equipped to develop these skills in SLP students. Some educators struggled to guide students effectively due to inadequate guiding questions and a lack of practical strategies for enhancing self-reflection. This aligns with research by Chan and Lee (2021) and Dunne et al. (2019), which emphasises the role of clinical educators' perceptions and input in developing student self-reflection skills.

6.6. Chapter Summary

Based on integration and analysis of the data obtained from the students' and the clinical educators' perspectives, the critical thinking skills of SLP students changed throughout the year. The chapter began by highlighting the overall improvement in critical thinking skills across the experimental and control groups throughout the academic year. While both groups showed progress, the experimental group, exposed to inquiry-based learning, demonstrated some changes in their critical thinking skills compared to the control group. However, the changes were not

statistically significant.

By examining students' perceptions and the depth and breadth of their self-reflections, self-reflection emerged as a critical factor in developing students' critical thinking skills during clinical education as opposed to the pedagogy of inquiry-based learning. Overall, integrating quantitative and qualitative data from both the students and the clinical educators provided evidence that self-reflection skills were key to the development of critical thinking skills among SLP students. This chapter also provided the foundation for the exploration of additional factors that influenced the development of critical thinking skills during clinical education.

CHAPTER 7: UNRAVELLING THE PROCESS OF CLINICAL EDUCATION AND ITS IMPACT ON THE DEVELOPMENT OF SLP STUDENTS' CRITICAL THINKING SKILLS

7.1. Introduction

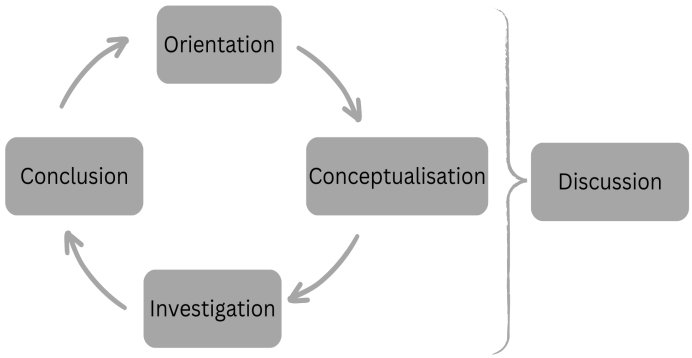
The implementation of inquiry-based learning by clinical educators did not differ significantly in practice from traditional clinical education methods. Dudding et al. (2017) highlight that traditional methods like questioning, feedback, and scaffolding are highly effective. These methods also form part of inquiry-based learning. Therefore, inquiry-based learning could be said to render hidden aspects of clinical education visible by including (1) the provision of terminology such as orientation and conceptualisation, which are terms with specific meanings in the inquiry-based learning cycle that clinical educators could then apply in clinical education; (2) structure (the actual cycle and leading students through each aspect of the cycle); and (3) sequence of clinical education (the inquiry-based learning cycle). Communication is also emphasised in both traditional and inquiry-based approaches, with methods such as tutorial groups, feedback, and peer learning. In this study, inquiry-based learning increased awareness of the importance of communication among clinical educators. Both educators and students recognised that factors beyond inquiry-based learning influence the development of critical thinking skills.

The clinical education process, including the implementation of inquiry-based learning, involves both intended and unintended influences on critical thinking skills. Intended factors are those explicitly taught in the inquiry-based approach, such as using student-generated questions and engaging with evidence-based literature during various phases of the inquiry cycle. These

intended factors also form part of the theory of change and the expected pathway that was to occur during the programme evaluation (Mayne, 2015). These factors offer insights into how inquiry-based learning can support critical thinking development. Figure 7.1 provides a reminder of the inquiry-based cycle to contextualise intended and unintended factors.

Figure 7.1

The inquiry-based learning cycle



Note. The figure is based on Pedaste et al. (2015).

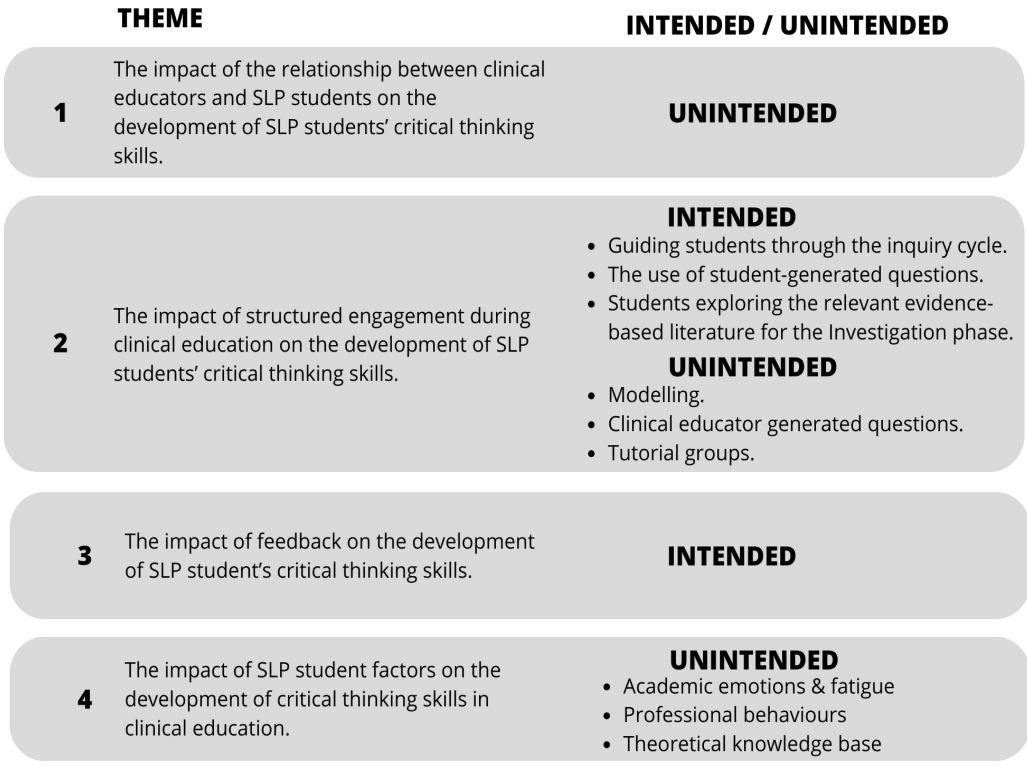
My study also revealed unintended factors that emerged during the programme. Unintended factors also so relate to the unanticipated factors that occur impact the theory of change that was developed for this programme evaluation (Mayne, 2015). These factors included real-world complexities such as the relationships between clinical educators and students, educator modelling, and structured tutorial groups. Additionally, student-specific factors, including their personalities, emotions, and external responsibilities, interacted with the inquiry-based learning process, impacting the development of students' critical thinking skills. Recognising these unintended factors allows a more comprehensive understanding of the real-world dynamics within clinical education. It also allows me to understand what unanticipated factors influenced

the theory of change.

By examining both the intended and unintended factors, I acknowledge the complexity of implementing an educational intervention, as Haji et al. (2013) suggest. This chapter explores how each of these factors, whether intended or not, influence the development of students' critical thinking skills, offering a nuanced view of the clinical education process. Four key themes emerge, each representing factors that influence critical thinking skills. Figure 7.2 summarises these themes, followed by a discussion of data from five case studies to further support the findings and illustrate the impact of clinical education on SLP students' critical thinking development.

Figure 7.2

Themes related to the process of implementing inquiry-based learning and whether they were intended or unintended.



7.2. Theme 1: The Impact of the Relationship Between the Clinical Educators and SLP Students on the Development of SLP Students' Critical Thinking Skills

The relationship between SLP students and their clinical educators is important during the clinical education process, significantly impacting the development of critical thinking skills, either positively or negatively, depending on the nature of that relationship. I identified this theme from the data collected in both the experimental and control groups of SLP students through initial interviews and end-of-year focus groups with clinical educators and students.

While relationship development is not a component of, nor emphasised in inquiry-based learning, it emerges as an unintended factor affecting critical thinking development, regardless of the pedagogical approach used. I did not expect this aspect of the clinical education process to influence critical thinking skills, as indicated by the literature. The existing research tends to be polarised, either focusing on the role of SLP clinical educators (DeRuiter & Ginsberg, 2020; Higgs & McAllister, 2007a, b) or on the pedagogies used to enhance critical thinking skills (Battaglia, 2020; Finn, 2011; Finn et al., 2016; Morris et al., 2018). There appears to be limited research that combines the impact of relationships in clinical education with the development of students' critical thinking skills. Moreover, this theme is not reflected in the quantitative results, as none of the statements included in the end-of-block Likert scales addressed the clinical education relationship.

Student SLPs reflected on the importance of building relationships with their clinical educators for a positive clinical education experience and to assist with developing their critical thinking skills and clinical skills. This theme is evident in Teresa's response (Stu2, FGD, B4, control),

where she commended her "*supervisor [clinical educator] for Monday's pracs [who] was hands-on, caring, considerate, friendly, and wanted to build a relationship with us*". Palesa (Stu3, FGD, B4, experimental) confirmed the importance of building relationships with clinical educators for developing critical thinking skills because her "*supervisors [clinical educators] were supportive and gave tutorials on all aspects that confused us. They understood that we were learning*".

Students in the experimental and control groups reflected on the importance of safe, supportive relationships with clinical educators who acknowledge their humanity and anxiety in clinical education as vital for the clinical education process and developing their critical thinking skills. Ayesha (Stu2, FGD, B4, control) "*really enjoyed the interaction [with her clinical educator]. And she was just the ideal educator for me in a sense that she got to know us on a personal basis*". Ayesha also valued that her clinical educator "*would always ask us about our mental health, which I think was something I really, really appreciated because no one else would ever ask us about that*". Nicole (Stu3, FGD, B4, experimental) also acknowledged the importance of having a relationship with clinical educators as it allowed students to manage their anxiety because the clinical educator "*acknowledged that we were new to it [the clinical practical site] and if we had, like any anxiety, she would help us to sort of deal with that and talk it through*".

Selena (Stu3, FGD, B4, control) highlighted the importance of the bidirectional student–clinical educator relationship in the development of critical thinking skills as "*it's supposed to be a contribution on both sides between the supervisor [clinical educator] and the students for it to be meaningful and for us to gain as much value out of the supervision as possible*". Ayesha (Stu2,

FGD, B4, control) also acknowledged that she "*really appreciates having a good rapport and a good relationship with [her] educators, and I really value having someone around that I feel that I can speak to. You know that I'm not afraid that, oh, if I ask her this question, she's going to say like, wow, you really don't know your work, you should be going over this*". Elizabeth (Stu2, FGD, B4, experimental) also provided insights into the importance of the relationship as it humanises the students and makes them feel seen when she could "*build the most wonderful relationship with her [clinical educator], and we discussed cases, and we also discussed the working world... But also, I don't know, it just makes you feel human because ultimately, as people, we have lots of different things that we go through. We are in different situations, and I think it's nice for that to be acknowledged and to be seen*".

Conversely, students commented on the impact of negative relationships on their clinical education. A negative student–clinical educator relationship tends to make them feel more unsure of themselves, increases their anxiety, and decreases their ability to learn, which then negatively impacts the development of their critical thinking skills. Teresa (Stu2, FGD, B4, control) identified the impact of a negative relationship between an SLP student and a clinical educator as she "*was always nervous about what was going to happen. And if I was going to get into trouble and, like, she was very much like on the spot, and I sort of blank when I go on the spot*". Ashton (Stu3, FGD, B4, control) also reflected on the impact of a poor relationship and how it decreases trust in oneself because "*if a supervisor [clinical educator] is quite autocratic about it and it's what they say is correct and you listen and you take everything in, but there's no room for your own contribution. I think that like kind of stunts the relationship, and it also stunts your trust in yourself*". Ayesha (Stu2, FGD, B4, control) reflected on the lack of personal

connection where she "*felt that [her clinical educator] didn't take the time to get to know us personally. So it was just very much like, oh, I mark your work, and I give you the resources, and you meant to do what you have to do. So, there wasn't a personal connection*". She felt that this lack of connection with her clinical educator impacted her "*journey for [her] to develop as a therapist*". Elizabeth (Stu2, FGD, B4, control) reiterated this by saying her clinical educator "*did a job, but it was just that. It should be more. I think it was just like a job for her. She didn't really care that much*".

Similarly, clinical educators acknowledged the impact of a negative relationship on the development of clinical skills. Nomkitha (CE, In Int, B1) noted the impact of a negative relationship if the clinical educator is "*being rude and unapproachable and not listening to students*". She reflected that "*sometimes, we [clinical educators] just need to listen to them [students]. Obviously, it's a balance. You need to obviously sometimes have a firm hand, especially for those who want to walk all over you*". Megan (CE, In Int, B1) echoed this sentiment by recalling clinical educators who were "*unapproachable and used to get quite dismissive of questions. Sometimes, like a pointer in the right direction would have been really helpful*". Megan (CE, In Int, B1) mentioned she thought "*being overly formal can also be a barrier to learning*". Layla (CE, In Int, B1) also highlighted the hindrance in developing a relationship and critical thinking skills by clinical educators who exhibited an overbearing confidence and are not open to different ways of learning, stating, "*I think sometimes when clinical educators come with this idea that, you know, they know everything and they are just there to kind of impart everything to students, it can be a barrier because it's not to say that the clinical educator you know doesn't have more knowledge or experience. But I think it can be a*

huge hindrance when they come, and they just want to kind of put it on to all the students and especially not understanding that, you know, we can still learn in different ways, taking in information in different ways".

Clinical educators who are rigid tend to assume the role of the knowledgeable other and require students to adapt to their style of providing therapy instead of promoting the student's growth as an individual. This rigidity then impacts the relationship between students and clinical educators, which could become a barrier to learning. Layla (CE, In Int, B1) stated that a clinical educator "*who feels that they know everything and they are there to just kind of teach the students can be a huge barrier, especially because I think we don't realise that, you know, everyone comes with their own understanding and their own experience into a space, and ultimately, I do think our role is to support and facilitate. It's not really to teach. I think ultimately students should have the knowledge before. It's just about facilitating growth, supporting them to be more confident and to understand the clinical space*". Layla further elaborated on this by stating she thought that "*when clinical educators come with this idea that, you know, they know everything. They are just there to kind of impart everything to students, it can be a barrier because it's not to say that the clinical educator you know doesn't have more knowledge or experience. But I think it can be a huge hindrance when they come, and they just want to kind of put it on to all the students, especially not understanding that, you know, we can still learn in different ways, taking in information in different ways*".

A clinical education relationship marked by rigidity in teaching style could create inconsistency among clinical educators and make learning centred on the clinical educator and not the student,

making it difficult for students to learn how to do therapy. Avashni (CE, In Int, B1) highlighted that "*students will often tell me, 'Oh, that's not how we did it in the last block, or this is not how this particular person or this particular educator preferred things done, or this is not the style I used with them*". Avashni further elaborated that "*students are almost having to adapt their responses and approaches to make it [clinical educator]-specific, and I think that's incredibly sad and definitely a barrier for students... And that's a worrying thing*".

A clinical educator who was generally closed off from relationships in the clinical education site could further impede students' development of critical thinking skills and, thus, clinical reasoning. Rachel (CE, In Int, B1) mentioned that "*being closed off from the patients yourself as the supervisor [clinical educator] and with all the employees at the site where you are*". She stated that this lack of engagement and developing a relationship at the clinical practical site *"really is a barrier because you are setting an example for them [students]. So, you need to act in a professional way and be a therapist. You're not just a clinical educator. You're also a therapist. So I think, you know, not fulfilling your role and showing them how things are done, being a model and being an example*". Gayner (CE, In Int, B3) also emphasised that "*not demonstrating clinical relationships*" at a clinical practical site is a barrier to knowledge translation.

Thus, from this data, I identified the value of building relationships between clinical educators and SLP students for developing critical thinking skills. A positive relationship led to a favourable clinical education experience that supported the development of critical thinking skills and clinical skills. The results acknowledge the importance of safe and supportive

relationships between clinical educators and students.

Positive relationships between SLP students and clinical educators contribute to meaningful learning experiences and the development of clinical skills, while negative relationships increase student uncertainty and anxiety, negatively impacting the clinical education process and the development of critical thinking skills. This theme underscores the critical role of the student–clinical educator relationship in shaping the clinical education experience. The development of critical thinking skills depends not only on the teaching pedagogy but also on the quality of this relationship, making it an additional factor that adds complexity to implementing inquiry-based learning in clinical education.

7.3. Theme 2: The Impact of Structured Engagements During Clinical Education on the Development of SLP Students' Critical Thinking Skills

The role of structured engagement during clinical education was identified as an important factor during the clinical education process and impacted the development of critical thinking skills. I identified this theme in the experimental and control groups of the SLP students. Certain aspects of structured engagement were components of inquiry-based learning and, thus, were intended factors. However, some aspects of structured engagement were separate from inquiry-based learning. The intended aspects of structured engagement included (1) guiding students through the inquiry cycle, (2) using student-generated questions, and (3) students exploring the relevant evidence-based literature for the *Investigation* phase of inquiry-based learning. The unintended aspects of structured engagement included (1) modelling, (2) clinical educators asking questions, and (3) tutorial groups. First, I discuss the intended aspects of structured engagement and their

role in developing critical thinking skills. Second, I discuss the unintended aspects of structured engagement and relate them to their role in developing critical thinking skills.

7.3.1. Intended Factors of Structured Engagement and Their Role in Developing Critical Thinking Skills

7.3.1.1. Guiding SLP Students Through the Inquiry Cycle to Develop Their Critical Thinking Skills

Guiding students through the inquiry cycle is an intended factor of inquiry-based learning. It is also a strategy present in traditional clinical education models (Dudding et al., 2017). Generally, educators implementing inquiry-based learning principles guide their students through the stages of the inquiry cycle with varying levels of support (Pedaste et al., 2015). In this study, clinical educators implementing inquiry-based learning commented that guiding SLP students through the inquiry cycle helped the students to be active learners and develop their critical thinking skills.

Clinical educators noted that students need support to be guided from *conceptualisation* to *investigation* and then to generate conclusions that they could implement in a therapy session. Nomkitha (CE, AD, B2) stated that she found it beneficial when engaging with students to not "*give [them] the answer because if [they] need it again and [they] have found the answer and kept that information, then [they] have it for a lifetime. Those who are not reading up are really struggling. They are struggling to make conclusions*". This comment shows that students need clinical educators to guide them to understand the importance of investigating information related to their patient's diagnosis and the evidence-based therapy they need to provide.

Megan (CE, AD, B2) highlighted the need to provide a structured approach to students when guiding them through the inquiry cycle, "*They had to go home today and find me some exercises to assist with tongue thrust... They need to go and read up and decide which school of thought they would like to belong to*". This guided inquiry involved students in a complete cycle of inquiry, from *orientation* to *investigation*, encouraging them to form a conclusion based on research and then implement it in therapy. Guided inquiry is a structured type of inquiry-based learning where the educator responds to students' ideas and provides the students with maximal support to move them through each stage of the inquiry cycle (Fong & Slotta, 2018). Guided inquiry relies on collaboration and cooperation between educators and students to arrive at conclusions (Rosli & Nasir, 2017).

Moreover, Megan (CE, FGD, B2) acknowledged the need for guidance, mentioning that the students "*needed quite a bit of guidance*". This recognition highlights the requirement for substantial support and direction that SLP students require in bridging the theory–practice divide. Avashni (CE, FGD, B2) reflected that guiding students through the process of inquiry was helpful because "*it helps them to engage and be proactive in their approach*". Layla (CE, AD, B2) also consolidated this perspective of understanding the importance of the process because she though that "*it's been quite helpful for the students to just understand a bit more about the child and not just to go in there and say, you know, this is my session, these are my aims, and I need to get through this*". However, Luyanda (CE, AD, B2) reflected on students' challenges with being able to understand the inquiry process and apply it in therapy. She reflected that "*it is still a long way to go. I can see they're still a bit confused, but we'll see how it goes*".

This guidance then allowed the students to participate in the inquiry cycle in a clinical setting. Megan (CE, FGD, B2) acknowledged that inquiry-based learning requires active learning by students and the role that clinical educators have to "*just start helping the students by guiding them to research, and just encourage reading up, researching things on their own, and coming to their conclusions. And I think that's why I like this and IBL [inquiry-based learning] so much. Because I think it does that so nicely*". Luyanda (CE, AD, B2) further reflected on the active role required from the students because "*inquiry-based learning does require something from them. You know it requires them to give input. It requires them to bother themselves, to plan their therapy, and to understand the diagnosis that they're presented with, and to them, that means you're saying they must do extra work*". Nomkitha (CE, FGD, B2) reflected further on this point by commenting that the students "*needed to come to the party as well, so I would teach them something, would ask them to go read something or show them something, and I would almost want to expect them next week to do it*".

Avashni (CE, FGD, B3) stated that through the process of being active learners in the inquiry-based learning process, "*ownership was really put on the students*". Luyanda (CE, FGD, B2) also reflected that inquiry-based learning helped students become more active learners because it was "*a collaborative effort. That's when you see them becoming more engaged. Otherwise, they're passive. They just show up in the morning, and they didn't prepare for anything because they know you will have a solution for them*". Mila (Stu3, FGD, B4, experimental) consolidated what the clinical educators expressed by highlighting the importance of independent research in developing clinical independence. She reported that "*some supervisors [clinical educators] would encourage you to go and do some specific research on something and then come back and*

discuss it. And that was also useful because it promoted clinical independence".

Clinical educators were aware that they needed to guide SLP students through the inquiry cycle, and they acknowledged that inquiry-based learning assists them with reflecting on the support and structure they provide to their students. Nomkitha (CE, FGD, B2) reflected that participating in implementing inquiry-based learning "*made me [her] more intentional about what I wanted to do each week".* Luyanda (CE, FGD, B2) also stated that inquiry-based learning guided her interactions with her students so that she "*was quite intentional about what sort of guidance I would give to the students*".

The SLP students offered insights into how educators' guidance supports their development of critical thinking skills and clinical reasoning. I gathered these insights by integrating the Likert scale results with thematic analyses from the initial interviews and end-of-year focus groups. Although the Wilcoxon test revealed no significant changes, I used histograms to visualise the Likert scale data and highlight the distribution's shape features, allowing key data characteristics to emerge (Nuzzo, 2019). The Wilcoxon test results are included in Appendix Y.

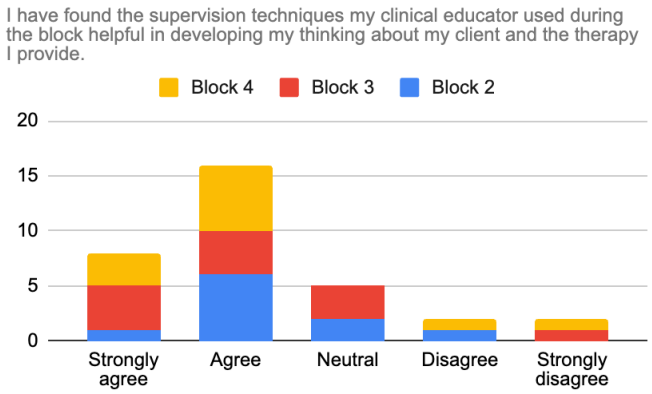
Figure 7.3 presents the Likert scale results related to students' perceptions of the clinical education process in developing their clinical and critical thinking skills. Both the experimental and control groups indicated that the clinical education techniques helped improve their thinking about patients and therapy planning. However, some students in both groups selected "disagree" or "strongly disagree" regarding the usefulness of clinical education strategies in shaping their approach to patients or guiding their clinical decision-making. This response remained

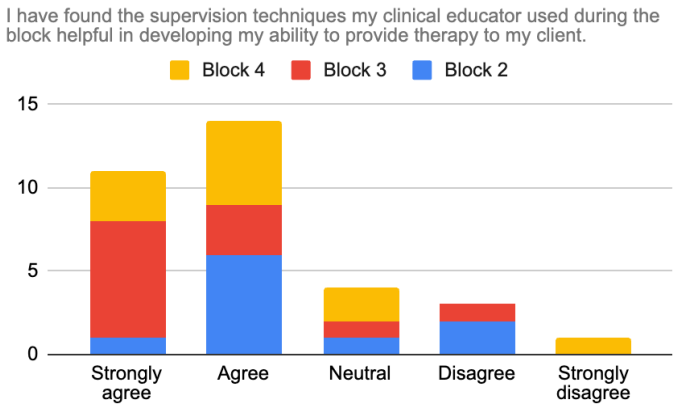
unchanged throughout the year, as indicated by the Wilcoxon results and the histogram shape. Therefore, the Likert scale results show that students maintained consistent perceptions over the year regarding the effectiveness of clinical education strategies in promoting their critical thinking skills.

Figure 7.3

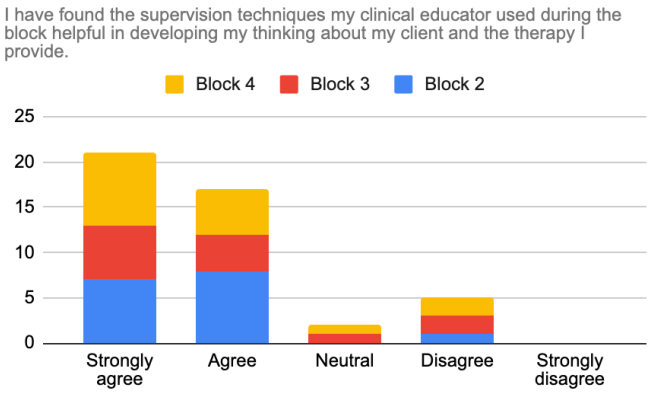
Histograms of the Likert scale statements regarding the impact of clinical education on developing critical thinking skills and clinical skills during clinical education, as perceived by second- and third-year SLP students in the experimental and control groups

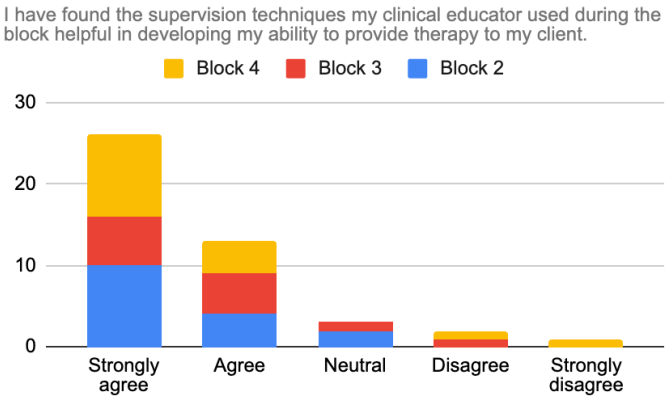
Experimental Group





Control Group





As seen from the thematic analysis, students reported positively and negatively on the clinical education strategies and their impact on the development of their critical thinking skills. Erin (Stu3, FGD, B4, experimental) highlighted her growth in clinical reasoning through "*[clinical educators] giving us advice, them trying to help us with clinical reasoning*". Similarly, Selena (Stu3, FGD, B4, experimental) attributed her growth in clinical reasoning to her clinical educator being "*very interactive, and I think I mean that helped me grow because, ultimately, it helped my clinical reasoning skills*". However, Elizabeth (Stu2, FGD, B4, control) expressed concern when the guidance provided by the clinical educator was sometimes conflicting with what students learnt in academic lectures because "*some of what she did in tutorials made me confused because it contradicted what the lecturers said*".

In addition to guiding students through the inquiry cycle, clinical educators and SLP students reflected that this guidance should be structured so that students know what to expect and what clinical educators and the practical site require of them. Avashni (CE, AD, B2) noted students "*need a little bit of structure, so you need to give clear guidance*". She acknowledged that with this structure, "*they're able to kind of take it and run with it. You just need to tell them what's expected*".

Several SLP student perspectives also highlighted the need for more explicit expectations at the onset of clinical education experiences. Teresa (Stu2, FGD, B4, control) expressed the desire for more guidance, especially "*just at the beginning of the block if they [the clinical educator] could give us a bit more guidance*". Building on this idea, Rebecca (Stu3, FGD, B4, experimental) emphasised the importance of explicit expectations. She felt it "*would just be helpful because, in*

the second year, I had a supervisor [clinical educator] with school-age language who, from the very first day, went over with us like what you would expect from us, what the steps of assessment would be, how she would expect us to do it, or how we should prepare for it, whereas this year all the supervisors [clinical educators] were kind of just taking the standard of you're in the third year now, you should know what to do, which isn't always the case because each case is different".

Mila (Stu3, FGD, B4, experimental) communicated the "*feeling of being unprepared because, like, oftentimes, it's the first time, as a student, it's the first time you're seeing these things. So, it can be a bit overwhelming*". She communicated that these feelings occur if structured guidance is not provided at the beginning of a clinic "*when you feel like you're just being thrown into the deep end with no guidance or, like, no idea where to begin*". She also requested that "*[clinical educators] bear that in mind and maybe give a little bit more guidance at the beginning. Just to kick start you in the process of the clinical setting*". This quote from Mila also highlighted that providing expectations and more support at the beginning of a clinic can initiate the support and development of the skills that a student is meant to learn at that specific clinic.

Elizabeth (Stu2, FGD, B4, control) emphasised that "*[clinical educators] should state their expectations from us, the students, beforehand or in the first session when we meet at the prac and then also what they expect of us as students*". She further noted that at times in clinical education, "*common sense is not all that common*" and "*sometimes the [clinical educator] assumes that we know, I don't know, well, especially with things like speech therapy, things like some of it, like now what I know now I think is common sense, but I didn't know it at the*

beginning of the year". This quote by Elizabeth also acknowledges that students lack the required critical thinking skills at the beginning of a clinic. Thus, being provided with more structured guidance at the outset could support the development of the required critical thinking skills.

The quotes highlight the need for explicit and structured guidance from clinical educators at the start of clinic placements to support the development of critical thinking skills. Students in both the experimental and control groups value clear expectations, assessment steps, and specific requirements to manage the challenges of unfamiliar cases. They note that clinical educators often assume they have more prior knowledge than they do, adding to their sense of being overwhelmed in new clinical environments. This finding suggests that the level of explicit information provided by clinical educators is crucial for effective clinical education, beyond just the use of inquiry-based learning.

In the context of inquiry-based learning, making the stages of the inquiry cycle and associated expectations clear is important for its effective implementation and for developing students' critical thinking skills. Students, especially when beginning at new clinical sites, benefit from a more guided approach that includes structured support during the orientation phase of the inquiry cycle. This foundation aids their progression through subsequent stages of the inquiry process. Thus, clinical educators may need to adjust their level of support to match students' needs as they navigate the inquiry cycle.

While clinical educators report offering guidance, and acknowledge that students often need

substantial support, student feedback reveals a gap in the type and structure of guidance necessary for fostering critical thinking. Both educators and students in the experimental group observed that structured guidance through the inquiry cycle enhances active learning, independent research, and clinical reasoning. Students identified areas where more guidance would further support their critical thinking development, indicating that a dialogue between clinical educators and students about the appropriate level of support can enhance the learning experience, especially at the beginning of new clinical placements.

7.3.1.2. The Use of Student-Generated Questions to Develop Critical Thinking Skills

Clinical educators implementing inquiry-based learning commented that student-generated questions help to develop the students' critical thinking skills. Student-generated questions are an intended factor of inquiry-based learning. Pedaste et al.'s (2015) framework of inquiry-based learning highlights the importance of questioning and hypothesis generation as part of *Conceptualisation*. Questioning is important so that students can engage with the subsequent stages of the inquiry cycle. Clinical educators noted at the beginning of Block 2 that students had difficulty asking appropriate questions relevant to their patients concerning the diagnosis, therapy, and context. Pedaste et al. (2015) acknowledge that this inability to generate questions may impact students' ability to investigate, experiment, and conclude.

Layla (CE, AD, B2) stated that her students seemed to have "*difficulty trying to think critically and use inquiry-based learning in a way that they have an idea of what to ask, but also how to answer it*". This quote identifies how it was difficult for students to start the inquiry cycle with a question about their patient and then how to answer that question to provide the appropriate

therapy. Nomkitha (CE, AD, B2) highlighted that "*many times, students started at the point of 'I don't know'* ". Thus, Nomkitha noted a prevalence of initial uncertainty among students in even knowing how to orient themselves and thus conceptualise their own questions and hypotheses. Additionally, Luyanda (CE, AD, B2) remarked on students' difficulty initiating therapy plans when "*they had to look at their findings and say what they mean and how they will approach therapy. I asked them to start a therapy plan that I'm going to have a look at, and then we were going to discuss it, but only one student actually did it. The others were saying that they don't know where to start*". These quotes indicated a common challenge for students to start an inquiry cycle through orientating and conceptualising. To start the inquiry cycle, students needed to be able to ask questions and create hypotheses.

However, Avashni (CE, AD, B3) observed progress in students' capacity to inquire and being "*able to ask questions*". Gayner (CE, AD, B3) reinforced this sentiment that "*they [students] have got really good questions*", acknowledging the quality of inquiries made by students. Furthermore, Gayner (CE, FGD, B3) mentioned that she has "*been impressed with the students as I see them taking on board questioning – thinking about the questions and asking me the questions and then actually giving me the answers themselves*". Her quote indicates how students were able to answer themselves when they provided good self-generated questions. Megan (CE, AD, B2) emphasised the importance of student-generated questions because when her "*students had interesting questions, I [she] encouraged others [students] to answer to see if we could get a consensus*". By promoting an environment where student questions were welcomed and collective problem-solving was encouraged, clinical educators could cultivate an atmosphere of shared exploration and learning among the students, promoting the inquiry-based learning

concept of discussion and its impact on the inquiry cycle.

These findings suggest that student-generated questions in inquiry-based learning help develop critical thinking skills among SLP students. Encouraging a questioning environment enables students to ask relevant and critical questions, enhancing their investigative skills and prompting deeper exploration. The improvement in question quality reflects students' progression in critical thinking as they interact with clinical educators to seek understanding and challenge assumptions. However, the challenges in fostering effective questioning highlight the need to teach students how to ask meaningful questions and critically evaluate information. This structured engagement promotes curiosity and exploration, nurturing critical thinking skills.

Clinical educators observe that as students improve their questioning skills, they become better at researching, applying information, solving problems, and discussing their concerns and solutions with educators. This use of student-generated questions is uncommon in traditional therapy models (Dudding et al., 2017) and could serve as a strategy for clinical educators to promote critical thinking during clinical education.

7.3.1.3. SLP Students' Exploration of Relevant Evidence-Based Literature to Develop Their Critical Thinking Skills

Clinical educators noted that SLP students actively engage in the *Investigation phase* of the inquiry cycle by researching evidence-based practice. *Investigation* through exploring, experimenting, and interpreting data is an intended factor of inquiry-based learning. Encouraging students to use literature for evidence-based practice is a principle of traditional clinical

education (Dudding et al., 2017). However, inquiry-based learning makes exploring, experimenting, and interpreting data from the literature more explicit for students (Pedaste et al., 2015). In this study, through the *Investigation phase*, SLP students appeared to develop their critical thinking skills.

Rachel (CE, FGD, B4) emphasised the importance of students researching information and that she "*always encourages them to go do reading up first. Then I'm happy to give them concrete information such as reading and go-to resources*". Rachel further elaborated that she "*definitely wants them to come to conclusions themselves first with a little bit of guidance, but I'm not going to give them everything to start with. I'm not saying I'm not going to provide them with information, but I think that they're, you know, you have to teach them to use their initiative and to go find the resources themselves first. And come to the conclusions themselves, using the clinical knowledge they have, and if they're not able to integrate, then guide them and, you know, help them get to that point in their minds and help them process all the information*".

Layla (CE, FGD, B2) acknowledged that "*when I first started, I wanted to, you know, tell them what to do. And, you know, give them all the information, but I think often it is too overwhelming. Students don't really take it in*". She went on to explain how investigating positively impacts the development of critical thinking skills and that "*for them to kind of facilitate their own learning can be a very powerful tool*". Rachel (CE, AD, B2) observed that she has "*seen growth in some students. It is nice to watch in a session and see them implement suggestions from the readings they did*". Her quote also highlights the importance of students completing their own reading and then implementing what they have learnt in a therapy session.

Layla (CE, AD, B2) further supported this approach, noting that "*sometimes students will come up with something, will be exposed to something that they're not really familiar with, or go out on their own to research that particular topic or find an article that's relevant to that particular topic and then come back and kind of present it to the rest of the group*". She found that students sharing with each other "*works quite nicely because I think the students can kind of feel empowered. They don't know something, but they can find out the information. And then they can also teach it to the others and kind of become this person who has this additional knowledge and can share it*". She noted that student sharing is "*really beneficial because the other students in the group are then often motivated, and they also like to hear all of this new information*". Sharing knowledge also supported students in the development of their critical thinking skills.

Megan (CE, FGD, B2) reflected on the importance of clinical educators "*to try and nurture that investigation and that exploration*" because then "*we'll create students and clinicians who are lifelong learners*". She also reflected that by encouraging students to investigate, clinical educators are reminding them that "*we have to keep learning as professionals... And, you know, we have to be up to date with the best evidence-based practice out there, and if we nurture this investigation, then [they can have] the flexibility and the confidence to change clinical practice. I do think that starts at a student level*".

Avashni (CE, FGD, B3) also reiterated that promoting the *Investigation Phase* of the inquiry cycle develops students' critical thinking skills because "*by the end, it really did show that the students were a lot more independent, they were collaborating more, they were thinking more critically about the patient and the cases, and their own sort of professionalism*". Gayner (CE,

AD, B3) described an exercise where students had to "*find an article, read the article, and then present it very briefly to all the students*". This exercise encouraged inquiry-based investigation, prompting students to critically analyse articles for therapeutic application. Gayner reflected that "*they came back with lovely articles, and what I really liked was the thinking skills when they were discussing the articles... But the way they all looked at the articles with an inquiry-based understanding, is this all true or how can I use this for therapy?*" This quote from Gayner highlights how students think more critically when they are encouraged to read literature and apply it to their therapy sessions.

Nomkitha (CE, FGD, B4) also noted that some students "*weren't actively, you know, participating in this learning journey*". Lack of engagement with resources impacted the students' critical thinking skills, as Nomkitha (CE, AD, B2) noted that "*those who are not reading up are really struggling, struggling to make conclusions about assessment findings*". Inquiry-based learning required students to be actively engaged in the inquiry cycle and to make use of resources to make conclusions. Thus, this lack of initiation and not actively engaging with the learning process required for inquiry-based learning potentially affected the development of SLP students' critical thinking skills.

SLP students in the experimental group also acknowledged the role of investigation during the focus group at the end of Block 4. Mila (Stu3, FGD, B4, experimental) emphasised that "*what is useful is sometimes like you're not 100% certain on an area and some [clinical educators] would encourage you to go and do some specific research on something and then come back and discuss it*". She felt this independent research "*was also useful because it promoted clinical*

independence". Selena (Stu3, FGD, B4, experimental) agreed with this. She noted that her "*[clinical educator] was very supportive because she just made us do a lot of research and prep a lot, which I think supported my learning because I didn't really have a choice but to understand the cases I was dealing with and research more on the best ways to deal with them*". Selena also reported that her clinical educator "*sat down and talked to me about it. She'd discuss it with me. She'd ask me my reasoning behind why I would choose those plans over other ones*". She reflected that being encouraged to research and engage in discussion, "*helped me grow, and ultimately, it helped my clinical reasoning skills*".

In clinical education, the *Investigation phase* of inquiry-based learning potentially develops the critical thinking skills of SLP students, as evidenced by the clinical educators and the students. *Investigation* was the one aspect of inquiry-based learning that clinical educators and SLP students reflected on despite there being no specific questions related to the specific phases in inquiry-based learning. The *Investigation phase* of inquiry-based learning may be the easiest to observe, as a clinical educator can identify when a student is engaging with the literature and applying it in their sessional plans. Investigation through reading literature for evidence-based practice is a skill promoted in traditional therapy methods (Dudding et al., 2017) and, thus, is arguably the easiest strategy for clinical educators and students to identify and implement during clinical education.

7.3.2. Unintended Factors of Structured Engagement During Clinical Education and their Role in Developing Students' Critical Thinking Skills

7.3.2.1. Modelling to Develop SLP Students' Critical Thinking Skills

Clinical educators implementing inquiry-based learning found that modelling is a valuable strategy for developing critical thinking skills, even though it is traditionally associated with standard clinical education models (Dudding et al., 2017) rather than inquiry-based learning (Pedaste et al., 2015). As an unintended factor, modelling helps students connect their theoretical knowledge to practical application in the clinical setting. Luyanda (CE, AD, B2) highlighted modelling by noting the importance of "*demonstrating for [students] how to implement therapy*", emphasising the role of modelling in showing the practical application of theory and allowing students to observe therapeutic techniques in action.

Gayner (CE, AD, B4) highlighted the importance of "*saying to them [students] this is not working. So try this. Or I model something for them*". This supportive approach fostered students' growth by offering solutions and modelling rather than criticism. Nomkitha (CE, AD, B3) echoed this sentiment by recognising she "*had to actually show the student*" and students "*need modelling for longer periods to actually grasp it*". Gayner (CE, AD, B4) mentioned taking a hands-on approach by demonstrating therapy techniques to students where she "*actually takes over some of the therapy, and I would like them to observe [me doing] some of the things*". This quote illustrates the active involvement of the clinical educator in providing practical demonstrations through modelling. Ayesha (Stu2, FGD, B4, control) also acknowledged the important role of modelling because "*it's not obvious as just telling a person to do this and do that because they don't know how to go about doing it*". She further stated that "*even the most*

basic things that educators may assume are obvious, it's not exactly obvious to people who have not been exposed to the situation".

Avashni acknowledged the importance of students modelling for other students. Avashni (CE, FGD, B3) noted that "*one thing that worked nicely was, and I think somebody else also mentioned, the students' ability to kind of observe other students*". She stated that this type of modelling was helpful because "*it helped them in terms of applying their knowledge of a case better, applying it maybe to a similar case but in a different kind of context. It really helped to kind of generalise the information a little bit more to say*". Thus, sustained and repeated modelling from clinical educators and other SLP students was valuable, emphasising that exposure to modelled behaviour is vital to assist students with developing their critical thinking skills and thus bridging the theory–practice divide.

7.3.2.2. Clinical Educator-Generated Questions to Guide SLP Students' Critical Thinking Skills

Clinical educators reflected on using questions to guide students' thinking processes and assist with activating the *Conceptualisation phase* in inquiry-based learning, where students needed to generate their own questions and formulate hypotheses. However, clinical educator-generated questions were not a component of inquiry-based learning and were thus an unintended factor in developing critical thinking skills. Nomkitha (CE, AD, B3) highlighted this approach where she "*would pose questions back – what do you think? What have you tried? Then, guiding them to the answer they want me to give them*". Megan (CE, AD, B2) also noted that she used questions to prompt students to reflect and engage in active learning, stating, "*If they ask me a question, to*

ask them one in return... What are you thinking? What's on your mind? How would you approach it?"

Gayner (CE, FGD, B3) emphasised the importance of "*questioning and trying to draw from them the answers*". Gayner gave examples of the questions she used to assist with developing students' critical thinking skills, and she reflected that the guiding questions assisted SLP students, so "*before [she] would answer, I say, 'What do you think you could do?' And then they're much more open to thinking of possibilities*". Gayner gave insight into how these types of questions encourage students to think independently and develop their problem-solving skills. Luyanda (CE, AD, B3) took a systematic approach to questioning her students, asking them, "*How do we plan therapy? What is the therapy that you are planning? What do we mean when we say we are planning therapy? How do we approach language therapy? How do we differentiate it or add to it?*" This method encouraged students to actively engage with their patients, fostered a sense of ownership in their learning, and developed their critical thinking skills.

Layla (CE, AD, B2) also stated how she "*found it to be quite helpful to just try to get the students to understand where the child is coming from and to try then integrate that and think more critically about how they can adapt their session to accommodate the child*". She noted that "*just probing those types of questions gets students to think a bit more critically about their session*". Therefore, her asking particular questions to guide students assisted in the students thinking more critically about the therapy that they were providing. These questions assisted students by modelling questions that they need to think about to start *Conceptualisation* in the inquiry cycle

and thus move through the other aspects of the inquiry cycle. In leveraging such questioning techniques, clinical educators can empower students to take an active role in their learning to move from *Conceptualisation* to *Investigation* and *Conclusion* forming to implement principles of evidence-based practice for their patients and develop their critical thinking skills.

7.3.2.3. Tutorial Groups to Develop SLP Students' Critical Thinking Skills

A tutorial group is a small, interactive learning setting led by a clinical educator, where participants engage in discussions, problem-solving, and collaborative activities to deepen their understanding of clinical education (Chan et al., 2024). Clinical educators frequently use tutorial groups to increase engagement and develop critical thinking skills, even though this is an unintended factor in fostering these skills. While there is no prescribed method for guiding students through the inquiry cycle, clinical educators find tutorial groups to be a key opportunity for implementing inquiry-based learning. They note that tutorial groups support the development of students' critical thinking skills. In this section, clinical educators and students sometimes refer to tutorial groups as "tuts" in their quotes.

Nomkitha (CE, AD, B3) highlighted the importance of supporting students through tutorial groups. She reported that she does "*a lot of tuts when I see them struggling with something, and you can see it coming through with a couple of students*". Nomkitha (CE, AD, B3) further elaborated on how she used tutorial groups as part of the multiple strategies she used to support students by reflecting, "*those are the kinds of things I do – positive reinforcement, extra tuts, extra input one-on-one. Especially with those that I know emotionally might be going through stuff*". These quotes emphasise the proactive approach taken by the clinical educator to identify

struggling students and provide them with additional support to develop their clinical skills. Avashni (CE, AD, B2) noted that "*when we had the group tut, it worked well... I found the students more creative, objective, and critical in their responses as compared to individual tuts*". Megan (CE, FGD, B2) also commented that "*the tutorials are one thing*" that she used amid a variety of strategies to support the development of the students' critical thinking skills. Avashni (CE, FGD, B3) also mentioned she "*gives students tutorials and tr[ies] to engage as much as possible, and the students are sort of engaging there*". These quotes highlight that several clinical educators employed tutorial groups to support students' clinical learning. The tutorial groups fostered a setting where students exhibited creativity, objectivity, problem-solving, and critical thinking.

Tutorial groups are also a space where critical thinking skills can be developed through collaboration. Avashni (CE, AD, B2) reflected that "*in the group tut, I found students more creative, objective, and critical in their responses as compared to individual tuts*". Moreover, Avashni highlighted the significance of tutorial groups as "*students said recurringly how they appreciated the group tuts as it gave them the opportunity to relate to peers, understand peer challenges in relation to themselves, and helped to problem solve with others*". These discussions not only encouraged relating to peers but facilitated a deeper understanding of the challenges faced by others, promoted collaborative problem-solving within the group dynamic, and thus developed critical thinking skills.

Layla (CE, AD, B2) further emphasised the positive impact of group tutorials because when her students "*finish [their therapy sessions], they facilitate a bit of a discussion and bring some*

important questions through to the rest of the group, and it's been nice to see that engagement". Layla (CE, AD, B2) also highlighted the significance that through the tutorial groups, "*students have been able to share knowledge, and other students have learned*". These tutorial groups further modelled how students could move through the inquiry cycle from *Conceptualisation* to *Investigation* and then form a *Conclusion* relevant to their patient. Indirectly, tutorial groups facilitated the *Discussion phase* of the inquiry cycle and thus revealed how discussion can move students through the various stages of inquiry and develop their critical thinking skills.

Students from the experimental and control groups also noted the value of tutorials for the development of critical thinking skills and clinical skills. Teresa (Stu2, FGD, B4, experimental) highlighted the benefit of tutorial groups for addressing anxieties because they had "*a tut where we talk about things that we were anxious about and how to deal with that*". Rebecca (Stu3, FGD, B4, experimental) also reflected on the benefit of group tutorials because it allowed them to "*pose questions and talk about our different cases and where we could all, like, brainstorm together with the [clinical educator]. And that was also very helpful*". Teresa (Stu2, FGD, B4, control) further highlighted the effectiveness of group tutorials for learning and developing clinical skills "*because you could get to ask as a group and you could hear other people's questions. So I think that strategy of tutorials was very helpful*".

Mila (Stu3, FGD, B4, experimental) also emphasised the value of group tutorials. She expressed a desire for more widespread implementation of group tutorials, "*so I know most [clinical educators] do that, but I would appreciate it if all [clinical educators] did that because I had some [clinical educators] that didn't conduct any tutorials for that specific rotation. And I*

always found [tutorials] really helpful because it really helps you to discuss like your specific case as well as listening to like your peers' cases". Mila expressed concern that not all clinical educators routinely offer group tutorials, despite this being a requirement of the university department for clinical education. However, it is important to note that while there is an expectation for clinical educators to conduct tutorials, whether this is explicitly communicated depends on the year coordinator. Clinical educators might need explicit guidance on the value of tutorial groups and how to effectively use them to develop critical thinking skills and clinical reasoning.

Nicole (Stu3, FGD, B4, experimental) explained that she preferred the group tutorials to be led by the clinical educator rather than students. She reported that "*another [clinical educator] that I had was really helpful [control group clinical educator] and gave us very structured critique and had tutorials weekly where each week we had a different theme that was covered, and we were allowed to ask questions, and she gave us different points of view, and that was much more helpful than us preparing tutorials ourselves*". This statement highlighted that clinical educators should consider teaching students about the co-construction of knowledge and, therefore, how students can learn from one another, not only from the clinical educator. Students may hold a bias that learning involves acquiring knowledge and skills from an expert (clinical educator) with the aim of reaching their level of expertise (Higgs & Titchen, 2001). Both clinical educators and students need to reflect on their perceptions of learning and any biases they have. Learning extends beyond simply acquiring knowledge from an expert (Delany & Molloy, 2009). Clinical educators may need to clarify constructivist learning theory by showing students how critical thinking skills can be developed through reading, preparing knowledge, and engaging in peer

learning within clinical education. Acknowledging that learning is shaped by perspectives, personal experiences, and diverse understandings of clinical practice is crucial for both educators and students (Delany & Molloy, 2009).

Comments from SLP students in the control group indicated that clinical educators outside the research also used group tutorials to support learning. Control group students noted the positive impact of tutorials on their learning and the development of critical thinking skills. While not originally part of the inquiry-based learning strategy, group tutorials serve as a collaborative, inquiry-based learning opportunity and an unintended factor in the inquiry cycle.

7.4. Theme 3: The Impact of Feedback on the Development of SLP Students' Critical Thinking Skills.

Clinical educators and students reflected on the role of feedback in developing critical thinking and clinical skills. Feedback was an intended factor that influenced the development of critical thinking skills related to the implementation of IBL. This theme highlights that clinical educators aimed to provide positive feedback to students to acknowledge their efforts relative to inquiry or in general clinical practice skills and maintain a positive learning environment.

Nomkitha (CE, In Int, B2) identified that "*what I've seen works a lot is positive reinforcement. I didn't get much of it... I had some clinical educators who would never say 'good', and sometimes you want to hear that. And so, I make sure that I tell them that they're good at something*". Gayner (CE, In Int, B3) also reflected that a clinical educator needs to be "*positive in feedback so that they [students] feel acknowledged and positive*". Inadequate feedback, or the lack thereof,

could negatively impact students' critical thinking and clinical skills development, as students may feel discouraged from seeking clarification or guidance. Gayner (CE, In Int, B3) reflected on this by commenting that a barrier to learning is when a clinical educator is "*just looking at the negatives*" and "*taking a long time to give feedback*". This statement by Gayner provides insight into the fact that when clinical educators take too long to provide feedback to students, it negatively impacts students. Students require immediate feedback, particularly Generation Z students (Hernandez-de-Menendez, 2020). However, this finding is also in line with the research on feedback by Fenwick and Dahlgren (2015), which states that immediate feedback is required for learning and developing clinical skills. Gayner (CE, In Int, B3) elaborated that if feedback is "*not very specific, then nobody knows what they don't know, what they've done wrong. They don't know what to change. They don't know what they've done right. They don't know what to continue with*".

Providing written feedback is also essential to the clinical education process and developing critical thinking skills. Avashni (CE, AD, B3) acknowledged the impact of feedback in conjunction with other aspects of clinical education on supporting students in engaging with their cases by stating that "*the written feedback, individual tuts, and group tuts are helping students to engage with cases more*". Layla (CE, In Int, B2) echoed this sentiment of using written feedback to develop critical thinking skills because she "*always writes back feedback, and I include some questions that I want them to think about*". By embedding questions within the feedback, clinical educators promote critical thinking skills by modelling the type of questions SLP students need to ask themselves.

However, Nomkitha (CE, AD, B3) reflected on the impact of students' inability to effectively use feedback from clinical educators. She expressed how a student was battling to use the feedback she was providing and how this indicated that the student had limited critical thinking skills. She stated how this particular "*student who doesn't take feedback is still struggling in terms of the aims that she had, which are not appropriate aims, and you could see that lack in critical thinking where she was targeting things that the child cannot do, but also starting at a very, very high level*". This quote highlights that if a student was unable to use the feedback provided by a clinical educator, it showed the limitations of their critical thinking skills and the subsequent influence on the development of their clinical reasoning. Megan (CE, AD, B3) noted that when students were "*kind of asking very critical questions and really listening to the feedback*" then she could "*see how they improve, they change their behaviour in the next session*".

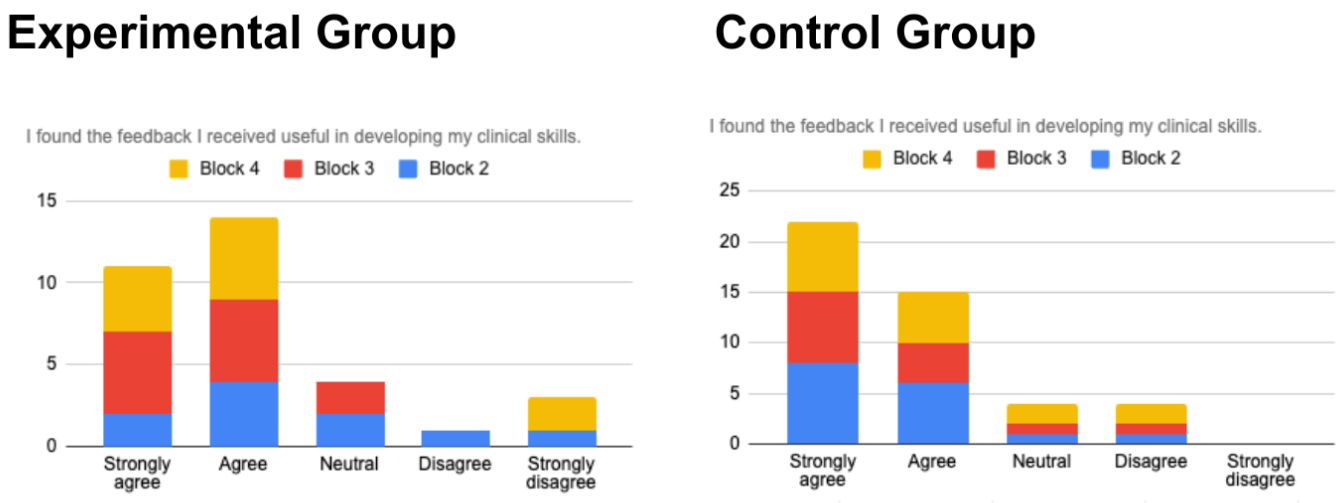
In evaluating the impact of feedback on clinical education, students from both the control and experimental groups shared their perspectives on how feedback influenced their learning and the development of critical thinking skills. I identified the importance of feedback by integrating the results from the Likert scales and the end-of-year focus group. These integrated results highlight feedback's role in shaping clinical education and supporting the development of students' critical thinking skills.

I used histograms to analyse the Likert scale data regarding SLP students' perceptions of feedback in clinical education. Histograms were appropriate because the Wilcoxon test indicated no significant changes in students' perceptions of feedback between the experimental and control

groups at the beginning and end of the year. The Wilcoxon test results are included in Appendix Z. Figure 7.4 presents the histograms of the Likert scales related to students' perceptions of the clinical education process. When reviewing the histograms across the blocks, I observed no change in the second- and third-year SLP students' perceptions of the feedback they received throughout the year, with no differences between the experimental and control groups. This suggests that students had similar views on the feedback they received, regardless of the clinical education style used.

Figure 7.4

Histograms of the Likert scales regarding the impact of feedback for developing clinical skills during clinical education as perceived by second- and third-year SLP students in the experimental and control groups



Most students in both groups reported on the Likert scale that they "strongly agreed" or "agreed" that feedback was useful for developing their clinical and critical thinking skills. However, some students disagreed, suggesting that certain SLP students did not find the feedback helpful. This view is supported by comments indicating that feedback is less effective when clinical educators

do not consistently observe students' therapy sessions or provide timely feedback.

The results from the student focus group consolidated the impact of feedback on the development of critical thinking skills. The students provided characteristics of feedback that supported and hindered the development of critical thinking skills. Rebecca (Stu3, FGD, B4, experimental) highlighted the importance of "*the clinical educator giving detailed feedback at the end of every session, outlining all areas that could be improved and providing suggestions on how to improve*". Selena (Stu3, FGD, B4, control) emphasised that her "*clinical educator provided me with a lot of feedback, which helped me improve the techniques I used during therapy*". Similarly, Jabulile (Stu3, FGD, B4, control) stated that she "*received individual feedback every session, and this gave me clear direction on the areas I needed to improve on*".

Kajal (Stu3, FGD, B4, control) commented that her "*preschool and ECI educators would recommend activities and do daily feedback at the end of sessions with group sharing; they did not have a harsh approach to feedback and gave suggestions*". Ariella (Stu3, FGD, B4, experimental) highlighted that "*actively showing me how to get great results during a clinical session and watching me perform such on my patients. Taking time out each week to discuss our individual patients and where to go from there*" were important aspects of providing feedback to students. Lastly, Erin (Stu3, FGD, B4, control) emphasised that "*constructive criticism – giving ideas and explaining ways to do things if I made an error or did something in a way that could've been more beneficial to my patients*" helped develop her clinical skills. These perspectives shed light on the nuanced role of positive feedback in clinical education and the development of critical thinking skills.

Teresa (Stu2, FGD, B4, control) emphasised the importance of immediate and supportive feedback. She said that her clinical educator "*was very supportive because at the end of the sessions that we've done and in our tut, she'd give us feedback. So, I think that's nice that we got feedback almost immediately*". Meanwhile, Mila (Stu3, FGD, B4, experimental) highlighted the value of "*the [clinical educator] observ[ing] and then giv[ing] you immediate feedback, written and verbal. Feedback is always really useful because then you know where you're going wrong and what you're doing correctly and what to continue doing and what to not do so much of, and maybe something new to implement. So, the feedback is always really useful in terms of clinical development*". She highlighted that both written and verbal feedback from clinical educators supports the development of clinical skills. Additionally, Elizabeth (Stu2, FGD, B4, control) acknowledged the impact of feedback on developing clinical skills because her "*school-age [clinical educator] observed me doing therapy and then gave me feedback on the things that I did well and things that I could improve on*".

Nicole (Stu3, FGD, B4, control) also emphasised the importance of consistent and frequent feedback, even though she reportedly did not receive it from her clinical educator. She stated that "*we [students] wouldn't always get feedback, and I think it would be helpful to get feedback every single session. And then also I found that some of the supervisors [clinical educators] were really, really busy, like they had their own private practice, and sometimes you wouldn't get as much feedback or even like the reports that we sent in. So, I think just the feedback, the constant feedback, is important*". Selena (Stu3, FGD, B4, experimental) expressed frustration that "*one of my [clinical educators] didn't really observe me with my patient that much, and they'd make*

suggestions for my patient that I knew weren't necessarily appropriate, but only after watching them for like 2 minutes". Mila (Stu3, FGD, B4, control) also expressed concerns about the limited observation opportunities because her one "*[clinical educator], who was very absent just in general with observing. So, I'm not entirely sure how my peers and I even got marked because we were observed maybe three times, maybe three times in the whole year for the practical across the whole year*".

Erin (Stu3, FGD, B4, experimental) reflected on the way feedback could negatively influence a student and their critical thinking skills, especially if the feedback was not appropriate to the case. She stated that "*it's really frustrating when you get feedback that doesn't really reflect the patient, but it's expected of you to change what you're doing based on that. And then it like breaks you down and makes you feel like you aren't helping. But it's more, it's actually coming from a place of the supervisor [clinical educator], not really observing and giving you a fair chance because they haven't actually seen what goes on in sessions for long enough to make a comment*". Ashton (Stu3, FGD, B4, control) elaborated that if there is poor feedback in clinical education, then it limits a student's development of critical thinking skills and clinical skills because "*it also stunts your trust in yourself because there were times where I was like, but I know my patient, and I know that the comment that you are giving me isn't appropriate*".

Furthermore, Teresa (Stu2, FGD, B4, control) highlighted the value of collaborative feedback between clinical educators and SLP students. She found "*that it's really productive when a [clinical educator] likes to hear what you've got to say and there's like an equal contribution, whereas if a [clinical educator] is quite autocratic about it and it's what they say is correct and*

you listen and you take everything in, but there's no room for your own contribution". Similarly, Selena (Stu3, FGD, B4, experimental) emphasised the positive impact of interactive engagement in feedback sessions on developing her clinical reasoning because her clinical educator "*would also sit down and talk to me about it. She'd discuss it with me. She'd ask me my reasoning behind why I would choose those plans over others. That helped me grow because, ultimately, it helped my clinical reasoning skills*". These reflections illustrate how reciprocal feedback supports the development of critical thinking and enhanced clinical reasoning.

Recent literature supports the idea that actively engaging students in feedback fosters autonomy and deeper critical engagement (Carless & Boud, 2018; Noble et al., 2020; O'Connor et al., 2021). Although some clinical educators use this interactive feedback style, research highlights the need for all educators to recognise students' active role in feedback processes. By enhancing students' feedback literacy, clinical educators can better support the development of clinical and critical thinking skills (Carless & Boud, 2018; Tavares et al., 2020).

Students value immediate and constructive feedback, noting its role in understanding their performance, identifying strengths and weaknesses, and guiding their clinical development. These observations underscore the impact of timely and comprehensive feedback on developing critical thinking and clinical skills. Pedaste et al. (2015) describe communication in the *Discussion phase* of inquiry-based learning as a process where students present their findings, receive feedback, and refine their understanding throughout the inquiry cycle.

Feedback emerges as a crucial theme in my study, shaping SLP students' critical thinking skills.

Both clinical educators and students emphasise the importance of how feedback is delivered. While Pedaste et al. (2015) does not detail methods for fostering communication, my findings highlight the value of bidirectional feedback that engages students in discussions about their feedback. However, providing regular feedback, a key responsibility of clinical educators, is not always consistent and is sometimes absent. My results suggest that consistent, reciprocal feedback can better support the development of critical thinking skills.

Relevant feedback also requires a comprehensive approach. Students and clinical educators stress the need for educators to consider various "data points" such as sessional reflections, tutorial discussions, informal chats, and one-on-one tutorials to understand both the patient and the student's therapeutic goals. This holistic understanding enables clinical educators to offer actionable feedback, aligning with literature that emphasises the role of meaningful feedback in supporting critical thinking skills (Carless & Boud, 2018; Noble et al., 2020; O'Connor et al., 2021).

7.5. Theme 4: The Impact of SLP Student Factors on the Development of Critical Thinking Skills in Clinical Education

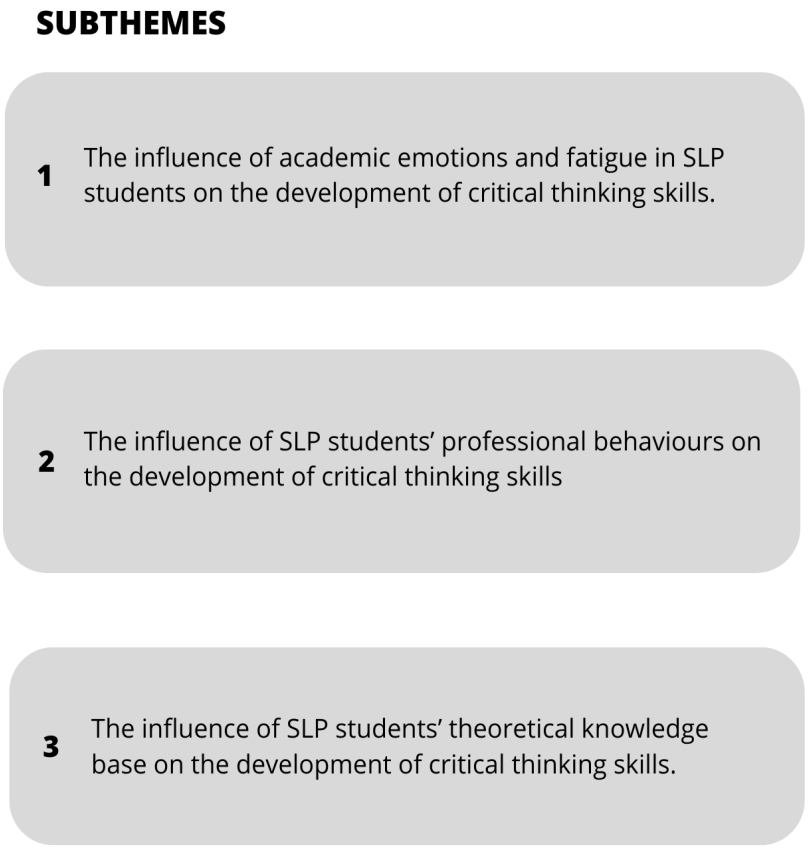
SLP students do not work in isolation and do not only complete clinical practicals where they are exposed to inquiry-based learning. They are also human beings with emotions, responsibilities, and additional influences from the multiple environments they are a part of, all of which could impact the development of critical thinking skills. Therefore, to consider the real-world complexity of implementing inquiry-based learning, I identified student factors that influenced the development of their critical thinking skills. These student factors are not components of

inquiry-based learning but are external to the inquiry cycle. External factors are also part of the theory of change which I needed to reflect on in order understand the additional factors which impacted the out working of a programme. Thus, student factors are unintended factors in the inquiry cycle, but are external factors of the theory of change.

Throughout the year, various student factors influenced the implementation of inquiry-based learning and the development of students' critical thinking skills. I identified these factors by analysing data from clinical educators' audio diaries and focus groups. Key student factors included academic emotions, professionalism, and their theoretical knowledge base, all of which impacted the effectiveness of inquiry-based learning. These influences evolved over the year, affecting the development of critical thinking skills. I now explore the three subthemes that comprise Theme 4, as outlined in Figure 7.5.

Figure 7.5

Subthemes related to the specific student factors in the clinical education process that impacted the development of second- and third-year SLP students' critical thinking skills



7.5.1. The Influence of Academic Emotions and Fatigue in SLP Students on the Development of Critical Thinking Skills.

According to Pekrun et al. (2002), common negative academic emotions include anger, stress, anxiety, and boredom. In my study, stress, anxiety, and fatigue appeared to impact SLP students' ability to actively participate in clinical education and develop critical thinking skills. This subtheme examines how academic emotions and fatigue influenced second- and third-year SLP students' engagement in clinical education. Although not intentionally addressed in the inquiry-based learning process, student academic emotions and fatigue emerge as factors that influence

the development of students' critical thinking skills. Previous research notes that students, particularly those from Generation Z, are at an increased risk for depression and anxiety (Hernandez-de-Menendez et al., 2020; Schroth, 2019). The results from both the clinical educators and the SLP students in this study reflect the findings from Hernandez-de-Menendez et al. (2020) and Schroth (2019).

The questions used for the audio diaries and focus groups did not specifically address academic emotions (see Appendices L and M). However, clinical educators frequently reflected on the students' academic emotions and fatigue. Thus, I identified this as an unintended factor that influenced clinical education and the development of critical thinking skills. Based on the clinical educators' reflections, students presented with both negative and positive academic emotions throughout the year, with more positive academic emotions in the second semester and towards the end of a block or clinical placement. Within my study, students' academic emotions appeared to influence student engagement and performance in clinical education. This result corresponds with research by Pekrun et al. (2002), who investigated the impact of academic emotions on motivation and academic achievement.

7.5.1.1 Negative Academic Emotions and Their Impact for Both Students and Clinical Educators

Negative academic emotions such as anxiety and stress were evident from the clinical educators' audio diaries. Gayner (CE, AD, B3) described that she thinks "*there is some anxiety on the part of the students*". Gayner further emphasised that "*what could be hindering or facilitating their ability is, first of all, the anxiety of the unknown*". Layla (CE, AD, B3) echoed these sentiments,

recognising the challenge of addressing student anxiety and their discomfort with uncertainty in clinical education. She reported that she thinks "*one thing that has been quite challenging is getting the students to also just be okay with not knowing. They are feeling worried that they don't know everything, which is obviously normal*". These negative aspects, primarily related to student anxiety and discomfort with uncertainty, pose challenges to implementing inquiry-based learning and clinical education in general. SLP students often experience uncertainty during clinical education practicals, especially when they are placed at new sites with unfamiliar clinical educators and complex cases. This uncertainty can stem from adapting to different clinical environments, understanding new expectations, and building rapport with new patients. Navigating these changes requires SLP students to quickly acclimatise and apply their skills in varied contexts, which can be challenging and stressful. The dynamic nature of these new settings can impact their academic emotions, highlighting the need for supportive structures to ease their transition.

Layla (CE, AD, B2) highlighted the challenge for clinical educators when, as a clinical educator, "*you're ready to do all of this work*", but the students are disinterested or lack enthusiasm*,* "*and students are just not there. I don't always think the students think about who this child is and what's happening with this child. So they don't understand what they've done or what the child's done that improved, so I think it's some of those factors that kind of hinder their critical thinking*". Nomkitha (CE, AD, B2) further highlighted this concern, observing that "*the clinic just became a chore for them*". Avashni (CE, AD, B2) identified that some "*students are not able to join the dots in the tuts... and they attribute this to exhaustion and stress*".

Avashni (CE, AD, B2) further highlighted the impact that these academic emotions and fatigue have on critical thinking skills because "*students are in an automated state of mind. So then it is not done objectively or critically*". Fatigue further emphasised this automated mindset, as evidenced by Avashni's (CE, AD, B2) statement acknowledging that "*students are exhausted and almost clock in, clock out, and [are] not critically thinking*". Therefore, these results emphasise the importance of acknowledging academic emotions and fatigue when providing clinical education due to their impact on students' ability to engage effectively during clinical education and thus negatively impacting the development of critical thinking skills.

Layla (CE, AD, B3) emphasised the importance of clinical educators understanding students' academic emotional states. She stated that clinical educators need an "*understanding that students are also going through a lot and, you know, giving them space in that time and also just then being open to, you know, further discussions, if they want to have a chat online or meet in person, is also quite helpful for that*". This recognition emphasises the need to create a supportive environment that allows students to receive the support they require during clinical education. Nomkitha (CE, AD, B3) also added that "*when they're confident and they believe in themselves, they know that 'I actually know more than I think I know'. So they're able to critically reason and think about certain things. But you know if you're doubting stuff and you think, 'Oh, I'm inadequate', or 'I think I'm the dumbest here', or whatever it is, they're not willing to stretch their brain or to even say yes, let's try. So that's how it links for me: the more confidence they had, even if they got the answer wrong, they like, OK, at least I'm on the right track*". A positive emotional state undergirded by a strong sense of self-confidence seems to support students' engagement and development of critical thinking skills in clinical education.

Hayat et al. (2020) report that students who believe in themselves while learning enjoy learning and engage in more metacognitive learning strategies and thus perform better. Nomkitha's observation reflected what Hayat et al. (2020) have reported. Hernandez-de-Menendez et al. (2020) also support this awareness and concern about students' academic emotions by encouraging educators to acknowledge that Generation Z students tend to be at a higher risk for depression and anxiety, and therefore need more positive affirmation and to be directed to support structures that can help them manage their academic emotions.

Quotes provided by the SLP students also acknowledge the theme of students' academic emotions and fatigue influencing their ability to engage during clinical education and develop their critical thinking skills. SLP students reported on the impact of their academic emotions on their ability to think critically during clinical education. They identified the impact of academic emotions on clinical education, irrespective of whether the clinical educator was implementing inquiry-based learning. Teresa (Stu2, FGD, B4, control) noted she "*was always nervous about what was going to happen. And if I was going to get into trouble and, like, she was very much like on the spot, and I sort of blank when I go on the spot*". This quote highlights how the student's nervousness would impact her ability to think critically when asked questions by her clinical educator.

Ashton (Stu3, FGD, B4, control) acknowledged that she "*felt quite sensitive and emotional because [the clinical educator] was so tough on us*". This quote describes the impact of the clinical educator's style on her academic emotions, which then influenced her ability to engage

in clinical education critically. Rebecca (Stu3, FGD, B4, experimental) further elaborated on the impact of academic emotions on her learning, explaining that she "*could not really say that my clinical educator was very helpful in any aspect really. And she just made me stress quite a lot*". Ashton (Stu3, FGD, B4, control) reflected that she "*felt that [her clinical educator] was initially quite intimidating because she wasn't very sweet, and this was stressful. She was more like, let's just learn and do, and if you make mistakes, I'll correct you, and we'll fix it. But she didn't really guide us as much*".

Clinical educators and SLP students both identify academic emotions and fatigue as factors influencing student engagement in clinical education. Clinical educators note how student emotions and fatigue affect participation in the clinical education process, while students highlight the influence of clinical educators on their academic emotions and how these emotions impact their engagement, regardless of the pedagogy used. This generation tends to respond better to positive reinforcement and affirmation rather than a 'toughen up' approach. Clinical educators face the challenge of balancing encouragement with ensuring students develop their clinical skills and reasoning, as confidence alone does not guarantee skill development.

7.5.1.2 Positive Academic Emotions and Their Impact for Both Students and Clinical Educators

While both students and educators acknowledged the negative impact of academic emotions on engagement and learning, they also recognised the benefits of positive emotions, such as confidence, enjoyment, and hope (Pekrun et al., 2002). Research by Tan et al. (2021) and Hayat et al. (2020) indicates that positive academic emotions can enhance academic achievement. In

my study, positive emotions appear to support student engagement in clinical education and the development of critical thinking skills.

Clinical educators in Blocks 3 and 4 of the year tended to observe more positive academic emotions in their students compared with the earlier blocks. Nomkitha (CE, AD, B3) highlighted that "*the students are less anxious now that they are working with patients*". This shift suggests that experience gained through clinical education potentially decreases students' anxiety despite the pedagogy being implemented by the clinical educators. The experience in clinical education provides SLP students with the necessary practical exposure to work with patients, thereby boosting their confidence in real-world scenarios and decreasing their negative academic emotions associated with anticipatory fear and anxiety.

With reduced anxiety in students, Avashni (CE, AD, B3) observed 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*". Gayner (CE, AD, B4) also acknowledged the impact of reducing anxiety through the clinical education process, which also led to improved critical thinking skills. She supported this by "*reducing the anxiety before we went into the sessions. Just to relieve that pressure off them and get them to open up. So I found that also relating to the students as individuals and their own needs certainly helped, and I would say that all of them, their critical thinking skills developed*".

In clinical education, Gayner (CE, AD, B4) also "*brought in emotional responses and how that can block our critical thinking and our executive functions*". Furthermore, Gayner acknowledged

that when students were in a positive emotional state, there was an "*eagerness to learn and an openness to learning*". Rachel (CE, FGD, B4) also acknowledged that the students "*were more motivated to ask questions... and engaged really nicely in the supervisory process*" when they had positive academic emotions and were less fatigued.

Furthermore, Layla (CE, AD, B3) acknowledged that it is "*quite nice to see the students have been gaining confidence*". Nomkitha highlighted how "*self-confidence makes [students] open to ask questions because sometimes if you're not confident, you're fearful in terms of asking questions... But because I'm confident, I know I'm good, and I'm good at what I do, so I'm very willing to ask for help*". Nomkitha (CE, AD, B3) further remarked that she is "*quite pleased with the growth of my students, from where they are to where they were when we ended last week*". This growth in confidence and clinical skills signifies the potential impact of inquiry-based learning, empowering students to become more confident and capable in their approach to learning and practical applications.

These insights highlight the potential impact of clinical education on student academic emotions, showcasing a positive trajectory where students experienced increased confidence and reduced anxiety as they actively engaged in clinical education. The change in academic emotions is apparent in the clinical educators noting positive changes in students' confidence, independence, motivation, and overall development. These positive emotions positively impacted the students' development of critical thinking skills.

SLP students also acknowledged the positive influence that clinical education can have on their

academic emotions and, thus, their critical thinking skill development. The students attributed this positive impact to the style of clinical education provided by their clinical educator. Nicole (Stu3, FGD, B4, experimental) highlighted that "*If [students] had, like, any anxiety, she [clinical educator] would help us to sort of deal with that and talk it through, and it was nice to know that she also had anxieties around certain things and that it's always important to acknowledge that and then think through it and how to tackle it*". This quote acknowledges the role of the clinical educator, and the positive impact of the style employed by the clinical educator on the students' academic emotions. Ayesha (Stu2, FGD, B4, control) acknowledged that her clinical educator also positively impacted her emotions through the clinical education she provided because "*[the clinical educator] would always ask us about our mental health, which I think was something I really, really appreciated because no one else would ever ask us about that. She didn't just teach me the academic side and the practical side. She's taught me how to be compassionate*".

Ashton (Stu3, FGD, B4, control) further reiterated the positive impact of clinical education on her emotions. Ashton "*felt that really built our [students] confidence because [the clinical educator] gave us a lot of reassurance*". SLP students from both the experimental and control groups note that the style of their clinical education positively affects their academic emotions and supports their learning. Integrating feedback from students and clinical educators suggests that clinical educators can either positively or negatively influence students' academic emotions, which in turn affect the development of critical thinking skills. The positive impact of a supportive clinical educator on student engagement appears to depend more on the educator's style and the students' ability to manage their workload, emotions, and fatigue rather than the specific clinical education pedagogy used.

7.5.2. The Influence of SLP Students' Professional Behaviours on the Development of Critical Thinking Skills

Within this subtheme, clinical educators observed that student professional behaviours impact the clinical education process and the development of critical thinking skills. I use the term "professional behaviours" based on nursing education literature. Charania et al. (2017) define professional behaviour as encompassing ethics, attitudes, time management, appearance, and accountability, while Kowalski (2016) associates it with respectful conduct in clinical settings. In SLP research, Torrington Eaton et al. (2022) identify professional behaviours as being organised, punctual, prepared, and hard-working. My data highlighted poor professional behaviours such as inadequate planning, poor time management, lack of accountability, and substandard work. I present evidence for each of these areas of professionalism in the data.

7.5.2.1. Impact of Poor Planning by SLP Students on the Development of Critical Thinking Skills

Planning is a crucial professional skill for SLP students to provide effective therapy. They need to create session plans that include their aims, rationale, procedures, and activities for each therapy session. This planning ensures they have all necessary resources, such as word lists, and equipment like games, flashcards, pens, and whiteboards. Nomkitha (CE, AD, B2) identified challenges related to planning, stating she had to ask a student the following questions, which led to her identifying a lack of planning by this particular student as the student could not answer questions like, "*What is it that the children [patients] must do exactly? What would you need? She 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 lack of structured planning impacted the

ability to implement a therapy session. Additionally, Luyanda (CE, AD, B3) highlighted that "*the biggest issue is that they [students] don't put effort into planning*".

Luyanda (CE, AD, B3) emphasised the need for more planning by wanting students "*to go a step further and to include strategies, eliciting strategies into the plans they will be using*". Luyanda also emphasised she needed to teach planning to second-year students through working "*a lot on planning therapy and how do we write out our goals and so forth*". These challenges with planning may also link to the students' theoretical knowledge base and their ability to access the knowledge and translate it into the planning of a session. Torrington Eaton et al. (2022) note that clinical educators and SLP students viewed their theoretical knowledge as foundational for professional behaviours. This concept of theoretical knowledge is explored below in the final subtheme in Section 7.5.3.

7.5.2.2. Poor Time Management by SLP Students Impacted the Development of Their Critical Thinking Skills

SLP students need effective time management skills to ensure person-centred care within sessions and balance academic and clinical education requirements for their degree. Clinical educators acknowledge that poor time management appeared to impact the space for learning during clinical education. Megan (CE, AD, B2) noted her "*group has struggled with time management. They tended to take too long to get their patient from the classroom and then take the child back to class. So, in the past couple of weeks, there is no time for a tutorial*". This struggle with using time effectively directly impacted the availability of time necessary for tutorial sessions, hindering the learning process. This challenge with time management may also

be avoidant behaviour or students not having clear expectations that a tutorial group is happening and that they are expected to attend and participate.

Gayner (CE, AD, B3) also noted the challenges with time management for herself and the students at the clinical site. She thought time management was impacted by "*the children [patients] not arriving, and then we would start discussions while we were waiting for the children, and sometimes I allowed the discussions to go on quite long. And there was another question, another question, and we never got to do the assessments quite as we wanted to or the therapy because I didn't have such good timekeeping skills on some of the days that we were there*". Gayner also seemed to struggle with time management, which then had a negative impact on student therapy time. It is essential for clinical educators to also model time management for students.

Avashni (CE, AD, B3) highlighted that "*the biggest hindering factors are students struggling with deadlines and submissions, poor time management*". The students appear to have poor time management in their lives generally. Moreover, Avashni emphasised the repercussions of poor time management, where "*students are struggling to think and reason critically because of their [poor] time management*".

7.5.2.3 Impact of Poor Accountability and Substandard Work Quality by Student SLPs on the Development of Their Critical Thinking Skills

SLP students must submit session plans and assessment reports to their clinical educators, a key aspect of their professional skills assessment. Poor accountability and substandard work quality

can hinder clinical education and the development of critical thinking skills. Rachel (CE, AD, B2) "*was frustrated as some students did not send me sessional [plans]. 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 clinical educators to guide and supervise effectively and, thus, to implement inquiry-based learning and develop critical thinking skills. Avashni highlighted that "*written work produced [by the students] is subpar, lacking basics like format and grammar*", which then impacts the support clinical educators provide as they have to "*give feedback on that and not necessarily on the therapy*". This substandard quality of work then detracts from the ability to implement inquiry-based learning as clinical educators have to spend time correcting written work instead of spending time on developing critical thinking skills and bridging the theory–practice divide.

7.5.3. The Influence of SLP Students' Theoretical Knowledge Base on the Development of Critical Thinking Skills

A student's theoretical knowledge base significantly affects their ability to engage in clinical education and inquiry-based learning. Students with a weaker knowledge base require more support, while those with a stronger foundation can progress more easily through the inquiry cycle. Nomkitha (CE, AD, B2) observed that knowledge gaps, especially among second-year students, hinder their engagement, stating, "*I felt as if there was a lack of knowledge so that theory base wasn't there*". This absence of a theoretical base impedes students' ability to navigate the inquiry process effectively. She explained, "*I don't think the guided inquiry was working only because there was no theory*". A student cannot think critically about a case and ask relevant questions without a foundational knowledge base, which limits their ability to

engage in inquiry-based learning.

Nomkitha (CE, AD, B2) also emphasised the challenge of students' initial uncertainty in clinical settings, noting, "*many times, students started at the point of 'I don't know'* ". This quote illustrates that students might have some knowledge but struggle to access and apply it to specific clinical scenarios. This difficulty in identifying and applying their knowledge highlights the need for clinical educators to support students in recalling and using their theoretical understanding at the start of a clinical practical. Nomkitha (CE, AD, B2) added that even when students appear capable, they may expect more support than is appropriate. She noted that "*one [student] stood out for me because even with guided inquiry, she couldn't get where I wanted her to get. So even with these questions where you want to inquire a bit more, 'Why would you do this? Why would you do that?', she struggles to even give you an answer... she's very capable, but I don't think she's willing*". This lack of willingness might be a Generation Z trait, where some students expect more guidance and lack initiative. Nomkitha's experience suggests that students might doubt their knowledge and abilities in new clinical environments, making it harder for them to apply their theoretical understanding effectively. This challenge could be one reason students have difficulty bridging the theory–practice gap.

Luyanda (CE, AD, B2) provided an example of a student facing challenges due to a lack of theoretical knowledge, stating, "*I had a child with autism, and of course, the student doesn't know what to do. So it is sort of a chaotic session*". Although the student had received theoretical training on working with children with autism, she struggled to apply this knowledge in a practical setting. Luyanda's observation highlights a disconnect between the theoretical

knowledge students acquire and their ability to use it in clinical practicals, suggesting a lack of initiative in accessing relevant literature and notes from their academic curriculum. More support from the clinical educator could have helped the student use her theoretical knowledge effectively, reducing the difficulties during the session. Luyanda's comment underscores the importance of clinical educators in helping students bridge the theory–practice divide, stating, "*reminding them about what they already know*" can assist in this process.

Avashni shared a similar observation, noting that at the practical site where she was providing clinical education, the students encountered complex communication disorders for the first time. While they were learning about these disorders in their academic courses, they struggled initially to apply this knowledge. Avashni (CE, AD, B2) recalled, "*the students were very open about saying this is the first time I've ever seen an autistic child. I've never seen a CP child ever. And we're learning about it [in the academic course] as we're doing it simultaneously in the prac*". She further reflected, "*it was very interesting to see how they [the students] kind of took it and ran with it, and they were able to kind of take the theory, look at the practice, and then formulate sort of practical ways forward*". This example shows that when students have a theoretical foundation, they can begin to integrate theory into practice with guidance, illustrating the importance of having a solid knowledge base to engage effectively in the inquiry cycle.

Nomkitha (CE, AD, B2) also noted that students with a stronger theoretical knowledge base respond better to guided inquiry "*because they've got the theory, when you guide them with questions, they get to where I want them to get with a little bit of help here and there*". However, Layla (CE, AD, B2) highlighted that even when students have theoretical knowledge, translating

it into practice can be challenging, stating, "*they have the theory, but implementing it practically is just taking them a huge step back in terms of understanding goals and understanding outcomes*". This suggests that while inquiry-based learning can aid in knowledge translation, it may not fully address the challenges some students face in applying theory in real-world clinical settings.

As the year progressed, clinical educators observed changes in students' ability to use their theoretical knowledge in clinical settings. Luyanda (CE, AD, B3) acknowledged that she observed improvement in their clinical skills because "*whatever they have read, you start seeing them applying it in sort of the next sessions and the next. So that's quite helpful*". This suggests that students often need initial guidance or direction before they can proceed with decreasing input from their clinical educator.

The findings indicate that a student's theoretical knowledge base can either hinder or support their engagement with inquiry-based learning and the development of critical thinking skills. Clinical education aims to help students learn through immersion and bridge the theory–practice gap, and educators must recognise their role in guiding students through this process rather than expecting them to apply theoretical knowledge independently.

7.6. Chapter Summary

This chapter explored the implementation of inquiry-based learning within the complex realities of clinical education, acknowledging that clinical education does not occur in isolation but is influenced by both intended and unintended factors. Intended factors were the aspects of inquiry-based learning that were a part of the inquiry cycle and appeared to impact the development of

critical thinking skills. In contrast, unintended factors revealed the intricate real-world nuances that affect the implementation of clinical education, offering valuable insights into the complexities of clinical education interventions.

The chapter also highlighted the role of specific student factors in the successful implementation of inquiry-based learning and the development of critical thinking skills. These factors included students' academic emotions, professional behaviours, and theoretical knowledge base. The examination of five case studies further consolidated these findings, providing evidence of the significant impact of inquiry-based learning on developing both critical thinking and self-reflection skills. By recognising and addressing these factors, clinical educators can better support students, enhancing their engagement in clinical education and fostering the development of critical thinking skills across diverse contexts.

CHAPTER 8A: INTRODUCTION TO THE DISCUSSION

Exploring whether inquiry-based learning affects the development of critical thinking skills in SLP students during supervised clinical education proved to be complex and challenging. I used a convergent mixed method research design to fully understand its impact within the clinical educator and SLP student dyad. The longitudinal, multilevel, and multimethod approach required for this theory-based impact evaluation presented significant challenges, especially in integrating and interpreting the analysed data holistically. Although difficult, this integration process ultimately provided valuable insights.

To address the insights gained, I divided my discussion into two chapters. *Chapter 8B* focuses on the novel methodological contribution of this research, offering a systematic approach for integrating multiple data sources in convergent mixed methods research based on complexity theory and pragmatism. This new method for data integration emerged as an unexpected outcome of my study, warranting a dedicated chapter to explain its development and application.

Chapter 9, the second discussion chapter, focuses on the theory of change and the factors within the clinical education dyad, along with contextual influences on student development. It explores the factors that potentially impact critical thinking skills development in students. The critical thinking skills development of SLP students is discussed within a framework of critical skills development in SLP clinical education, focusing on the role of self-reflection, feedback, the clinical educator-student relationship, and the incorporation of Generation Z student factors.

CHAPTER 8B: THE ADAPTED EXTENDED PILLAR INTEGRATION PROCESS AS A MODEL FOR MIXED METHODS INTEGRATION

8.1. Introduction

The integration of multiple qualitative and quantitative data sources is fundamental in mixed methods research (Guetterman et al., 2015). Effective integration allows researchers to achieve unified results that exceed the sum of individual qualitative and quantitative components (Fetters & Freshwater, 2015). Alhassan (2024) notes that when qualitative and quantitative results are not integrated, a researcher is not employing mixed methods appropriately. However, integrating different data sources can be complicated and messy.

After collecting data from clinical educators and SLP students throughout the year, I realised that the analysed data I needed to integrate to answer my research question were indeed complex. Initially, it was overwhelming to make sense of these data to understand the results and address the central research question. I needed a method to help me systematically and transparently integrate the multiple qualitative and quantitative data sets for a more combined understanding of the results. Additionally, I had to integrate data sets from different stages of the research and participant groups to comprehend how both groups perceived the process and outcomes of the programme evaluation. Given that students and clinical educators work closely together and maintain a clinical education relationship, it was important to identify the similarities and differences in their experiences of implementing inquiry-based learning in clinical education and the development of critical thinking skills.

This chapter is an in-depth discussion of the process to ensure integrated results and highlight the novel integration method employed within complexity theory. In this chapter, I detail the initial analysis of the qualitative and quantitative data sets. Then, I explain systematic integration, which Creswell and Plano Clark (2018) recommend for integrating data sets from convergent mixed methods research. I provide the background of the original Pillar Integration Process and the Extended Pillar Integration Process to form the foundation of the Adapted Extended Pillar Integration Process that I developed for integrating multiple data sets based on complexity theory. In summary, I then discuss the synergy of the results that I gained from integrating the qualitative and quantitative data sets using the Adapted Extended Pillar Integration Process.

8.2. Reflection on the Initial Analysis of the Qualitative and Quantitative Data Sets

To understand the results presented in *Chapters 6* and *7* in relation to the central research question, I needed to integrate the qualitative and quantitative data. When I first analysed the qualitative and quantitative data, I analysed the process and outcome data for each participant group separately. Then, I attempted to make sense of the results by first writing up the quantitative results, followed by a paragraph on the qualitative results. This method has been discussed and recommended for integrating qualitative and quantitative data in mixed methods research by Creswell and Plano Clark (2018). However, the results for each participant group based on the process and outcomes of implementing inquiry-based learning were disjointed and repetitive. I also found it challenging to integrate the qualitative and quantitative data in a manner that was systematic, transparent, and trustworthy. Therefore, I lacked an understanding of the integrated, holistic results needed to answer my research question.

8.3. Reflection on the Systematic Integration of Qualitative and Quantitative Data

This section provides insights into the integration used for convergent mixed methods research. It then describes joint displays, explicitly using the Pillar Integration Process, followed by an explanation of the development of the Adapted Extended Pillar Integration Process within a complexity framework.

8.3.1. Reflection on the Integration for Convergent Mixed Methods Research

I was overwhelmed by the volume of data I needed to integrate. Thus, I researched methods for systematic, transparent integration of multiple quantitative and qualitative data sources when completing convergent mixed methods research. Alhassan (2024) notes that researchers using mixed methods often encounter difficulties integrating qualitative and quantitative data while aiming to maintain the richness of their data, highlighting that my challenges in this regard were not unique.

Creswell and Plano Clark (2018) recommend that when integrating qualitative and quantitative data from a convergent mixed methods design, a researcher should identify common themes across the results and compare the qualitative and quantitative results. They recommend two methods of integration, either (1) by transforming the results or (2) by integrating results in a narrative discussion or joint display. Transforming the results refers to integration that is accomplished by converting the qualitative or quantitative results and combining them to form one database. For example, Creswell and Plano Clark (2018) recommend providing a scoring system so qualitative codes can be converted to a number that could be used in quantitative analysis. Due to the number of different qualitative and quantitative data sources that I had collected, I did not feel that transforming all my qualitative data to quantitative data or vice versa

would have been helpful in expanding my understanding of the results and validating and confirming the results. I also thought that converting qualitative data to quantitative coding would lose the richness of my data.

I considered narrative discussion, as described by Creswell and Plano Clark (2018), which involves writing the quantitative results alongside supporting qualitative data and discussing their similarities and differences. However, my initial attempt at narrative discussion resulted in disjointed results due to the varied number of data sets. The separation of qualitative and quantitative data limited synergy, preventing true integration that could yield new insights and address the central research question. Consequently, the use of narrative discussion did not adequately integrate my results, prompting me to explore joint displays for better integration.

A joint display, as defined by Creswell and Plano Clark (2018), is a table that researchers use to integrate qualitative and quantitative data. The use of a joint display allows for a visual representation and comparison of qualitative and quantitative data that is "more direct and nuanced" (Creswell & Plano Clark, 2018, p. 332). A joint display also allows a researcher to identify new insights that move beyond the individual quantitative and qualitative results (Fetters et al., 2013). Creswell and Plano Clark (2018) describe a variety of methods that researchers can use to complete joint displays. The methods varied, and the authors of the articles often did not provide clear steps for developing the joint displays, making it difficult for other researchers to reproduce them systematically.

I wanted an explicit, systematic method that I could employ to develop joint displays to integrate my analysed data transparently and that could be replicated for other research projects. Guetterman et al. (2015) recommend the following general practices when using joint displays to integrate data: (1) label the qualitative and quantitative results; (2) use the same design consistently; (3) use the same integration approach consistently; and (4) explicitly identify the insights generated by the joint display. Therefore, when I read about the different ways that other researchers have developed joint displays, I was cognisant of these characteristics. I also made sure to consider these characteristics when selecting a method that would be useful for generating joint displays and identifying new insights from the integration of qualitative and quantitative data. Through reading about the use of joint displays for integrating mixed methods results, I encountered the pillar integration process (PIP) and the extended pillar integration process (ePIP) for integrating qualitative and quantitative data. I identified that these two methods could be helpful for the systematic integration of the data that I had collected. The PIP and ePIP approaches both form the basis for the integration method that I developed and employed, which I call the Adapted ePIP.

8.3.2. Background of PIP and ePIP

Johnson et al. (2019) developed PIP as a transparent framework for integrating analysis of one source of qualitative data and one source of quantitative data in mixed methods research. This approach aims to reduce observer bias and increase data integration opportunities, thereby promoting trustworthiness in data analysis. To integrate qualitative and quantitative data, PIP employs a joint display, which is essential for ensuring transparent, systematic integration. In the joint display created during PIP, researchers list the quantitative data and their corresponding categories, then match these to the qualitative codes and categories. The researcher verifies that

the qualitative and quantitative data align and build a pillar containing the integrated theme (Johnson et al., 2019).

However, within the realm of mixed methods research and programme evaluation, research may be conducted where multiple sets of qualitative and quantitative data are collected and need to be integrated. Consequently, Gauly et al. (2024) developed ePIP, enabling the integration of three data sets from mixed methods research to build a pillar and identify a shared theme across the three sets of qualitative and quantitative data. The basis of the ePIP is still the use of a joint display like the PIP, but it allows researchers to add more data sources to the joint display. Gauly et al. (2024) highlight their application of the ePIP in two instances involving the combination of three data sets. They propose that when integrating data with multiple sets, a researcher should begin by matching two sets of the same type before matching the other type of data. For example, if there are two qualitative sets of data, match the analysed data from the two qualitative sets in the joint display and then match the one quantitative data set in the joint display. Therefore, ePIP provides a method for integrating three sets of data.

8.3.3. Reflection on the Adaption of the ePIP Approach for my Study

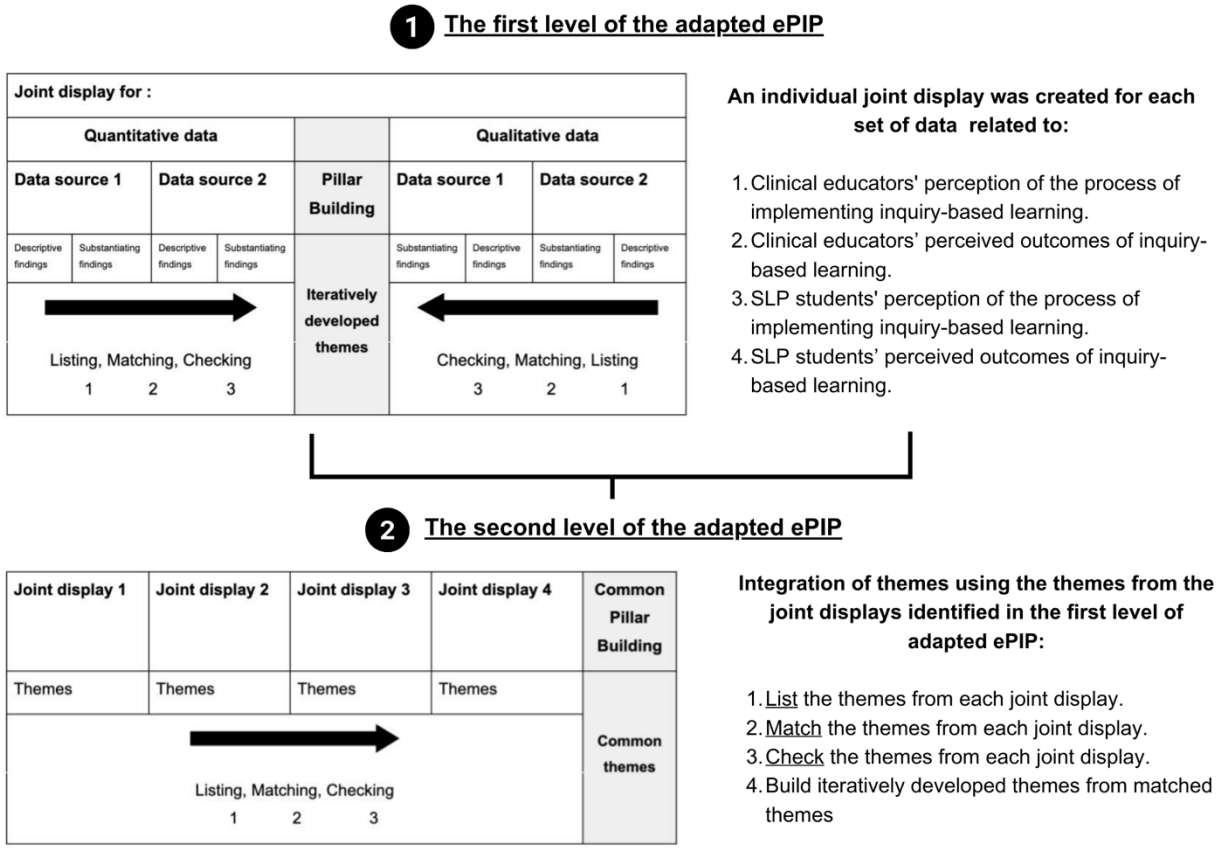
I had three or more than three data sets that I needed to integrate using a systematic and transparent method to develop themes. These data sets were from the two participant groups (clinical educators and SLP students) and various stages of my study (pre-, during, and post-implementation). Therefore, I adapted the ePIP and named it the Adapted ePIP so that I could first integrate three or more data sources, and then second, integrate the themes/pillars across participant groups and stages of my study.

To accomplish this goal, I designed two levels of integration for the Adapted ePIP. In the first level of the Adapted ePIP, I used joint displays to build pillars/themes through the integration of three or more sets of qualitative and quantitative data that I had already analysed individually. Joint display building occurred through the four traditional stages of ePIP to integrate the various qualitative and quantitative data for a participant group at a specific time of the research. The second level of the adapted ePIP incorporated the integration of the pillars/themes built in the joint displays during the first level of integration. The first and second levels of the Adapted ePIP are illustrated in Figure 8.1.

In the following sections, I describe how I adapted the ePIP. I first describe Level 1 of integration and then Level 2 of integration. Lastly, I provide a rationale for the two levels of integration of qualitative and quantitative data in this novel method of integration within a complexity framework.

Figure 8.1

Visual illustration of the process of the adapted ePIP



8.3.3.1. Level One of the Adapted ePIP

In level one of the adapted ePIP, I adapted the ePIP by adding extra columns to the joint display for the additional data sources that I needed to integrate. I then followed the traditional stages of listing, matching, and checking based on Johnson et al. (2019) and Gauly et al. (2024). However, I added to the matching stage to provide a transparent explanation of how I matched multiple data sets.

I completed the four stages of ePIP in level one of the Adapted ePIP to construct the joint display

tables. Stage 1 was *Listing,* which incorporated listing the raw data from the quantitative or qualitative results in a table format. Stage 2 was *Matching,* which involved me matching data between the quantitative or qualitative results that I displayed in the table. I needed to select how I would match the data given the multiple data sets for qualitative and quantitative research. I chose whether I was matching qualitative or quantitative data first based on which data type had the most sources. For example, if there were three sets of quantitative data, I matched those first and then the qualitative data. The matching method I used was the same as Gauly et al.'s (2024) method for matching multiple data sets. The matching data were aligned horizontally on the table. If there were no matching data, then it was left blank or "no matching data" was written in the table.

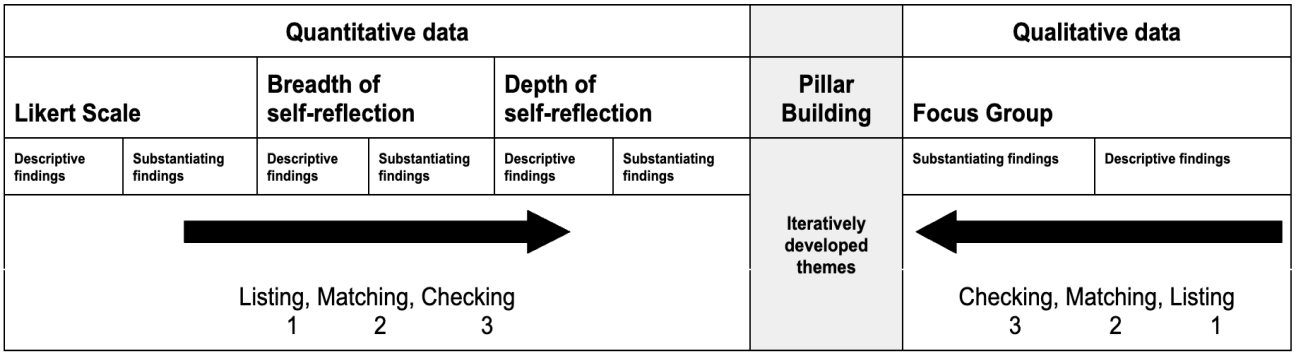
Stage 3 was *Checking,* which ensured that columns were cross-checked for completeness and ensured appropriate matching of qualitative and quantitative data. If there were no matching data, I checked and verified that no raw data could have been provided as an appropriate match. This stage also required reflection on the patterns emerging and, consequently, refining and modifying the lists of data in the table. Stage 4 was *Pillar Building*, which occurred in the central column of the joint display table. Pillars are built by integrating the patterns, themes, and insights that emerge when matching and checking the data. Each pillar contains the integrated theme from each row of the table. This integration occurs through the visual and conceptual integration of the qualitative and quantitative data.

An example of using the Adapted ePIP was when I integrated the analysed data from the implementation stage of my study. That stage comprised the implementation of inquiry-based

learning during clinical education. During the analysis of the results of the implementation stage of my study, I needed to integrate the data collected from the SLP students during this implementation time, which included quantitative data from the Likert scale results, breadth of self-reflection, and depth of self-reflection with the qualitative end-of-year focus group. Figure 8.2 provides a visual representation of the Adapted ePIP in the first level of integration when there were more than three data sources. Figure 8.2 is related to the example described when integrating the qualitative and quantitative data from the SLP students during the implementation stage of the research.

Figure 8.2

Visual representation of the first level of the adapted ePIP for my study



In the first level of integration, I used the Adapted ePIP to create an individual joint display for the sets of data related to the following groups and stages of the programme evaluation:

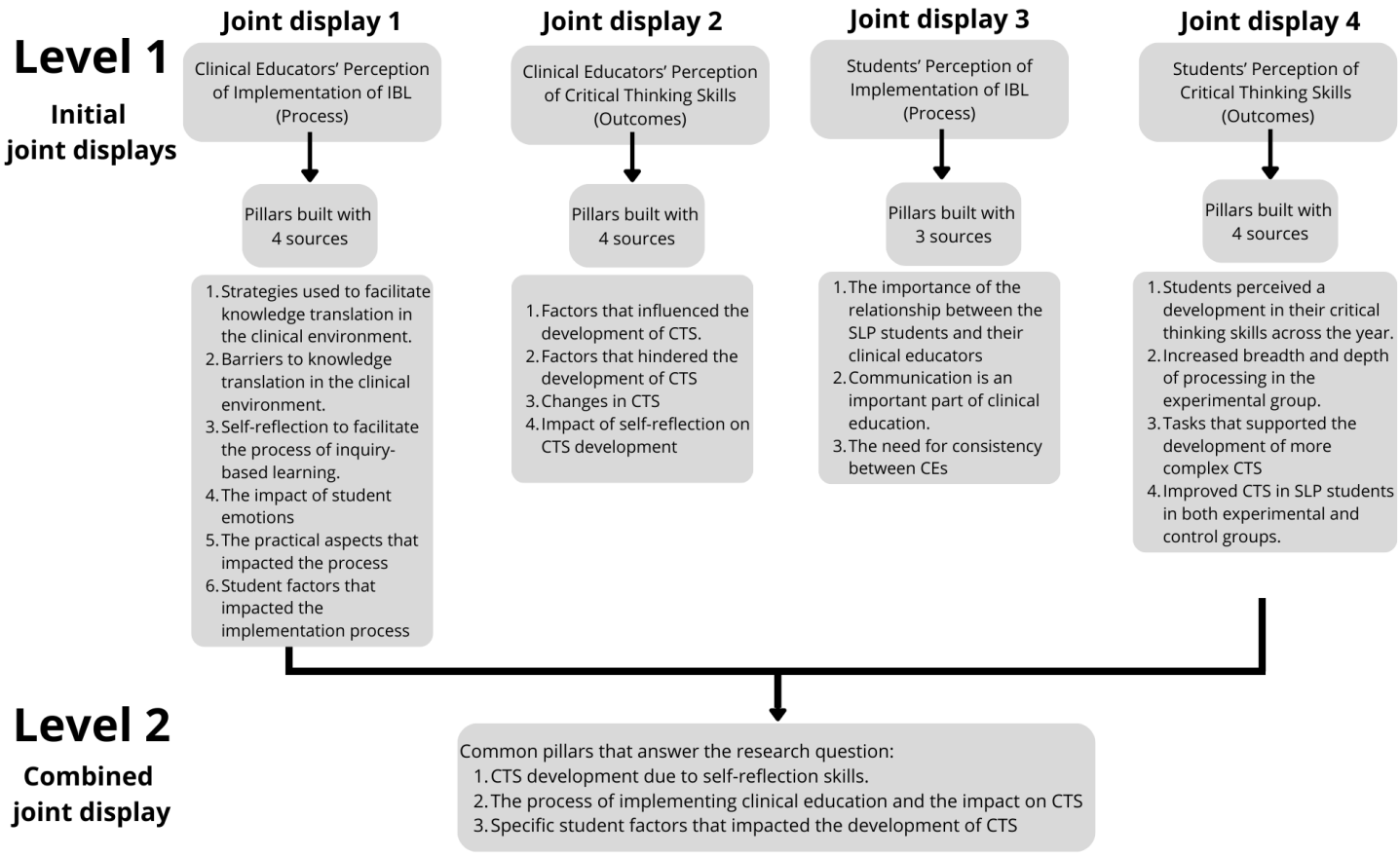
1. Clinical educators' perception of the process of implementing inquiry-based learning.
2. Clinical educators' perceived outcomes of inquiry-based learning.
3. SLP students' perception of the process of implementing inquiry-based learning.
4. SLP students' perceived outcomes of inquiry-based learning.

8.3.3.2. Level Two of the Adapted ePIP

The second level of the Adapted ePIP integration included listing the themes/pillars from one of the joint displays from the first level of the adapted ePIP. Then, themes from the other joint displays were matched to it. If a theme did not match, I placed it in a row on its own, and "no matching theme" was written in the row under the other joint display columns. I checked the matched themes to ensure they did match and that there was cohesion between the themes that I matched. Creating the second level of the adapted ePIP allowed me to integrate themes and make sense of a multitude of data from both participant groups and from the process and outcomes of the programme evaluation. Figure 8.3 illustrates the two levels of the Adapted ePIP and how I used it specifically to integrate a variety of data sources throughout the stages of the study. The themes shown in this illustration are presented in my results chapter and the subsequent discussion chapter.

Figure 8.3

Visual representation of the two levels of adapted ePIP as an example from my study



Note. CTS: Critical thinking skills

8.3.4. Reflection on the Rationale for the Adapted ePIP within a Complexity Framework

This section details the rationale for Adapted ePIP within a complexity framework. *Chapter 4* details the complexity framework applied to this study. In the current chapter, I provide definitions of key concepts necessary to understand this section so that the reader does not have to reread *Chapter 4.* I first explain why I required two levels of integration based on the complex adaptive system, the foundation of complexity theory. I then explain how the levels of the nested

systems, which form part of complexity theory, also reinforce the use of the Adapted ePIP.

Complex adaptive systems provide the foundation for the system of complexity observed in my study. A complex adaptive system is formally characterised as "a collection of individual agents with freedom to act in ways that are not always totally predictable and whose actions are interconnected such that one agent's actions change the context for other agents" (Plsek & Greenhalgh, 2001, p. 625). My research context was a complex adaptive system due to having a group of clinical educators and SLP students learning in an environment where there is variability and unpredictability in the participant groups, the interactions within and between the groups, and the environment within which they exist. They interacted with one another in a manner that I, as the researcher, could not control, and the interactions also brought about additional, unpredicted, and uncontrollable changes, as described by Greenhalgh and Papoutsi (2018) and Thompson et al. (2016).

Thompson et al. (2016) note that an important strength of complexity theory is its emphasis on viewing the system in its entirety rather than reducing it to its individual parts. By integrating data using the Adapted ePIP, I was able to illustrate the plurality of voices inherent in complex research, which helped me comprehend the processes and outcomes of various participants involved in the programme evaluation. This focus on diverse perspectives facilitated a deeper understanding of the whole system rather than just the sum of its parts, as described by Greenhalgh and Papoutsi (2018).

Through the second level of integration, I generated a holistic, integrated answer that reflected

the overall patterns observed in the programme evaluation rather than merely the sum of its parts, by combining insights from different participants and stages of the research. The complexity framework emphasises that there is no simple answer when analysing programme evaluations (Greenhalgh & Papoutsi, 2018). This principle encouraged me to adopt creative and reflexive approaches in my data analysis, ultimately leading to the development of the Adapted ePIP.

Different levels of nested systems within complexity theory reinforce the use of two integration levels in the Adapted ePIP. As described by Plsek and Greenhalgh (2001), complexity theory in healthcare encompasses various nested systems, including the individual, population health, and health service systems. The relationships among participants within a complex system, such as clinical education, serve as the foundation for the system's properties (Thompson et al., 2016). As explained in *Chapter 4*, my study framed the levels of the health sciences education system according to these nested systems. Specifically, my study comprised the following levels: the SLP student (individual), the relationship between clinical educators and SLP students (population), clinical education pedagogy (health service system), and the university with HPCSA regulations for graduation (planetary ecosystem).

It was important for me to determine which levels would serve as the core for analysis and whether these levels provided a comprehensive understanding of the system, specifically the clinical education dyad and the influence of inquiry-based learning on developing critical thinking skills. I concluded that analysing the individual components, followed by an examination of the combined population within the context of clinical education pedagogy, would sufficiently interrogate this complex adaptive system. The second level of analysis also

ensured that I evaluated the programme outcomes holistically.

8.4. Synergy of the Results Gained by Integrating Qualitative and Quantitative Data Through the Adapted ePIP

This section explores the synergy achieved in the results by integrating qualitative and quantitative data using the Adapted ePIP. It highlights its role in promoting awareness of complexity, connection, reconfiguration through fusion, and coherence, all of which are crucial for successful data integration.

8.4.1. The Adapted ePIP Supports the Awareness of Complexity

Systematic, transparent integration of qualitative and quantitative data is critical for understanding mixed methods research results and complex adaptive systems. I prioritised participants' voices by analysing the qualitative data, which revealed interactions within and between participants. In contrast, the quantitative data provided only yes/no/maybe answers to my central research question, offering limited insight into the experience and unfolding of the process. Thus, a systematic integration method for both data types was essential. As Thistlethwaite et al. (2012) note, relying solely on quantitative scores is insufficient to determine the benefits or impact of medical education. There is a need to understand the learning process. Alhassan (2024) similarly suggests that mixed methods in medical education research enable researchers to quantitatively assess educational intervention outcomes while qualitatively exploring the experiences and perceived outcomes of students and educators. Consequently, I needed to integrate qualitative and quantitative data systematically to gain a deeper understanding of the learning process in clinical education and its impact on developing critical thinking skills.

As Greenhalgh and Papoutsi (2018, p. 3) note, integrating qualitative and quantitative data can provide a "rich, nuanced picture of what is going on and why". Using the Adapted ePIP facilitated the necessary synergy to address my central research question and helped identify and explore the themes and their interconnections, which are detailed in my results and discussion chapters. This integration allowed for a more detailed analysis of the interacting influences that affected the process and outcomes of the programme evaluation, considering the various agents and participants involved. Furthermore, the Adapted ePIP enabled me to recognise that implementing clinical education and trialling a different pedagogy, such as inquiry-based learning, is an emergent and dynamic process that must be understood as a whole. This approach engaged with the complexity of the system in understanding the programme evaluation's process and outcomes, rather than attempting to control that complexity.

8.4.2. The Adapted ePIP Promotes Connection Between the Data Sets

Bazeley (2024) emphasises the importance of understanding the impact on data during integration. My awareness of how the data transformed through the integration process using the Adapted ePIP revealed the synergy created by combining qualitative and quantitative data. This synergy facilitated the exploration of inquiry-based learning pedagogy and the development of critical thinking skills within the interactions among SLP students, clinical educators, the context of SLP service provision, and the broader university environment.

Connections that emerge during the integration of mixed methods data are important for achieving synergy in the results (Moran-Ellis et al., 2006). I identified connections between data collected from different stages of the research, various participant groups, and the distinct data sets. These connections are detailed in *Chapters 6* and *7*. One example of a connection that led to

synergy was the relationship between SLP students and clinical educators and its influence on their academic emotions. Another unexpected finding that emerged from integration using the Adapted ePIP was the connection between self-reflection and the development of critical thinking skills. This synergy was only identified through the integration of data.

The Adapted ePIP also facilitated the formation of dynamic cognitive connections, as the two levels of integration supported the comparison and contrast of concepts and processes from my results. As Bazeley (2024) explains, identifying the similarities and differences between concepts and processes leads to new perspectives. The Adapted ePIP provided a visual format that made these similarities and differences easily identifiable and subject to interrogation, ultimately allowing for the emergence of new insights.

8.4.3. The Adapted ePIP Supports Reconfiguration Through Fusion

Bazeley (2024) defines reconfiguration through fusion as a dynamic binding together of the integrated data so that a new understanding, model, or process of the data is provided. Through both levels of the Adapted ePIP, the data I was integrating were reconfigured through fusion. In the first level of the Adapted ePIP, the integration of the qualitative and quantitative data was used to build pillars/themes. The fusion of the qualitative data with the quantitative data provided insights into the new integrated data and allowed me to have a fresh understanding of the data. This level of integration was useful for understanding the processes and outcomes of implementing inquiry-based learning according to each participant group.

In the second level of the Adapted ePIP, there was further reconfiguration through fusion as the pillars from the initial joint displays were integrated to provide a more complete understanding

of the programme evaluation as a whole and not just as a sum of the parts. This second level of integration is what highlighted the impact of self-reflection on the development of critical thinking skills as opposed to the impact of implementing inquiry-based learning. This level also provided insight into the specific student factors that influenced the process and outcomes of the programme evaluation and the SLP students' ability to engage in clinical education in general. Lastly, this level provided further insights into the process of clinical education and the factors that impact its implementation. It was only through the second level of integration that reconfiguration through fusion occurred, which led to a new understanding of the data.

8.4.4. The Adapted ePIP Promotes Coherence

Despite the complexity of the social world, Uprichard and Dawney (2019) assume that several results can be synthesised to create a coherent representation of social phenomena. Through the two levels of the Adapted ePIP, I was able to determine a coherent, holistic answer to my central research question. Prior to using the Adapted ePIP, my results were disjointed and did not provide an answer to my central question. That lack of an answer to my central question is what led me to engage in determining what the best integration method for my study would be. The use of the Adapted ePIP allowed for coherence, which then promoted the synergy gained from integration at both levels. Through achieving this coherence, I was able to identify that inquiry-based learning did not conclusively develop the critical thinking skills of SLP students. The coherence did, however, allow me to identify other factors that influenced the process and outcomes. As Bazeley (2024) noted, when there is coherence through integration, the resulting knowledge and understanding from the research study become the focus as opposed to specific data items or methods.

8.5. Chapter Summary

In this chapter, I discussed the process of ensuring integrated results and highlighted the novel integration method for mixed methods research, the Adapted ePIP, employed within complexity theory. The Adapted ePIP proved valuable for integrating data, revealing both outcomes and processes of programme evaluation. It enabled me to discern how the programme operated, why it was effective, and what dynamics were at play. Its systematic and transparent nature made it particularly suitable for integrating multiple data sources, influenced by my central research question and the nature of the collected data. I emphasised the synergy achieved through integrating qualitative and quantitative data sets using the Adapted Extended Pillar Integration Process, highlighting its potential for enhancing programme evaluations. This synergy arose from an awareness of complexity, forming connections, reconfiguration through fusion, and coherence during integration.

CHAPTER 9: A PROPOSED FRAMEWORK FOR DEVELOPING CRITICAL THINKING SKILLS IN SLP STUDENTS

9.1. Introduction

I began my PhD journey by exploring the development of critical thinking skills in SLP students through a "flipped" approach to clinical education. I introduced inquiry-based learning pedagogy to SLP clinical educators, aiming to determine whether this change in pedagogy improved critical thinking and clinical reasoning skills. This evaluation of the implementation of inquiry based learning was designed based on a theory of change. The theory of change is key to understanding if and how the programme works (Mayne, 2015). My study's findings identify potential elements of clinical education that support me in understanding that the critical thinking skills of students did change and the possible reasons for these changes in the development of critical thinking skills in SLP students. Consequently, I propose a framework incorporating the factors of self-reflection, feedback, collaborative relationships, and the influence of generational characteristics to potentially foster the development of critical thinking skills in SLP students.

This chapter first revisits the theory of change that was developed in *Chapter 4*. Next, I present a proposed framework for developing critical thinking skills in SLP students, exploring the factors that were identified during the process of the study and that build on the pathway and assumptions of the theory of change. These factors include self-reflection, feedback, effective clinical educator-student relationships, and recognition of student factors associated with the current cohort of students.

In this chapter, I present that the proposed framework for developing critical thinking skills should address both SLP students and clinical educators, as understanding each layer of the proposed framework is essential for appreciating their influence on clinical education and critical thinking skills development. Additionally, I demonstrate how clinical education expectations can potentially be made explicit through this proposed framework and explore the factors that limit the development of critical thinking skills. Throughout the chapter, I use the pronoun "we" when referring to clinical educators, as I identify as one myself, and the study's results resonate with my experiences and those of other clinical educators involved in shaping the next generation of SLPs.

9.2. The Theory of Change to Evaluate the Implementation of Inquiry-based learning

A theory of change, as described by Mayne (2015), outlines an impact pathway supported by causal assumptions. This pathway includes several components: *activities*, *outputs*, *reach and reaction*, *capacity changes*, *behavioural changes*, *direct benefits*, *well-being changes*, and *external influences*. In *Chapter 4*, Figure 4.2 presents the theory of change developed for this study, based on Mayne's framework. It was used to guide the programme evaluation by mapping how inquiry-based learning was expected to be implemented and take effect. Each component of the theory of change is outlined below to demonstrate how the programme unfolded across its various stages, and highlight the assumptions underpinning each phase to facilitate the understanding of the elements that potentially contributed to the development of critical thinking skills in SLP students.

The *reach assumption* based on Mayne's (2015) definition (relating to how the intervention engaged participants and triggered a response) was addressed by providing CEs with an inquiry-based learning training workshop and regular check-in sessions. These sessions, conducted at the end of each block in the form of focus group discussions, created opportunities to reflect on the implementation of inquiry-based learning and to offer further training where necessary.

Capacity change assumptions were created in developing the theory of change to ensure that the *reach and reactions* led to *capacity changes* (Mayne, 2015). The predicted *capacity change* was that CEs would receive the knowledge and skills that they required to implement inquiry-based learning in clinical education. The *capacity change assumptions* included that the benefits of critical thinking skills would be understood and that they understood the principles of inquiry-based learning to then implement the skills in clinical education. *Behaviour change assumptions* were created in developing the theory of change to ensure that CEs were able to apply the *capacity changes* so that they became *behaviour changes*. The *behaviour change assumptions* included (1) CEs want to develop the critical thinking skills of students; (2) CEs would make decisions about how to implement inquiry-based learning when supervising students; and (3) CEs have the skills necessary to implement inquiry-based learning.

Both the *capacity* and *behaviour change assumptions* were observed in the Likert scales the CEs completed as well as the audio diaries, where CEs reflected on their ability to implement inquiry-based learning and the critical thinking skills that students were employing in the clinical practicals. CEs self-reported on each Block that they were improving in their ability to

implement inquiry-based learning practices, and they reflected on the changes in the critical thinking skills of the students.

Through the stages of the theory of change, which included the *activities, outputs, reach and reaction, capacity changes,* and *behaviour change*, as well as the *assumptions* predicted between each stage, unanticipated results occurred, and I was able to identify external factors that influenced the process. Acknowledging unanticipated results and the influence of external factors is important in understanding the process that occurred in the theory of change. It is through understanding this process of the stages with the unanticipated results and external factors that allowed me to have better insight into the process, which facilitated the development of critical thinking skills in the SLP students. As per the theory of change, we need to understand these changes in the process in order to be able to understand the direct benefits and well-being changes that occurred from the implementation of the programme.

Therefore, I explore a proposed framework for developing critical thinking skills in SLP students based on information obtained from the components of theory of change including the *activities*, *outputs*, *reach and reaction*, *capacity changes*, and *behavioural changes*. I will provide insight into the process that occurred during these components that led to the programme's outcomes, which could potentially support CEs in developing the critical thinking skills of SLP students. This insight will be provided in the form of a proposed framework for developing critical thinking skills for SLP students. The outcomes of this process (the *direct benefits* and *well-being changes*) are discussed to potentially support CEs in developing the critical thinking skills of SLP students.

9.3. A Proposed Framework for Developing Critical Thinking Skills in SLP Clinical Education

When analysing the results across data sets and comparing them to the theory of change, it became clear that inquiry-based learning alone could not account for the observed changes in students' self-reflection skills and, consequently, their critical thinking skills. By framing clinical education within the context of complexity theory and analysing multiple data sources and perspectives, I realised that the process is too intricate to attribute change to a single factor as I initially proposed in the original theory of change (Delany & Molloy, 2009).

To account for the complexity of clinical education, I examined changes in students' self-reflection and critical thinking skills within the broader context of the clinical education process, exploring the components of the theory of change including the *assumptions* (intended) and *external influences* and *unanticipated results* (unintended factors). This approach enabled me to understand what transpires during clinical education that might have facilitated the *direct benefits* and *well-being changes* related to the development of SLP students' critical thinking skills. While there is tentative evidence suggesting that inquiry-based learning had some impact on enhancing students' critical thinking skills, the most consistent finding which relates to the *behaviour changes* that lead to the *direct benefit* of the development of critical thinking skills in SLP students was the importance of self-reflection and feedback within a positive clinical educator–SLP student relationship for developing these skills. This combination of factors in clinical education appears to be more important than the specific pedagogy used to foster the development of students' critical thinking skills and knowledge translation in a flipped clinical

education framework. Although I used self-reflection to monitor the progression of students' critical thinking skills, it also played a role in their development and facilitated their engagement with inquiry-based learning, as previously noted by Pedaste et al. (2012).

Given the complex nature of clinical education, particularly in SLP, developing a framework offers a valuable way to organise and interpret the key components that emerged from this study. Van der Waldt (2020) explains that frameworks serve as both organising instruments and mental maps, helping researchers make sense of dynamic social settings by visually and conceptually connecting core constructs.

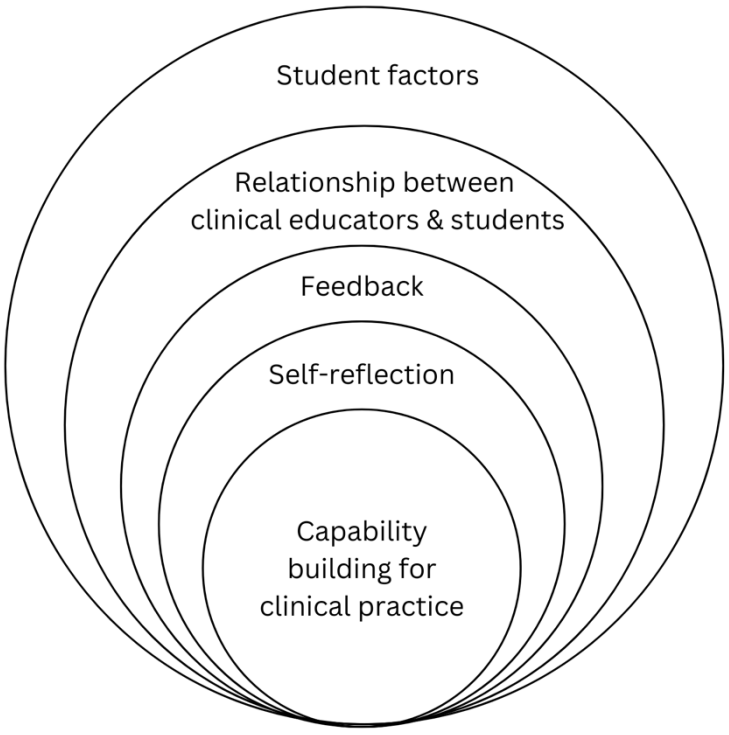
Van der Waldt (2020) further notes that frameworks are especially valuable in applied fields like clinical education, where variables are often abstract, context-dependent, and shaped by complex interpersonal dynamics. In this study, the clinical education setting involves multiple, interrelated elements, such as educator approaches, student characteristics, learning processes, and contextual influences, that impact the development of critical thinking skills. Constructing a framework from these findings enables the organisation of these components into a coherent structure, offering a deeper understanding of how critical thinking develops within SLP clinical education. It also provides a foundation for guiding future educational strategies and research in similar practice-based learning contexts.

Consequently, I advocate for a proposed framework to develop critical thinking skills in SLP students, based on my study's results. This proposed framework promotes the development of critical thinking skills through self-reflection and feedback, anchored in a strong clinical

educator-student relationship while considering factors relevant to Generation Z students, the participants in my study. Ultimately, this proposed framework aims to enhance critical thinking skills, enabling students to apply theoretical knowledge in clinical scenarios and effectively bridge the theory–practice divide. Figure 9.1 presents a visual representation of this proposed clinical education framework. Further details on each layer and their strategies are elaborated on in their respective sections of the proposed framework for developing critical thinking skills in SLP clinical education.

Figure 9.1

Proposed framework for developing critical thinking skills in SLP clinical education



9.4 Reflection Literacy: Developing Critical Thinking Through Self-Reflection

The importance of self-reflection in developing critical thinking skills among SLP students emerged as a significant finding during the data collection and analysis process. Although inquiry-based learning was initially prioritised as the primary pedagogical focus, the data indicated that students' engagement in self-reflective practices—particularly when supported by structured guidance—played a more prominent role in fostering critical thinking (Braun & Clarke, 2022). This shift highlights the importance of remaining responsive to data and supports the prioritisation of self-reflection by both students and clinical educators to bridge the theory–practice divide. Self-reflection is inherently complex and can be challenging to implement effectively in clinical education, especially given the dynamic and unpredictable nature of healthcare settings (Schaepkens et al., 2022). The skills required for meaningful self-reflection are not innate; rather, they develop progressively and require active facilitation from clinical educators (Driessen et al., 2008; Plack et al., 2005). As students gain experience and expand their knowledge base, their reflective skills deepen in complexity (Uygur et al., 2019; Ng et al., 2020). Pedagogical approaches should therefore explicitly support the development of reflective capacity alongside inquiry-based learning strategies (Colley et al., 2012; Cook et al., 2019; Plack et al., 2005).

9.4.1 Reflection Literacy in SLP Students

Self-reflection plays a central role in developing critical thinking by allowing students to critically evaluate their clinical experiences and connect theoretical knowledge with practical application (Ku & Ho, 2010; Schaepkens & Lijster, 2022). Reflective practice encourages students to analyse their decisions, actions, emotions, and responses during therapy sessions, thereby fostering deeper learning (Loughran, 2002; Grant et al., 2002). However, the depth and

effectiveness of students' self-reflection depend on how it is introduced and supported by clinical educators. Furnari (2014) suggests that reflective tasks should be structured to promote both depth and breadth, while Schaepkens and Lijster (2022) caution that reflection should not merely serve assessment requirements. When students perceive reflection as a procedural task rather than a valuable learning tool, their engagement becomes superficial, limiting its developmental impact (Dunne et al., 2019; Schaepkens et al., 2023). In contrast, students who internalised reflection as a learning strategy from early in their training engaged more meaningfully and developed deeper reflective capabilities (Dunne et al., 2019).

Clinical educators should clearly communicate the purpose of self-reflection, model reflective practice, and scaffold the process in a way that aligns with students' developmental needs (Mikroyannidis et al., 2013; Pedaste et al., 2015). One effective strategy identified in this study involved guiding students to ask questions about their patients and therapy processes, as these self-generated questions encouraged reflection and promoted critical thinking (Ilgen et al., 2021b; Dunne et al., 2019). Initially, students often struggled to formulate such questions due to limited clinical exposure or low confidence, highlighting the importance of educator modelling (Ilgen et al., 2021b). As students progressed, their ability to ask thoughtful, reflective questions improved, likely due to the influence of educator scaffolding within the inquiry-based learning cycle (Mikroyannidis et al., 2013; Pedaste et al., 2015). This iterative process helped students examine their knowledge and assumptions and apply clinical reasoning in real-world contexts. Clinical educators should therefore model reflective questioning and support students in developing these skills collaboratively (Dunne et al., 2019).

9.4.2 Reflection Literacy in Clinical Educators

Developing reflection literacy is not only important for students but also essential for clinical educators. Self-reflection enables educators to understand the complexities of their roles and how best to support students (Boles, 2018). However, if clinical educators reflect only at a superficial level, valuable learning opportunities may be missed (Fenwick & Dahlgren, 2015). Clinical educators should reflect on their own understanding of self-reflection and the developmental processes required to foster it in students. Cook et al. (2022) and Dunne et al. (2019) argue that clinical educators with a deeper understanding of reflective development are better equipped to support students effectively. My findings support this view, revealing that educators who understood reflection as a process and adopted appropriate strategies were better able to model reflective skills. This aligns with Boles (2018), who found that such educators more effectively facilitated student learning. To enhance their effectiveness, clinical educators must actively develop their own reflective practices. In doing so, they can better model these behaviours for students and implement strategies that align with students' learning trajectories (Cook et al., 2022; Dunne et al., 2019).

9.4.3 Reflection Literacy as a Shared Responsibility

Reflection literacy has been defined as the ability to reflect cognitively, express emotions and thoughts, and use reflection as a tool for learning and assessment (Chan & Lee, 2021). This concept should be cultivated not only at the student level but also among educators, and across pedagogical and institutional levels (Chan & Lee, 2021). The development of reflection literacy requires intentional training and support for both students and clinical educators. Chan and Lee (2021) further highlight the ethical and emotional risks associated with reflective practice. For students, reflection may involve confronting difficult experiences or perceived failures, which

can result in vulnerability, anxiety, or emotional distress. Without a safe and supportive environment, these risks may discourage honest engagement. It is the responsibility of clinical educators to create such environments, ensuring that reflection is not only meaningful but also psychologically safe (Chan & Lee, 2021). When educators use reflection solely as an assessment tool, they may unintentionally overlook these emotional and ethical dimensions (Ghaye, 2007; Schaepkens et al., 2023). As noted in this study, some clinical educators lacked the necessary understanding to support deep, ethically responsible reflective practice. This gap must be addressed through the prioritisation of reflection training and the cultivation of a reflective culture in clinical education. Students with strong reflective skills tend to be more receptive to feedback and more capable of translating feedback into changes in practice. In contrast, those with poor reflection skills are less likely to engage meaningfully with feedback or use it to improve (Fraser & Greenhalgh, 2001). Therefore, the development of reflection literacy is not only critical for individual learning but also for fostering a feedback-rich and growth-oriented clinical environment.

9.4.4 Summary of Reflection Literacy

Reflection literacy is essential for the development of critical thinking skills in SLP clinical education. When both students and clinical educators engage in reflective practices, supported by training, scaffolding, and ethical awareness, they are better positioned to bridge the theory–practice gap. Clinical educators must model reflection, support student questioning, and foster psychologically safe environments where reflection can thrive. In doing so, they contribute to cultivating reflective learners who are capable of critical thought and effective clinical reasoning (Cook et al., 2019; Dunne et al., 2019; Schaepkens et al., 2022).

9.5 Feedback Literacy: Developing Critical Thinking Skills Through Feedback

Feedback literacy forms the foundation of students' ability to engage meaningfully with feedback and is critical to the development of clinical reasoning and critical thinking skills. Carless and Boud (2018) define feedback literacy as the capacity to understand the purpose and process of feedback, including how judgments are formed, how feedback can be implemented, and how emotional responses to feedback are managed. Students with well-developed feedback literacy are more likely to actively engage with feedback conversations and apply feedback to enhance their clinical performance (Noble et al., 2020; O'Connor et al., 2021).

Students who lack feedback literacy may fail to recognise the significance of feedback or struggle to interpret it (Winstone et al., 2017). Clinical educators should explicitly support students in developing this skill, encouraging them to seek out feedback rather than waiting passively. However, Li et al. (2023) found that even confident and independent Generation Z students may hesitate to initiate feedback conversations due to anxiety. This highlights the importance of a supportive relationship between clinical educators and students, where feedback is positioned as a tool for learning rather than a judgement of competence (Tavares et al., 2020).

Feedback literacy should be nurtured early and consistently throughout clinical education. It enables students to navigate the complex healthcare environment, become more self-aware, and effectively integrate feedback into their evolving clinical practice. In the context of this study, feedback literacy underpinned the value of receiving feedback from various sources, including clinical educators, peers, mentors, and the clinical environment. Feedback was also most effective when accompanied by modelling and guidance in applying evidence-based literature.

9.5.1 Feedback from Multiple Sources

My findings support the importance of receiving feedback from diverse sources to promote the development of critical thinking. Clinical educators, mentors, peers, patients, and the clinical environment all contribute to the learning process. Feedback should be formative, timely, and continuous to support reflection and adjustment throughout placements (Fenwick & Dahlgren, 2015; Sargeant et al., 2010).

Students must be actively involved in processing and applying feedback for it to impact their learning (Burgess et al., 2020; Noble et al., 2020; Tavares et al., 2020). However, interpreting and prioritising feedback is not intuitive. Clinical educators must support students in recognising its relevance and learning how to apply it meaningfully (Fenwick & Dahlgren, 2015; Sargeant et al., 2010). Without this support, feedback may be misinterpreted or disregarded (Noble et al., 2020).

Peer feedback, both formal and informal, played an important role in the development of students' critical thinking in my study. Through shared case discussions, tutorials, and informal conversations, students reflected on therapy decisions and clinical reasoning. This aligns with findings from Burgess et al. (2020), who note that peer feedback supports clinical skill development and professional identity. Peer interaction also fosters collaboration, creativity, and problem-solving (Grundy, 2004; Baxter, 2004). Students in this study valued the opportunity to learn from each other and viewed peers as an important learning resource, consistent with Generation Z learning preferences (Seemiller & Grace, 2017). Clinical educators should therefore create opportunities for peer feedback and dialogue to enhance learning (Ho & Whitehill, 2009; Coutts & Barber, 2023).

Feedback on students' self-reflections, although often inconsistently delivered, is another essential element. Dunne et al. (2019) emphasise that the timing and consistency of formative feedback on reflective writing are more critical than whether it is delivered verbally or in writing. Folkvord and Risa (2023) argue that detailed feedback on the depth and quality of reflections enhances both self-awareness and critical thinking. My study found that students and educators recognised the value of post-session feedback, particularly when it followed direct observation of clinical performance, echoing findings by Li et al. (2023).

9.5.2 Modelling to Enhance Feedback Effectiveness

Feedback is more impactful when paired with modelling. Clinical educators in this study highlighted the value of demonstrating clinical techniques alongside verbal or written feedback. Modelling allows students to visualise expectations and integrate feedback more effectively into their practice (Pena & Kiran, 2008).

Students expressed that feedback without demonstration was difficult to implement. This is particularly relevant for Generation Z students, who prefer learning through observation and practice (Shatto & Erwin, 2016; Seemiller & Grace, 2017). Modelling helps to clarify expectations and aligns with learner-centred feedback approaches, which actively involve students in the feedback process (Molloy et al., 2020; Quigley et al., 2020).

9.5.3 Feedback Supporting Information Literacy

Feedback that encourages students to access and apply evidence-based literature also contributes to the development of critical thinking. Clinical educators in this study reported that students benefited from being guided to explore relevant resources, reflect on their application, and use

this information in therapy planning. This approach fosters student independence and promotes habits of lifelong learning.

Despite being considered digitally fluent, Generation Z students often struggle with identifying relevant information and applying it meaningfully (Isaacs et al., 2020). Clinical educators must therefore provide support not only in accessing resources but also in evaluating and applying them. Students in this study appreciated receiving relevant articles and therapy guidelines, but they also required guidance on how to interpret and integrate this information into clinical decision-making (Quigley et al., 2020).

Modelling information literacy helps bridge the gap between theory and practice. Educators should not assume that students who read literature will automatically apply it effectively. Feedback should include specific suggestions on how to translate theory into clinical action, which reinforces critical thinking and improves clinical outcomes.

9.5.4 Summary of Feedback Literacy

Feedback literacy enables students to interpret, process, and act on feedback in ways that promote clinical reasoning and critical thinking. It should be developed intentionally through supportive relationships and instructional strategies. When students receive feedback from multiple sources, including peers and clinical educators, and are guided through modelling and literature use, they are better equipped to apply feedback meaningfully. A feedback-rich learning environment that includes peer discussion, modelling, and resource-guided reflection fosters both self-awareness and the capacity for clinical problem-solving. In this way, feedback becomes an essential tool for bridging the theory–practice gap in SLP clinical education.

9.6 Educator–Student Relationships and the Development of Critical Thinking Skills

My study highlights the significant role of the relationship between clinical educators and SLP students in fostering critical thinking skills. While pedagogical strategies are often prioritised in clinical education research, the quality of educator–student relationships appears equally important in creating a learning environment that supports self-reflection, feedback engagement, and critical thinking.

9.6.1 Creating Safe and Supportive Learning Environments

SLP students in my study described a positive educator–student relationship as one in which their humanity, emotions, and learning processes were acknowledged. A safe, non-judgemental environment fostered both clinical confidence and critical thinking. In contrast, autocratic or impersonal approaches increased anxiety and inhibited learning. Clinical educators also reflected that rigid teaching styles and disengagement undermined students' clinical and reflective capabilities. A psychologically safe space enables students to engage meaningfully in both feedback and self-reflection, key components of critical thinking (Ramani et al., 2020; Tavares et al., 2020). This safe space must balance understanding students' needs with clearly communicated expectations (O'Brien et al., 2019). Students in this study seemed to benefit from educators who were flexible, open-minded, and responsive, allowing them to participate more actively in their own learning and develop feedback literacy and self-reflection skills.

9.6.2 Characteristics of Effective Clinical Education Relationships

Reciprocity and collaboration emerged as central characteristics of productive clinical education relationships. Ossenberg et al. (2019) suggest that educator–student relationships should be co-constructed, involving actively engaged learners and shared knowledge-building. Clinical

educators in my study described positive relationships as those where openness and collaboration were prioritised over authority. Educators noted that while students should remain receptive to guidance, they should not become overly dependent on prior clinical experiences, which can limit learning. Ramani et al. (2020) argue that feedback is most effective when co-constructed within a supportive relationship. Folkvord and Risa (2023) similarly emphasise the importance of a trusting dynamic between students and educators in facilitating feedback and clinical learning. These findings align with the views of participants in this study, where trust and openness in the educator–student relationship supported deeper engagement and critical reflection.

9.6.3 Gaps in the Literature on Relationships and Critical Thinking

Despite the clear relevance of clinical relationships, their role in supporting critical thinking remains underexplored in the literature. Most studies focus on teaching methods, such as simulation or problem-based learning, without addressing how interpersonal dynamics shape learning (Giuffrida et al., 2023). This separation of pedagogy from relational context fails to capture the complexity of clinical education, where learning occurs not only through structured tasks but also through real-time interpersonal interactions. Snowdon et al. (2020) acknowledge that effective clinical educators build strong educational relationships, yet their study does not explore how these relationships influence critical thinking. Furthermore, reliance on self-reported measures in such studies introduces bias (Wolford et al., 2021). This was evident in my study, where students in the control group reported perceived gains in critical thinking skills, even when self-reflections revealed limited growth.

9.6.4 Toward Compassionate, Transformative Clinical Education

My findings suggest that strong clinical educator–student relationships contribute meaningfully to the development of critical thinking skills. These relationships foster safe spaces where students can explore, reflect, and apply feedback in meaningful ways. Vandeyar (2020) argues that clinical educators must demonstrate lovingness, passion for learners, and an epistemology of compassion to foster learning and social cohesion. Similarly, Freire (1998) calls for educators to embody humility, compassion, courage, tolerance, patience, and joy. These relational qualities contribute not only to student well-being but also to the development of clinical reasoning and critical thinking, supporting more inclusive and transformative clinical education.

9.7 Student Factors and the Development of Critical Thinking Skills

Understanding the characteristics and needs of the current student cohort is essential for effective clinical education. In this study, several student factors were identified as influential in the development of critical thinking skills, including academic emotions, professionalism, and generational characteristics. While cultural and linguistic diversity is widely acknowledged in the literature as a crucial component of South African higher education (Boughey & McKenna, 2021; Khoza-Shangase & Mophosho, 2018; Naidoo, 2015), these dimensions were not evident in the data and were therefore not included in the findings. The focus in this section is on student factors that were directly evidenced during data generation and analysis.

9.7.1 Generational Characteristics, Lived Experience, and Intersectionality

To support the development of critical thinking skills, clinical educators must consider both the generational traits and the lived experiences of current students. Generation Z students, who make up the majority of the current cohort, are often described as valuing transparency,

individualism, experiential learning, and regular feedback. These traits can shape how they engage with clinical education and influence their responses to pedagogy and supervision. In the South African context, Swanzen (2018) highlights the importance of relational, reflective teaching approaches for Generation Z students, promoting dialogue, self-awareness, and mutual respect. These students often thrive in environments where their perspectives are acknowledged and where emotional and academic support is available.

However, while generational trends can offer helpful insights, it is important to avoid overgeneralising or applying stereotypes uncritically. This concern was addressed in the original version of the thesis, which noted that "while generational stereotypes should be approached cautiously (Sriprom et al., 2019), general trends in Generation Z offer valuable insights for SLP educators." Furthermore, I highlighted the need for contextually responsive and individualised approaches, drawing on Li et al. (2023), who emphasise the intersectionality of identity, including age, gender, socioeconomic status, ethnicity, and lived experiences, as a necessary lens for understanding student diversity. Educators should remain attuned to the complexity of students' realities and be willing to adjust their teaching accordingly.

Students' broader lived experiences, including family income, access to resources, place of residence, and peer influences, can significantly affect their learning and critical thinking development (Lee & Quijada Cerecer, 2010). These contextual factors may not always be visible during clinical encounters but can shape how students participate, reflect, and respond to feedback. Generation Z students may also arrive at university with diverse spiritual, emotional, physical, and financial needs, requiring educators to move beyond one-size-fits-all approaches. Recognising this diversity is essential for creating inclusive clinical learning environments where

critical thinking can flourish. A commitment to reflection, curiosity, and adaptability on the part of clinical educators is key to supporting these students effectively.

9.7.2 Academic Emotions and Learning in Clinical Education

Academic emotions were identified as a significant influence on students' engagement with clinical education and their ability to apply inquiry-based learning. Although not directly prompted by interview questions, both students and clinical educators frequently referred to emotions such as anxiety. Hayat et al. (2020) found that positive academic emotions support the use of metacognitive strategies, improving students' ability to plan, reflect, and regulate their learning. In my study, anxiety often hindered students' participation and negatively affected their critical thinking development. These findings align with existing literature indicating that Generation Z students are at increased risk of anxiety and depression (Hernandez-de-Menendez et al., 2020; Schroth, 2019) and tend to seek emotional support from authority figures, including clinical educators (Deluliis & Saylor, 2021).

Clinical educators observed that when students felt emotionally supported, they were more open to feedback and reflective learning. This is consistent with Delany et al. (2015), who found that unmanaged anxiety impairs both learning and clinical performance. Clinical educators in this study who cultivated secure learning environments appeared to support students in managing emotional distress, enabling them to engage more fully in clinical education. This aligns with the recommendations of Hayat et al. (2020), who advocate for learning environments that promote positive academic emotions. Rothwell et al. (2021) also highlight the role of effective supervision in reducing stress during clinical placements. The value of emotional connection and support was further echoed in the work of Geller and Foley (2009), who call for educators to

remain aware of students' emotional states, and by Miller and Mills (2019), who note that Generation Z students respond well to humour and personal connection. These approaches appear to facilitate both improved clinical performance and the development of critical thinking skills.

9.7.3 Professional Behaviours and Clinical Education

Professional behaviours also shaped the development of critical thinking skills in this study. Clinical educators noted that students who demonstrated poor preparation, inadequate planning, or a lack of accountability struggled to engage fully with clinical reasoning. These findings align with the work of Torrington Eaton et al. (2022), who identified professional behaviours such as punctuality, preparation, and responsibility as essential for successful SLP clinical placements. Similarly, Quigley et al. (2020) observed that learning environments are most effective when both educators and students are well prepared and engaged. My findings suggest that professionalism supports the application of inquiry-based learning and facilitates active participation in feedback and reflection. In contrast, when students lacked these behaviours, their ability to think critically and engage with the complexities of clinical education was diminished.

9.7.4 Summary of Student Factors

The findings of this study prompt clinical educators to reflect on how they perceive and respond to the current cohort of students. It is important to ask: How do we view today's students? Do we recognise how their attributes affect learning? Are we adapting our supervision strategies to meet their evolving needs, or are we replicating the methods we once experienced ourselves? These questions are particularly relevant in the South African clinical education context, where students' realities are shaped by a range of intersecting social, emotional, and economic factors.

Supporting critical thinking development requires more than effective pedagogy. It requires flexibility, curiosity, and a willingness to adapt to the lived experiences and evolving needs of each student (Li et al., 2023). By embracing this complexity, educators can create inclusive clinical learning environments that foster deep thinking, reflective practice, and professional growth (Li et al., 2023).

9.8. Making Clinical Education Expectations Explicit Through Critical Thinking Development

Basic principles of clinical education that are widely regarded as standard practice include providing both verbal and written feedback, facilitating group tutorials, promoting student self-reflection, and fostering collaborative, respectful relationships with students (Quigley et al., 2020). However, in this study, it became apparent that some of these practices were either inconsistently applied or, when implemented, were perceived by students as exceptional rather than routine.

This observation raised a concern that clinical educators may not be consistently supported or adequately prepared to implement these foundational practices. Some may not have received formal training in clinical education or may rely on supervisory approaches modelled to them in the past, which do not necessarily align with current expectations. As a result, what should be standard practices are sometimes delivered in ways that feel informal or insufficient, for example, through unstructured feedback or a lack of direct observation.

While these patterns were not explored as a formal focus of my study, the findings suggest a gap in how clinical education responsibilities are understood and enacted. This gap highlights the importance of clearly articulating the expected elements of effective clinical education and

supporting clinical educators in applying them consistently. The framework developed in my study seeks to bring greater visibility to these foundational practices and to ensure that all students are afforded equitable and intentional learning opportunities.

9.9 Factors Limiting the Development of Critical Thinking Skills in SLP Clinical Education

This study identified two primary factors that may limit the development of critical thinking skills in SLP students during clinical education. These include the challenges associated with students' theoretical knowledge base and the level of understanding and acceptance of the proposed critical thinking framework by clinical educators and students.

9.9.1 Limitations in Accessing and Applying Theoretical Knowledge

One factor that appeared to influence critical thinking development was students' ability to access and apply theoretical knowledge in clinical settings. Clinical educators in this study reported that some students struggled to recall or integrate content from their academic coursework. This issue was particularly evident when students did not review theoretical material in preparation for clinical sessions. Without engaging with foundational knowledge, students were less prepared to apply evidence-based reasoning during therapy planning and patient management.

It is important to recognise that taking initiative and applying theory are distinct challenges. Students may be willing to engage but lack the skills to connect theory with clinical application. These difficulties may result in hesitation, uncertainty, or errors in judgement, all of which can hinder the development of critical thinking skills.

Clinical educators observed that students with stronger theoretical foundations demonstrated greater confidence and ability when engaging in inquiry-based learning. These students were more successful in progressing through the inquiry cycle and applying their knowledge in clinical decision-making. In contrast, students with weaker theoretical grounding appeared less confident and struggled to apply knowledge flexibly. Despite these challenges, improvements were noted over time. With appropriate support and guidance, students gradually became more capable of integrating theory into practice, which supported their development of critical thinking skills.

It is also important to consider the lasting impact of the COVID-19 pandemic. Disruptions to face-to-face learning and the shift to emergency remote teaching may have affected students' conceptual understanding, which in turn may have compromised their ability to apply theoretical knowledge in clinical contexts.

9.9.2 Limited Understanding and Acceptance of the Framework

Another factor that may limit critical thinking development is the extent to which clinical educators and students understand and accept the framework proposed in this study. The framework draws on key concepts such as complexity theory, reflective literacy, feedback literacy, and generational learning characteristics. For the framework to be effective, users must understand these theoretical foundations and apply them intentionally within clinical education.

Thomson et al. (2019) report that clinical educators often lack in-depth knowledge of educational theory, which may affect how they engage with pedagogical frameworks. This was echoed in my study, where understanding and practical application of the framework varied. Without a solid

grasp of the underlying principles, clinical educators may find it difficult to translate these concepts into supervisory practices that support student development.

Similarly, students who do not understand the value of reflection may view it as a compliance-based task rather than a meaningful opportunity for learning. This perception is supported by previous research, which shows that students often fail to engage deeply with reflective tasks when they do not understand their relevance (Lutz et al., 2017; Mahlanze & Sibiya, 2017; Oakley et al., 2014). Kuswandono (2014) also found that superficial engagement with reflection reduced its impact on critical thinking development. When reflection is not seen as integral to learning, students may produce descriptive rather than analytical responses, which limits their growth as reflective practitioners.

9.9.3 Summary of Factors Limiting the Development of Critical Thinking Skills

In summary, the development of critical thinking skills in SLP clinical education may be hindered by gaps in theoretical knowledge and by limited engagement with the proposed educational framework. Addressing these challenges requires active support for students in consolidating and applying theory, as well as training and mentorship for clinical educators in the application of pedagogical principles. A shared understanding of the framework's purpose and potential can contribute to more effective supervision and enhance students' ability to develop as critical and reflective practitioners.

9.10. Chapter Summary

The clinical educators' progression through the inquiry-based learning cycle alone did not foster the development of students' critical thinking skills. Instead, it appeared that an emphasis on the discussion phase of the inquiry-based learning cycle played an important role for developing

critical thinking skills, particularly the integration of feedback and self-reflection at each stage. Consequently, the focus of inquiry-based learning needed to extend beyond the procedural aspects of the cycle to include the discussion phase and the role of self-reflection and feedback.

The results highlighting the potential importance of self-reflection and feedback within a positive clinical educator–student relationship, while also considering specific student factors, led to the creation of a proposed framework for the development of critical thinking skills in SLP Clinical Education. This framework attempts to use strategies from both inquiry-based learning and traditional clinical education to support the development of critical thinking skills. These elements appear to be important for ensuring that SLP students can bridge the theory–practice gap and enhance their critical thinking skills.

CHAPTER 10: CONCLUSION

10.1. Introduction

This chapter concludes the study by summarising the results and providing the implications for practice and theory. The limitations of the research are then explored. In closing, I express my final reflections on the study.

10.2. Summary of the Research

This study aimed to explore whether an inquiry-based learning pedagogy supports the development of critical thinking skills in second- and third-year SLP students within supervised clinical settings. It explored both the outcomes and processes of implementing this approach over the course of a year, using insights from clinical educators and students. While some changes in students' critical thinking skills were observed, inquiry-based learning did not appear to be the only factor promoting these changes. Instead, through analysing the theory of change developed for the programme evaluation other key factors were identified. These factors included self-reflection, meaningful feedback, and the presence of a safe, supportive relationship between clinical educators and students. The influence of the current cohort of students (Generation Z student) characteristics also emerged as important. These findings highlight the value of viewing clinical education through the lens of complexity theory to better understand how students bridge the theory–practice divide.

I deepened my understanding of the importance of reflective practice in learning through my study. Initially, I underestimated the role of reflective practice, but my analysis of the results shaped my understanding of its influence in shaping clinical reasoning and critical thinking skills. It also reshaped my approach as a clinical educator. I now view self-reflection not as a

task to be assessed but as a foundational framework for developing critical thinking skills in SLP students. Additionally, I had not anticipated that the student–clinical educator relationship could potentially impact critical thinking skills development. However, the results showed that a safe, collaborative relationship where SLP students and clinical educators can communicate and learn through feedback, engagement, and empowerment appears to have an impact the development of critical thinking skills and clinical reasoning in SLP students.

These factors contributed to the development of a proposed novel framework for the development of critical thinking skills in SLP clinical education. This framework aims to potentially build SLP students' critical thinking skills to provide contextually relevant, just, equitable, and evidence-based therapy services moving beyond an exclusive focus on inquiry-based learning or any single pedagogy, ensuring that SLP students are equipped with the critical thinking skills to adapt to diverse clinical settings.

The study also highlighted the importance of viewing pedagogy within the complexity of the nested systems in which clinical education takes place (Sturmberg & Martin, 2013). Pedagogies cannot be examined in isolation, as this fails to account for the multifaceted nature of clinical education (Grant et al., 2023). To integrate complexity into my study, I developed a systematic approach by adapting the Extended Pillar Integration Process (ePIP). This Adapted ePIP method allowed me to systematically and transparently integrate qualitative and quantitative data sources, promoting synergy between the results and supporting the awareness of complexity. The Adapted ePIP proved to be a valuable tool for future research that acknowledges complexity theory, incorporates multiple data sources, and addresses a central research question.

Overall, this study offers novel insights into the development of critical thinking skills in SLP students, with an emphasis on the importance of self-reflection within a safe, positive relationship. The proposed framework and the Adapted ePIP methodology provide potential contributions to both theory and practice, with implications for curriculum design, clinical practice, and future research.

10.3. Implications for Curriculum and Practice

The findings of this study indicate that the curriculum and practice of SLP clinical education in the South African context need to be reviewed through a complexity framework. A simplistic view that clinical education arises solely from the clinical educator, the SLP student, and the employed pedagogy is insufficient. It is crucial to consider the other complex systems involved in SLP clinical education, such as the clinical setting, the patient, and the academic environment (Braithwaite et al., 2017; Grant et al., 2023; Sturmberg & Martin, 2013). By incorporating a complexity framework, the curriculum and practice of SLP clinical education could focus on complexity and the development of critical thinking skills.

The SLP clinical education curriculum could potentially be adjusted to make this complexity more explicit by fostering discussions about patient and contextual complexities to enhance awareness during clinical education practicals. Furthermore, clinical educators possibly need training in complexity theory and its application in clinical education to effectively engage with students about these complexities.

The study's proposed framework for the development of critical thinking skills in SLP clinical education offers practical implications for clinical education by focusing on the influence of self-reflection, feedback, relationships, and student factors on developing critical thinking skills and clinical reasoning. This study highlights the need to provide training for both clinical educators and SLP students on how these factors could contribute to developing critical thinking skills, and clinical reasoning.

10.3.1. Prioritising Self-Reflection Literacy in SLP Clinical Education

Training should begin by emphasising the importance of self-reflective practices and their benefits beyond simply serving as an assessment tool. Clinical educators need to be equipped with a range of questions to help deepen students' reflective skills (Cook et al., 2019; Cook et al., 2022; Dunne et al., 2019; Dunne et al., 2024).

10.3.2. Prioritising Feedback Literacy in SLP Clinical Education

Feedback literacy includes training clinical educators and SLP students in bidirectional and collaborative feedback that encourages the students to participate in the feedback and take ownership of the feedback so that they can learn how to implement it (Carless & Boud, 2018; Noble et al., 2020; O'Connor et al., 2021). Clinical educators need to provide feedback for both clinical skills and student self-reflection. Clinical educators can enhance critical thinking skills by providing frequent, transparent feedback to motivate active participation (Carless & Boud, 2018; Tavares et al., 2020).

In turn, SLP students should actively engage with this feedback and apply it to their learning.

This engagement with feedback can be achieved by asking students to determine their strengths and weaknesses based on the feedback they have been given and then develop a goal based on the feedback, a strategy to develop feedback literacy by Carless and Boud (2018). Another approach to support feedback literacy is the "one thing" approach (Haglund et al., 2015). In this approach, clinical educators and SLP students discuss the one thing the student would like to improve or change in their clinical skills. These are practical applications that clinical educators can use to support the development of feedback literacy.

10.3.3. Nurturing a Positive Relationship Between Clinical Educators and SLP Students

The results of my study emphasise the potential role of the relationship between clinical educators and SLP students in developing critical thinking skills. A positive relationship, where educators recognised students' humanity and supported their learning journey, seems to be important for fostering a safe, non-judgemental environment conducive to developing clinical skills and critical thinking. Conversely, autocratic and impersonal relationships seems to hinder student learning and confidence, negatively affecting the development of their critical thinking skills.

Therefore, to advance clinical education practice, there are practical recommendations for clinical educators and SLP students to potentially foster a clinical relationship that will promote critical thinking skills development. For clinical educators, a flexible approach that allows for collaborative knowledge-building, where both educator and student engage in mutual learning, needs to be adopted. This engagement fosters self-reflection and feedback literacy, which are vital for developing critical thinking skills (Carless & Boud, 2018; Noble et al., 2020; O'Connor

et al., 2021). Students, on their part, need to understand that effective learning emerges from an active, engaged relationship with their clinical educators (Ossenberg et al., 2019). SLP students need to embrace the feedback and self-reflection opportunities provided within this safe space of a positive supervisory relationship, as these practices are fundamental to enhancing their critical thinking skills (Ramani et al., 2020; Tavares et al., 2020).

This study also highlighted the potential need to move beyond focusing solely on pedagogical strategies. The complexity of the clinical education environment, appeared to be a significant factor in developing critical thinking skills. This approach not only supports the development of critical thinking and clinical skills but also contributes to the broader goal of decolonising and transforming the curriculum to promote critical thinking skills development.

10.3.4. Prioritising Student Factors in SLP Clinical Education

To potentially develop critical thinking skills in SLP clinical education, both clinical educators and students must consider the unique needs of their current cohort of students. As this study progressed, I reflected on the generational differences between students, typically aged 18 to 25, and clinical educators, many of whom may belong to older generations. The current cohort of students who are Generation Z students typically bring different values, learning styles, and academic emotions. Their developing prefrontal cortices (Arain et al., 2013), which influence executive functioning and decision-making, raise questions about the applicability of traditional adult learning principles to this age group.

Noffs and Wilson (2021) emphasise adult learning principles such as active involvement, relevance, and collaborative, dialogue-rich environments. While Generation Z students also value experiential learning, their preference is often shaped by pragmatism and digital reliance (Hernandez-de-Menendez, 2020; Seemiller & Grace, 2017; Shatto & Erwin, 2017). This reliance may limit social skill development and reduce comfort in collaborative settings. As such, clinical educators may need to provide additional support to help students engage in dialogue and bridge the theory–practice divide. Moreover, although Generation Z learners share adult learners' preference for real-world application, they often favour short, accessible content and may struggle with traditional learning formats (Hernandez-de-Menendez, 2020; Seemiller & Grace, 2017; Shatto & Erwin, 2017).

Academic emotions are another potential consideration. Despite not being explicitly explored in this study, both students and clinical educators frequently reflected on academic emotions. These emotions strongly influenced engagement in both theoretical learning and clinical practicals, echoing research that links positive emotions to academic achievement (Hayat et al., 2020; Hernandez-de-Menendez, 2020).

10.4. Implications for Theory Relating to Critical Thinking Skills

My study contributes to the theoretical understanding of critical thinking skills development in clinical education. Theoretical understandings of aspects of clinical education, such as self-reflection, feedback, and relationships, were typically not related to the development of critical thinking skills in previous literature. The results from my study add to the role that self-reflection plays in the development of critical thinking skills. It highlights that self-reflection may be an important process for the development of critical thinking skills. If a student is unable to self-

reflect, how do they interrogate their knowledge, biases, and perceptions and become lifelong learners who value evidence-based practice that is contextually relevant?

Self-reflections, when analysed systematically, can serve as valuable tools for assessing and monitoring critical thinking skills in clinical education. I recommend that researchers consider investigating the impact of pedagogies on critical thinking skills relevant to clinical practice incorporate a focus on self-reflections into their methodology. By using self-reflections, researchers can potentially gain insights into how different pedagogical approaches influence SLP students' critical thinking abilities. This reflective process not only allows students to evaluate their thought processes and decision-making but also provides educators with a rich source of qualitative data to assess the effectiveness of various teaching methods.

Additionally, incorporating self-reflections enables researchers to identify the development of critical thinking skills in clinical scenarios, where it is essential to determine whether these skills are indeed developing and being effectively carried over into the clinical setting (Cook et al., 2019). This aspect is particularly important, as the goal of clinical education is to ensure that students can apply their theoretical knowledge and critical thinking skills in real-world contexts (Ness et al., 2021) . Furthermore, integrating self-reflections into research designs enhances the understanding of students' learning experiences and how these experiences contribute to the development of critical thinking skills in real-world clinical environments. Ultimately, this approach fosters a deeper exploration of the relationship between pedagogy and critical thinking, leading to more effective educational strategies in the field of SLP.

10.5. Implications for Theory Relating to SLP Clinical Education

The results from my research add to the theory underlying SLP clinical education. The results of my study show that developing critical thinking skills is reliant on potentially more aspects than just the pedagogy that a clinical educator employs. Morris et al. (2018) explored pedagogies for developing critical thinking skills without incorporating any other factors related to the clinical educator or the SLP student. However, in my study, feedback and relationships in clinical education were identified as impacting the development of critical thinking skills in SLP students.

Previous research has primarily focused on clinical educator and student factors related to general learning factors within clinical education, often overlooking how these factors influence the development of critical thinking skills (DeRuiter & Ginsberg, 2020; Higgs & McAllister, 2007a, b). However, in my study, student factors related to academic emotions, professional behaviours and theoretical knowledge base seem to influence the development of critical thinking skills. These student factors highlight the need to consider the current cohort of students with their specific values and learning styles. Student factors could also impact the theoretical understanding of the development of critical thinking skills in SLP students. Clinical educators' understanding of student factors could assist with building SLP students' capacity for clinical education.

10.6. Implications for Future Research

Researchers of clinical education and student skill development need to be more aware of complexity theory and nested complex adaptive systems when researching clinical education and how to promote student learning. A reductionist approach to investigating clinical education

tends to be limiting. It prevents researchers from exploring the full richness of clinical education and the complexities that occur when students are learning to apply theory to a clinical scenario (Grant et al., 2023; Plsek & Greenhalgh, 2001; Thompson et al., 2016). Therefore, for future research, researchers should contemplate the role of complexity in the variables they are investigating as well as the complexity of the context where the research occurs. As Bleakley and Cleland (2023) wisely stated in their work on medical education, "no one factor was as important as the relationship between factors" (p. 224).

The novel proposed framework for the development of critical thinking skills in SLP clinical education offers significant potential for further research. Future studies should explore the impact of educator training and student preparation on the framework's implementation and outcomes. Specifically, the role of self-reflection and feedback literacy in fostering critical thinking skills deserves deeper investigation. Importantly, future research should also examine how this framework can be applied across diverse educational and clinical settings, taking into account a range of cultural and contextual factors. This will help to ensure the framework's relevance and responsiveness to different learning environments and enhance its broader applicability.

The Adapted ePIP method also warrants further investigation. Future studies should investigate whether the Adapted ePIP method could be used in other mixed methods research studies within different fields of research, both in wider healthcare education and other spheres of research. This research sets the stage for a broader re-evaluation of SLP clinical education practices, with the potential to influence educational policies and clinical training programmes across South

Africa.

10.7. Limitations of the Study

This study faced several limitations, including the sample size, restricted access to data, lack of available data, the data collection methods employed, and response attrition. However, I implemented strategies to lessen these limitations.

The sample size was limited as I relied on clinical educators and SLP students to voluntarily participate in the research. Ethical considerations restricted the incentives that could be offered. While clinical educators received CPD points as an incentive, students were not incentivised to avoid coercion. Additionally, research fatigue, particularly due to the increase in online surveys during and after the COVID-19 pandemic, likely contributed to the smaller sample size (Andrade, 2020; De Koning et al., 2021; Patel et al., 2020; Watermeyer et al., 2022). Although power calculations were conducted, the quantitative sample size of 14 participants was low, potentially increasing the risk of Type II errors and limiting the generalisability of findings. Consequently, achieving a 90% confidence interval may have been challenging, possibly contributing to the lack of statistically significant outcomes and reducing precision in the quantitative estimates. Furthermore, sample sizes differed between the quantitative and qualitative components; however, such differences are commonly anticipated within mixed methods research, where larger quantitative samples accompany smaller qualitative samples to achieve data saturation (Creswell & Plano Clark, 2018).

Another limitation of this study could be the decision to group second- and third-year students in

the analysis. While this was done to strengthen statistical power and maintain coherence in the interpretation of findings, it could potentially limit the ability to account for differences in student experience and maturity. The uneven distribution of second-year students in the control group and third-year students in the experimental group may have influenced the results, particularly given the potential variation in critical thinking development across year levels. Although year level was not treated as a separate variable in the quantitative analysis, differences in experience were acknowledged and explored through qualitative data, including clinical educator feedback. However, these data suggested that student year level, and the associated clinical exposure, seem to have limited contribution to variations in the development of critical thinking skills. Future research with a larger and more evenly distributed sample may consider disaggregating data by year level to more fully explore these influences.

I had limited access to data on students' critical thinking skills and dispositions. I was unable to complete the original critical thinking skills assessment battery that I wanted to use. The time-intensive nature of these assessments and the perception of being evaluated may have deterred student participation. However, analysing self-reflection provides a more accurate reflection of students' critical thinking skills in a clinical environment. Additionally, there was a lack of consistent data from students' self-reflections, as some clinical educators did not request students to routinely submit self-reflections, reducing the data available for analysis. While this was a concern given the importance of self-reflection in developing critical thinking skills (Cook et al., 2019, 2022), the study proceeded with the data that were available.

Regarding data collection methods, the use of Likert scales posed the risk of measurement errors

and biases such as social desirability and acquiescent responses (Kusmaryono et al., 2022). To reduce social desirability bias, I maintained anonymity, employed reverse coding in the Likert scales, and minimised the use of face-to-face interactions. Moreover, the end-of-year focus groups were conducted by an independent research assistant, which further minimised these biases.

Finally, response attrition was a consideration, particularly in the submission of the clinical educators' weekly audio diaries, which decreased towards the study's end. I had hoped that strategies such as sending reminders would mitigate this attrition with the audio diaries, but this was not the case. Future research could benefit from more interactive engagement with participants to encourage consistent data submission.

In summary, while the study encountered certain limitations, proactive measures were taken to lessen their impact, ensuring that the research still provided meaningful insights into the role of inquiry-based learning in developing critical thinking skills in SLP students.

10.8. Final Reflections

This study has been a deeply reflective journey for me as a researcher, clinical educator, and SLP clinician. The process of self-reflection has been integral to my development throughout this study and deserves recognition in this conclusion. My study did not provide me with the results that I thought it would. I wanted nice, neat statistical results that showed me how students improved their critical thinking skills according to my critical thinking skill assessment battery and that this change would only be due to the implementation of inquiry-based learning by the

clinical educators who agreed to participate in my study. I was naive at the outset, and I lacked insight into the complexity of the phenomenon I wanted to study. Thankfully, throughout my research process, my understanding of complexity theory and how it occurred in my study improved and assisted me in understanding and accepting the messy complexity of my study. The results provided a rich and meaningful description of the clinical education that was being provided to second- and third-year SLP students at the University of the Witwatersrand for the year of investigation. The results from this study provide insights into clinical education from both students' and clinical educators' perspectives.

Throughout this journey, I gained a deeper appreciation of the complexities of clinical education, healthcare provision, and research. Initially, when I planned and wrote the proposal for my study, I was only thinking about clinical education in terms of bridging the theory–practice divide and how we could ensure students apply theory in clinical scenarios by developing their critical thinking skills using inquiry-based learning. My study has helped me to view clinical education in a much broader manner. I have learnt to acknowledge the complexities of clinical education, healthcare provision, and research.

The changes that I experienced in my perspectives and understanding of concepts throughout the journey of my study truly challenged me as a researcher, a clinical educator, and an SLP. This research has changed my perspectives on complexity, clinical education, critical thinking skills, self-reflection, clinical educators, and SLP students. It has widened my perspectives and made me understand the beauty of complexity. My study has changed me. As Wilson (2008) stated, "If research has not changed you as a person, then you have not done it right" (p. 135).

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Appendix A

Participant Information Sheets for Clinical Educators

Dear Clinical Educators,

My name is Nancy Barber. I am a PhD student and an academic intern at the University of the Witwatersrand, Johannesburg. I am conducting a study entitled "Flipping Clinical Education for Speech-Language Pathology Students: Evaluating the role of inquiry-based learning in the development of critical thinking skills."

This study will help me understand the role of using an inquiry-based learning pedagogy in the development of second and third-year speech-language pathology students' critical thinking skills. I am excited by this research as I am passionate about the way in which we supervise students and develop their critical thinking skills and, thus the clinical reasoning skills they will use as future clinicians. I would like to invite you to participate in this study. Participating in this research aims to provide you with clinical supervision skills that may support the clinical supervision you provide to students. Participation in this study will occur via online platforms.

The study will occur for the duration of 2022. I would like to collect the following data from you to see the perceived impact of inquiry-based learning and to understand the clinical supervision process. Ideally, it would be beneficial if you could participate in all of the above activities. However, if you do not want to participate in a particular activity, please tick no for that specific activity on the consent form. I would appreciate your involvement in:

1. An initial needs-based individual interview for 30-45 minutes will be conducted. At the beginning of the interview, you will be asked some questions about your demographics and experience as a clinical educator. You will then be given 5-10 minutes to complete a self- assessment of competencies in clinical education using a Likert scale on Google Forms. After completion of the Likert scale, the initial needs-based individual interview will occur for the remainder of the 30-45 minutes. This will be completed in the week prior to the first training session in 2022.
2. Training on inquiry-based pedagogy and clinical supervision.
   The initial training will be Monday 21 February 2022 from 12:00-16:00 in person however this is dependent on COVID restrictions and there will be an online option for those unable to attend in person. A light lunch will be included.
   There will be subsequent training sessions for 1 hour on 18 April at 14:00; 13 June at 14:00; 12 September at 14:00 and then 7 November at 14:00.
   You will receive 8 CPD points for your time.
3. Completion of a weekly audio diary via WhatsApp. You are requested to record a short voice note based on prompts regarding clinical supervision. This should take a maximum

of 5 minutes of your time each week.

4. At the end of each block, complete a Likert scale on an online survey (Google Forms). This should take 5-10 minutes.

Your participation is entirely voluntary. There are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You can withdraw from the research at any stage and there will be no negative consequences for you.

Please note that your responses will not be shared with the students or other clinical educators, other than possibly in an aggregated de-identified format. Your results will not be linked to the academic or clinical performance of your students. Anonymity cannot be maintained during the data collection phase but strict confidentiality will be adhered to by assigning you with a pseudonym. Anonymity will be maintained during data analysis when reporting the results. Data that may be reported in the PhD manuscript, in scientific journals and/or at a conference will be anonymized. There will be no personal costs to you if you participate in this project.

If you require a data bundle to participate, please indicate so on the Google Forms form.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report for a PhD which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). The data collected from this research project will be stored on a password-protected computer. With your permission, the data collected from this research project may be used by other researchers in an anonymised format subject to them obtaining their own ethical clearance.

If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za

Thank you for taking the time to consider participating in this study.

Nancy Barber
0827400349
nancy.barber@wits.co.za
0300242G

Appendix B

Participant Consent Forms for Clinical Educators

Flipping Clinical Education for Speech-Language Pathology Students:

The role of inquiry-based learning in the development of critical thinking skills.

I, …….., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following: (Please select the relevant options below).

I agree that even though my participation may not remain anonymous during data collection, the data collected will be kept confidential and my participation will be anonymous during the data analysis and reporting process.	YES	NO
I agree that the researcher may use anonymous quotes in her research report	YES	NO
I agree to participate in the clinical educator training	YES	NO
I agree to participate in the interview that will occur before the training and the focus group at the end of each block	YES	NO
I agree that the individual interview and the focus groups may be audio recorded.	YES	NO
I agree to participate in the audio diary	YES	NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

..…… (signature) …… (date)

Appendix C

Detailed Clinical Educator Participant Demographics

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

Appendix D

Clinical Educators' Demographic Questions

Instructions for clinical educators at the beginning of the initial interview:

Please answer the following questions about your experience as a clinical educator. Confidentiality as your demographic information will be maintained and you will be assigned a pseudonym only known to the researcher.

Due to the nature of this research anonymity cannot be maintained during data collection in order to collate the data collected. However, strict confidentiality will be employed. Anonymity will be ensured during data analysis and the write up of results.

Questions for clinical educators (these will be asked during initial interview):

1. Please select your highest level of study: Honours / Masters / PhD
2. Please select the institution where you obtained your undergraduate speech-language therapy degree: University of Pretoria / University of Stellenbosch / University of KwaZulu Natal / University of Cape Town / Sefako Makgatho Health Sciences University / University of Fort Hare / University of the Witwatersrand
3. Please select the institution where you obtained your postgraduate degree: University of Pretoria / University of Stellenbosch / University of KwaZulu Natal / University of Cape Town / Sefako Makgatho Health Sciences University / University of Fort Hare / University of the Witwatersrand
4. Please enter your years of experience as a speech-language pathologist:
5. Please enter your years of experience as a clinical educator:
6. Please list any life experiences you have had that you think influenced your role as a speech-language therapist and clinical educator:
7. Please select your socioeconomic bracket: low/medium /high/do not want to answer
8. Have you received any training regarding clinical supervision: None / informal networking/self-study or readings/workshops or conferences / on the job training / Online asynchronous training modules / Other (able to select more than one)
9. What type of clinical supervision training would you participate in: None/self-study or readings/workshops or conferences / Online asynchronous training modules / other (able to select more than one)
10. If a course existed in the area of clinical supervision, how likely would you be to participate: Very likely / More likely than unlikely / More unlikely than likely / Very

unlikely

Appendix E

Participant Information Sheets for SLP Students

(This will be adapted for whichever year it is sent to, so when sending it to the second-year students it will only say "Dear Second-year…" and when sending to the third-year students, it will only say "Dear Third year…")

Dear Second OR Third-year Speech-Language Pathology Students,

My name is Nancy Barber. I am a PhD student and an academic intern at the University of the Witwatersrand, Johannesburg. I am conducting a study entitled "Flipping Clinical Education for Speech-Language Pathology Students: Evaluating the role of inquiry-based learning in the development of critical thinking skills."

This study will help me understand the role of using an inquiry-based learning pedagogy in the development of second and third-year speech-language pathology students' critical thinking skills. Inquiry-based learning is a way of teaching that is based on questions generated by students. These student-generated questions are then answered with support from the clinical educator by helping you investigate and apply the knowledge that you learn. I am excited by this research as I am passionate about the way in which we supervise students and develop your critical thinking skills and thus the clinical reasoning skills that you will use as a future clinician. I would like to invite you to participate in this study. Participation will occur via online platforms.

The study will occur for the duration of 2022. I would like to collect the following data from you to see the perceived changes in your critical thinking skills and practical skills. Ideally, it would be beneficial if you could participate in all of the activities. However, if you do not want to participate in a particular activity, please tick no for that specific activity on the consent form. I would appreciate your involvement in:

1. Providing some information regarding your demographics and answering a brief open-ended online survey.
2. Completing the critical thinking skills measures as well as the critical thinking dispositions measure. This will take 1.5 hours. It will be completed in February/March 2022 and December 2022. This will occur in those two months when you are not at Wits so that they do not place extra time pressure on your schedules.
3. Submission of your weekly self-reflection that you would normally complete at the end of a sessional which you can email to me when you email your supervisor and should take 5 minutes maximum. When I save your self-reflection it will be saved under a participant number so that they are anonymous during data analysis and reporting of the

research results. Submission of your feedback from the block that is provided by your supervisor on the block mark rubric. Your mark will not be used other than to track changes and to relate to your weekly self-reflections. The marks will not be analysed concerning your critical thinking skill measures. This will be submitted via email and should take 5 minutes maximum.

4. Completion of a Likert scale at the end of each block that will reflect on how you perceived the development of your thinking skills. Remember this will be confidential and will not be linked to a specific supervisor. This will take 5 minutes to complete.
5. Participate in a focus group in December 2022 for 30–45 minutes.

Your participation is entirely voluntary. There may be direct benefits from participation as inquiry-based learning is hypothesized to improve critical thinking skills which may be beneficial for your clinical skills. There are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You can withdraw from the research at any stage and there will be no negative consequences for you.

Please note that your responses will not be shared with your lecturers or clinical educators, other than possibly in an aggregated de-identified format. Your results will not be linked to your academic or clinical performance. Anonymity will be compromised but all data will be submitted with your student number a reference. During data analysis, the data obtained from each data source will be assigned a participant number to keep your results anonymous and confidential when analysing and reporting the results. Data that may be reported in scientific journals and/or at a conference will be anonymized. There will be no personal costs to you if you participate in this project.

If you require a data bundle to participate, please indicate so on the Google Forms form.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report which will be available online through the university library website. If you wish to receive a summary of this report, I will be happy to send it to you (optional). The data collected from this research project will be stored on a password-protected computer. With your permission, the data collected from this research project may be used by other researchers in an anonymized format subject to them obtaining their own ethical clearance. If you have any questions or concerns about the research projects, please contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Thank you for taking the time to consider participating in this study.

Many thanks,

Nancy Barber
nancy.barber@wits.co.za
0300242G

Appendix F

Participant Consent Forms for SLP students

Flipping Clinical Education for Speech-Language Pathology Students:

The role of inquiry-based learning in the development of critical thinking skills.

Researcher: Nancy Barber

I, …….., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please select the relevant options below).

I agree that even though my participation may not remain anonymous during data collection, the data collected will be kept confidential and my participation will be anonymous during the data analysis and reporting process.	YES	NO
I agree that the researcher may use anonymous quotes in her research report	YES	NO
I agree to participate in the critical thinking skills measures	YES	NO
I agree to participate in the focus groups that will occur at the end of 2022	YES	NO
I agree that the focus groups may be audio recorded.	YES	NO
I agree to participate in the submission of my weekly self-reflection.	YES	NO
I agree to participate in the submission of my block mark rubric I receive at the end of each block.	YES	NO
I agreed to complete the Likert scale at the end of each block.	YES	NO

I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained. YES NO

..…… (signature) …… (date)

…… (name of participant)

Appendix G

Questions Regarding SLP students' Demographics

Instructions for students on Google Forms:
Please answer the following questions about your student experience. Your demographic information will be kept confidential, and all data will be related to your student number.

Due to the nature of this research, anonymity cannot be maintained during data collection so that the data collected can be collated. However, strict confidentiality will be employed. Anonymity will be ensured during data analysis and the writing up of results.

Questions for students at the beginning of the research:

1. Please enter your student number:
2. Please enter your age:
3. Please list any life experiences you have had that you think influenced your role as a student speech-language therapist:
4. Please select your socioeconomic bracket: low/medium/high/do not want to answer
5. What year of study are you in: second /third
6. If third-year is selected then the following questions will be asked to only the third-year students:
    a. In your second year of SLP, how many patients did you assess and treat?
    b. In your second year of SLP, how many hours did you spend assessing and treating patients? Do not include observation hours.
    c. In what settings did you complete your clinical pracs in, in your second year of SLT: education/health/university clinic (able to select more than one)
    d. What types of diagnoses and disorders did you assess and treat in your second year:
    e. How did the style of the clinical educator support your development as a speech-language therapist?
    f. What techniques or strategies were employed to develop your skills that were useful?
7. What techniques or strategies do you think your clinical educator could use in order to help develop your clinical skills?

Appendix H

Detailed Demographic Information of SLP Student Participants

Demographics of the second-year SLP students:

Pseudonym	Age	Socioeconomic bracket
Teresa	25	High
Nolitha	19	Medium
Jackie	19	Medium
Ayesha	22	Medium
Rose	20	Medium
Zuleka	20	Medium
Mina	21	Medium
Zinhle	20	I do not wish to answer
Elizabeth	20	Medium
Aria	20	Medium
Jesse	20	Medium
Casey	21	Medium
Kelly	21	Medium
Hlelo	20	Medium
Naomi	20	Medium
Hana	21	Medium

Demographics of the third-year SLP students:

Pseudonym	Age	Socio-economic bracket	For the duration of the SLP second year:			
			Number of patients treated	Hours completed	Clinical education settings	The type of diagnoses seen
Stacey	23	medium	4 individual therapy patients; 3 groups of between 3–6.	77	Education (e.g., school)	Articulation, foetal alcohol syndrome,
Jabulile	21	medium	5	110	Education (e.g., school)	language differences, language delays and articulation disorders
Ashton	21	medium	7	90	Education (e.g., school)	Articulation errors, language delays, lisps, language differences.
Kajal	20	medium	5 individuals and 12 in a group	113	Education (e.g., school)	specific language disorder, epilepsy
Mila	20	medium	7	112	Education (e.g., school)	Articulation, language differences,

Pseudonym	Age	Socio-economic bracket	For the duration of the SLP second year:			
			Number of patients treated	Hours completed	Clinical education settings	The type of diagnoses seen
						language delays
Ariella	22	medium	4	80	Education (e.g., school)	Language difficulties, Speech difficulties
Erin	22	high	8	95	Education (e.g., school)	Lisp. ASD. Language delay. Language difference. Malocclusion. Auditory memory. Syntax.
Palesa	21	medium	3	46	Education (e.g., school)	Mainly language delay
Nicole	25	medium	6	100	Education (e.g., school)	Preschool and school aged language- this included articulation disorders and language disorders/delays
Rebecca	22	I do not wish	7	90	Education	Language

Pseudonym	Age	Socio-economic bracket	For the duration of the SLP second year:			
			Number of patients treated	Hours completed	Clinical education settings	The type of diagnoses seen
		to answer			(e.g., school)	delays, articulation error, stutter
Selena	21	Medium	10	120	Education (e.g., school)	Speech disorders, language differences, language disorders

Appendix I

ASHA Questionnaire for Clinical Educators

Based on the supervisory survey developed by ASHA (2016).

This self-assessment was loaded on Google Forms and clinical educators were sent the link via the Google Forms scheduling system.

Instructions: Select the box that describes your perceived level of competency for each of the overall knowledge and skills. No identifying information will be collected when clinical educators complete this self-assessment. Demographic information will be collected separately to ensure anonymity and confidentiality of this data set

Questions:

Rating Scale			
0	**1**	**2**	**3**
Not Yet	**Occasionally/** ***Just Starting***	**Frequently but Sporadically/** ***Getting There***	**Consistently/** ***Got It!***

I. Supervisory Process and Clinical Education	**0**	**1**	**2**	**3**
A. I possess knowledge of collaborative models of supervision.				
B. I possess knowledge of adult learning styles.				
C. I possess knowledge of teaching techniques (e.g., reflective practice, questioning techniques).				
D. I define the supervisor and supervisee roles and responsibilities appropriate to the setting.				
E. I adhere to research/evidence-based practice, convey that information/analysis to the supervisee, and encourage the supervisee to seek applicable research and outcomes data and to use methods for measuring treatment outcomes.				

Rating Scale			
0	1	2	3
Not Yet	Occasionally/ *Just Starting*	Frequently but Sporadically/ *Getting There*	Consistently/ *Got It!*

II. Relationship Development and Communication Skills	0	1	2	3
A. I develop a supportive and trusting relationship with supervisee.				
B. I create an environment that fosters learning, and I explore personal strengths and needs of supervisee.				
C. I transfer decision-making and social power to the supervisee, as appropriate.				
D. I educate the supervisee about the supervisory process.				
E. I define expectations, goal setting, and requirements of the relationship.				
F. I define and demonstrate expectations for interpersonal and modes of communication.				
G. I define and demonstrate evidence of cultural competence and appropriate responses to different communication styles.				
H. I demonstrate recognition of and access to appropriate accommodations for supervisees with disabilities.				
I. I engage in difficult conversations when appropriate regarding supervisee performance.				
J. I demonstrate use of technology, when appropriate, for remote supervision.				

Rating Scale			
0	1	2	3
Not Yet	Occasionally/ *Just Starting*	Frequently but Sporadically/ *Getting There*	Consistently/ *Got It!*

III. Establishment/Implementation of Goals	0	1	2	3
A. I observe sessions, and I collect and interpret data with the supervisee.				
B. I give the supervisee objective feedback to motivate and I improve performance.				
C. I understand the levels and use of questions to facilitate learning.				
D. I adjust supervisory style based on level and needs of supervisee.				
E. I review relevant paperwork and documentation.				

Appendix J

Individual Interview Questions for Clinical Educators

Based on questions suggested by Lyberg-Ahlander et al. (2014).

Good day clinical educator

Thank you for agreeing to participate in this interview. Please remember that what is discussed in this interview will remain confidential. You are also allowed to leave the interview at any point during the discussion and you are not required to explain your reason for leaving. Please feel free to answer questions with as much detail as you see fit. This interview is going to be recorded.

Ice breaker: Tell me about the characteristics of your favourite clinical educator or tell me about a clinical educator who made a good impression on you without saying their name.

Questions:

1. Clinical supervision questions:
    a. What are the stimulating or exciting aspects of being a clinical educator?
    b. What are the difficulties with being a clinical educator?
    c. What strategies do you enjoy using in clinical supervision to facilitate learning?
    d. What clinical educator behaviours do you think are barriers to students' clinical learning?
    e. What is your view on what constitutes good clinical supervision?
2. Clinical educator training questions:
    a. What is your view on clinical educator training?
    b. Have you received any training on how to be a clinical educator? (Provide details if yes)
    c. What kind of support or training would you like to develop as a clinical educator?
3. Critical thinking skill questions:
    a. What does the term critical thinking skills mean to you?
    b. What do you think promotes the development of critical thinking skills in

students?

c. Are critical thinking skills necessary for clinical speech-language therapy? Why?

d. What critical thinking skills do you think students have, lack or need support developing?

4. Do you have any further comments on the clinical supervision process?

Appendix K

Likert Scale for Clinical Educators

This measurement will be loaded on Google Forms and clinical educators will be sent the link via the Google Forms scheduling system. This Likert scale was developed based on the aims of the research to be able to investigate the process of implementation of IBL.

Instructions: Please reflect on the past clinical block when selecting the term on the scale that describes your perceived level of agreement with the statement. The terms will be the same for each item and will be organised as a scale under each statement. The terms are: strongly agree, agree, neutral, disagree and strongly disagree. Remember this will be anonymous and will not be linked to you or your specific students so please be as honest as possible.

Statements:

1. I was able to implement the principles of IBL in clinical supervision easily.
2. I enjoy using the principles of IBL during clinical supervision.
3. It was challenging to implement the principles of IBL during clinical supervision.
4. I do not see any value in implementing IBL during clinical supervision.
5. During clinical supervision, I can support students in the “orientation” phase of IBL.
6. During clinical supervision, I can support students in the “conceptualisation” phase of IBL.
7. During clinical supervision, I can support students in the “investigation” phase of IBL.
8. During clinical supervision, I can support students in the “conclusion” phase of IBL.
9. During clinical supervision, I can support students in the “discussion” phase of IBL.
10. The students I supervised appeared to think critically about the clinical cases they were working with.
11. The students I supervised appeared to be able to synthesise information from theoretical coursework when developing the patient’s therapy approach and goals.
12. The students I supervised appeared to be able to apply the information from theoretical coursework when determining the rationale, therapy procedures and therapy activities for the patient’s therapy sessions.
13. The students I supervised appeared to be employing higher-order thinking skills during their clinical practicals.
14. The clinical reasoning skills and knowledge translation of the students I was supervising

appeared to improve.

15. The confidence levels of the students improved.

Appendix L

Instructions for the Audio Diaries and the Prompt Sheet

Based on the instruction sheet designed by Crozier & Cassell (2016)

Dear Clinical Educator,

Thank you for agreeing to complete an audio diary about your experience using inquiry-based learning during supervision. A reminder that your audio recording will be assigned to your pseudonym to ensure confidentiality and anonymity during data analysis and the reporting of the findings.

How to complete the audio diary:

1. Please record your thoughts regarding the supervision process weekly during the block. You can record directly on WhatsApp and send it to me via WhatsApp (0827400349). The recording will then be stored on a password protected OneDrive account.

2. Please use the prompts provided below to guide the information provided in your audio diary. You do not have to answer all the prompts, please just use the prompts that assist you with reflecting on the implementation of IBL over the prior few weeks.

3. Prompts:
    a. Has the implementation of inquiry-based learning (IBL) challenging or easy this week?
    b. Please explain your answer to (a) with specific information or situations.
    c. What IBL strategies facilitated clinical supervision this week?
    d. What IBL strategies hindered clinical supervision this week?
    e. Other than using IBL strategies, what other strategies did you use during clinical supervision times?
    f. What are your observations regarding the students' ability to critically think about the patient they are working with?

g. What do you think is hindering or facilitating the students' ability to think critically about their patients?

4. You will receive an email reminder to complete an audio diary weekly in each block. Once you have completed a diary entry, please WhatsApp the voice recording to me on 0827400349. The voice recording will then be saved and stored on a OneDrive account.

Appendix M

Focus Group Questions for Clinical Educators

These questions are based on the questions used in Lyberg-Ahlander et al. (2014).

Good day clinical educators

Thank you for agreeing to participate in this training. Please remember that what is discussed in this training should remain confidential. However, I cannot ensure confidentiality. I request that participants do not share information discussed in this group. Please also remember that I cannot maintain anonymity in the group and thus if you would like to leave the focus group now you can. You are also allowed to leave the focus group at any point during the discussion and you are not required to explain your reason for leaving. Please feel free to unmute and engage at any stage of the discussion. This session will also be recorded.

Please answer these questions with regards to the block that has passed.

1. Clinical supervision questions:
    a. What was your experience of implementing IBL in this block?
    b. What important contributions did you as a clinical educator provide your students with this block?
    c. What strategies did you enjoy using in clinical supervision in this block to facilitate learning?
    d. What clinical educator behaviours occurred in this block that you think may have been barriers to students' clinical learning?

2. Implementation of IBL:
    a. What were the exciting aspects of implementing IBL in this block?
    b. What were the difficulties with implementing IBL this block?
    c. What was your opinion on the use of IBL in this block?
    d. Would you like support or training to make implementing IBL easier? If yes, how would you like to be supported?

3. Critical thinking skill questions:
    a. What critical thinking skills did your students display in this block?
    b. What do you think promoted the development of their critical thinking skills in this block?
    c. This block, what critical thinking skills do you think students lack or need support developing?
4. Do you have any further comments on the clinical supervision process from the previous block and the implementation of IBL?

Appendix N

Likert Scale for SLP Students

This measurement will be loaded on Google Forms and SLP students will be sent the link via the Google Forms scheduling system. This Likert scale was developed based on the aims of the research to be able to investigate the process of implementation of IBL.

Instructions: Please reflect on the past teaching block when selecting the term on the scale that describes your perceived level of agreement with the statement. The terms will be the same for each item and will be organised as a scale under each statement. The terms are: strongly agree, agree, neutral, disagree and strongly disagree. Remember this will be anonymous and will not be linked to you or your specific clinical educator so please be as honest as possible.

Statements:

1. I have found the supervision techniques my clinical educator used during the block helpful in developing my thinking about my patient and the therapy I provide.
2. I have found the supervision techniques my clinical educator used during the block helpful in developing my ability to provide therapy to my patient.
3. I do not see any value in the supervision techniques the clinical educator has implemented during clinical supervision.
4. I was able to think critically about my patient's assessment and therapy interventions throughout the block.
5. I was able to apply the information I learned from theoretical coursework and journal articles when developing the patient’s therapy approach.
6. I was able to apply the information I learned from theoretical coursework and journal articles when developing the patient’s aims/goals and rationale.
7. I was able to apply the information I learned from theoretical coursework and journal articles when determining the therapy procedures and therapy activities for the patient’s therapy sessions.
8. I found the feedback I received useful in developing my clinical skills.
9. I was able to explain information that I learned to my clinical educator and peers during my clinical practical.
10. My clinical reasoning skills (thinking skills used during assessment and therapy planning) for the particular population group of the block improved throughout the block.

Appendix O

Most Significant Change Focus Group Questions

These questions are based on the questions suggested by Davies and Dart (2005).

Good day clinical educators,

Thank you for agreeing to participate in this focus group. Please remember that what is discussed in this focus group should remain confidential. However, I cannot ensure confidentiality. I request that participants do not share information discussed in this focus group. Please also remember that I cannot maintain anonymity in the focus group and thus if you would like to leave the focus group now you can. You are also allowed to leave the focus group at any point during the discussion and you are not required to explain your reason for leaving. Please feel free to unmute and engage at any stage of the discussion.

Questions:

1. Looking back over the past year, was there a change in your clinical supervision and if yes, what do you think was the most significant change in the clinical supervision that you provided?
2. From among all these significant changes that people have contributed, what do you think is the most significant change of all with regards to clinical supervision?
3. Looking back over the past year, what do you think was the most significant change in the critical thinking skills of the students that you supervised?
4. From among all these significant changes that people have contributed, what do you think is the most significant change of all with regards to critical thinking skills?

Appendix P

Focus Group Questions for SLP Students

Good day students

Thank you for agreeing to participate in this focus group. Please remember that what is discussed in this focus group should remain confidential. However, I cannot ensure confidentiality. I request that participants do not share information discussed in this focus group. Please also remember that I cannot maintain anonymity in the focus group and thus if you would like to leave the focus group now you can. You are also allowed to leave the focus group at any point during the discussion and you are not required to explain your reason for leaving. Please feel free to unmute and engage at any stage of the discussion.

Questions:

1. How did the style of the clinical educator support your development as a speech-language therapist?
2. What techniques or strategies were employed to develop your clinical skills that were useful?
3. What other techniques or strategies do you think your clinical educator could use in order to help develop your clinical skills?

Appendix Q

Examples of Students' Analysed Self-reflection Using the Coding Schema

Example 1:

SELF-REFLECTION: 7 March 2022

What worked for me and why?

RETURN, ROA Having toys for [patient name1] worked, because he really enjoys playing. The assessment I used for him was also really colourful and straightforward, so he understood what was being asked of him

ROA I've built really good rapport with [patient name2], so she wasn't nervous during the assessments. This helped with easing her nerves during the assessment which could have had a negative impact on the assessment results. CONTENT This has happened in the past.

What did not work for me and why?

RETURN, ROA I took too much time with TAPS, because I was rereading the instructions and going over the questions multiple times. I also spent too much time on discussing the picture scenes with [patient name].

What did I learn today?

I learnt how to say "I want" using Makaton.

What do I still need to learn and where can I source this information from?

RFA I still need to learn Makaton. The teacher has given me books that can assist me in learning. I will also use YouTube videos.

What changes did the therapist make when things did not work for the patient?

I communicated with [patient name1] using sign and verbal language, for example you would say "I want a car" as you sign it. This is done to assist Joshua in learning spoken language.

How did the patient respond?

The patient responded really well, he understood what I was doing because it is done in class as well. He had to be reminded, however also reciprocated and did the same.

How would I plan differently next time?

RFA I need to find a way to complete what I had planned for [patient name2], without it looking like I'm rushing her especially when it comes to assessments. We spend too much on one question or subtest.

What areas do I need to read up on?

What additional information/support do I need from my supervisor?

I would like to observe how I tackle the time issue with [patient name2] next week Monday. If I'm still not done with assessments, I think I'll need assistance or advice on how I can work a bit faster with these assessments so I can start therapy.

Example 2:

SELF- REFLECTION: 9 May 2022

What worked for me and why?

[patient name1]- Nothing worked in today's session.

[patient name2]- RETURN, PROCESS, ROA In today's session I worked on finding word meaning in context using contextual clues. Reading the sentences really helped, because she has reading comprehension difficulties and therefore would struggle with the activity. Reading the sentences helped her understand the sentences better and also giving her clues helped.

What did not work for me and why?

[patient name1]- ROA my plan for therapy was not appropriate for [patient name1], because it was not targeted the appropriate aspects of phonological awareness that [patient name1] needs. The activity had no clear aim.

[patient name2]- ROA, RFA for the reading comprehension activity, giving [patient name2] a long comprehension does not work because she forgets what the first three sentences were. I think for my next session, I will have one detailed sentence and multiple questions about that sentence and as time goes increase the amount of sentences.

What did I learn today?

[patient name1]- I learnt that he does not have letter-sound knowledge.

[patient name2]- CONTENT [patient name2] was very anxious for today's therapy session, so she couldn't answer questions based on a long comprehension compared to last week. This showed me the extent of [patient name2]'s reading difficulties so I need to alter the comprehensions and

make them shorter.

What do I still need to learn and where can I source this information from?

[patient name1] - I need to read up on the stages of phonological awareness. I will find the notes in my folders from last year lectures.

[patient name2]- I need to look for age appropriate sentences for [patient name2].

What changes did the therapist make when things did not work for the patient?

[patient name2]- the second activity with finding word meanings, [patient name2] was meant to read the sentences however struggled. RIA This was going to hamper the main aim of the activity, so the student therapist read the sentences for him.

How did the patient respond?

[patient name2] responded really well and the activity was concluded.

How would I plan differently next time?

[patient name2]- RFA I would base the comprehension question off of one detailed sentence instead of a long story in order to enforce and encourage understanding.

[patient name1]- RFA I need to prepare a management plan for the next four weeks off therapy in order to have a clear understanding of Joshua's needs and the stages of phonological awareness.

What areas do I need to read up on?

The phonological awareness hierarchy.

What additional information/support do I need from my supervisor?

None at the moment.

Other comments

I am not sure how I feel about therapy. ATTEND My confidence really dropped after the last session, however I need to work harder in order to regain my confidence and accurately plan my sessions.

Example 3:

SELF- REFLECTION: 10 October 2022

ATTEND At the beginning of the year, I was extremely excited about the year. I was ready to meet new patients and gain new clinical skills. With the clinical experience gained from last year, I was more confident about practicals. The year was however challenging due to the range of new patients and unfamiliar populations. ROA This year required us to conduct a lot of research and learn more about our patients. RETURN We worked with a variety of patients such as: complex language, adults, autism and teletherapy.

In my ASD practice, I encountered a few difficulties at first. RETURN, ROA It was my first time with a non-verbal patient, however, I learnt that to become a better clinician I had to conduct research and speak to my supervisor when in need. RETURN, ROA I learnt how to conduct group therapy for two different patients with different needs. RETURN, ROA I learnt how to target the individual's needs using the same theme for therapy, by altering the complexities of the different activities. RFA I am more comfortable with working with the ASD population, because of the experience and knowledge I have gained from this prac.

I enjoyed teletherapy. ROA This allowed me to explore my creativity and grow using multiple therapy styles. My patient had Childhood Apraxia of Speech. Initially, I was very ATTEND confused and nervous, however, after conducting research I managed to construct management. My patient responded well to the therapy, however, experienced a block after a few months. His progress declined and I, therefore, needed to rework my therapy plan. ROA, PROCESS Making the content more visual, interactive and functional improved my therapy outcomes drastically. ROA, RFA This helped me learn that it's okay to relook at your therapy plan and change something if it's not working and learnt how to become flexible in altering my therapy content to best suit my patient.

I have learnt a lot this year and grown in terms of being a better clinician. My clinical reasoning, flexibility and independence have developed. At first, I was all over the place, however, now I can manage my time well and my therapy sessions are more well-organised.

Appendix R
An Example of Coded Transcriptions as Part of the Thematic Analysis Process

How did the style of the clinical educator support your development as a speech-language therapist?		
Student 1 (Control)	For me personally, my clinical educators were very nice because they, when they came to watch us, they would take notes down and then write at the end of every session. I feel like she was very supportive because then at the end of the sessions that we've done and in our prac, she'd give us feedback. So I think that's nice that we got feedback almost immediately. And then also if I was doing something particularly wrong in a particular case when I had as a child who stated I wasn't 100% clear on the techniques to use and things like that. So she would stop me if necessary and sort of show me how to do it so that I don't start doing it wrong. So I think just that constant like evaluation of what I was doing and then feedback was quite supportive in terms of the clinical educators.	observe supportive feedback (immediate) modelling constant eval & feedback
Student 9 (Participant & Control)	So my response is quite similar to that. It's a little bit difficult also to respond to everything like 100% because we've had different like clinical educators. So and like everyone's style is quite different. So but in terms of what did work really well is as Student 1 was saying as well, when we do a session and the supervisor observes and then gives you immediate feedback written and verbal feedback is always really useful because then you know, Like where you going wrong and what you're doing correctly and what to continue doing and what to not do so much of and maybe something new to implement. So the feedback is always really useful in terms of clinical development. What was also useful is sometimes like you're not 100% certain on an area and some supervisors would encourage you to go and do some like specific research on something and then come back and discuss it. And that was also useful because it like promoted clinical independence.	Different styles Being observed Immediate written and verbal feedback Detailed feedback Feedback important for clinical dev. Discuss Clinical independence

Student 8 (Participant)	Umm so my one supervisor. She was very supportive because she, umm, she just she made us do a lot of research and prep a lot, which I think supported my learning cause I didn't really have a choice but to understand like the cases I was dealing with the research more on the best ways to deal with it and she also sit down and talk to me about it. She'd discuss with me. She'd ask me my reasoning behind why I would choose those plans of other ones. She was very interactive and I think I mean that helped me grow because ultimately, it helped my clinical reasoning skills.	supportive Research, prep Discussions Reasoning Interactive Growth Clinical reasoning
Student 16 (Participant)	I didn't really have a great experience with my supervisor and this year I had the same supervisor for both of my pracs, so it was quite a challenging year for me. However, one thing I really did learn was the skill of independence as she wasn't too supportive. So, and you know, kind of left us on our own quite a bit, which was challenging, but I feel as though I can very confidently go into the next year which is only going to be more demanding and but feeling very independent and knowing where I can find answers, how to kind of think and incorporate what I'm learning and resources I have at home and calling on friends and kind of you know, I'm not really relying on other people, but rather coming up with things on my own, but then checking with other people if it sounds like a good idea, so I definitely think independence was something that I that I had to learn. It was kind of forced, but I'm really grateful that I had to learn and because ultimately that is how the world works as being independent. So that was a good skill that I learned.	Not good experience. Independence Not supportive Left on own Research Integrate research with clinical skills Checking with peers. Good to learn independence.
Student 17 (Participant)	Perfect. So with one of my supervisors, what I thought was really nice that she did was that it was for a prac that we were fairly new to. It was the autism spectrum prac. And she sort of acknowledge that we were new to it and if we had, like any anxiety, she would help us to sort of deal with that and talk it through and It was nice to know that she also had anxieties around certain things and that it's always important to	New prac Acknowledged new Acknowledged anxiety. Discussion

Appendix S

Example of ePIP Approach Used in This Study

Joint display for Student Perception on Implementation of IBL (Process)						
Quantitative data			**Qualitative data**			
Likert Scale		**Pillar Building**	**Focus Group**		**Initial Interview**	
Descriptive findings	**Substantiating findings**		**Substantiating findings**	**Descriptive findings**	**Substantiating findings**	**Descriptive findings**
→ Listing, Matching, Checking 1 2 3		**Iteratively developed themes**	← Checking, Matching, Listing 3 2 1			
No data to add about relationships	No data to add about relationships.	The importance of the relationship between the SLP students and their clinical educators	I just always felt that she didn't take the time to get to know us personally. So it was just very much like, oh, I mark your work and I give you the resources and you meant to do what you have to do. So there wasn't really a personal connection. And I I'm someone that really likes to develop that because I feel that this is a journey for me to develop as a therapist. Stu 2 Ctrl I think that's where	Student SLPs reflected on the importance of safe, supportive relationships with clinical educators that acknowledge their humanity and anxiety in clinical education as being vital for the clinical education process.	The supervisor for Monday's pracs were hands on, caring, considerate, friendly and wanted to build a relationship with us. Stu 16 The supervisors were supportive and gave tutorials on all aspects that confused us. They were there at all times and understood that we were learning. Stu 27 Emotional support. Stu 16	Student SLPs reflected on the importance of building relationships with CEs in order for the clinical education process to be successful.
			the ideal educator for me in a sense that she got to know us on a personal basis. Stu 2 "And she sort of acknowledge that we were new to it and if we had, like any anxiety, she would help us to sort of deal with that and talk it through." Stu 17 She would always ask us about our mental health, which I think was something I really, really appreciated, because no one else would ever ask us about that. Stu 2			

Appendix T

Examples of the Adapted ePIP Approach Developed for Use in This Study

Joint display for Student Critical Thinking Skills (Outcomes)								
Quantitative data							Qualitative data	
Likert Scale		Breadth of self-reflection		Depth of self-reflection		Pillar Building	Focus Group	
Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Iteratively developed themes	Substantiating findings	Descriptive findings
→							←	
Limited evidence of change in students' perception of the development of their own CTS in both experimental and control groups.	Wilcoxon results, when compared at the end of each block, revealed no significant changes in students' reflections on the development of their CTS.	Not identified	Not identified	Not identified	Not identified	**Students perceived a development in their critical thinking skills across the year** (even if not reflected by Wilcoxon results based on likert scale CTS.) ***PERCEPTION***	*"I think I mean that helped me grow"* Stu 8 Exp *"And she would really give us that opportunity to grow and not just dictate what should be done and what we doing wrong."* Student 2 Ctrl *"I felt that that really like built our confidence because she*	Students perceived a development of their skills across the year.

Joint display for Student Critical Thinking Skills (Outcomes)								
Quantitative data							Qualitative data	
Likert Scale		Breadth of self-reflection		Depth of self-reflection		Pillar Building	Focus Group	
Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Iteratively developed themes	Substantiating findings	Descriptive findings
→							←	
Not identified	Not identified	There did appear to be a difference between the exp group and control group for Attend, Reflect for Action, Process, Reflect in Action, and Premise	No difference between exp and control groups based on Mann Whitney U results. Looking at the visual representation of results, the mean of these was higher in the exp group across the blocks as compared to the control groups.	No significant difference in block 1 highlights that students in exp and control groups started at a similar depth of processing. At block 4, there was a significant difference, indicating that exp group had an increased depth of processing skills compared to the control group. In Block 4 Exp group were	Mann Whitney U results when comparing Exp and Control: no significant difference in block 1 ($p= 0.24$); Significant difference in block 4 ($p= 0.04$)	**Increased breadth and depth of processing in the experimental group.** Increased critical thinking skills in the experimental group evidenced through self-reflection analysis and focus group.	*"To say I think I did this wrong but I think I'm actually good at this and you know the whole self-reflecting part of it I think was really helpful to develop my own skills as a therapist."* Stu 5 Exp *"We learned how to grade activities… that's like helped me a lot because it firstly helped me figure out*	Increased critical thinking skills in the experimental group evidenced through self-reflection analysis and focus group. Tasks that supported the development of more complex CTS: - Reflection - Grading activities - Research

Joint display for Student Critical Thinking Skills (Outcomes)								
Quantitative data							Qualitative data	
Likert Scale		Breadth of self-reflection		Depth of self-reflection		Pillar Building	Focus Group	
Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Iteratively developed themes	Substantiating findings	Descriptive findings
		→					←	
students' perception of CTS in both experimental and control groups. It was similar for both groups.	of results, there tends to be a positive trend towards the students choosing more agree/strongly agree in B4 as compared to B2. Showing a more positive reflection on their CTS in a clinical space	of the breadth of processing in the control group. Increase in certain aspects of the breadth of processing in the experimental group.	comparing changes within groups from block 1 to block 4: No significant difference for exp and control groups for each self-reflection codes except Reflect for action- both exp (p= 0.03) and control (p=0.04) and premise in the control group (p=0.04). Visual representation: Control group: -decrease in Reflect for action; Reflect	number of emerging reflectors decreased to none whilst the amount of reflectors increased- this indicates an increase in depth of reflexive abilities across the year. In the control group, there was a significant increase in the reflectors, but there was not a significant decrease in the emerging	comparing within groups of exp and control between B1 and B4- Significant diff Exp group: Emerging Reflector (p= 0.003) decreased; Reflector (p=0.025) increased Significant diff Control group: Emerging Reflector (p= <0.001) decreased	**self-reflection skills:** Improved CTS in SLP students in both experimental and control groups. However, more complex reflection skills were developed in the experiment group.	*and I think I mean that helped me grow because, ultimately, it helped my clinical reasoning skills."* Student 8 Exp *"And she would really give us that opportunity to grow and not just dictate what should be done and what we doing wrong."* Student 2 Ctrl *"I don't think*	development of clinical reasoning and critical thinking skills throughout the year.
			in action; Premises -increase in Attend. Experimental group: -decrease in reflect for action; reflect in action -Increase in Attend; Process; Content	reflector, and there was a change in that there were some non-reflectors at the end of the year. The control group did not show as positive a change as the exp group in the depth of self-reflection.			*we were really like outright taught clinical reasoning skills."* Student 8 Exp *"So the, you know, them giving us advice, them trying to help us with clinical reasoning. The supervisor giving us feedback, but then also having a relationship."* Student 16 Exp *"I felt that that*	

Example of Adapted ePIP Integrating 4 Data Sets to Investigate the Outcomes of Clinical Education:

Joint display for Elizabeth on Critical Thinking Skills (Outcomes)								
Quantitative data							Qualitative data	
Likert Scale		Depth of self-reflection Breadth of self-reflection		HSRT results CCTDI results		Pillar Building	Focus Group	
Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Descriptive findings	Substantiating findings	Iteratively developed themes	Substantiating findings	Descriptive findings
		→					←	
Student 6 did not perceive a change in their CTS.	Most answers were agree or strongly agree for each block.	Not identified	Not identified	No change in thinking dispositions.	No change in CCTDI results- no change in thinking dispositions over the year. Overall score for CCTDI Block 1: 285 Block 4: 279	**Student perception of growth in CTS across the year was not present.**	None of their contributions to the focus group reflected on the development of CTS	
Not identified	Not identified	Decrease in depth and breadth of processing.	In Block 1, 2 and 3, Student 6 was a Reflector. However, in Block 4, they changed to being an emerging- reflective elements. Block 4 had fewer reflective elements required for depth of processing.	Critical thinking skills improved.	Student 6 was in the 33 percentile in Block 1 and was in the 64th percentile in was seen in Analysis, Interpretation, Inference, Induction, Deduction and Numeracy subtest.	**CTS improved despite a decrease in depth and breadth of**	"The supervisor was nurturing, but she also was she gave us constructive criticism when we was that she gave us was in feedback written on the paper so instead of giving them to us, also verbally so, so I could keep it for my records" "I like that she gave us extra resources." "They were also open to me asking questions. So that was helpful. So they were well, they didn't dismiss any questions."	Process was supportive. Did this have an

Appendix U

Quality Reporting Guidelines

The criteria for assessing the quality of mixed method research (Fàbregues & Molina-Azorín, 2017):

Study phase	Criterion	Included on page/s:
Planning	A rationale is provided for using a mixed methods design to address the research problem and questions.	137
	The philosophical assumptions of the researcher are made clear.	114-117
	The study purpose and research questions are clearly stated.	135-136
	A literature review and/or conceptual framework is provided that situates the study and informs the research questions and methods.	56-134
	Key literature on mixed methods is reviewed in support of the mixed methods approach chosen by the authors.	137
Undertaking	Quantitative and qualitative components are well implemented and adhere to the quality criteria of each tradition.	165-174
	Quantitative and qualitative components of the study are effectively integrated.	183-187; 304-323
	The mixed methods design is clearly described in terms of purpose, phasing, priority, and process of integration of the quantitative and qualitative components.	137-183
	Sampling, data collection and data analysis procedures referring to both quantitative and qualitative components are	148-183

	linked to the study aims and research questions.	
	Sampling, data collection and data analysis procedures referring to both quantitative and qualitative components are described in sufficient detail.	148-183
	The mixed methods design is linked to the study aims and research questions.	137-138
	The mixed methods design matches the rationale given for combining quantitative and qualitative components.	137-138
Interpreting	Inferences are consistent with the study findings.	200
	Inconsistencies between findings/ inferences emerging from quantitative and qualitative components are stated.	183-184
	Inferences are consistent with the study aims and research questions.	200
	Inferences derived from the quantitative and qualitative findings are adequately incorporated in the meta inferences regarding the entire study.	200
Disseminating/ applying findings	The research process is reported transparently.	135-199
	The unique insights and added value gained from using a mixed methods design are described.	318-323
	The value and implications of study findings for policy and practice are explained	360-370

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

(Tong et al., 2007)

Topic	**Item No.**	**Guide Questions/Description**	**Reported on Page No.**
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	174
Credentials	2	What were the researcher's credentials? e.g., PhD, MD	174
Occupation	3	What was their occupation at the time of the study?	174
Gender	4	Was the researcher male or female?	174
Experience and training	5	What experience or training did the researcher have?	174
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	50-51
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g., personal goals, reasons for doing the research	50-51
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g., Bias, assumptions, reasons and interests in the research topic	45-51
Domain 2: Study design			

Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis	123-133
Participant selection			
Sampling	10	How were participants selected? e.g., purposive, convenience, consecutive, snowball	160
Method of approach	11	How were participants approached? e.g., face−to−face, telephone, mail, email	160
Sample size	12	How many participants were in the study?	148-159
Non−participation	13	How many people refused to participate or dropped out? Reasons?	148-159
Setting			
Setting of data collection	14	Where was the data collected? e.g., home, clinic, workplace	140
Presence of non−participants	15	Was anyone else present besides the participants and researchers?	Not applicable
Description of sample	16	What are the important characteristics of the sample? e.g., demographic data, date	148-159
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot	162-164

		tested?	
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	141-147
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	161
Field notes	20	Were field notes made during and/or after the interview or focus group?	187-188
Duration	21	What was the duration of the interviews or focus group?	169-170
Data saturation	22	Was data saturation discussed?	154
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	191

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	182
Description of the coding tree	25	Did authors provide a description of the coding tree?	N/A
Derivation of themes	26	Were themes identified in advance or derived from the data?	182
Software	27	What software, if applicable, was used to manage the data?	N/A
Participant checking	28	Did participants provide feedback on the findings?	191

Reporting			
Quotations presented	2 9	Were participant quotations presented to illustrate the themes/findings?	203-294
		Was each quotation identified? e.g., participant number	203-294
Data and findings consistent	30	Was there consistency between the data presented and the findings?	203-294
Clarity of major themes	31	Were major themes clearly presented in the findings?	203; 238
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	203-233; 239-292

Study Procedures and Sample (Symonds & Tang, 2024)

Apply this section to quantitative, qualitative, and mixed methods studies.

Indicator name	Indicator scoring	Indicator description
Setting	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the study setting (venues) and/or geographic location described in detail?** A qualitative or quantitative statement about the location of research. Are the venues defined (e.g., venue type, venue characteristics)? Is the geographic location of the venue(s) defined? Partial information could be venue type defined (e.g., middle school, experimental laboratory) but number of venues and location of venues undefined.
Recruitment	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Were the recruitment processes explained?** A qualitative statement about the approach to recruiting participants, for example by telephone, email, or social media.
Administration	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the administration process explained?** A qualitative statement that can include quantitative details about how the data collection instrument was administered, e.g., by teachers to students in classrooms.

Consent	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Did the researchers receive informed consent from human participants?** Information should be included about obtaining informed consent for each participant group.
Ethics	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Is there a clear statement about ethical practices?** Each study of human participants should include a statement about ethical research practices. Partial evidence includes a statement that the research aligns with national or international conventions. Full evidence includes a statement about the study receiving ethical clearance from a mandated body (e.g., ethics committee).
Sample	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the study sample described in detail?** A quantitative statement of the sample in terms of the total sample size and individual characteristics as relevant to the population, e.g., gender, ethnicity, age, grade, mother tongue, religion, migrant status. Accept qualitative statement of characteristics as partial evidence (e.g., “a mixed gender sample”).

Achieved sample	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Were the numbers of people who did/did not consent to participate stated?** Quantitative statement of numbers. Accept qualitative statement about barriers to consent as partial evidence.
Sample Size	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the number of participants justified?** Quantitative studies should include justification of number of subjects needed to detect anticipated effects. Evidence that power calculations were considered and/or conducted. Accept qualitative justification for sample size as partial evidence. Qualitative studies should include justification of the number of participants in relation to the planned analysis method (thematic analysis, interpretive phenomenological analysis, etc.).

Additional Indicators for Quantitative Studies

(Symonds & Tang, 2024)

Apply this section to quantitative and mixed methods studies. Please note that the attrition and repeated measures indicators are only relevant for longitudinal studies (do not fill these out for cross-sectional studies).

MissingD	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the missingness of data mentioned?** There is evidence of a missing data analysis (e.g., missing data points within cross-sectional data, or attrition across time points). Accept a qualitative statement about missingness as partial evidence.
Attrition	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**<u>For studies with repeated measures / longitudinal data</u>** **Was the number of participants at each stage/ wave specified?** Quantitative statement of the number of participants at each time point. This can be across measures or for individual measures. Accept statement of numbers at multiple waves (e.g., first and last wave of a four-wave study), but not all waves, as partial evidence. Check for numbers in participants section but also in tables.

MissingS	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Did the authors report their missing data handling strategy?** For example, data imputation or the removal of data.
Valid	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**Was the reliability and validity of measurement methods mentioned?** Was construct reliability (e.g., alpha), structural validity (e.g., exploratory factor analysis or CFA), face validity (e.g., cognitive testing of items) or criterion validity (e.g., association with similar measure) conducted for any of the measured constructs? Accept a report of validity from prior research as partial evidence.
RepeatR	1 = No 2 = Partially 3 = Yes **Scoring: 3**	**<u>For studies with repeated measures / longitudinal data</u>** Was factorial invariance, test-retest (in a pilot study), interrater reliability, average inter-item correlation, or split-half reliability, conducted for any of the repeated measures constructs? Accept report of reliability from prior research as particle evidence.
Descriptives	1 = No 2 = Partially 3 = Yes	**Are there descriptive statistics of the main measurement results?** Typically a descriptive statistics table is presented at the start of the results section. Descriptive statistics can also be presented

	Scoring: 3	in results tables. Study measures should be represented using frequencies or measures of central tendency (e.g., mean, standard deviation). The minimum and maximum of each measure should be specified in the text or tables.

Appendix V

Ethics Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Barber

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H21/11/06**
PROJECT TITLE	Flipping Clinical Supervision for Speech-Language Pathology Students: Evaluating the role of inquiry-based learning in the development of critical thinking skills
INVESTIGATOR(S)	Mrs N Barber
SCHOOL/DEPARTMENT	Human and Community Development/
DATE CONSIDERED	19 November 2021
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	16 March 2025

DATE 17 March 2022 **CHAIRPERSON** J Knight
(Professor J Knight)

cc: Supervisor : Dr J Neille, Prof J Watermeyer and Dr K Coutts

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I agree to completion of a regular progress report. For Minimal and Low studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

N Barber
Signature

24 / 03 / 2022
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES

Appendix W

The results of the Wilcoxon matched-pairs tests for the Likert scale related to SLP students' perception of clinical education outcomes when comparing Block 2 with Block 4 for the experimental and control groups

Questions related to the students' perceptions of the clinical education outcomes	*N*	Wilcoxon *Z*-value	*P*-value
I was able to think critically about my patient's assessment and therapy interventions throughout the block.	Experimental Group: 10	1.04	0.3
	Control Group: 16	0.74	0.56
I was able to apply the information I learnt from theoretical coursework and journal articles when developing the patient's therapy approach.	Experimental Group: 10	0.94	0.35
	Control Group: 16	0.11	0.91
I was able to apply the information I learnt from theoretical coursework and journal articles when developing the patient's aims/goals and rationale.	Experimental Group: 10	1.13	0.26
	Control Group: 16	0.61	0.54
I was able to apply the information I learnt from theoretical coursework and journal articles when determining the therapy procedures and therapy activities for the patient's therapy sessions.	Experimental Group: 10	0.16	0.87
	Control Group: 16	0.16	0.87
I was able to explain information that I learnt to my clinical educator and peers during my clinical practical.	Experimental Group: 10	0.71	0.48
	Control Group: 16	0.18	0.86

My clinical reasoning skills (thinking skills used during assessment and therapy planning) for the particular population group of the block improved throughout the block.	Experimental Group: 10	1.56	0.12
	Control Group: 16	1.36	0.18

**$P < .05$; reject the null hypothesis of no difference within groups between Blocks 2 and 4.

Appendix X

The results of the Wilcoxon matched-pairs tests for the Likert scale statements related to clinical educators' perceptions of student critical thinking skills when comparing Block 2 with Block 4

Questions related to the critical thinking outcomes of inquiry-based learning (IBL)	***N***	**Wilcoxon *Z*- value**	***P*-value**
The students I supervised appeared to think critically about the clinical cases they were working with.	5	1.63	0.10
The students I supervised appeared to be able to synthesise information from theoretical coursework when developing the patient's therapy approach and goals.	5	1.34	0.18
The students I supervised appeared to be able to apply the information from theoretical coursework when determining the rationale, therapy procedures, and therapy activities for the patient's therapy sessions.	5	1.73	0.08
The students I supervised appeared to employ higher-order thinking skills during their clinical practicals.	5	1.73	0.08
The clinical reasoning skills and knowledge translation of the students I supervised appeared to improve.	5	0	1.00

***P*< .05; reject the null hypothesis of no difference within groups between Blocks 2 and 4.

Appendix Y

Wilcoxon Test Results Comparing the Students' Perceptions of Clinical Educators' Support in the Development of their Critical Thinking Skills in Block 1 versus Block 4

Statements related to the students' perception of clinical education impacting their development of critical thinking skills		***N***	**Wilcoxon *Z* value**	***P*-value**
I have found the supervision techniques my clinical educator used during the block helpful in developing my thinking about my patient and the therapy I provide.	Experimental Group:	10	0.85	0.4
	Control Group:	16	0	1
I have found the supervision techniques my clinical educator used during the block helpful in developing my ability to provide therapy to my patient.	Experimental Group:	10	1.51	0.31
	Control Group:	16	1.63	0.1

**$P < .05$; reject the null hypothesis of no difference within groups between Block 2 and Block 4

Appendix Z

Wilcoxon Test Results Comparing Students' Perceptions of Clinical Educators' Feedback in Supporting the Development of their Critical Thinking Skills in Block 1 versus Block 4

Statements related to the students' perception of clinical supervision impacting their development of critical thinking skills		***N***	**Wilcoxon *Z* value**	***P*-value**
I have found the feedback I received useful in developing my clinical skills	Experimental Group:	10	1.93	0.05
	Control Group:	16	0.18	0.86

**$P < .05$; reject the null hypothesis of no difference within groups between Block 2 and Block 4