



Exploring Pre-service Teachers' Experiences with Cooperative Learning in an Introduction to Research Module

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Abstract

Introduction to research modules in undergraduate teacher education programmes is often experienced as abstract, complex and anxiety-provoking, especially by pre-service teachers encountering formal research for the first time. In response to these challenges, cooperative learning is increasingly employed as a pedagogical approach to promote engagement, shared learning and peer support. Cooperative learning is widely advocated for in educational theory, but limited empirical research exists that examines how it is experienced by pre-service teachers in research-intensive coursework in South African higher education. This qualitative study explores how final-year pre-service teachers experience cooperative learning within the context of an introductory research module at a private higher education institution in South Africa. Data were generated from a single open-ended questionnaire, consisting of six reflective questions, completed by sixteen final-year pre-service teachers. Responses were analysed inductively, after which Social Interdependence Theory was used to examine the enabling and constraining dimensions of cooperative learning. The findings indicate that cooperative learning fostered a sense of connectedness, reduced anxiety and supported shared meaning-making. Challenges included unequal participation and dominant group members. Findings illustrate the duality of cooperative learning as both enabling and constraining, arguing that its effectiveness is conditional. Cooperative learning is not inherently effective but is dependent on task design, group functioning and lecturer facilitation. The findings contribute context-specific insight into how research education in teacher education can be reimaged through more intentionally structured cooperative learning.

Keywords: initial teacher education, novice researchers, pedagogical approaches, social interdependence theory, South African higher education.

1. Introduction

Introductory research modules form part of most undergraduate teacher education programmes. In this study, final-year pre-service teachers complete an introductory research module in their first semester, focusing on educational research. Pre-service teachers are guided through the main education research paradigms and their associated methodologies, techniques, and processes. The focus is on the theoretical principles, steps and procedures in research and the ethical application thereof.

Introductory research modules, unfortunately, are often perceived as abstract, cognitively demanding and anxiety-inducing (Papanastasiou & Zembylas, 2006; Sweller, Ayres, & Kalyuga, 2011; Healey & Jenkins, 2009). Different pedagogical approaches are used to lecture on research modules. In this study, the focus was on using cooperative learning as a strategy to address the challenges experienced by final-year pre-service teachers. Cooperative learning uses structured small groups so that students can learn together (Johnson, Johnson, & Smith, 2014). Cooperative learning, when implemented correctly, provides peer support, engagement and shared meaning-making, which enables the effective acquisition of research knowledge and skills (Butera & Buchs, 2019).

The literature provides comprehensive evidence of the challenges undergraduate students experience in introductory research modules. Furthermore, the benefits and challenges students face with cooperative learning are extensive. Nevertheless, there remains limited theory-driven research that examines how pre-service teachers experience cooperative learning within introductory research modules. This study bridges that gap by foregrounding pre-service teachers' voices and their lived experiences with cooperative learning in research modules. Guided by Social Interdependence Theory (SIT), the study offers a theory-informed analysis of how the principles of cooperative learning are structured, implemented and experienced in an actual lecture context.

This study aims to explore how final-year pre-service teachers experience cooperative learning in the context of an introductory research module. To achieve this aim, the following research question is posed: What challenges and benefits do final-year pre-service teachers associate with cooperative learning in an introduction to research module?

2. Theoretical and Literature Background

2.1 Cooperative Learning and Social Interdependence Theory

Cooperative learning involves the use of educational practices and pedagogical methods that provide structure to group work and is underpinned by several principles of cooperation, which will be discussed in detail in a later section (Butera & Buchs, 2019). In contrast to cooperative learning is competitive learning, where students work against each other to attain their individual goals (Johnson, Johnson, & Smith, 2014).

Cooperative learning is grounded in Social Interdependence Theory (SIT), which serves as a suitable theoretical lens for exploring how final-year pre-service teachers experience cooperative learning in an introductory research module. The framework is suitable for examining cooperative learning experiences as its key principles relate to interactions, shared responsibility and mutual reliance (Butera & Buchs, 2019). These principles are key features of the learning design implemented in this study.

SIT posits that individuals' outcomes are affected by their own actions and the actions of others. What motivates cooperative or competitive behaviour within groups is the accomplishment of goals. The theory of cooperation and competition was conceptualised by

Deutsch (1949) as three types of interdependence, namely, positive interdependence, negative interdependence and no interdependence. Cooperative learning is grounded in Social Interdependence Theory. Five principles of cooperation were conceptualised that explain how cooperation functions, but also why cooperative learning can support or constrain learning outcomes. The first principle is positive interdependence. As previously defined, it exists when group members perceive that they can only achieve success if all group members succeed (Butera & Buchs, 2019). The second principle is responsibility and accountability, which emphasises personal responsibility accompanied by group or individual accountability in the functioning of groups. The third principle is promotive interactions, where teammates work together in an accommodative manner (Butera & Buchs, 2019). The fourth principle is social skills. To facilitate and coordinate within groups, a set of social skills is required. Clear and appropriate communication and conflict resolution are some of the critical skills required for optimal group function. The fifth principle is group processing. This involves a metacognitive process after the completion of tasks. Members reflect on group actions, communication decisions and performance (Butera & Buchs, 2019).

The five principles operationalise cooperative learning by translating SIT into instructional practice. When all five principles are present, cooperative learning is more likely to promote shared understanding, emotional support and skill development. When one or more principles are weak or missing, cooperative learning may result in constrained learning environments (Butera & Buchs, 2019).

SIT is also used as an analytical lens to examine participants' experiences in terms of how cooperative structures enabled or constrained learning. It allows for an explanatory analysis of the balance between enablers and limitations in cooperative learning design and practice.

2.2 Challenges of Learning Research at Undergraduate Level

Many pre-service teachers experience research anxiety, characterised by fear, doubt, anxiety and a lack of confidence when engaging with research concepts and processes as novice researchers (Tolentino, Valenzuela & Cruz, 2024). Research learning places high demands on academic reading and writing and within the South African higher education context, many pre-service teachers are English additional language speakers, which can intensify difficulties comprehending research literature and articulating research ideas clearly. Boughey and McKenna (2016), leading South African scholars in the field of higher education and literacy, argue that students are often positioned as 'decontextualised learners', expected to acquire disciplinary literacy practices as if these were neutral skills, while the norms of academic argumentation and evidence-based knowledge-making remain unarticulated to novice researchers. Additionally, research modules often require students to master new concepts, develop academic writing skills and complete complex tasks under tight deadlines, which can result in cognitive overload (Sweller, Ayres, & Kalyuga, 2011; Tight, 2016, Toquero, 2021).

2.3 Pedagogical Approaches to Teaching Research

Inquiry-based learning emerges as one of the leading pedagogies used in teaching research at undergraduate level and continues to evolve. Moreover, explicit teaching of research literacies is encouraged within a South African context. Encouraging practices that support epistemological access rather than reproducing "skills-only" approaches. Clarence and McKenna (2017) and Boughey and McKenna (2016) are scholars advocating and leading the implementations of such approaches. These scholars also propose modelling as a pedagogical tool aligned with the approaches to teaching research-related literacy. Additionally, scaffolded pedagogical designs are used to break down the research process into sequenced, supported tasks. Elder, Wittman and Giang (2023) used instructional scaffolding to guide students

towards increasing independence in research. Scaffolding thus allowed for the gradual development of research competencies.

Lastly, cooperative and collaborative learning are pedagogical methods used to support the attainment of learning goals in structured groups (Johnson, Johnson, & Smith, 2014). Cooperative learning methods have been found to support sense-making, reducing anxiety and enabling peer explanations (Gillies, 2016).

2.4 Benefits of Cooperative Learning in Research Modules

Cooperative learning reduces research-methods anxiety and stress as students do not have to tackle the difficult content found in research modules alone (Van Ryzin & Roseth, 2021). Furthermore, cooperative learning improves conceptual understanding through peer collaboration and active participation, which makes students task-focused and perceive tasks as meaningful (Tolentino, Valenzuela & Cruz, 2024; Harianto, 2024). Students are shifted from passive roles to a more active role in the learning process. Students feel more autonomous towards their own learning and that of others (Trung & Truong, 2023).

Cooperative learning develops teamwork and communication skills. This pedagogical approach develops skills such as discussions, feedback and collaborative problem-solving directly relevant to the research process (Sidgi, 2022). Additionally, cooperative learning develops students' social skills. These skills are also important for pre-service teachers entering their profession, where they will engage with different stakeholders.

2.5 Challenges of cooperative learning in research modules

Although cooperative learning offers several benefits, researchers also highlight how it may constrain learning outcomes. Cooperative learning tasks may increase students' cognitive load as they must manage group dynamics, complex research content and unfamiliar research practices. Novice researchers may feel overwhelmed rather than supported (Kirschner, Sweller and Clark, 2006; Janssen et al., 2010). Meijer, Hoekstra, Brouwer and Strijbos (2020) argue that group assessments can undermine individual accountability and that students' individual contributions become indistinguishable from shared outcomes. Additionally, Forsell, Forslund Frykedal and Hammar Chiriak (2020) highlight that individual fairness is a common challenge with cooperative learning as lecturers find it difficult to differentiate between the knowledge and effort of individual group members. Furthermore, unequal participation and inactive group members also lead to increased workload and cognitive load for certain members who must complete more work. Huertas-García, Lengler and Consolación (2022) found that implementing multiple peer assessment checkpoints across cooperative learning tasks reduces social loafing and improves students' perceptions of fairness in group work.

Moreover, cooperative learning in research modules requires strong lecturer facilitation. Lecturers, at times, find it challenging to properly implement cooperative learning principles (Trung & Truong, 2023; Garcha & Kumar, 2015). If clear guidance and appropriate support cannot be provided by lecturers, cooperative learning becomes unsuccessful. This is detrimental to novice researchers, as research learning involves disciplinary norms that such researchers are not always able to infer independently.

3. Methodology

A qualitative case study design was adopted to explore final-year pre-service teachers' experiences of cooperative learning within an introductory research module at a private higher education institution. Case studies allow for a deep exploration of participants' lived

experiences within a specific, natural context (Du Plooy-Cilliers et al., 2021). The study was situated within an interpretivist paradigm, seeking to understand participants' lived experiences, meaning and perspectives.

Participants were final-year Intermediate Phase pre-service teachers enrolled in a Bachelor of Education degree. Participants completed six structured cooperative tasks during the module in self-selected groups of four to six members. To be eligible for participation, pre-service teachers had to be assigned to a group, actively participate in cooperative activities, and attend at least eighty percent of lectures. Of the sixty-two enrolled pre-service teachers, fifty-seven met the inclusion criteria. Sixteen participants voluntarily completed an anonymous online questionnaire comprising six open-ended reflective questions exploring their experiences, perceived benefits, and challenges of cooperative learning.

Ethical clearance and institutional permission were obtained before data collection. Written informed consent was secured, and anonymity was ensured using participant-allocated numbers. All procedures adhered to ethical research guidelines.

3.1 Analytical Procedure

Thematic Analysis was applied to the open-ended questionnaire. The flexible method of analysing data by identifying recurring patterns and perspectives, Braun and Clarke's (2006) six-phase model guided the inductive analysis process. The researcher familiarised themselves with the data by reading all sixteen participants' responses across the six questionnaire items several times. Inductive coding was applied to each participant's response. Each meaningful unit of data was assigned a descriptive initial code closely linked to participants' verbatim responses. The initial codes were compared and grouped into subthemes and organised into main themes thereafter through an iterative process of comparison, refinement, and rereading of the data to ensure internal coherence. Subthemes were supported by providing adequate verbatim quotes from participants. Lastly, themes, supported by participants' quotes, were linked to Social Interdependence Theory (Johnson & Johnson, 2009; Butera & Buchs, 2019). Table 1 provides an illustrative sample of the audit trail of the codes-to-themes process, showing verbatim participant extracts from the questionnaire, the initial codes, subthemes, main themes and corresponding SIT principles.

3.2 Trustworthiness and Reflexivity

To ensure trustworthiness, this study adopted Lincoln and Guba's (1985) trustworthiness framework for qualitative inquiry, comprising four principles. Credibility was ensured by the researcher's prolonged engagement with the data. This was maintained through conducting multiple, non-consecutive readings of all sixteen participants' responses, reviewing the dataset at various points to evaluate emergent codes and avoid premature closure. Dependability was maintained through a transparent audit trail. Coding decisions, code revisions, and the organisation of subthemes and themes were recorded throughout the analytical process. Table 1 serves as a partial representation of the audit trail, showing the shift from raw data to final themes. Confirmability was supported because findings were shaped by the participants and not the researcher. All interpretive claims were grounded in verbatim participant quotes, ensuring that interpretations remain traceable to the data. Furthermore, the researcher noted participants' accounts when they diverged or contradicted one another, to preserve the complexity of the data set. Lastly, transferability was supported by providing in-depth descriptions of the study context, participant characteristics, module design, and cooperative learning structures. This allows readers to assess how the findings apply to other contexts with similar dynamics, without claiming generalisability.

The researcher occupies a dual role that warrants explicit reflexivity, as the researcher is both the lecturer responsible for delivering the introductory research module and the researcher conducting the study. The use of an anonymous online questionnaire created an opportunity for participants to respond candidly. Additionally, the inductive approach to coding meant that initial codes were directly generated from verbatim participant quotes and then SIT principles were applied. This reduced researcher-driven and theory-driven interpretations. The researcher afforded equal analytical weight to positive accounts and those that diverged or contradicted one another. The above-mentioned practices do not eliminate the influence of researcher subjectivity but rather make the researcher's positionality transparent and accountable. Given the reflexive thematic approach adopted, coding was conducted by the researcher rather than through inter-coder reliability procedures. This aligns with the principles of rigorous qualitative inquiry and meaning-making that is interpretative, rather than purely procedural (Braun & Clarke, 2006; Lincoln & Guba, 1985).

Table 1: Codes-to-Themes- analytical trail (Sample)

All participant extract references are verbatim quotations drawn directly from the anonymous online questionnaire (n=16, six open-ended items). Source Column: P = Participant number; Q = Questionnaire item (Q1-6). SIT = Social Interdependence Theory (Johnson & Johnson, 2009; Butera & Buchs, 2019). Five principles: (1) positive interdependence, (2) individual accountability, (3) promotive interaction, (4) social skills, (5) group processing. Where a principle appears with "(reduced)", "(breakdown)" or "(absent)", this indicates the principle was operating in a constrained or dysfunctional form.

Verbatim Participant Extract Source	Initial Code	Subtheme	Theme	SIT Principle
P1, Q1	Groups provide diverse ideas and reassurance	Exposure to different perspectives	Theme 1: Cooperative learning as a supportive learning space	Promotive interaction
P15, Q1	Active collaboration deepens understanding through diverse views	Active collaboration deepens understanding through diverse views		
P11, Q2	Shared pressure reduces individual burden	Sense of connectedness in a demanding module		Positive interdependence; Promotive interaction
P9, Q1	Mutual respect and shared accountability enable free participation			Positive interdependence; Accountability
P10, Q2	Peer re-explanation improves collective understanding	Learning through peer explanations		Promotive interaction
P4, Q4	Low-pressure space for questioning and peer critique	Comfort and trust within small groups	Theme 2: Enhanced understanding of research concepts through peer interaction	Promotive interaction
P4, Q1	Smaller group setting reduces inhibition	Comfort and trust within small groups		Social skills; Promotive interaction
P8, Q4	Home language translation and familiar phrasing scaffold comprehension	Cooperative learning as a language scaffold		Promotive interaction; Social skills
P2, Q4	Discussion and explaining own ideas reinforce understanding	Shared meaning-making through discussion		Promotive interaction

P14, Q3	Unequal contribution creates tension and increases others' workload	Uneven contribution levels	Theme 3: Participation and group dynamics	Accountability (weak individual accountability)
P7, Q3	Poor commitment from some members			Promotive interaction (reduced); Social skills (underdeveloped)
P6, Q3	Silencing quieter voices; contributions dismissed	Dominant group members and feelings of exclusion		
P5, Q4	Peer undermining erodes self-confidence			
P14, Q5	Task division limits depth of individual engagement; over-reliance on peers	Constraints: task division	Theme 4: Cooperative Learning as both enabling and limiting learning	Accountability; Positive interdependence (negative effect)
P15, Q5	Multiple interpretations create inconsistent understanding			Positive interdependence (negative effect); Group processing (absent)
P10, Q5	Task division and miscommunication limit individual depth			Accountability; Positive interdependence (breakdown)
P8, Q6	Anxiety reduces; researcher identity strengthened through cooperative structure	Affordances: anxiety reduction and confidence		Positive interdependence; Promotive interaction
P12, Q6	Cooperative learning increases confidence and excitement			
P11, Q4	Group as reciprocal space for articulating and refining thinking	Affordance: self-directed learning and skill growth		Social skills; Group processing
P3, Q6	Individual tasks needed to verify depth of cooperative learning gains			
P4, Q6	Group composition determines quality of cooperative learning experience	Group composition affects outcomes	Theme 5: Context matters : the role of structure and facilitation	Social skills; Positive interdependence
P11, Q6	Mixed-ability grouping enables peer learning and interdependence			Positive interdependence; Promotive interaction
P6, Q6	Structured role assignment with lecturer checkpoints improves accountability	Need for intentional task and role design		Accountability; Group processing
P16, Q4	Lecturer scaffolding prior to cooperative tasks is a critical enabler	Structured facilitation and clear guidance		All five SIT principles operationalised by lecturer
P9, Q6	Insufficient time to process content limits cooperative effectiveness			

4. Findings and Discussion

Five main themes emerged from the data analysis: Cooperative learning as a supportive learning space; Enhanced understanding of research concepts through peer interaction; Participation and Group Dynamics; Cooperative Learning as both Enabling and Limiting learning; and, lastly, Context Matters: The Role of Structure and Facilitation. These themes are discussed in relation to relevant literature and interpreted through the lens of Social Interdependence Theory.

4.1 Cooperative Learning as a Supportive Learning Space

This theme reports on participants' overall experience with cooperative learning in their introductory research module. Fourteen out of sixteen participants indicated that their overall experience with cooperative learning was positive. These participants described cooperative learning as reassuring, enjoyable, encouraging, educational, helpful, pleasant and insightful. Three key patterns emerged under the theme: Exposure to Different Perspectives, Learning Through Peer Explanations, and Sense of Connectedness in a Demanding Module.

Six participants described how exposure to different perspectives and feedback helped them make sense of complex research concepts and reduced feelings of isolation within the module. Participant 15 stated: "It allowed me to engage with diverse perspectives, share ideas, and deepen my understanding of educational research through active collaboration." (P15, Q1). Participants reported feeling less isolated in a demanding module, creating a sense of connectedness. Participant 11 depicted this sense of shared burden: "The fact that you don't have to feel the pressure alone and that there are others to guide your thinking and exchange ideas that might link to yours or better yours"(P11, Q2). This theme reflects cooperative learning as a social and cognitive support structure for students in the context of an introductory research module. The data also aligns with positive interdependence as participants ascribe success to how the group functions. Participant 9 alluded to both positive interdependence and individual accountability: "My peers and I have mutual respect for one another; everyone was able to divide tasks easily, and we could hold each other accountable" (P9, Q1). Promotive actions are evident as students actively support each other's learning and success. This supports Harianto's (2024) findings that through peer collaborations, students co-construct meaning and improve each other's comprehension of research concepts.

4.2 Enhanced Understanding of Research Concepts

Participants described cooperative learning as a low-pressure environment where they could ask questions freely, explain concepts in familiar language, and test their understanding without fear. Participant 4 elaborated: "*Working in a small group allowed me to ask questions more freely. My peers allowed me to articulate my understanding of concepts and then sustain or add onto my descriptions, as well as critique me if I am wrong. My peers explained concepts in a way I understood*" (P4, Q4). Additionally, Participant 8 stated: "*It has assisted me in grasping difficult content much easier and with a deeper understanding, as we were able to explain it utilising terms and phrases that we fully understand as well as translating it into our home language*" (P8, Q4).

Lastly, Cooperative learning facilitates shared meaning-making in research education. Participant 2 reflected: "*Working in a group helped me understand research concepts better through discussion and shared ideas. Hearing different views made complex topics clearer and more practical, while explaining my own ideas strengthened my understanding*" (P2, Q4). These findings are especially relevant within the South African context of higher education and align with the ideas posed by Clarence and McKenna (2017) and Boughey and McKenna (2016) that academic literacy practices must account for students' contextual backgrounds. Promotive interaction emerges as a dominant SIT principle because of the reciprocal nature of the relationship between group members (Butera & Buchs, 2019).

4.3 Participation and Group Dynamics

Despite overall positive experiences being reported by participants, challenges related to group work were also raised. Participants frequently described unequal participation, where some members disengaged from tasks, while others assumed disproportionate responsibility

for the workload. Participant 10 shared: *"One or two students wouldn't participate in some activities, which made the workload fall on the rest of the students"* (P10, Q3), and Participant 7 noted that *"not all group members were as committed as others"* (P7, Q3). Some participants attributed the lack of participation to poor commitment.

Dominant group members and feelings of exclusion emerged as another key pattern that made cooperative learning challenging for certain members. Participant 6 stated: *"No one was listening to what I had to say, and they undermined me even though, at the end, my answers were correct"* (P6, Q3). Participant 5 described a related but distinct experience: *"Some of my group members made me feel like I didn't know what was going on, yet my answers were always correct -they kept making me second-guess myself"* (P5, Q4). Participant 14 shared their experiences with participation and group dynamics. They stated, *"At times, not all members contributed equally, which created tension and extra pressure on others. This taught me the importance of setting clear roles and accountability early in the process."* (P14, Q3) The above quote and the theme highlight structural tension in cooperative learning. In theory, cooperative learning is collaborative, but in practice, it can become inequitable. These findings demonstrate an important principle of cooperative learning: students must receive training and support in developing social skills for groups to function optimally. Conflict resolution and clear, appropriate communication are key skills required (Butera & Buchs, 2019). These experiences reflected weakened accountability structures and reduced promotive interaction within groups (Johnson, Johnson & Smith, 2014). Challenges with group dynamics, absenteeism and commitment along with grappling with understanding the research process, caused cognitive overload (Kirschner, Sweller and Clark 2006). Additionally, when group processing is skipped, groups tend to repeat the same dysfunctions across tasks. The absence of group processing also has a direct impact on accountability and social skill deficits discussed (Johnson & Johnson, 2009).

4.4 Cooperative Learning: Affordances and Constraints

Participants critically reflected on how cooperative learning enabled the development of knowledge and skills, and limited learning experiences. Participant 3 shared: *"Sometimes other people were confused, then we discussed and we all would then become confused"* (P3, Q5). Participant 15 elaborated: *"With the group voicing their own interpretation of the research concepts, it often made it difficult to form a consistent understanding until I revisited the reading independently"* (P15, Q5). These constraints align with the SIT principle of group processing (Butera & Buchs, 2019)

Four participants explicitly reported that cooperative learning constrained their individual engagement and deepened understanding as tasks were divided, as not every student was engaged in every aspect of research. Participant 14 describes this tension: *"Working in a group can sometimes hinder individual understanding because the workload is divided, meaning I only engage deeply with certain sections. There are times when I rely on others' explanations instead of developing my own knowledge, which can limit learning"* (P14, Q5).

Findings, however, also suggest that cooperative learning encouraged self-directed, independent learning when group members encountered a gap in their knowledge. Several participants stated the challenges they had encountered while working in groups and how, through the process, they had learnt to listen carefully to what others had said. This enhanced their understanding of the research concepts in the end. Participants also reported that the group's ability to talk through and learn to communicate appropriately and clearly was a skill that was well developed. Other skills developed were decision-making, critical thinking, problem-solving, taking responsibility for assigned tasks and developing a strong research

voice to convey their own understanding and ensure that they were heard within a group setup. An additional affordance that cooperative learning provided participants with is reducing research-related anxiety. Participant 8 reflected: *"I think my lecturer did an amazing job in incorporating cooperative learning into the classroom, as I perceived the subject as a very daunting thing and was scared of it at first. However, my lecturer broke it down into manageable pieces and provided us with enough time to explore the different topics. It helped ease my nerves and showed me that with effort and practice, I would also be able to become a researcher"* (P8, Q6). Participants used phrases such as easier, less overwhelming, daunting and manageable. Participants exhibited positive emotional responses such as finding research enjoyable, motivating and engaging. References were made to peer support, reducing stress and increasing confidence and comfort with research content.

The affordances and constraints can be linked to various principles and concepts underpinned by cooperative learning and Social Interdependence Theory. Employing cooperative learning strategies had a dual impact on participants' research-related understanding and development of social skills. As Trung and Truong (2023) contend, cooperative learning in research requires strong lecturer facilitation. Without a clear structure, modelling and monitoring, cooperative learning becomes unproductive. This statement encapsulates important mechanisms that must exist for cooperation to have the desired effects. The same cooperative structure can produce different outcomes dependent on how the five SIT principles are implemented.

4.5 Context Matters: The Role of Structure and Facilitation

In the final reflective question, participants were invited to provide suggestions and comments on the use of cooperative learning in their introduction to research module. Participants reported that group composition affects outcomes. Participants could select their own groups. Participant 4 shared on the conditional nature of the above finding: *"Having a group that worked well together affected my opinions of cooperative learning strategies used in [the module]. If I had a group of people with poor communication or teamwork skills, I would have most certainly had a poor review of cooperative learning in that module"* (P4, Q6).

Lecturer guidance and well-structured activities were reported as factors that influenced the effectiveness and success of cooperative learning. Participant 16 confirmed the importance of well-structured activities: *"This was helpful; however, the lecturer's scaffolding was particularly helpful in giving us understanding before engaging in research"* (P16, Q4). Additionally, Participant 6 proposed a structured accountability mechanism: *"Everyone should have a task to do and thereafter provide feedback to the group- for example, one person figures out the title and the other questions, and once checked by the lecturer, they come back to the group to report what was correct and what wasn't"* (P6, Q6). These findings align with Kirschner, Sweller and Clark (2006), who found that lecturer mediation is extremely important. How the lecturer structures and facilitates cooperative learning is ultimately what operationalises SIT in practice.

5. Conclusion

The collective findings of this study indicate that final-year pre-service teachers experience cooperative learning in the introductory research module as overall positive but complicated as a pedagogical approach. Cooperative learning supports understanding, peer engagement and confidence; however, its success is influenced by aspects such as group dynamics, individual participation and instructional design. Furthermore, Social Interdependence Theory served as an explanatory framework that demonstrated how cooperative learning functioned as both

enabling and constraining. Therefore, cooperative learning is not inherently effective, but rather conditional. Lecturers implementing cooperative learning in undergraduate research modules are encouraged to embed cooperative learning within a broader pedagogical ecology. It is important that task design is intentional and that roles and accountability within groups are emphasised. Furthermore, lecturer facilitation and modelling are critical for cooperative learning in practice. Pre-service teachers must receive training in cooperative practice.

Practical recommendations for lecturers are based on three structural dimensions of cooperative learning design. Firstly, lecturers are advised to assign explicit, rotating roles to each group member at the start of every cooperative task. When each member's contribution is distinct and necessary, passive participation becomes challenging (Johnson, Johnson & Smith, 2014). The rotation of roles also allows all students to engage with aspects of the research process over time, reducing fragmented understanding resulting from the mechanical division of tasks. Secondly, individual accountability must be enforced in groups. Lecturers are guided to complement group products with an individual accountability component, for instance, by submitting a brief individual reflection alongside the group task. This helps address the pattern of unequal workloads and challenges with individual accountability. Lastly, lecturers are encouraged to incorporate a structured group-processing activity at the end of each cooperative task session. This creates regular affordances for groups to identify and address dysfunctional dynamics (Butera & Buchs, 2019). When the three structural mechanisms are implemented together, they translate the five social Interdependence principles from theory into daily cooperative practice.

In addition to foregrounding pre-service teachers' voices, the study also makes context-specific contributions, providing insights into teachers' education in South Africa. Though the purpose of the study was not to generalise findings, the small sample size and single module context are limitations. Recommendations for future research would be to broaden the design to include lecturer perspectives and comparative pedagogical designs. Nevertheless, this study addressed an under-researched intersection between research modules, cooperative learning and Social Interdependence Theory with promising insights and contributions to scholarship on pedagogy and research education.

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