




Enhancing Engineering Education in the Global South:

The Impact of Peer-Led Tutoring Systems on Student Learning and Resilience


Reginald Kanyane
University of Pretoria EBIT Faculty

Background and Purpose:

Investigates the influence of peer-led tutorial systems in high-impact engineering modules in the Global South.



Focuses on the impact on student resilience and learning experiences.

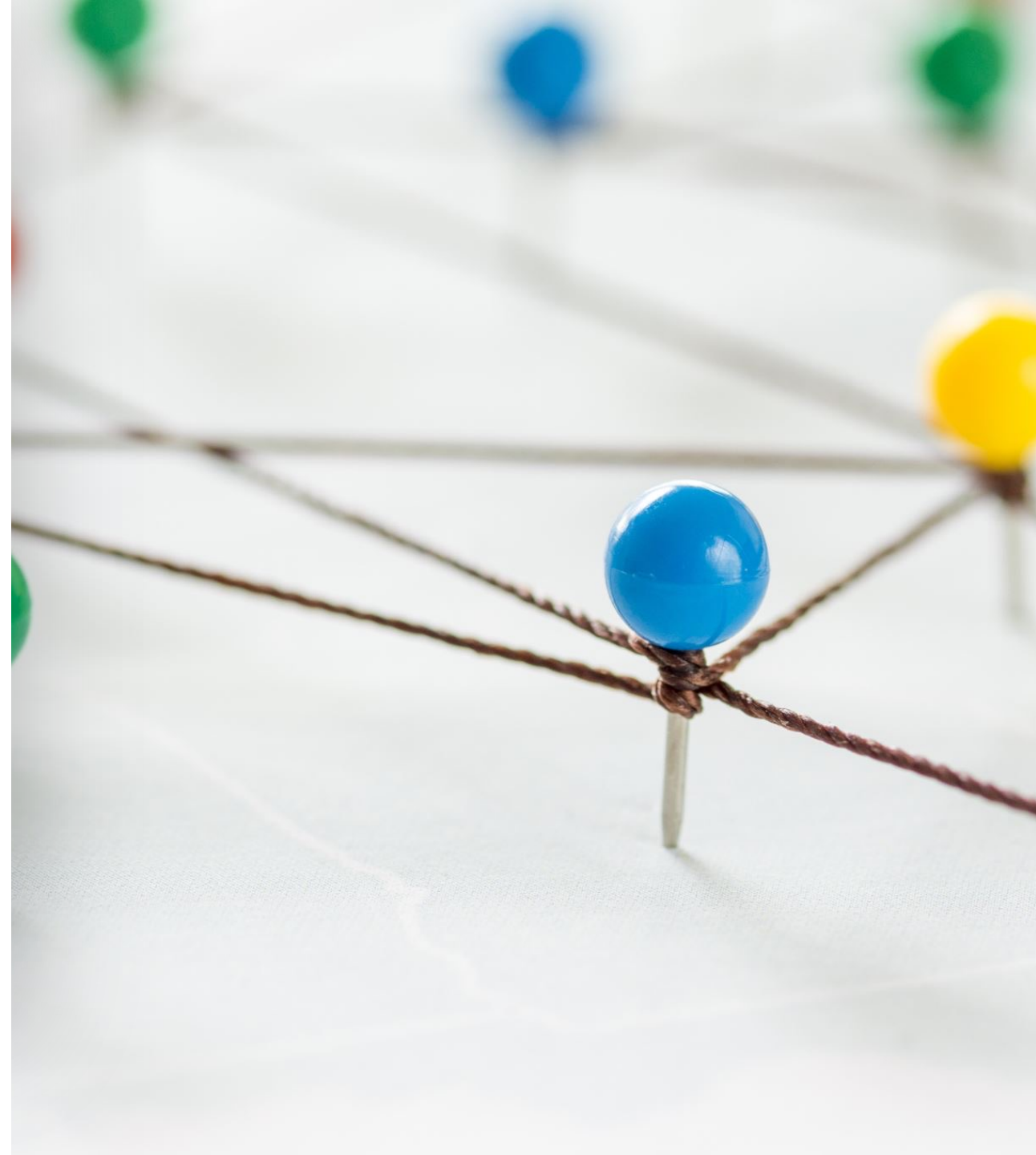


Addresses the gap in existing literature, especially in contexts where Ubuntu values are central

Theoretical Framework

Relationship-Resourced Resilience Theory:

- Explores how social connections and peer support foster resilience.
- Emphasizes the transformative impact of smaller, peer-led tutorial sessions



Methodology

Research Design:

- Mixed-methods approach combining quantitative data with qualitative insights.
- Analysis includes both academic performance metrics and thematic qualitative data.



Implementation

Pilot and Modification:

- 2022 pilot for mechanics module.
- Enhanced in 2023 with integrated tutors and structured sessions.
- Focus on interactive and approachable learning atmospheres.



Study Group Intervention

Study Leaders:

- Selected based on academic performance.
- Trained to facilitate group interactions rather than direct instruction.
- Sessions started earlier in the semester and included additional tutors



Data Collection and Analysis

Quantitative:

- Academic performance metrics: semester and final grades, attendance records.
- Comparison of performance before and after intervention

Qualitative:

- Online surveys, focus groups, post-intervention interviews.
- Thematic analysis to identify patterns and themes

Quantitative Results

Performance Metrics:

- Average semester grade: 49.6%
- Exam entrance: 82.0%
- Pass rate: 62.6%
- No significant correlation between tutorial attendance and grades.
- Positive trend for students attending more than eight sessions.



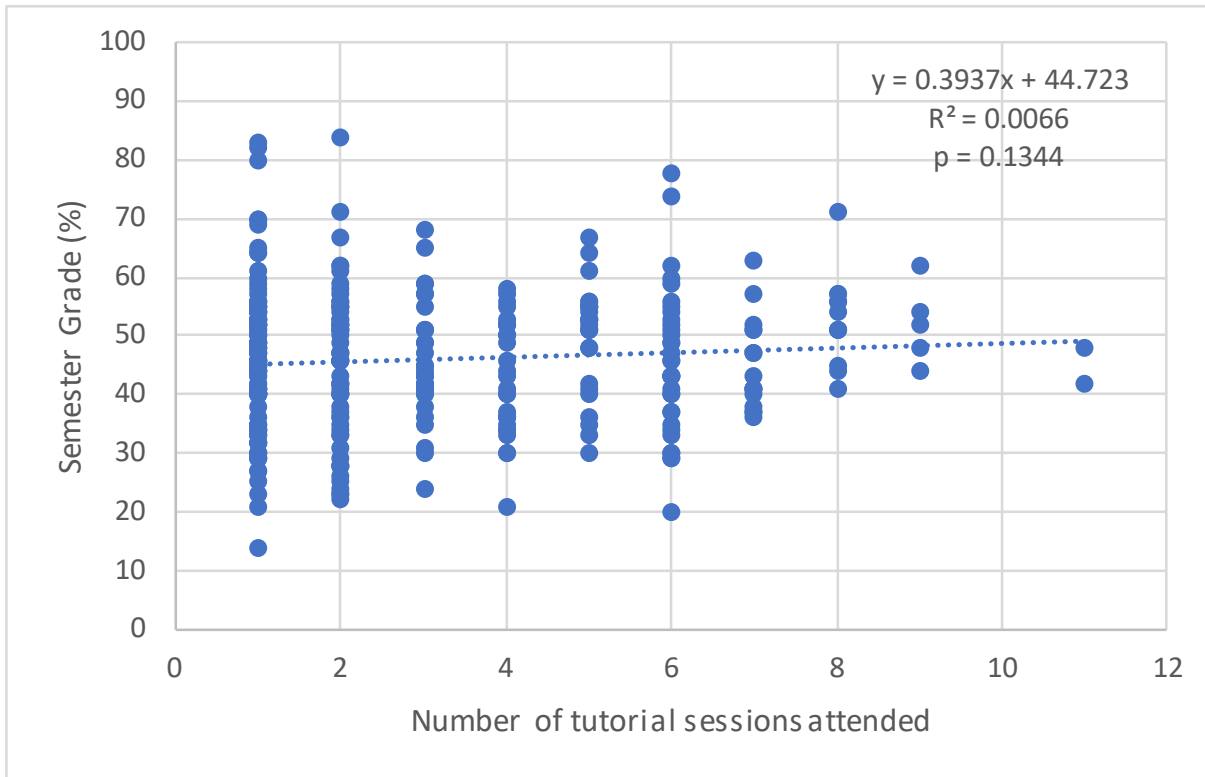
Summary of student data

	2023
Number of students	1057
Semester grade average (%)	49.6
Semester grade standard deviation (%)	12.7
Exam entrance	867(82.0%)
Pass	662 (62.6%)

Comparison of semester grade and pass rate for students attending tutorial sessions

	Number of students	Semester grade (%)	Pass rate (%)
No tutorial sessions attended	1188	48.4	49.6
At least one tutorial session attended	76	44.5	40.8

Quantitative Analysis



- **Attendance and Performance:**

- Scatter plot analysis showed no significant relationship.
- Marginal improvement in exam grades for students attending dedicated revision sessions.

Qualitative Results

- **Themes Identified:**

- ❖ Leveraging Social Connectivity
- ❖ Collective Resilience
- ❖ Optimizing Learning through Small Group Dynamics
- ❖ Fostering Inclusivity and Engagement



Leveraging Social Connectivity

- **Key Insights:**

- Peer social connection enhances learning.
- Supportive environments empower students to engage and ask questions.
- Quotes from students highlight the benefits.

“The study group sessions were very helpful. The groups were fantastic and it was nice to work with others going through what you are going through and having that support”

“The choice of students to run the study groups were was great”

“It is a good platform to help students help each other”

“We challenged each other and helped each other”

“Working on the problems with my group helped me to grasp the material more easily”

“Coming together and helping each other with the work really helped me”

“All the leaders had different approaches and strong points, so we were able to give different ways to look at a problem.”

Collective Resilience

- **Key Insights:**

- Shared experiences reduce feelings of isolation.
- Peer support provides comfort and motivation.
- Realizing common struggles fosters resilience.

“You realise that you are not the only struggling so we could comfort and support each other”

“Learning what other students who have done the module before was insightful”

“Knowing that we weren't the only ones in the class gave us hope and kept us motivated to keep going”

“I appreciated the fact that there were other people who found the module a bit tricky and were making an effort to do better”

“For some of these students it was their first time failing so it really made them lose hope, but for the students who stuck it through with the module, it really helped them to see other students also struggling”

Small Group Dynamics

Key Insights:

- Small groups facilitate comfortable learning environments.
- Students feel more confident to ask questions.
- Collaborative learning enhances comprehension of difficult concepts.

“Being helped by my classmates, they understand the struggle best and they can relate the most thus making it easy for me to learn from them and as I'm more comfortable around them I can ask as much as I want”

“Learning from other students who also find certain concepts difficult, because the lecturers don't always understand how difficult it is to grasp”

“Working in smaller groups helped us to see different ideas on how to tackle a problem”

“I enjoyed how we were all helping each other and giving each other some advice on how to tackle questions, that doesn't always happen in lectures and tutorials because the groups are too big and you feel shy to ask questions”

Inclusivity and Engagement

Key Insights:

- Increased understanding of the benefits of student communities.
- Non-residential students particularly benefited from study groups.
- Quotes highlight improved sense of belonging and support.

“I think the day students benefitted more from the study groups than the res students, because at res we have those study groups. For the day students it helped them a lot to have that support”

“It really helped me, it made me realise that working in a group helps you to not feel alone. I wish they had study groups for every module”

Discussion

Integration with Literature:

- **Aligns with previous research on peer support and academic resilience**
 - The notion of collective resilience is crucial for navigating academic challenges, a theme echoed in previous research (Davis, 2019). Our study, however, delineates how peer-led groups embody this resilience, particularly within the complexity of engineering education.
- **Emphasizes the unique socio-cultural context of the Global South.**
 - By leveraging the Relationship-Resourced Resilience Theory (Ebersöhn, 2019) and drawing parallels with Neuhaus et al. (2022) on the efficacy of peer-led Positive Psychology Interventions, we offer empirical evidence of Ubuntu-driven collectivism's role in enhancing educational outcomes
- **Highlights the importance of Ubuntu-driven collectivism.**
 - Our findings on fostering inclusivity and engagement through peer-led study groups contribute significantly to the discourse on educational interventions in the Global South. Mirroring the principles of the MindKit project (Jones Bartoli et al., 2023), our study demonstrates the psychosocial and academic benefits of creating inclusive learning communities.
 - Interventions, we offer empirical evidence of Ubuntu-driven collectivism's role in enhancing educational outcomes. This collective resilience, rooted in shared cultural values and mutual support, provides a novel perspective on overcoming educational challenges in the Global South.



Recommendations

- **Future Research:**
 - Explore scalability and long-term impacts of peer-led tutorials.
 - Investigate integration across different modules and disciplines.
- **Practical Implications:**
 - Advocate for holistic student support systems.
 - Encourage adoption of peer-led study groups in engineering education.



Conclusion

- **Summary:**

- Peer-led groups enhance learning and resilience.
- Smaller, collaborative groups provide a supportive environment.
- Study contributes to understanding educational strategies in the Global South.

- **Final Thoughts:**

- Integration of peer-led tutorials can significantly benefit academic and psychosocial development.



References

- Anderson, K., & Thompson, R. (2022). Redefining Student Success in South African Universities. [Journal Name, Volume(Issue), pages].
- Arruda, H., & Silva, É. (2021). Assessment and Evaluation in Active Learning Implementations: Introducing the Engineering Education Active Learning Maturity Model. *Education Sciences*, 11(11), 690. <https://doi.org/10.3390/educsci11110690>
- Brown, A., & Patel, B. (2020). Community Building in Engineering Education: A South African Perspective. [Journal Name, Volume(Issue), pages].
- Christie, M., & De Graaff, E. (2017). The philosophical and pedagogical underpinnings of Active Learning in Engineering Education. *European Journal of Engineering Education*, 42(1), 5-16.
- Dados, N., & Connell, R. (2012). The Global South. *Contexts*, 11(1), 12–13. <https://doi.org/10.1177/1536504212436479>
- Davis, S. (2019). Challenges and Resilience in First-Year Engineering Students. [Journal Name, Volume(Issue), pages].
- de Klerk, D. (2021). Making Known the Real: An Exploration of Academic Advising Practices in a South African Higher Education Context. *Journal of Student Affairs in Africa*, 9(2), 101-121.



Thank You !

Any Questions ?