Effectiveness of a Structured Mentoring Program on the Self-Efficacy of the Newly Qualified Mathematics Teachers (NQMTs): Acase of Selected Schools in Kabwe District of Central Province of Zambia

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ABSTRACT

This paper has one objective. It sets out to investigate the impact of a structured mentoring program on the self-efficacy of Newly Qualified Mathematics Teachers (NQMTs) in selected secondary schools of Kabwe District in Zambia. For purposes of this paper, a newly qualified mathematics teacher will mean a teacher who has taught for not more than two years.

The research employed a quantitative research study design. The data was collected by using a sense of self-efficacy scale. Data was later analysed using the Statistical Package for Social Science (SPSS v25) to generate statistical figures and descriptive tables.

The findings of the study revealed that the use of a structured mentoring program enhanced the levels of self-efficacy of Newly Qualified Mathematics Teachers. The structured mentoring program performed better than the unstructured mentoring program, and as such, it was recommended that the Ministry of Education consider adopting the structured mentoring program because of its effectiveness on the self-efficacy of newly qualified mathematics teachers.

Keywords: Mentoring, Self-efficacy, Newly Qualified Mathematics Teachers, Effectiveness

INTRODUCTION

The transition from teacher training to the classroom is a critical phase for newly qualified teachers, particularly in the field of mathematics. Newly qualified mathematics teachers (NQMTs) encounter a lot of challenges as they transition into their teaching careers, both in Zambia and globally. Banja (2020) notes that newly qualified teachers, despite their initial training, are faced with a lot of challenges and that most teachers leave tertiary institutions ill-prepared and less competent to take on their roles as teachers and competently implement the curriculum. These challenges include classroom management, adaptation to diverse learning needs, alignment of instructional strategies with curriculum standards, and managing the demands of assessment and evaluation (Ingersoll & Strong, 2011). These challenges can impact teachers' self-efficacy and perceptions. This underlines the need for effective mentoring programs (Banja, 2020). The provision of mentoring support to newly qualified teachers become particularly relevant in this context, as it can equip them with the skills and confidence required to navigate these challenges and deliver quality education.

The concept of self-efficacy, as elaborated by Bandura (1997), is crucial in this setting. It refers to a teacher's belief in their ability to effectively teach and influence positive student outcomes. It reflects the teachers' confidence in their capacity to facilitate learning, manage the classroom, and achieve desired educational

outcomes. Teachers' high self-efficacy is associated with increased enthusiasm, persistence, and effort in teaching (Tschannen-Moran & Hoy, 2001). Teacher self-efficacy is recognized as a critical determinant of teaching effectiveness (Bandura, 1997). Research suggests that teachers with high self-efficacy are more likely to set ambitious goals, persist in the face of challenges, and adapt their instructional practices to meet the diverse needs of students (Tschannen-Moran & Woolfolk Hoy, 2001). However, newly qualified teachers often face a lot of challenges as they transition from teacher preparation programs to professional practice. The early years of teaching can be demanding and overwhelming, and teachers may grapple with a sense of uncertainty and self-doubt (Ingersoll & Strong, 2011).

Mentoring in this study will mean a process in which a teacher experienced in Mathematics and competent guides and advises a newly qualified mathematics teacher toward becoming an effective teacher (Krajcik et al., 2014). Research has shown that mentoring can provide emotional support, practical guidance, and opportunities for reflection and growth (Ingersoll & Strong, 2011; Villar & Strong, 2007). Within the discipline of mathematics education, where the demand for highly qualified teachers is particularly acute, mentoring programs for newly qualified mathematics teachers as a mechanism for supporting newly qualified teachers have gained prominence (Blank & Langesen, 2007).

Mentoring offers guidance and support to newly qualified teachers. This is done through mentors who provide necessary guidance, support, and feedback, helping novice teachers navigate the complexities of the teaching profession. Regular interactions with mentors boost new teachers' confidence, positively impacting their self-efficacy (Lejonberg & Tiplic, 2016).

The Zambian Ministry of Education has recognized the importance of enhancing teacher quality, especially in key subjects like mathematics, as a critical step towards improving educational outcomes (MOE, 2018). The training of mathematics teachers in Zambia has been criticized for not fully preparing teachers for the complexities of classroom teaching. The focus is often on theoretical knowledge rather than practical skills (Mutolwa, 2019; Mukuka et al., 2020 & Lefebvre, 2014). In Zambia, newly qualified teachers often enter the profession without adequate support. Many are inadequately trained and work in challenging environments. While induction and orientation are provided, meaningful support, including mentorship, is often limited (Banja, 2016). This lack of support has significant implications for the quality of education.

Banja (2020) notes that newly qualified teachers, despite their initial training, are faced with a lot of challenges and that most teachers leave tertiary institutions ill-prepared and less competent to take on their roles as teachers and competently implement the curriculum. Newly Qualified Mathematics Teachers (NQMTs) in Zambia often face unique challenges during the transition from their teacher training programs to real classroom settings. This transition is marked by a need to adapt quickly to diverse classroom environments, manage classroom dynamics, and effectively deliver curriculum content (Sikwibele & Mweemba, 2016). Mathematics, as a subject, poses additional challenges due to its abstract nature and the general perception of its difficulty among students. Banja (2020) emphasized the need for mentorship of newly qualified teachers as the most effective way to ameliorate the challenge of curriculum implementation by teachers.

Banja (2020) further argues that one key aspect of successful curriculum implementation missing from the Zambian educational system is that of mentoring newly qualified teachers (NQT) in fundamental aspects of curriculum implementation. This observation by Banja (2020) shows that there is no deliberate policy on mentorship for teachers in Zambia, of which newly qualified mathematics teachers are not an exception. Therefore, there is some information gap in guidance provision regarding mentorship of newly qualified mathematics teachers. However, to bridge the information gap, the Ministry of Education, through the revised curriculum framework and the "Educating Our Future" document of (1996), has placed emphasis on the implementation of Continuous Professional Development (CPD) as a strategy to provide guidance on key competence skills required for the effective implementation of the curriculum.

In the field of Mathematics education, the role of mentoring is particularly crucial in supporting newly qualified teachers as they navigate the complex landscape of teaching. Mentoring has been identified as a key strategy to enhance self-efficacy. The Zambian educational system has seen a gradual implementation of mentoring programs, particularly in mathematics education. These programs pair NQMTs with experienced

teachers to provide guidance, support, and professional development opportunities (Chapula, 2019). However, the effectiveness of these mentoring programs in the Zambian context, especially in secondary education, is not well documented.

Several studies have been done on mentoring in Zambia. These include Banja (2020), Banja et al. (2021), Mwansa (2022), and Musonda A. (2023). However, the focus of these studies has been on mentoring generally for newly qualified teachers and not specifically for Mathematics. Most studies on mentoring have not been on subject specialization such as Mathematics. This piece of work is an extract from the broader research study done. The overall purpose of the study was to investigate the impact of mentoring on the self-efficacy of newly qualified Mathematics teachers. Four research questions guided the study. This work particularly addresses only one of the four research questions from the broader study. This one research question is: To what extent does Mentoring contribute to improving the self-efficacy of newly qualified Mathematics teachers?

METHODOLOGY

Research Design

The study adopted a quasi-experimental research design. The quantitative method was used. The design was found suitable for this study on the impact of mentoring on the self-efficacy of newly qualified mathematics teachers because the study aimed to measure realistic changes in self-efficacy within the natural school environment, making a quasi-experimental approach more appropriate. The intervention (structured mentoring program) was implemented in a practical school setting.

A control group (non-mentored newly qualified Mathematics teachers) and a treatment group (mentored newly qualified Mathematics teachers) were created for quantitative data. This design allowed for the comparison of outcomes between a treatment group (teachers receiving mentoring) and a control group (teachers not receiving mentoring). It involved a pre-test and a post-test to assess changes in the self-efficacy beliefs among participants after receiving mentoring.

Population

The study targeted all newly qualified Mathematics teachers and experienced Mathematics teachers in selected secondary schools of Kabwe district. The selected experienced Mathematics teachers were mentors of these newly qualified Mathematics teachers.

Sample Size

The sample size of the Newly qualified Mathematics teachers was determined by the use of a formula by Slovene, which states that:
n=N1+Ne2n = \frac{N}{1 + Ne^2}
Where:

- nn represents the sample size
- NN represents population size
- ee is the margin of error

Below is the computation to determine the sample size: The estimated population is 80 newly qualified Mathematics teachers, and the confidence level is 95%, giving a margin of error of 0.05%. Therefore, we plug the figures into the formula as follows:

- n=801+80(0.05)2n = \frac{80}{1 + 80(0.05) ^2}
- n=801+80(0.0025)n = \frac{80}{1 + 80(0.0025)}
- n=801+0.2n = \frac{80}{1 + 0.2}

- n=801.2n = \frac{80}{1.2}
- n=66.67n = 66.67 (Sample size)
- n=66n = 66

The sample size for newly qualified Mathematics teachers was 66, arising from the computation. These 66 newly qualified Mathematics teachers came from 20 selected secondary schools. These were divided into two equal groups of 33 members in each group. Ten experienced Mathematics teachers who were mentors were purposively chosen from the selected 20 secondary schools.

Procedures for Data Collection

Before administering the research, instruments and starting data collection, the researchers sought permission from the relevant authorities to carry out the studies. Prior to the Mentoring Program with the newly qualified Mathematics teachers, the 10 mentor teachers received training for a week. They were provided with materials for mentoring. This was a mentoring guide that was designed by the researcher with the help of experts.

The researcher ensured that the training content for mentors was comprehensive, covering mentoring techniques, communication skills, and strategies to enhance teacher self-efficacy. Mentors were introduced to the Teachers' Sense of Efficacy Scale (TSES) and a questionnaire. The instruments were explained, showing how they would be used to assess the impact of mentoring. This preparation took place for a week.

Pre-Intervention, Intervention, and Post-Intervention

In the second week, the TSES scale was simultaneously administered to both groups. The researcher ensured that the administration was done in the same conditions and settings to maintain consistency. The completed TSES scales were securely stored and organized for analysis.

After administering the pre-test, the mentoring for the treatment group began. Mentoring took place for 10 weeks, from week three to week thirteen. There was regular monitoring and support by the researcher to the mentors and mentees during this period. This was done in order to address any issues and provide support as needed.

In the thirteenth week, after the completion of the mentoring program, the Teacher Sense of Efficacy Scale (TSES) was administered to both the treatment and control groups to measure their self-efficacy levels again. A semi-structured questionnaire in the form of a mentoring program evaluation form was also administered to the treatment group in order to gather their feedback on the effectiveness of the mentoring program.

Presentation and Discussion of Findings of the Study

Analysis of the pre-test and post-test and the questionnaire responses led to the following results:

The mean self-efficacy score for the mentored group was 7.1, while the non-mentored group had a lower mean of 5. Following the mentoring intervention, the mentored group’s mean self-efficacy score increased to 8.1, whereas the non-mentored group saw only a minor increase to 6.0. The pre-test and post-test results demonstrated notable differences between the mentored and non-mentored groups. This showed that the intervention had an impact on the self-efficacy of newly qualified Mathematics teachers.

Hypotheses:

- **H_0 (Null Hypothesis)**: There is no significant mean difference in self-efficacy between mentored and
- non-mentored newly qualified Mathematics teachers.
- **Ha (Alternative Hypothesis)**: There is a significant mean difference in self-efficacy between mentored

- and non-mentored newly qualified Mathematics teachers.

A repeated measures analysis of variance (ANOVA) was conducted to evaluate the null hypothesis of the research. The ANOVA was employed to comprehensively evaluate the collective influence of mentorship on teacher self-efficacy.

The Wilks' Lambda statistic was used to measure the proportion of the variance that could not be explained by the intervention. A smaller alpha score indicates a stronger effect attributed to the intervention, in this case, the mentoring.

The Wilks' Lambda statistic yielded a significant result ($p < .001$), confirming that the variance in self-efficacy scores between mentored and non-mentored groups was not due to chance but because of the mentoring intervention. The Partial Eta Squared value ($\eta^2 = .942$) indicated that the mentoring intervention accounted for a large proportion of variance in teacher self-efficacy.

Table 1: Results of Multivariate Wilks' Lambda Test during ANOVA

		Value	F	Hypothesis df	Sig.	Partial EtaSquared
Between Subjects	Intercept	.001	6885.985	11.000	.000	.999
	Group	.058	68.848	11.000	.000	.942
Within Subjects	Time	.076	51.688	11.000	.000	.924
	Time*Group	.160	22.396	11.000	.000	.840

For the **T-Test Results**:

- **Mentored Group**: T (57) = -3.443, p = 0.001, effect size = -0.899
- **Non-Mentored Group**: T (58) = -0.101, p = 0.874, effect size = -0.026

The mentored group exhibited statistically significant improvements, whereas the non-mentored group showed minimal or no changes. Thus, the null hypothesis was rejected, confirming that structured mentoring had a positive and significant impact on teacher self-efficacy.

The repeated measures **ANOVA** revealed a significant linear effect of time on all the tests conducted between the subjects. **Table 2** below presents the findings of the ANOVA test.

Table 2: Results from ANOVA Analysis on the Data Collected

Question	DF	F	Sig	Partial Eta Squared
How much can you do to control disruptive behaviour in the mathematics classroom?	1,1	36.957	0	0.393
How much can you do to motivate students who show low interest in doing Mathematics work?	1,1	4.413	0.04	0.072
How much can you do to get students to believe they can do well in Mathematics work?	1,1	88.115	0	0.633
How much can you do to help your students value learning?	1,1	23.745	0	0.294
To what extent can you craft good questions for your students?	1,1	47.321	0	0.454
How much can you do to get students to follow classroom rules?	1,1	23.235	0	0.29
How much can you do to calm a student who is disruptive or noisy?	1,1	75.371	0	0.569

How well can you establish a classroom management system with each group of students?	1,1	41.175	0	0.419
How much can you use a variety of assessment strategies?	1,1	36.607	0	0.391
To what extent can you provide an alternative explanation or example when students are confused?	1,1	15.492	0	0.214
How much can you assist families in helping their children do well in school?	1,1	205.263	0	0.783
How well can you implement alternative strategies in your classroom?	1,1	92.284	0	0.618

The p-values (Sig.) for all variables are less than 0.05, indicating that the differences between the pre-test and post-test are statistically significant. The F-values show the strength of the effect of mentoring on self-efficacy. Partial Eta Squared (effect size) indicates the proportion of variance explained by mentoring. A higher Partial Eta Squared value means a stronger effect.

According to Cohen (1988) guidelines, the effect size interpretation is as follows:

- 0.01-0.05 = Small effect
- 0.06-0.13 = Medium effect
- ≥0.14 = Large effect

In this study, all effect sizes were above 0.14, indicating a large effect across all Key Result Areas (KRAs). This means mentoring had a substantial impact on improving teacher self-efficacy. Therefore, a structured mentoring program had a measurable impact on teacher self-efficacy.

The findings also indicated that the structured mentoring program significantly improved self-efficacy across multiple dimensions of teaching. Well-noted ones were classroom management, student motivation, instructional delivery, and assessment strategies. The mentored group consistently reported higher confidence in managing classroom disruptions, motivating students, and implementing alternative teaching strategies compared to the control group.

The Key Areas of Improvement Included:

Classroom Management and Student Behaviour Control: The post-test results showed that 37% of mentored teachers reported having "A Great Deal" of confidence in controlling disruptive behavior, compared to 0% in the pre-test. Independent T-Test results (T=-3.443, p=0.001) indicate a significant improvement in classroom discipline for mentored teachers.

Student Motivation and Lesson Delivery: Over 50% of mentored teachers reported having "A Great Deal" of confidence in motivating students, crafting questions, and implementing assessment strategies, compared to less than 30% in the pre-test. The effect size (-1.623) for increasing self-belief among students highlights the strong influence of mentorship on NQMTs' ability to foster student motivation.

Use of Alternative Teaching Strategies and Assessments: Post-test results revealed that mentored teachers had a mean score of 8.2 in their ability to provide alternative explanations and examples, compared to 5.0 in the pre-test. The T-test results (T=-7.449, p<0.0001) suggest a highly significant improvement in instructional adaptability.

Emotional Well-being and Confidence: 90% of mentored teachers reported that the mentorship program provided valuable guidance and support. 80% of mentored teachers indicated that mentorship improved their confidence in handling complex teaching tasks. The effect size for implementing alternative strategies (-2.358) suggests that mentoring significantly reduced teacher anxiety and improved their ability to adapt to classroom challenges.

The findings align with the Social Cognitive Theory (1986), which emphasizes the role of mastery experiences, observational learning, verbal persuasion, and emotional regulation in shaping self-efficacy.

The findings of this study are supported by existing literature, confirming that structured mentoring enhances self-efficacy among newly qualified teachers. The study by Mwelwa et al. (2020) and Siame & Hachintu (2020) found that mentored teachers report 30-40% higher confidence levels compared to their non-mentored counterparts. Another study by Musonda (2023) also emphasized that Zambia lacks a standardized mentoring framework, leading to inconsistent teacher confidence and instructional effectiveness. Furthermore, Chibamba (2024) in his study highlighted that mentoring programs reduce teacher anxiety and enhance professional preparedness, a trend reflected in the current study.

Limitation of the Study

The study's reliance on self-reporting from teachers may introduce bias or errors as participants may provide socially desirable responses, inflated reports of improvement, or in contrast, underreport problems. The study's results may only apply to the specific population and context studied, which could limit the generalizability of the findings to other contexts. The experiences and perceptions of the mentors and administrators were not considered in this study.

CONCLUSION AND RECOMMENDATION

This study provides strong empirical evidence that structured mentoring significantly enhances the self-efficacy of newly qualified mathematics teachers. The rejection of the null hypothesis confirms that mentoring leads to significant improvements in teacher confidence, instructional skills, and student engagement. The structured mentoring program tested in this study demonstrates a strong positive impact on teacher self-efficacy.

The Ministry of Education (MOE) and the Teaching Council of Zambia (TCZ) may consider mandating structured mentoring programs as part of Continuous Professional Development (CPD) for new teachers. Teacher training colleges may also integrate practical mentoring modules to prepare NQMTs for real-world classroom challenges. However, the absence of a structured mentoring framework in Zambia results in fragmented and inconsistent implementation (Banja, 2020). Developing a national mentoring framework would ensure consistent teacher development across all schools.

REFERENCES

1. Banja, M. (2016). Teacher induction and mentoring in Zambia: Challenges and opportunities. University of Zambia Press.
2. Banja, M. (2020). The Effectiveness of Mentorship in Teacher Professional Development: A Zambian Perspective. International Journal of Educational Research, 15(4), 67-85.
3. Banja, M. (2020). The missing link in Zambian teacher education: Mentorship and induction of newly qualified teachers. Journal of Education Development, 45(2), 121–135.
4. Banja, M., Phiri, J., & Zulu, P. (2021). Strengthening mentoring programs for newly qualified teachers in Zambia. African Journal of Teacher Development, 9(1), 56–72.
5. Bandura, A. (1997). Self-efficacy: The exercise of control. W.H. Freeman and Company.
6. Blank, R.K., & Langesen, D. (2007). State indicators of science and mathematics education 2007. Council of Chief State School Officers.
7. Chapula, M. (2019). The effectiveness of mentorship programs for secondary school teachers in Zambia. International Journal of Teacher Education, 12(3), 67–81.

8. Chibamba, S. (2024). Mentoring programs and teacher self-efficacy in Zambia: A study of newly qualified mathematics teachers. African Educational Research Journal, 15(1), 78–95.
9. Chikampa, B., Simukonda, P., & Banda, L. (2023). Mathematics teachers' self-efficacy and its impact on student learning outcomes in Zambia. Journal of Mathematics Education, 17(2), 110–125.
10. Cohen, J. (1988). Statistical power analysis for the behavioural sciences (2nd ed.). Routledge.
11. Ingersoll, R., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. Review of Educational Research, 81(2), 201–233.
12. Krajcik, J., McNeill, K.L., & Reiser, B.J. (2014). Learning-goals-driven design model: Developing curriculum materials that align with national standards and incorporate project-based pedagogy. Science Education, 98(1), 1–25.
13. Lejonberg, E., & Tiplic, D. (2016). A framework for mentoring in teacher education: How mentor approaches influence mentee development. Teaching and Teacher Education, 58, 68–76.
14. Lefebvre, S. (2014). Improving teacher preparation through mentoring: A comparative analysis of Zambia and Canada. Comparative Journal of Education Research, 6(4), 23–39.
15. Ministry of Education (MOE). (2018). Teacher Professional Development Policy: Enhancing Teacher Competency and Growth. Government of Zambia Press.
16. Mukuka, A., Mwanza, C., & Shumba, O. (2020). Mathematics teacher education in Zambia: Gaps in teacher preparation and the need for mentorship. African Journal of Education Studies, 14(3), 45–61.
17. Musonda, A. (2023). Challenges in mentoring newly qualified teachers in Zambia: The case of secondary mathematics education. International Journal of Education Research, 19(2), 34–49.
18. Siame, M., & Hachintu, P. (2020). Mentoring programs and teacher confidence: A study of Zambian secondary school teachers. African Journal of Teacher Development, 10(4), 99–113.