



Extent to which Collaboration Management Strategy is Employed by Heads of Public Secondary Schools Enhances Teaching and Learning of the Mathematics Subject in Iringa Region, Tanzania

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Abstract: *This study examined the Extent to which the Collaboration Management Strategy Employed by Heads of Public Secondary Schools Enhances Teaching and Learning of Mathematics Subjects in Iringa Region, Tanzania. Guided by the System Theory by Ludwig Von Bertalanffy (1940s) and Contingency Theory by Frid Fiedler (1960s). The study adopted a convergent design using a mixed-methods approach. The target population 9,898 included QAs, DSEOs, HoSs, mathematics teachers, and Form Four students. A sample of 434 participants was selected using census and total population sampling, and data were collected through interview guides, questionnaires, and observation checklists. Instrument validity was ensured through expert review, while reliability was ensured using Cronbach's alpha technique, which yielded a coefficient of 0.857 for mathematics teachers and 0.815 for students, as well as inter-coder agreements for qualitative tools. Quantitative data were analyzed using descriptive statistics, and qualitative data through thematic analysis. The Ethical research was considered. Findings indicated that heads of public schools ensured collaboration to a high extent through departmental meetings, inter-school mathematics clubs, mentoring programs, and parental involvement. However, time shortages, teachers, and resources hinder consistent and effective implementation. The study concludes that Heads of Schools collaborate with mathematics teachers to a high extent through departmental meetings, mathematics clubs, teachers' mentorship, and parental involvement, which enhance teaching quality. The study recommends that the MoEST should institutionalize structured collaborative teaching under the MEWAKA, support fund, and teacher capacity building, to ensure sustainable collaboration and enhance the teaching and learning of mathematics subjects.*

Keywords: Management, Strategies, Mathematics, Collaboration, Enhance.

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1. Introduction

Education benefits everyone in society and is therefore considered a public good, with the state as the primary duty bearer responsible for ensuring it is available, accessible, and of good quality. However, providing quality education is not solely the state's job; it requires collaboration among various stakeholders, including civil society organizations, teachers, private sector partners, communities, families,

young people, and children. This shared responsibility calls for inclusive participation in developing and implementing education policies and programs, ensuring all voices are heard. The state is essential in setting and enforcing rules, standards, and norms such as curriculum guidelines, teacher qualifications, and school safety measures to ensure the education system is fair, equitable, and meets quality expectations. At the same time, society as a whole actively contributes to its success (UNESCO, 2015).

The collaboration strategy intervention benefited teachers and students. Mathematics teaching and learning involve fostering a collaborative culture, establishing professional learning communities, supporting peer observation and mentorship, and ensuring access to shared instructional resources (Mathias et al., 2024). Collaboration as a management strategy has been widely recognized as a critical factor in improving teaching and learning outcomes, particularly in mathematics. In Malaysia, collaboration reduced professional isolation, improving teachers' collective pursuit of professional improvement to enhance teaching and learning mathematics (Mohd Zabidi et al., 2023). In Saudi Arabia, engaging in lesson study has positively impacted improving students' mathematics teaching and learning (Ma & Marion, 2021). Mathematics teachers' support significantly positively affects mathematics performance in Finland and Denmark. In contrast, ability grouping for mathematics classes and student disruptive behaviors significantly negatively impact mathematics performance for Singapore and Korea (Niu et al., 2025). Research shows that when heads of schools actively promote teamwork through professional learning communities, shared decision-making, and peer mentoring, they create an environment that supports teachers' professional growth and fosters problem-solving approaches in mathematics education. In most developing countries, the implementation of strategies faces challenges due to inadequate training for school heads, resource constraints, and resistance to change.

In Africa, the importance of collaborative management in schools has been increasingly emphasized in education policies and reform agendas. The professional development workshop in Chile promoted collaborative problem-solving activities for mathematics in the classroom. Teachers collaborated with a monitor to solve a new mathematics problem and created a problem-solving activity (Saadati & Felmer, 2021). In Rwanda, collaboration positively benefitted teachers and student face-to-face interaction and group accountability, with 71.9% interaction encouraging collaboration and problem-solving and fostering a positive learning environment (Bugingo & Hesbon, 2024). In Ghana, the unsuccessful implementation of STEM practices in Public secondary and Vocational-Technical Schools was mainly due to inadequate teaching-learning materials, a shortage of certified STEM teachers, a lack of dedicated infrastructure, limited professional development and curriculum, restricted access to technology, and insufficient teaching time for STEM subjects (Bardoe et al., 2023).

In East Africa, collaborative management strategies in education have gained attention as governments strive to improve STEM education, particularly mathematics.

Evidence from the region shows that schools where heads embrace participatory decision-making and foster teamwork among staff tend to record higher mathematics performance. Nevertheless, many heads of schools still rely on top-down management approaches, limiting teachers' engagement in curriculum planning and problem-solving. Large class sizes, limited ICT integration, and scarce opportunities for teacher professional development in mathematics compound this challenge.

The Tanzanian government's education policies and development programs emphasize collaborative management as a key strategy for improving mathematics education. In Tanzania, the government has recognized the role of collaborative management in strengthening mathematics education, as reflected in the Education and Training Policy and the Secondary Education Development Programmes (SEDP I, II, and III) Education Sector Development Plan 2025/26 – 2029/30 agenda emphasizes the need for targeted interventions to bridge existing gaps, and it highlights the importance of teacher training, curriculum development, and the provision of adequate learning resources, recognizing these as fundamental components in achieving sustainable educational improvements, however, the underinvestment poses a significant challenge to improving teaching quality and ensuring effective learning outcomes at all levels (URT, 2025). Despite these policy directives, reports from the Tanzania Institute of Education and the National Examinations Council indicates persistent underperformance in mathematics at the secondary school ordinary level of the National Examination Council of Tanzania (2021, 2022 and 2023) in the analysis reports of students' performance in mathematics subject indicates low performance in four years from 2019, 20.03%, 2020, 20.12%, 2021, 19.54%, 2022, 20.08% (URT, 2023), and 2023, 25.4% BEST (2024). This raises concerns about adequate collaborative leadership training and their ability to enhance an effective collaboration strategy.

In the Iringa region, mathematics remains one of the most challenging subjects in public secondary schools, with national examination results showing consistently low pass rates. The Iringa Regional Education Office's mathematics performance trend for three years, from 2021, was 15.11%, in 2022, 17.04%, and in 2023, 16.08% (Iringa Educational Officer, 2023). These harmed the national economy by causing shortages in skilled workers, especially in fields like engineering and mathematics. This limits innovation, reduces productivity and economic growth, and restricts access to higher education. Overburdened teachers due to staff shortages reduce the effectiveness of collaborative efforts (Mremi, 2023). As a result, the potential of collaboration to transform mathematics teaching and learning in the region is far from fully realized. However, the extent

to which collaboration is supported to enhance teaching and learning mathematics in public secondary schools is among the themes that the present study addressed.

1.1 Statement of the Problem

Despite the effort made by the government to improve management strategies to enhance teaching and learning of the mathematics subject. The role of public secondary school heads in enhancing teaching and learning mathematics in Iringa region continues to be a problem. If this problem can not be solved, the country could continue to face the challenge of the shortage of professionals in science, engineering, statistics, and mathematics teachers. Stakeholders such as parents, students, and education officers have voiced concerns about poor teaching and learning mathematics outcomes. Previous studies such as Logation, et al. (2021); Mlawa (2024); Hossa and Wachawaseme (2023) focused on challenges hindering the leadership instructions in teaching and learning; insufficient training opportunities and effectiveness of managerial strategies respectively. None of these reviewed studies addressed on the extent to which collaborative management strategies employed by Heads of Public Secondary Schools enhance teaching and learning of Mathematics. Therefore, this study investigated extent to which collaborative management strategies employed by Heads of Public Secondary Schools enhance teaching and learning of Mathematics in Iringa Region, Tanzania.

1.2 Research Question

To what extent do collaborative management strategies employed by Heads of Public Secondary Schools enhance teaching and learning of Mathematics in Iringa Region, Tanzania?

2. Literature Review

This section reviewed the literature on the extent to which collaboration between the mathematics department, lesson preparation, teachers' mentorship, and parental involvement in school academic activities is utilized by heads of public secondary schools to enhance the teaching and learning of mathematics. It explores theoretical perspectives, focus, empirical findings, and best practices that inform effective collaborative leadership in mathematics education.

Maudia et al. (2024) explored how collaborative professional development programs can enhance the Pedagogical Content Knowledge of mathematics teachers, particularly in integrating pedagogy with content, improving teaching strategies, and addressing challenges in the classroom in Indonesia. The study used a qualitative research design with a case study approach that included in-depth interviews,

classroom observations, and document analysis. Data were thematically analyzed. The study found that collaborative professional development significantly improved teachers' ability to integrate pedagogy with content, implement innovative teaching strategies, and develop more structured lesson plans. The revised study provided new insights into the effectiveness of collaborative professional development in enhancing Pedagogical Content Knowledge among mathematics teachers. It contributes to existing knowledge by demonstrating the impact of cooperative learning on teaching strategies. It identifies key challenges, offering valuable implications for future teacher training programs. Middle school mathematics teachers were the unit of analysis affected by mathematics teaching and learning. On the other hand, using qualitative methods limited the rationality of the findings and their generalization in the broader context. The reviewed study slightly addresses the role of heads of schools' collaborative strategy. Adding a convergent research design under a mixed methods approach and utilizing questionnaires, interview guides, and observation tools enriched findings and triangulated the data on the role of head of school management collaboration strategies to enhance the teaching and learning of mathematics subjects in public secondary schools in the Iringa Region, Tanzania.

Amua & Ako, (2025). Effect of Explicit Teaching Strategy and Collaborative Learning Approach on Students' Motivation, Achievement, and Retention in Mathematics in Benue State, Nigeria. The study focused on the effect of collaborative learning and explicit teaching strategy on students' motivation, achievement, and retention in mathematics in Benue State, Nigeria. The study adopted a Quasi-experimental design and a simple random sampling technique. The Mathematics Achievement Test and the Mathematics Motivation Inventory were employed for data collection, and the data were analyzed using Mean, Standard Deviation, and Analysis of Covariance. The results showed that the collaborative learning approach improved students' motivation, achievement, and retention in mathematics more than the explicit teaching strategy. The study contributed to the knowledge of teachers and students' collaboration in teaching and learning strategies. Furthermore, provided knowledge on the data collection instruments, the Quasi-experimental design, and the simple random sampling technique. The role of heads of schools' collaborative strategy was inadequately addressed. Enriching the findings, the current study employed a convergent research design under a mixed research approach to explore the extent of the role of the head of school's collaboration strategies in enhancing teaching and learning of the mathematics subject in Iringa region.

Machisi, (2023) The study presents findings from multiple case studies undertaken in three secondary schools in South Africa's Limpopo Province. The goal was to collect input

from students on mathematics teaching practices in their classrooms. The study included a self-selected sample of eleven grade 12 students. Unstructured individual interviews and students' written reports were used to collect data, which was then analyzed based on emerging themes. Students expressed genuine concerns about teachers' lesson preparation, subject and pedagogical knowledge, classroom management, attention given to slow learners, quality of classwork and homework tasks given to students, exam preparation, class attendance, and utilization of contact time, teachers' attitudes, and their emotional intelligence, among others. The review highlighted the importance of teachers' lesson preparation for teaching and learning systems. The gap remains in how the role of heads of school management in collaborative strategies enhances teaching and learning mathematics. The current study explored the role of the head of school in ensuring collaboration strategies in enhancing teaching and learning mathematics subjects at secondary schools in the Iringa region by employing a convergent research design under a mixed research approach to fill the gap of weakness of using a single research approach by triangulating the findings.

Thabologo & Kesianye (2024) The study investigated the effectiveness of workshops on parental involvement in their children's mathematical education. The study employed a quasi-experimental design with a pre-test-post-test design. The results showed that the parental involvement level before and after the intervention marked a difference with a significant increase. Parental involvement variables such as parenting style, parental expectations, home rules, parental supervision, communication between parents and children, children's home mathematics activities, and parental attitude toward school all improved significantly. The findings further indicated that parental involvement in their child's general and mathematical learning can be improved. The reviewed study contributed on the importance of involving the parents in academic activities. However, the management strategy was inadequately discussed in the case of the roles of heads of public secondary schools. Also the reviewed study provided information on a single methodology used. Adding a convergent research design under a mixed methods approach and utilizing questionnaires, interview guides, and observation tools enriched findings and triangulated the data on the role of heads of school management collaboration strategies to enhance the teaching and learning of mathematics subjects in public secondary schools in the Iringa Region, Tanzania

Zulu et al., (2025). The study investigates the impact of a structured mentoring program on Newly Qualified Mathematics Teachers' self-efficacy in selected secondary schools of Kabwe District in Zambia. For this paper, a newly qualified mathematics teacher means 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 to generate statistical figures and descriptive tables. The study's findings revealed that using 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. The reviewed study acknowledged the importance of involving the parents in academic activities. However, the management strategy was inadequately discussed in the case of the roles of heads of public secondary schools. Also, the reviewed study provided information on a single methodology used. Adding a convergent research design under a mixed methods approach and utilizing questionnaires, interview guides, and observation tools enriched findings and triangulated the data on the role of head of school management collaboration strategies to enhance the teaching and learning of mathematics subjects in public secondary schools in the Iringa Region, Tanzania

Samuel & Nduta (2025). This study aimed to explore the influence of collaborative learning on students' performance in mathematics in public day secondary schools in Nyagatare District in Rwanda, focusing on peer learning, group discussions, and problem-solving methods. Data were collected using a questionnaire and a cross-sectional research design. Data were analyzed using descriptive statistics, correlation, and regression. A reviewed study revealed that Collaborative learning methods significantly improve students' academic performance in mathematics. Peer learning, group discussions, and problem-solving enhance understanding, self-confidence, and academic success. The reviewed study contributed knowledge to the importance of effective collaboration, teaching, and learning, and fostering a supportive and engaging community for improving student academic performance. The unit analysis was conducted on students affected by mathematics teaching and learning. On the other hand, the ability to use a cross-sectional research design limited the rationality of the findings and their generalization in the broader context. The reviewed study slightly addressed the role of heads of schools' collaboration strategy. Adding a convergent research design under a mixed methods approach and utilizing questionnaires, interview guides, and observation tools enriched findings and triangulated the data on the role of head of school management collaboration strategies to enhance the teaching and learning of mathematics subjects in public secondary schools in the Iringa Region, Tanzania.

Urio & Mwakabenga, (2025). The study examined the impact of teacher mentorship practices. It investigated the methods employed during teacher mentorship and support to mathematics teachers to facilitate collaborative learning across various learning communities linked to schools. The study employed a qualitative research approach and a case study design, using in-depth interviews and focus group

discussions to gather thematically analyzed data. The study revealed that participation in the in-service training initiative enabled mathematics teachers to form learning communities with their mentors, colleagues, students, and the broader community of educational professionals. Using social media platforms, teachers had opportunities to participate in mentorship activities in person and virtually. It was also found that a structured mentorship programme, grounded in a clear framework, could support teachers in mastering collaborative learning, thereby improving their teaching practices and assessment strategies. The review contributed to effective collaborative teaching and learning systems. The gap remains in how the role of heads of school management in collaborative strategies enhances teaching and learning mathematics. The current study explored the role of the heads of school in ensuring collaboration strategies in enhancing teaching and learning mathematics subjects at secondary schools in the Iringa region by employing a convergent research design under a mixed research approach to fill the gap of weakness of using a single research approach by triangulating the findings.

Georgina G. Mugisha et al. (2023). This qualitative case study investigated collaborative practices (CPs) among secondary school teachers, focusing on their role in enhancing teachers' professional development (PD). The research employed interviews, focus group discussions, and thematic analysis to gather and analyze data from thirty purposively selected participants in Ilala Municipality. The results revealed three prevalent CPs among secondary school teachers: coaching, teaming, and mentoring. Teachers embraced these practices to address educational challenges and enhance their teaching knowledge and skills. The reviewed study informed that teachers have more influence on students' learning mathematics. The reviewed study informed the qualitative case study approach, focus group discussion, and interview in collecting data. The reviewed study is limited to the role of the head of school's collaboration strategy in enhancing the teaching and learning of Mathematics. The current study, adding the convergent under mixed method approach, enriches the findings by triangulating the data on the role of heads of schools' selected collaboration strategies in enhancing.

Generally, the reviewed literature on the role of heads of public secondary schools' collaboration management strategy to enhance teaching and learning had a knowledge, contextual, and methodological gap. The reviewed study (Maudia et al., 2024; Amua & Ako, 2025; Urrio & Mwakabenga, 2025; Georgina G. Mugisha et al., 2023) shows that collaborative professional development, peer learning, mentorship, and group problem-solving significantly improve mathematics teaching and learning. However, most studies focus on teachers' or students' collaboration, with minimal attention to the role of heads of public secondary schools in managing such strategies. The

few studies that mention school leadership do not comprehensively examine how heads implement and sustain collaboration to enhance mathematics performance, particularly in the Tanzanian context. Methodological gap: Most studies employed a single methodology, either a qualitative or a quantitative design (Urrio & Mwakabenga, 2025; Samuel & Nduta, 2025). There is a contextual gap in most of the studies conducted outside of Tanzania. This gap calls for a convergent mixed-methods investigation in Iringa Region to triangulate findings and provide deeper insights into how heads' collaboration management strategies influence mathematics teaching and learning.

4. Methodology

This study used a convergent design and a mixed-methods approach. The target population of the study was 9,898 from 143 public secondary schools, constituting 5 DSEOs, 143 HoSs, 392 mathematics teachers, 143 heads of Mathematics departments, 9210 form four students, and four chief quality assurers (URT, 2023; Iringa Regional Educational Office, 2024). The sample size of the study was 434 participants from 10 public secondary schools, consisting of 3 DSEOs, 4 quality assurers, 10 HPSSs, 10 Heads of Mathematics departments, 39 mathematics teachers, determined by 10-30% authority (Cohen et al., 2018), and 368 form four students determined by the Yamane (1977) formula. The study used stratified random sampling and total population sampling. The data collection instruments were interviews, questionnaires, and an observation checklist. Quantitative data collection instruments were validated by 3 research experts from MWECAU, specializing in planning and administration, while qualitative data collection instruments were validated through triangulation. Pilot testing of the data collection instruments was conducted in one district, constituting 10% of the sample size. The reliability of the data collection instruments was assured using Cronbach's alpha Technique, which yielded coefficients of 0.857 for teachers and 0.815 for students, as helped by the use of SPSS version 27, while the reliability of qualitative data collection instruments was ensured through inter-coder agreements. Quantitative data were analyzed through descriptive statistics such as means and standard deviations with the aid of SPSS version 27, while qualitative data were analyzed through thematic analysis using a seven-step framework by Creswell and Creswell (2023), which allowed researchers to code, query, and visualize data. The study observed ethical considerations such as research permits, informed consent, and avoiding plagiarism.

4. Results and Discussion

The study aimed to examine the extent to which collaboration management strategies employed by heads of

public secondary schools in Iringa Region enhance the teaching and learning of mathematics. Using a convergent mixed-methods approach, perspectives were gathered from Quality Assurers (QA), District Education Officers (DEOs), Heads of Schools (HoS), and Heads of Mathematics Departments (HoD), as well as from mathematics teachers. The instruments used to collect data

were a questionnaire and an interview guide. The findings are organized thematically and interpreted through eight paragraphs corresponding to different sets of interviews and literature support. Each sub-section integrates both quantitative results and qualitative insights, interpreted in line with previous studies.

Table 1: Responses for mathematics teachers on the extent to which the collaboration Management Strategy enhances teaching and Learning Mathematics

	Very Low Extent		LOW Extent		Moderate Extent		High Extent		Very High Extent		Mean 9.00		
	f	%	f	%	f	%	f	%	f	%			
Head of school regularly uses departmental meetings to address mathematics teaching problems.	1	2.9	0	0.0	10	28.6	21	60.0	3	8.6	0	0.0	4.05
Timely mentorship from leaders or peers strengthens collaboration to enhance the teaching and learning of mathematics subjects.	0	0.0	1	2.9	14	40.0	17	48.6	3	8.6	0	0.0	3.54
Head of school regularly facilitates collaborative lesson preparation between teachers to ensure consistency, innovation, and alignment with the curriculum.	0	0.0	0	0.0	13	37.1	16	45.7	6	17.1	0	0.0	3.68
Head of school observations followed by feedback help refine and enhance Mathematics teaching and learning practices.	0	0.0	2	5.7	9	25.7	18	51.4	5	14.3	1	2.9	3.80
Head of school always uses parental meetings to ensure effective collaboration to enhance teaching and learning of the Mathematics subject.	1	2.9	2	5.7	2	5.7	19	54.3	11	31.4	0	0.0	3.68
Head of school normally encourages collaboration with private schools to enhance teaching and learning mathematics.	0	0.0	4	11.4	15	42.9	9	25.7	7	20.0	0	0.0	3.55
Head of school creates a WhatsApp group platform to foster timely discussions about mathematics-related teaching and learning activities.	1	2.9	2	5.7	15	42.9	10	28.6	6	17.1	1	2.9	4.05
Head of school often ensures the inter-school club to enhance teaching and learning of the mathematics subject	1	2.9	1	2.9	12	34.3	15	42.9	5	14.3	1	2.9	3.54
Heads of Schools actively collaborate with mathematics teachers in school committees to enhance the teaching and learning of the mathematics subject.	0	0.0	3	8.6	14	40.0	13	37.1	4	11.4	1	2.9	3.68
Head of School frequently cultivates a supportive environment that promotes effective collaboration with mathematics teachers to improve the teaching and learning of mathematics.	2	5.9	2	5.9	10	29.4	15	44.1	5	14.7	0	0.0	3.80
Grand mean													3.73

Source: Field Data (2025)

Data from Table 1 reveal that 2.9% of teachers rated the head of schools organization of mathematics departmental meetings at Very Low Extent (VLE), 0% at Low Extent (LE), 28.6% at Moderate Extent (ME), 60.0% at High Extent (HE), and 8.6% at Very High Extent (VHE), resulting in a mean score of 4.05, indicating that the strategy was implemented to a high extent. This shows that heads of schools played an active role in ensuring that mathematics departmental meetings were held regularly as part of professional development and collaborative teaching improvement. The high percentage of respondents at the high and very high levels (68.6%) implies that departmental meetings have become institutionalized as a key mechanism for addressing teaching challenges, reviewing lesson plans, and sharing effective teaching and learning strategies. These meetings strengthen collegial relationships among mathematics teachers and foster a reflective culture of continuous improvement in lesson delivery and student learning outcomes.

Qualitative evidence strongly reinforces the quantitative results. Quality Assurance Officers (QA1) confirmed that heads of schools ensured consistency in holding departmental meetings under MEWAKA programs, where teachers collaboratively analyzed complex topics, shared solutions, and refined lesson planning and delivery approaches (QA1, 20th June 2025). Similarly, District Education Officers (DEO2) affirmed that departmental collaboration was actively encouraged at school and cluster levels through structured sessions and follow-up supervision, enabling teachers to identify learning gaps and adopt innovative teaching methods. *“In the district, departmental collaboration is mostly emphasized through MWEWAKA-encouraged meetings at the school level, sometimes in the cluster levels. Mathematics teachers share experiences in challenges and adjust lesson delivery to improve outcomes”* (DEO2, 2nd Jul 2025).

From the Heads of Schools (HoSs) perspective, these meetings formed the backbone of instructional leadership by promoting teamwork, peer mentoring, and shared problem-solving, sometimes extending to inter-school and cross-departmental collaborations. HoS1 said that departmental collaboration is where various challenges and difficulties are identified. *Our school holds regular departmental meetings where teachers analyze lesson plans and identify challenges, ensuring consistency in teaching approaches”* (HoS1, 8th Jul 2025). Furthermore, HoS9 shows that collaboration among the mathematics teachers is crucial for enhancing teaching and learning mathematics, where teachers meet in the department and one-to-one, teachers share various issues concerning mathematics. However, a few teachers and a shortage of time limit the effectiveness of departmental collaboration within and outside the schools.

Teachers collaborate through departmental and individual meetings. Since there are only two mathematics teachers, each plans individually for their classes. They only collaborate when facing challenges in certain topics. Currently, this peer support strengthens lesson planning and leads to improved student outcomes. (HoS9, 22nd Jul 2025).

Heads of Mathematics Departments (HMD1) emphasized that heads of schools facilitated discussions focused on difficult topics, syllabus coverage, and assessment analysis, leading to improved student performance and teacher confidence (HMD1, 8th July 2025). Also, HMD2 respondents stated that the heads of school collaborate with mathematics teachers in departments or with individuals. However, time becomes a barrier to ensuring consistent collaboration; sometimes, the teachers' resistance also limits the collaboration among teachers.

He communicates both individually and through departments. However, Time is a big challenge because the Head has many responsibilities. Readiness of teachers to meet in the department is always another challenge. Collaboration enhances confidence in lesson delivery and strengthens students' learning performance (HMD2, 9th Jul 2025)

The data reveal that the collaboration was seen as crucial and well ensured by the heads of school to enhance teaching and learning of the mathematics subject. However, the shortage of teachers, time, many activities, and the rejection of teachers were found to be difficult to ensure consistent collaboration among teachers and the heads of schools.

The findings revealed that both quantitative and qualitative data confirm that to a high extent, with a mean score of 4.05 the heads of schools ensured that departmental collaboration is central to enhancing mathematics teaching and learning; however, in some extent lacked the consistence of ensuring the departmental collaboration which cosed by the shortage of teachers, time limits and redness of teachers to collaborate with other teachers. This finding aligns with (Samuel & Nduta, 2025b), which recognizes that collaborative teaching and learning methods through peer learning, group discussions, and problem-solving enhance understanding, self-confidence, and overall academic success. Also, URT (2023), frameworks recognize collaborative professional learning as a key driver of instructional quality and improved academic outcomes in secondary education.

In case of Parental collaboration in enhancing teaching and learning mathematics subject in secondary schools, the data from Table 1 reveal that 2.9% of teachers rated Very Low Extent (VLE), 5.7% Low Extent (LE), 5.7% Moderate Extent (ME), 54.3% High Extent (HE), and 31.4% Very High Extent (VHE), resulting in a mean score of 3.68, indicating a high extent of involvement of parents in schools meetings. The majority who participated in this study indicated that heads of schools consistently utilize parental meetings as a key collaborative strategy to enhance the teaching and learning of mathematics. The questionnaires demonstrate that nearly 86% of teachers rated high and very high extent agreed that such meetings were frequently held and effectively linked to teaching and learning enhancement. These create opportunities for heads of schools to discuss learners' academic progress, share learning outcomes, and mobilize parental involvement in providing materials such as mathematical sets, mathematics reviews, and exercise books for enhancing students' learning. The moderate responses (5.7%) suggest that although most schools organize these meetings regularly, a few face challenges such as inconsistent parental attendance or limited contributions, sometimes limiting collaboration within schools. Largely, the data imply that parental engagement through meetings strengthens accountability, improves home-school collaboration, and contributes to a more supportive teaching and learning environment for mathematics.

The quantitative data agreed with Quality Assurance Officers (QAs) confirmed these data, noting that heads of schools consistently organize meetings that align parents with academic objectives. QA1 explained that heads of schools organize such meetings at least twice yearly to report mathematics performance and seek support, which helps learners to remain committed to learning mathematics (QA1, 20th Jun 2025). QA2 highlighted that parents often cooperate with schools through contributing to remedial classes and teacher inspiration, reinforcing mathematics teaching quality (QA2, 24th Jun 2025). This parental meetings collaboration highly enhances teaching and learning mathematics. Similarly, District Education Officers (DEOs) confirmed that parental meetings foster shared responsibility between schools and communities. DEO1 stated that heads of schools use these gatherings to present examination results and design support strategies for mathematics, which prompts students and aligns school goals with parental expectations. *Heads of schools consistently involve parents in meetings where examination results are shared and strategies to support mathematics are discussed. This collaboration motivates students and strengthens curriculum alignment*" (DEO1, 1st Jul 2025). DEO2 added that such collaboration encourages parents to contribute resources for remedial teaching, directly enhancing mathematics teaching and learning outcomes (DEO2, 2nd Jul 2025). DEO3

emphasized that these meetings help monitor attendance and academic performance, strengthening accountability and cooperation between home and school. *"Conversely, District officers report that schools engage parents through regular meetings to monitor attendance and mathematics performance. These forums build accountability and promote collaboration in lesson delivery"* (DEO3, 2nd Jul 2025). These perspectives confirm Ngusa and Mfaume (2024). This implies that heads of schools highly collaborate with parents in meetings, build transparency, and reinforce shared accountability for enhancing teaching and learning mathematics.

Moreover, most heads of schools (HoSs) offered strong qualitative evidence supporting the survey results. HoS1 noted that parental collaboration meetings help discuss student progress and encourage home-based academic follow-up, thus enhancing teaching consistency. *"In my school, parents' meetings are held regularly to discuss students' progress, particularly in mathematics, and to encourage them to provide home support. This strategy strengthens accountability and enhances curriculum implementation"* (HoS1, 8th Jul 2025). Likewise, HoS2 reported that quarterly collaboration meetings foster mutual accountability, encouraging teachers and learners. *"We engage parents through monthly meetings, where mathematics results are shared and solutions are discussed. This collaboration builds responsibility and stimulates teachers and learners"* (HoS2, 9th Jul 2025). HoS7 stated that collaboration with parents is essential for boosting student seriousness, involving them in meetings for various discussion challenges in teaching and learning mathematics. Although the participation was ineffective due to the low awareness of some parents, we tried to educate them, but it was still a problem for some parents to understand the importance of attending the meetings.

Twice per year, I am involved in parent meetings, though most have only a primary education and limited knowledge. We ask them mainly to support students by providing food and uniforms and ensuring attendance. Only a few educated parents, such as teachers or nurses, can provide meaningful input". (HoS7, 17th Jul 2025).

Collectively, these views expose that heads of schools regularly use parental engagement not only as a stimulation but also as a tool for resource mobilization and performance monitoring, teaching and learning mathematics. However, the challenge of unawareness of some parents limits the collaboration in enhancing teaching and learning mathematics.

Likewise, the heads of mathematics departments' (HMDs) data supported the importance of collaborating with

parents in academic discussions to enhance teaching and learning mathematics in secondary schools. However, some parents were reluctant to attend the meetings. As HMD4 explained, parental meetings bridge resource gaps by encouraging parents to provide essential materials and enhance student participation, although they are not regularly involved in academic meetings. Also, when they are invited, few of them attend the meetings, which limits the effectiveness of enhancing teaching and learning mathematics in secondary schools.

The head of school does not regularly invite parents during academic meetings to discuss challenges in mathematics learning. When they call the parents to attend meetings, some do not attend. However, meetings have improved collaboration in school and positively affected teaching and learning mathematics (HMD4, 11th Jul 2025).

The data imply that heads of school identified the importance of involving parents in the academic meetings, which contributed to positive effects in enhancing teaching and learning mathematics in secondary schools. However, the irregular invitation for parents limited the high level of collaboration with the parents to enhance teaching and learning mathematics.

The finding revealed that the majority of the respondents had a mean score of 3.68, which implied the head of schools were highly collaborative with parents in academic meetings. Also, the interviews from respondents' evidence reveal that parental meetings are a highly effective strategy through which heads of schools mobilize support to enhance mathematics teaching and learning. However, there is a lack of consistency in collaborating with parents in academic meetings, which limits the enhancement of teaching and learning mathematics in secondary schools. This finding conforms with (Thabologo & Kesianye, 2024), which indicates that parental involvement in their child's general and mathematical learning can be improved.

Data from Table 1 on the heads of public secondary schools assigned the experienced mathematics teachers to mentor the new teachers reveal that 0% of teachers rated Very Low Extent (VLE), 2.9% Low Extent (LE), 40.0% Moderate Extent (ME), 48.6% High Extent (HE), and 8.6% Very High Extent (VHE), resulting in a mean score of 3.54, which indicates a moderate-to-high extent of assigning experienced. This shows that heads of schools frequently assign experienced mathematics teachers to mentor their less-experienced colleagues to strengthen collaboration and enhance teaching quality. The data of the majority indicated that nearly 57% (HE+VHE) of respondents acknowledged that mentoring activities are consistently practiced, while 40% (ME) indicated moderate engagement, revealing that although mentoring is widely

recognized, its implementation varies depending on teacher workload, school size, and leadership capacity. To a low extent, the small percentage (2.9%) implies that a few schools still face structural barriers, such as inadequate staffing, that hinder regular mentorship.

The quantitative data confirm that mentoring fosters peer learning, improves lesson delivery, and builds teacher confidence, enhancing students' mathematics performance. Qualitative data from QAs illustrated that mentoring is an essential teaching support mechanism promoted by heads of schools. QA3 noted that mentorship is also embedded within internal seminars, where senior teachers train peers on pedagogical approaches, thereby improving overall teaching performance (QA3, 24 Jun 2025). Similarly, QA4 It was confirmed that heads of schools assign returning trainees to share new insights with their peers, ensuring continuity in teaching and learning improvement; however, a shortage of mathematics teachers and limited time hinder highly collaborative mentoring in some schools.

Timely, Inexperienced mathematics teachers benefit from guidance when heads assign experts returning from training to share knowledge with peers. The shortage of teachers and sometimes time limits collaboration and mentoring This ensures continuity of teaching standards and collaborative problem solving at the school level (QA4, 25th Jun 2025).

This data emphasizes school-based mentoring as a pillar of professional development that enhances mathematics learning outcomes through teacher collaboration and reflection. Also, DEOs' perspectives strongly align with the survey data, ratifying mentoring as a leadership-driven strategy for professional growth. DEO1 noted that heads of schools identify competent teachers to mentor new staff on challenging topics. This practice boosts confidence and improves student outcomes; however, some teachers are reluctant to reveal their difficulties, which makes it challenging to address their needs (DEO1, 1st July 2025).

Heads of schools often identify competent mathematics teachers and assign them to guide new teachers on difficult topics. This mentoring ensures that inexperienced teachers gain confidence and improve student learning outcomes, though the reluctance of some teachers to reveal problems is difficult, which limits collaboration (DEO1, 1st Jul2025)

Furthermore, DEO2 elaborated that mentoring is supported through SEQUIP-related programs and departmental sessions where senior teachers model best practices for

junior ones, thereby strengthening collaboration and teaching strategies (DEO2, 2nd Jul 2025). 2025). The data from DEOs imply that structured mentorship, when timely and continuous, plays a crucial role in reducing teaching disparities across schools. Additionally, heads of schools presented strong and detailed confirmations of the mentorship process as a leadership responsibility. HoS1 stated that experienced teachers are promptly assigned to mentor less experienced ones, fostering collaboration and improving student performance. *In our school, I ensure that experienced teachers are promptly assigned to mentor newly appointed or less experienced teachers, especially in mathematics. This mentoring enhances collaborative planning and strengthens teaching practices, ultimately improving student outcomes* (HoS1, 8th Jul 2025). Also, HoS10 confirmed that mentoring begins within the first week of teacher deployment, with senior teachers offering coaching and modeling, creating a supportive learning culture, and improving student engagement (HoS10, Jul 2025).

I ensure that mentoring relationships between experienced and inexperienced teachers are established immediately. This collaboration creates a supportive culture in the mathematics department, making learning more effective and enjoyable for students, despite a shortage of time, and a shortage of mathematics, which can limit highly collaborative (HoS10, 22nd Jul2025)

Likewise, heads of Mathematics Departments provided evidence that mentoring is highly systematically embedded within departmental collaboration. HMD1 emphasized that heads of schools pair senior and new teachers to improve content mastery and strengthen classroom delivery (HMD1, 8th Jul 2025). HMD10 added that mentoring discussions during lesson analysis and exam preparation enhance curriculum coverage, efficient teaching, and continuous professional development, but a shortage of meeting time and teachers limits high mentoring collaboration (HMD8 21st Jul 2025). These perspectives conform with Zulu et al. (2025), who found that a structured mentoring program enhanced the levels of self-efficacy of Newly Qualified Mathematics Teachers. Mosha (2023) found that mentoring under departmental coordination improves pedagogical competence and reinforces collective teacher efficacy in mathematics teaching.

The finding revealed that most participants had a mean score of 3.54, and interview findings reveal that timely one-on-one mentoring is a critical strategy through which heads of schools strengthen collaborative teaching and professional learning among mathematics teachers. The results demonstrate that highly effective mentorship

improves teaching consistency, confidence, and innovation, while ensuring students benefit from well-prepared lessons. However, the moderate proportion (40% ME) implies that implementation is not yet universal, often limited by staffing, teachers' reluctance to reveal the problem and time constraints. The findings confirm the importance of structured, timely, and peer-based mentoring consistent with the frameworks. The finding was also confirmed by Urio & Mwakabenga, (2025), who found that a structured mentorship programme, grounded in a clear framework, could support teachers in mastering collaborative learning. Mugisha et al. (2023) revealed three prevalent CPs among secondary school teachers: coaching, teaming, and mentoring.

In the case of collaborative lesson preparation and curriculum evaluation. Data from Table 1 indicate that 0% of teachers rated Very Low Extent (VLE), 0% Low Extent (LE), 37.1% Moderate Extent (ME), 45.7% High Extent (HE), and 17.1% Very High Extent (VHE), yielding a mean score of 3.68, signifying that the heads of schools ensure collaborative lesson preparation and curriculum evaluation occurred to a high extent. This distribution shows that nearly 63% (HE + VHE) of teachers recognized the heads of school's consistent facilitation of collaborative planning and curriculum review sessions, while 37.1% (ME) expressed moderate engagement, suggesting that although collaborative practices were well established, their frequency and depth varied among schools. The findings imply that heads of schools regularly promoted teamwork in lesson preparation, encouraging teachers to align teaching and learning with the national curriculum, share innovative strategies, and review teaching content to meet diverse learners' needs. The high mean score (M = 3.68) demonstrates that these initiatives contributed to consistency, innovation, and improved alignment of classroom delivery with curriculum goals, thereby enhancing mathematics teaching and learning outcomes.

Quality Assurance officers confirmed that collaborative lesson preparation and curriculum evaluation are ongoing and structured processes guided by the heads of schools. QA1 explained that heads of schools involve mathematics teachers in curriculum review sessions and feedback dialogues to assess how well the syllabus meets learners' needs, improving pedagogy and learning outcomes (QA1, 20th Jun 2025). Also, QA4 affirmed that involving teachers in curriculum review enables adaptation of teaching methods to meet learners' needs, strengthening curriculum alignment and effective practice. *"Heads of schools integrate collaborative lesson preparation into extra timetables beyond regular classes. Such structured sessions enhance teachers' innovation while maintaining consistency in mathematics instruction"* (QA4, 20th Jun 2025). In addition, the DEOs' perspectives reinforce the significance of heads' leadership in sustaining

collaborative lesson planning and curriculum evaluation. DEO1 reported that heads of schools encourage mathematics teachers to identify learning gaps in the syllabus and provide feedback during departmental meetings, where lesson plan preparation is conducted, ensuring teaching and learning remain responsive to students' academic needs (DEO1, 1st Jul 2025). DEO3 observed that despite teacher shortages, heads of schools continue to involve available staff in inter-school feedback discussions, promoting curriculum alignment and collaborative problem-solving. *“District officers note that while joint preparation is limited where only one mathematics teacher is available, heads of schools still promote inter-school sharing in preparation. This collaboration addresses difficult topics and fosters innovation in teaching mathematics”* (DEO3, 1st Jul 2025).

Furthermore, Heads of Schools offered rich evidence of direct leadership engagement in collaborative lesson preparation and curriculum evaluation. HoS1 explained that involving teachers in team preparation enhances lesson planning and student outcomes by aligning teaching with learner needs. This contributed to the understanding of individual mathematics subjects. *“In our school, teachers meet quarterly in departmental meetings to prepare lessons together, discuss challenges, and align strategies. This collaboration enhances consistency in instruction and improves student performance in mathematics”* (HoS1, 8th Jul 2025). Likewise, HoS10 further emphasized that collaborative curriculum evaluation builds teacher confidence, fosters innovation, and enhances student achievement through continuous feedback loops (HHoS10, 22nd Jul 2025). Heads of Mathematics Departments confirmed that heads of schools play a facilitative role in ensuring teachers collaborate during curriculum evaluation and lesson preparation. HMD1 explained that curriculum evaluation meetings allow teachers to share challenges and propose solutions that enhance classroom delivery (HMD1, 8th Jul 2025). HMD10 confirmed that teacher involvement in curriculum review enhances innovation, ensures curriculum consistency, and promotes highly prepared teaching aligned with student needs (HMD10, 24th Jul 2025).

The integrated analysis of data reveals that with a mean score of 3.68, public secondary school heads ensure that facilitation of collaborative lesson preparation and curriculum evaluation is implemented to a high extent. The majority of respondents interviewed show that teachers value the leadership role of heads of schools in promoting teamwork and innovation. At the same time, qualitative findings demonstrate that QAs, DEOs, HoSs, and HMDs view collaboration as central to curriculum alignment and improved teaching quality. These findings affirm that when mathematics teachers participate in curriculum evaluation

and preparation, they adapt teaching more highly to learners' needs, ensuring consistency, relevance, and innovation in mathematics. This overall interpretation conforms with Machisi (2023), who indicated teachers' lesson preparation, subject and pedagogical knowledge, classroom management, attention given to slow learners, quality of classwork and homework tasks given to students, exam preparation, and class attendance. Also, aligned with (Nshimiyimana & Andala, 2024), the board was advised to support and train schools in evaluating the competence-based curriculum in mathematics and improve lesson preparation.

The data from Table 4 shows that the mean score of 3.54 indicates that respondents generally agreed that Heads of Schools often ensure the establishment of inter-school mathematics clubs to enhance teaching and learning. A total majority of 57.2% (A + SA) of respondents agreed that inter-school collaboration exists and contributes to learning enhancement. Meanwhile, 34.3% remained neutral, implying that implementation is inconsistent or dependent on resources and logistics. Only 5.8% (SD + D) disagreed, showing minimal opposition. This pattern suggests that Heads of Schools moderately promote inter-school mathematics collaboration. However, its frequency and sustainability vary across institutions.

The data of this study reveal that the mean score of 3.54 represents a high extent (HE) of implementation, indicating that Heads of Schools play a significant role in ensuring the establishment and coordination of inter-school mathematics clubs. Quantitatively, 57.2% of respondents, high to very high, confirmed that Heads of Schools often promote inter-school collaboration through mathematics clubs and activities that enhance teaching and learning mathematics. This demonstrates that a majority of school heads not only value such collaborative initiatives but also recognize their importance in fostering knowledge exchange among teachers and learners. The presence of these clubs encourages shared learning experiences, peer simulation, and exposure to diverse problem-solving strategies among students and teachers across different schools. However, 34.3% of respondents rated moderate as neutral, suggesting that while some schools maintain functional inter-school clubs, their operations are not consistent or regular. The neutrality among respondents implies that the frequency and effectiveness of these collaborations vary across schools due to contextual factors such as location, school size, and management capacity. Meanwhile, only 5.8% (VLE + LE) expressed disagreement, showing minimal opposition to the existence of such clubs. This small percentage reflects that, although inter-school collaboration is widely acknowledged, resource limitations, transport challenges, and lack of sustainable funding restrict the uniform implementation of these initiatives. The results imply that while the majority

of school heads are proactive in promoting inter-school collaboration, structural and logistical constraints limit the potential for sustained and equitable participation among all schools.

Also, interview data confirm that many Heads of Schools establish and actively encourage collaborative mathematics clubs to enhance teaching and learning. These clubs extend beyond individual institutions, serving as platforms for peer teaching and learning, collaborative problem-solving, and the exchange of innovative teaching strategies. For instance, one head remarked, "*We actively organize inter-school mathematics clubs, where students exchange ideas and teachers gain insights into varied teaching strategies. This initiative strengthens collaboration and increases student confidence in tackling mathematics challenges*" (HoS1, 8th Jul 2025). Similarly, another Head emphasized that "*The school participates in cluster-based inter-school clubs that unite learners and teachers to solve problems collectively*" (HoS2, 9th Jul 2025). These responses indicate the regularity of collaboration, where inter-school mathematics clubs contribute to nurturing teamwork, reducing fear of mathematics, and promoting interactive learning among students.

Despite the presence of mathematics clubs, some schools experience inconsistent collaboration due to limited resources and logistical barriers. One Quality Assurance Officer noted, "*Mathematics clubs exist, but inter-school collaboration is rare, mainly due to resource and transport limitations*" (QA1, 20th Jun 2025). Similarly, "Although inter-school mathematics clubs exist, participation of students and teachers remains challenging. Heads of schools attempt to sustain these clubs by linking them with academic trips" (DEO3, 2nd Jul 2025). These statements highlight that the heads of secondary ensured most of the inter-school clubs' collaboration. Although the Heads acknowledge the value of inter-school collaboration, the lack of transportation, limited funding, and time constraints make it difficult to maintain regular club activities. Consequently, the benefits of inter-school mathematics engagement are not uniformly experienced by all schools.

Moreover, Quality Assurance Officers (QAs) and Heads of Mathematics Departments (HMDs) reported that collaboration through MEWAKA and JZK structures supports inter-school academic exchange. "*Through JZK/MEWAKA structures, heads of schools sometimes extend collaboration beyond their schools to link with others*" (QA2, 24th Jun 2025). These structured platforms enable teachers from different schools to share teaching practices, align curriculum implementation, and improve professional competence. Similarly, "*Inter-school clubs are integrated within MEWAKA sessions, allowing teachers to share knowledge and teaching practices across schools*" (QA4, 20th Jun 2025). This evidence reflects

regular teaching and learning collaboration, where the Heads of Schools effectively utilize formal networks to enhance mathematics teaching and learning and teacher development. While the initiative has had positive impacts, sustainability remains a challenge. "Department heads say inter-school clubs are embedded in ward and municipal-level meetings. Although not consistently held due to financial constraints, they enhance collaboration and innovation in mathematics instruction" (HMD4, 11th Jul 2025). The responses indicate regularity of sustainability, as activities are often contingent upon external funding, teacher availability, and district-level prioritization. Without consistent financial support, many schools struggle to maintain the frequency and reach of their inter-school mathematics programs.

Both survey and interview results indicate that Heads of Schools ensure inter-school mathematics clubs collaboration to a high extent, with a mean score of 3.54. The 57.2% (HE + VHE) rating aligns with interviews describing structured collaboration through MEWAKA, JZK, and school cluster frameworks, where teachers and students engage in meaningful academic exchanges. The 34.3% (ME) neutral response reflects the irregular participation and inconsistencies caused by insufficient funding and logistical support, while the 5.8% (VLE + LE) group represents schools with minimal engagement due to a lack of coordination and resources. The findings revealed that the majority of those involved in this study were positively accepted by heads of public secondary schools, who ensured that inter-school mathematics clubs are powerful vehicles for academic development. They strengthen teacher professional learning, promote student efforts through teamwork and competitions, and facilitate school curriculum alignment and resource sharing. However, these clubs' effectiveness depends on external support such as financial allocation, transport provision, and administrative guidance from educational authorities. The findings aligned with Hokonya (2021), which revealed that learners' mathematical identities are heavily influenced by the values that were foregrounded in the after-school mathematics clubs

Furthermore, the quantitative and qualitative data show that Heads of Schools encouraged knowledge sharing with private schools to enhance mathematics teaching and learning. The mean score of 3.55 signifies a high level of collaboration with private schools, suggesting that the majority of Heads of Schools foster collaborative relationships, though the frequency and consistency of such collaboration vary across schools. According to the data distribution, 11.4% of respondents indicated limited collaboration, 42.9% reflected moderate engagement, and 45.7% (25.7% + 20.0%) confirmed active participation, while none rated the practice as very low (0.0%). This pattern indicates that while inter-school collaboration is

generally valued, its implementation remains uneven, largely influenced by resource availability, administrative commitment, and logistical support.

These survey data further reveal that 45.7% of respondents (high and very high levels) revealed that Heads of Schools facilitate meaningful knowledge-sharing initiatives with private schools. Typical activities include joint mock examinations, departmental meetings, professional dialogues, and academic tours, which expose teachers to diverse teaching and learning approaches and enhance their confidence in delivering mathematics content. Meanwhile, the 42.9% moderate response category implies that several schools undertake such initiatives intermittently, often dependent on the support of district academic programs or the availability of funds. The 11.4% of respondents who reported low engagement highlight that certain schools face limitations such as funding shortages, transportation challenges, and a lack of coordination, restricting regular cooperation with private schools.

These survey insights are supported by interview evidence that illustrates how Heads of Schools operationalize collaboration in practice. As revealed under this sub-theme, collaboration with private schools, though encouraged, is often limited and irregular. Quality Assurance Officers reported that *“interaction with private schools remains limited and irregular”* (QA1, 20th Jun 2025), while others noted occasional involvement of private teachers during MEWAKA sessions (QA2, 24th Jun 2025). This inconsistency underscores that the majority of partnerships rely on informal or opportunistic arrangements, rather than structured policy frameworks. These insights suggest inter-school collaboration fosters creativity, reflective practice, and teaching and learning improvement. Nevertheless, as revealed by the DEOs, the sustainability of these collaborative efforts remains a persistent challenge. The District Education Officer emphasized that *“collaboration with private schools is occasional and poorly coordinated due to a shortage of funds”* (DEO1, 1st Jul 2025), while HoS1 remarked that such engagements *“lack structured follow-up, limiting their effectiveness”* (HoS1, 8th Jul 2025). These remarks demonstrate that most collaboration with private initiatives remains difficult to practice without formal coordination and continuous support.

Furthermore, HoSs present examples of well-coordinated and impactful collaborations that yield tangible enhancements in teaching and learning. HoS6 affirmed, *“Our school encourages knowledge sharing by inviting teachers from private schools to departmental sessions. This brings diverse teaching ideas into mathematics classrooms”* (HoS6, 16th Jul 2025). Similarly, HoS5 noted that involving private schools in mock examinations provides *“platforms for sharing strategies and assessing student outcomes.”* Such initiatives have been shown to

strengthen curriculum delivery and improve teaching and learning outcomes. Also, the heads of mathematics departments revealed that leadership commitment, teaching, and learning support reveal that visionary leadership is crucial for sustaining and encouraging inter-school collaboration. As HMD10 observed, *“The head inspired mathematics teachers to engage with private schools, making knowledge sharing a consistent practice that boosts teaching quality”* (HMD10, 9th Jul 2025). Schools with strong leadership demonstrate that when collaboration is embedded into institutional culture and strategic planning, it becomes a systematic and sustainable collaboration for teacher development.

When the survey and interview data are triangulated, the mean score of 3.55 strongly aligns with interview evidence showing that Heads of Schools value and actively promote inter-school collaboration, though the degree of implementation varies. These findings confirm that collaboration between public and private schools contributes substantially to enhancing mathematics teaching and learning through professional dialogue, shared teaching and learning practices, and mutual support. However, the evidence also underscores that irregularity, funding constraints, and limited policy support hinder the consistency and depth of these efforts. To address these limitations, it is recommended that educational authorities institutionalize inter-school collaboration in mathematics teaching and learning through district and national education frameworks, allocate regular funding for inter-school collaborative activities, and establish mechanisms for monitoring and evaluating their effects. If such measures are effectively implemented, the observed sporadic engagements can evolve into structured, sustainable partnerships that significantly improve mathematics teaching and learning, teacher competency, and student learning mathematics outcomes across both public and private secondary schools in Tanzania. The finding aligned with (Bushe & Maluleke, 2023) concerned the potential benefits of partnerships with major stakeholders in improving mathematics and science education in the Vhembe District.

The findings reveal that heads of public secondary schools in Iringa Region actively promote collaboration to a high extent through departmental meetings, inter-school mathematics clubs, mentoring programs, and parental involvement. These collaborative efforts have proven instrumental in enhancing the teaching and learning of mathematics. However, the practices remain inconsistent due to persistent challenges such as time constraints, shortages of mathematics teachers, and limited financial and material resources, which affect the frequency and effectiveness of implementation

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that heads of schools' collaborative management strategies significantly enhance mathematics teaching and learning in public secondary schools. The study concludes that, to a high extent, the majority revealed that Heads of Schools collaborate with mathematics teachers through departmental meetings, inter-school clubs, mentorship, and parental involvement in academic meetings, which greatly enhance teacher quality, teamwork, and the overall teaching and learning of mathematics. However, despite the high level of collaborative efforts, the study notes that inconsistency in implementation, mainly due to limited funding, time constraints, and inadequate teacher availability, undermines these strategies' sustainability and overall impact.

5.2 Recommendation

From the study, the following recommendations were observed:

1. It is recommended that the Ministry of Education institutionalize structured collaborative programs under the MEWAKA framework to ensure regular and sustainable teacher interaction.
2. Adequate funding and logistical support should be provided to facilitate inter-school collaboration and active parental participation.
3. Furthermore, teacher capacity-building initiatives should prioritize mentorship, teamwork, and continuous professional development to enhance mathematics teaching and learning outcomes in public secondary schools

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