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Analysis of the effects of teaching units on the underqualification of mathematics teachers in secondary schools in the masina I pool

Pierre OLELA NGONGO[1], Jean Marie KAPENGA KAZADI NTUNDULA [1,2], Bienvenue ANAYEL NOWA [1], Lucien MUNSA ME TILA [1] ,Faustin KIPOPO MBALA [1]

1. Researchers at the Centre for Research on Mathematics Education, Kinshasa, Democratic Republic of Congo, alphonsonjunior@gmail.com , Tel: +243811803041
2. Full Professor at the National Pedagogical University (UPN), Faculty of Sciences, Department of Mathematics and Computer Science, Kinshasa, Democratic Republic of Congo

Abstract

This study aims to analyse the effects of teaching units on underqualified mathematics teachers in schools in the Masina 1 secondary education pool. The central issue is the observation that the majority of mathematics teachers are underqualified, with an alarming proportion of them having no teacher training. The main hypothesis posits that supervision by qualified teachers could improve the pedagogical and disciplinary skills of underqualified teachers.

The methodology adopted includes surveys and interviews with teachers, as well as classroom observations to assess teaching practices. The results reveal that teachers recognise the importance of mentoring. Although some resort to private consultations with qualified colleagues, the lack of a structured continuing education system remains problematic.

Discussions of the results highlight the need to strengthen initial and continuing teacher training in order to improve the quality of mathematics teaching. This study highlights major challenges and calls for strategic interventions to support teachers' professional development and, consequently, student success.

Keywords: teaching units, underqualified teaching, mathematics, continuing professional development, teaching difficulties.

Summary

This study aims to analyse the effects of pedagogical units on underqualified mathematics teachers in the Masina 1 secondary educational pool schools. The central issue lies in the observation that the majority of mathematics teachers are underqualified, with an alarming proportion of them lacking pedagogical training. The main hypothesis posits that mentoring by qualified teachers could improve the pedagogical and disciplinary skills of underqualified teachers.

The methodology adopted includes surveys and interviews with teachers, as well as classroom observations to assess teaching practices. The results reveal that teachers recognise

the importance of mentoring. Although some seek private consultations with qualified colleagues, the absence of a structured continuous training system remains problematic.

The discussion of the results emphasises the need to strengthen both initial and ongoing training for teachers in order to improve the quality of mathematics teaching. This study highlights major challenges and calls for strategic interventions to support the professional development of teachers and, consequently, the success of students.

Keywords: pedagogical units, underqualified, mathematics education, continuing education, teaching difficulties.

Introduction

Mathematics education in the Democratic Republic of Congo (DRC) has been influenced by complex historical factors, including colonisation and internal conflicts. After independence in 1960, the education system underwent numerous reforms, but these were often hampered by political and economic crises. These disruptions have had a direct impact on the quality of education, including mathematics education. We aim to determine whether the supervision of underqualified teachers who teach mathematics in the Masina I secondary pool is effective, partial or virtually non-existent, and also what effects the use of training tools in teaching units has on these teachers' knowledge.

As part of our study on the effects of teaching units on the underqualification of mathematics teachers, we examine several crucial aspects. Our central questions are as follows: Does the basic cell exist in the schools of the Masina I secondary pool? Are teaching units for the exact sciences, particularly those dedicated to mathematics, effectively implemented in these establishments? Are there any continuing education programmes aimed at strengthening the capacities of mathematics teachers within teaching units? How are mathematics training tools used within teaching units to improve teaching? We hypothesise that: the basic unit is partially respected in Masina I secondary schools, but gaps remain due to limited resources and a lack of teacher training. Science teaching units, particularly those dedicated to mathematics, are implemented unevenly across schools, with teachers having varying levels of qualification that affect their application. Continuing professional development programmes for mathematics teachers exist, but their scope and frequency are insufficient to meet the needs of all underqualified teachers. Mathematics training tools are underutilised in teaching units due to teachers' unfamiliarity with these tools and insufficient support for their integration into teaching.

This research aims to identify the influence of the basic cell on underqualified mathematics teachers in secondary schools in the Masina1 pool. These teachers have not followed the courses required by the framework law and official instructions.

It examines the negative impact that disrupts the quality of education and the dangers that arise from this in Congolese society.

The World Bank, 2005, cited in Muhindo Binzaka (2016), highlights academic results below 50% due to traditional expository methods and under-equipment, linking this to an implicit under-qualification of teachers.

A study on teacher underqualification in Bukavu (Ano, 2023) identifies a lack of qualification in mathematics as the main cause of high school failure rates, with a failure to comply with national curricula exacerbated by poorly adapted teaching units.

SERNAFOR in Oicha (Ano, 2023) demonstrates that continuing education through teaching units reduces "under-teaching" in mathematics, rejecting the hypothesis that initial ISP training is sufficient. An analysis of the underqualification of French teachers (Zihalirwa, 2018) extends the problem to other subjects, noting two forms: lack of formal training and pedagogical absenteeism, with negative impacts on students' expression. Many teachers lack adequate training and professional support, which limits their ability to teach effectively. A professional competency framework has been established to guide teacher training, but its implementation remains uneven. Teachers must not only master mathematical content, but also be able to adopt innovative teaching approaches to engage students (Enguta, 2020). According to the UNESCO report (2014), teacher qualification is a determining factor in student academic success. However, many countries, including the Democratic Republic of Congo, face challenges in teacher training, resulting in widespread underqualification. Underqualification refers to a situation where teachers do not have the skills or knowledge necessary to teach their subject effectively. In the context of Pool Masina, several studies (Kambale, 2018; Mbuyi, 2020) have shown that the majority of mathematics teachers do not have adequate training, which negatively impacts student performance. Teaching units, which are continuing education structures set up to improve teachers' skills, play a crucial role in combating underqualification. According to Bongo (2019), these units enable teachers to train in innovative teaching methods and familiarise themselves with current school curricula. However, their effectiveness depends on several factors, including teacher commitment and the quality of trainers.

For this study, we want to know whether the teaching units that are supposed to supervise and train the underqualified work in groups according to the existing training areas in schools and organise activities to help the underqualified improve in order to provide quality teaching.

1. Materials and Methods

1.1. Environment

With regard to the spatial and temporal framework, data collection took place in secondary schools offering mathematics education between November and December 2025. The questionnaires were administered in October-November, while the interviews and observations were conducted in November and December. As for the sample size, since the population of mathematics teachers in the municipality of Masina is finite, we used cluster sampling, randomly selecting a number of schools (clusters) and then interviewing all the teachers in the selected schools.

1.2. Sampling

With regard to sample size, as the population of mathematics teachers in Masina 1 secondary school is finite, it is appropriate to use the formula:

$$n' = \frac{n}{1 + \frac{n-1}{N}}$$

Where n is the size calculated using Cochran's formula ($n = \frac{Z^2.p.(1-p)}{e^2}$; n = sample size, Z = Z value (confidence coefficient), p = estimated proportion of the attribute in the population.

The reference population comprised approximately 120 mathematics teachers. A convenience sample of 57 teachers was selected due to participant accessibility and institutional constraints. This choice implies limitations in terms of representativeness and potential selection bias. We chose a random sample, also known as a non-probability sample. The choice of this sample is justified by the different mathematics teachers in the different schools we surveyed. This type of sample is constituted by the researchers themselves following difficulties encountered in the field of research or investigation.

Table I: List of schools surveyed

No.	REGIME	SCHOOLS	FREQUENCY	PERCENTAGE
1	PRIVATE APPROVED	C.S. MODERNE JESUS CHRIST MY REFERENCE	25	78
		C.S. NODASA		
		C.S. BOUISSON ARDENT		
		C.S. LE MARCUS		
		C.S. SADISANA		
		COL. THE HAND OF THE ETERNAL		
		C.S. DE LA TSHANGU		
		C.S. EBEN EZER		
		C.S. SAINTE ANDREA		
		C.S. FAMILY		
		C.S. ARCHE		
		C.S. LE SAVOIR		
		C.S. SAINT GABRIEL		
		Sacred Heart		
		C.S. LA GLOIRE		
		COLLEGE LES VISIONNAIRES		
		COLLEGE INTELLIGENCE		
		C.S NOL AND LUZINGU		
		C.S. MISERICORDE		
		C.S BARAKA		
		OKAPI COLLEGE		
		LA GLOIRE SCHOOL COMPLEX		
		SCHOOL COMPLEX DIYAVANGA		
		I.T.I MOTEYI		
		NARVALO SCHOOL GROUP		
2	PUBLIC	DON BOSCO COLLEGE	7	22
		I.T.P TATAMANA		
		BAHUMBU INSTITUTE		
		MAKAYA INSTITUTE		
		BOLINGO INSTITUTE		
		SALVATION ARMY		
		MASINA FAMILY INSTITUTE		
	TOTAL		32	100

Source: our field surveys, 21 November–20 December 2025

This table shows that 25 schools, or 78%, are accredited private schools and 7 schools, or 22%, are Congolese state schools.

Table II: Distribution of teachers surveyed according to seniority

Seniority	Frequency	Percentage
2 to 5 years	6	10
6 to 10 years	10	17.5
11 to 15 years	16	28
16 to 20 years old	14	24.5
21 to 25	3	5.2
26 to 30	6	10.5
31 to 41	2	3.5
TOTAL	57	100

Source: our field surveys, 21 November–20 December 2025

From this table, it can be seen that 6 (10.5%) have between 2 and 5 years' experience teaching mathematics, 10 (17.5%) have between 6 and 10 years' experience, and 16 (28%) have between 11 and 15 years' experience: 14 (24.5%) have 16 to 20 years of experience, 3 (5.2%) have 21 to 25 years of experience, 6 (10.5%) have 2 to 5 years of experience, 2 (3.5%) have between 31 and 41 years of experience teaching mathematics.

Table III: Distribution of teachers surveyed by age

AGE	Frequency	Percentage
21 to 30	12	21
31 to 40	10	17.5
41 to 50	8	14
51 to 60	26	45.6
61 to 70	1	1.7
TOTAL	57	100

Source: our field surveys, 21 November–20 December 2025

This table shows that 12 respondents (21%) are aged between 22 and 30, 10 (17.5%) are aged between 31 and 40, 8 (14%) are aged 41 to 50, 26 (45.6%) are aged 51 to 60, and 1 (1.7%) is aged 61 to 70.

1.3. Equipment

1.3.1. Field equipment

a) Data collection instruments

Instruments and collection Quantitative data was collected using a Likert scale questionnaire. Qualitative data was obtained from semi-structured interviews and non-participant observations. All procedures were carried out after obtaining administrative authorisation and consent.

b) Logistical tools

Support equipment included: a laptop and mobile printer for data management, a smartphone and notepads for interviews and observations, and a map of schools in this subdivision to organise fieldwork accurately.

1.3.2. Reagents and/or culture media.

No chemical reagents or biological culture devices were used in this research. All data collected came from direct observations, surveys and teacher testimonials. It focused on issues that prompt analysis by mathematics teachers at Masina I secondary school regarding the effectiveness of the basic unit and the qualifications of teachers who ensure the quality of teaching.

1.4. Methods

1.4.1. Methodological approach

This study adopts a mixed explanatory design combining quantitative and qualitative approaches, which allows complex phenomena to be explained by cross-referencing numerical data with contextual perceptions. This type of design is particularly suitable when quantification alone is not sufficient to understand the processes at play; it is necessary to explore the causal mechanisms behind statistical observations. According to Creswell & Plano Clark (2018), mixed explanatory design is appropriate when "quantitative results require in-depth clarification by qualitative data in order to explain observed relationships or effects".

In our case, the impact of teaching units on teacher underqualification cannot be captured solely by numbers (e.g., scores or rates), as it involves practices, perceptions, institutional constraints, and continuing education.

1.4.2. Operational definition of variables

With regard to independent variables (IV) (impact factors): Qualifications, continuing professional development, teaching practices, level of initial professional training and qualifications held by the teacher (bachelor's degree, master's degree, teaching certificate, participation in professional development sessions, workshops, internships, seminars after

recruitment, teaching methods used in the classroom: explanatory, active, differentiated.

For the dependent variable (DV) (what is impacted): Situation where a teacher does not have the official qualifications required to teach mathematics at the relevant level (teaching certificate, specialised training), school subject studied, including content, methods and skills taught, results in standardised assessments and performance in arithmetic, algebra and geometry *Data collection techniques.*

The techniques used include:

Firstly, a questionnaire survey of a convenience sample of 57 mathematics teachers. Although not probabilistic, this sample was considered sufficient to produce robust descriptive statistics on teaching units and the quality of training in the field of mathematics.

Secondly, a documentary technique: this enabled us to read documents related to our subject in order to obtain sufficient information for our article, taking into account its purpose.

Thirdly, open-ended interviews: these enabled us to make contact with the authorities, including the various prefects and directors of studies, who put us in touch with mathematics teachers in order to obtain data for our research topic.

Fourthly, direct observation: being in the field allowed us to observe carefully and understand the pedagogical difficulties affecting mathematics teaching in the Masina I secondary school pool during the period from 21 November to 20 December 2025, as indicated in relation to our survey period.

Ethical considerations: participants signed a free and informed consent form. The data was anonymised, stored securely, and participants had the right to withdraw. The study complies with the ethical principles of social science research.

With regard to the inclusion criteria (for teachers), we set the following criteria: to be a mathematics teacher, to actually teach at secondary level, to work in a school located in the municipality of Masina 1 in order to consent to participate in the study (informed consent).

The **exclusion** criteria **(for teachers)** were as follows: teaching only at secondary level and being a teacher of another subject who is not responsible for mathematics lessons, in order to have voluntarily refused to participate in the survey.

Limitations: the main biases concern non-probabilistic sampling, social desirability bias, and the potential influence of the observer during the observed sessions.

1.4.3. Data analysis

Our statistical analysis followed three main steps

a) Data preparation

We cleaned and coded the data by assigning numerical codes to qualitative responses (e.g. Public = 1; Private = 2). We created composite variables: we measured qualifications using several questions, combining them (by summing or averaging) to obtain an overall qualification score. We did the same for the basic cell and the quality of teaching.

Our test assumptions were verified by the normality of the distribution of the dependent variable, the linearity of the relationship between the IVs and the DV, and homoscedasticity (constant variance of errors).

b) Descriptive analysis

At this stage, we developed a table of the reality under study.

Frequencies and percentages: describing the distribution of schools (public/private), the gender of teachers, the presence of laboratories, etc. Central tendencies: calculating the mean and standard deviation for the teaching unit score, the training score and the teaching quality score.

c) Inferential analysis

At this stage, we tested the hypotheses to generalise the results of our sample to the population. To measure the variables selected above, the tools we used ensured validity and reliability.

Table IV: The different measurement tools (instruments)

Variable	Measurement instrument (tool)	Key elements to be measured
Basic cell (VI1)	Observation grid and checklist (for the school)	Number of sessions combined into a teaching unit, effectiveness of the basic unit
Teacher training (VI2)	Survey questionnaire (for teachers)	Frequency of training received (ordinal scale), relevance of training, mastery of the subject area (Likert scale)
Quality of teaching (VD)	Classroom observation grid or standardised test	Practices: use of active teaching methods, student activity time (observation grid). Performance: Average student scores on a common assessment.
Control variables	Demographic and questionnaire	Age, gender, years of experience, level of qualification.

The data were processed at two levels:

Quantitative analysis: Analyses were conducted using SPSS. Descriptive statistics, Pearson correlations and linear regressions were used. The internal reliability of the scales was verified using Cronbach's alpha (a ≥70). The conditions of normality, collinearity and homoscedasticity were checked. Using Cronbach's alpha coefficient, we tested the internal reliability of the Likert scales in the questionnaires (VI2 and VD). Independent factors associated with teaching quality: There are many other independent factors that can influence teaching quality. It was essential for us to identify them and, where possible, include them as control variables in the multiple regression analysis to ensure that the observed impact was not due to another factor. The relevant exogenous and endogenous factors are the teacher's experience (we sought to determine their length of service in teaching (in years)), motivation and satisfaction (the teacher's level of motivation and job satisfaction), management support (administrative and pedagogical support provided by the head teacher), class size (pupil/teacher ratio), curriculum (the relevance and flexibility of the current mathematics programme), and the socio-economic background of the pupils (family context and parents' level of education can impact pupils' engagement and performance).Given the correlational nature of the study, which aims to determine an "effect", the main test used is **multiple regression**.

Table V: Statistical tests used

Purpose of the analysis	Statistical test	Level of measurement of variables	What the test demonstrates
Simple relationship between an IV and the DV	Pearson's correlation coefficient	Intervals or ratios (scores)	Strength and direction of the relationship (e.g., the better the training, the higher the quality)
Combined and predictive impact of IVs on DV	Multiple linear regression analysis	DV: Interval/Ratio; IV: Interval/Ratio or Dichotomous	The independent and overall impact of teaching units and access to training tools on teaching quality
Difference in quality between two groups (public – private)	Student's t-test	VD: Interval/Ratio; VI of Nominal Grouping (2 modalities)	The average quality of teaching differs significantly depending on the status of the school

Focus on multiple linear regression: This is the test that corresponds to the general hypothesis formulated above. It provided us with:

a) **Adjusted R^2**: This indicates the percentage of variation in teaching quality that is explained by the two independent variables (functioning of teaching units and access to and use of continuing education tools within these units) combined.

b) Standardised beta coefficients (β) : these show the unique and relative impact of each independent variable (effectiveness of teaching units and access to training tools) on the dependent variable (level of underqualification), while controlling for the effect of the other variable. This is the key indicator for assessing the relevance of each factor.

c) The p-value: this is used to determine whether the impact is statistically significant (generally if $p < 0.05$). If $p < 0.05$, the null hypothesis (H_0) is rejected and the research hypothesis (H_1) is accepted.

- **Qualitative analysis:** The thematic analysis followed the steps proposed by Braun and Clarke (2021). The coding was carried out in four stages: open coding, categorisation, theme development,

and validation. Triangulation of sources and double coding reinforced the credibility of the results.

- **Data integration:** integration followed a logic of connecting, building, then merging (**Creswell, 2015**). The quantitative results guided the selection of participants for the interviews; the qualitative themes were constructed on the basis of statistical relationships; finally, the two corpora were merged to identify convergences, divergences and complementary interpretations.

2. Results

2.1. Variable of qualification, under-qualification and non-qualification

In the world of work, this refers to the psychological meaning of teaching staff qualifications. An article 90 Annales de l'Unigom, n°2, 2018 An underqualified person, as opposed to an unqualified person, is someone who does not have the necessary qualifications for a particular job. Underqualification in secondary education occurs when a graduate or licentiate teaches subjects that do not match their specialisation. According to MUJINAYI and BOLOJI (1880, p.24), cited by BYUMANINE ZIHALIRWA Guillaume, underqualification in teaching takes two specific forms: lack of the training required to work at a given level of secondary education; teaching subjects that do not fall within their specialisation. Human work is imperfect. Nevertheless, the ideal for anyone performing a job is that they be qualified, a necessary condition for reducing the risk of a large number of imperfections. **Underqualification** occurs and undermines the development of any career, particularly that of teaching. Our study considers any teacher who teaches outside their field, who has not been trained for teaching but does so by default, believing that they can find better work elsewhere, to be underqualified. **Non-qualification** characterises a person who does not hold a graduate or bachelor's degree and who, due to particular circumstances, teaches at secondary school level.

A D6 or PP5 is not authorised by the current school legislation in the Democratic Republic of Congo to teach at secondary school level.

If they do so, it is mainly due to a lack of qualified personnel, and as such they are filling a gap. They are therefore both scientifically and didactically underqualified. Circular EDN/PS/883/370/72 of 1 April 1972, concerning the qualifications of teachers of general secondary education courses, stipulates the following: in the orientation cycle (C.O) and the short cycle, graduates with a regent's degree are assimilated by way of derogation and on a transitional basis, from D6 or PP5, provided that they are supervised in their schools by at least two qualified teachers (one in literature and one in science), they will only be retained in their positions if they do not receive two consecutive overall ratings lower than 'GOOD' in their annual report.

Table VI: Distribution of mathematics teachers according to their field of study and university degree.

		TITLE			TOTAL	PERCENTAGE	
	Fields of study	L2	G3	D6			
1	Mathematics	3	5	-	8	14	14
2	Physics Maths			9	9	15.78	86
3	Polytechnic	8	10	-	18	31.5	
4	Management information systems	4	3	-	7	12.2	
5	Savings	1	2	-	3	5.26	
6	Construction and public works	3	6	-	9	15.78	
7	Electricity	-	-	1	1	1.75	
8	Biomedical	1	1	-	2	3.5	
	TOTAL	20	27	10	57	100	
%		35	47.3	17.5	100		

Source: our field surveys, 21 November–20 December 2025

According to the data in Table 5, 86% of mathematics teachers in the Masina 1 secondary school pool are not qualified in this subject, while only 14% are. This distribution raises concerns about the quality of teaching in this essential subject.

The predominance of teachers who are not specialised in teaching mathematics can have a significant impact on student learning. Indeed, a teacher who has not received in-depth training in a subject may find it difficult to convey complex concepts and answer students' questions effectively.

This could also affect students' motivation and confidence in their mathematical abilities.

2.2. Qualification and underqualification

According to SEGUSHIMANA M. (2006), cited by BYUMANINE ZIHALIRWA, underqualification in primary, secondary and vocational education comprises three distinct concepts: scientific underqualification; methodological underqualification; and voluntary under qualification. A teacher who teaches a subject that is not their speciality **is scientifically underqualified**. A teacher with an L2 or G3 qualification who teaches but lacks pedagogical training is **methodologically underqualified**. A teacher with an L2 or G3 qualification in applied pedagogy who teaches in their field of specialisation but, for various reasons, does not prepare lessons or mark assignments **is voluntarily underqualified**.

Table VII: Teachers' opinions on qualification and underqualification

		Responses			
		YES		NO	
No	Variables	F	%	F	%
1	Do you teach mathematics?	57	100		
2	Are you an academic specialist in mathematics?	15	26.3	42	73.6
3	Do you feel comfortable in your department?	41	71.9	16	28
4	In relation to your qualifications, do you have time to take care of your department?	57	100		
5	Does your qualification enable you to prepare and teach your lessons properly?	41	71.9	16	28
6	Are there any difficulties you encounter when performing your task?	50	87.7	7	12.3

Source: field surveys 21 November–20 December 2025

Comment: The data clearly indicates that 73.6% of mathematics teachers in secondary schools in Masina 1 do not have specific training in mathematics teaching. However, 71.9% of these teachers say they are satisfied with their job, despite the difficulties they encounter due to their initial training. They are tasked by the prefecture with teaching mathematics, which they prepare and deliver, even though they are not specialists in the subject.

On the other hand, 26.3% of teachers have formal training in mathematics. Among those who are not trained, 28% see their role as a career opportunity, while 28% express a lack of pride in the responsibility assigned to them. This raises questions about the motivation and commitment of teachers in a field where they do not feel fully competent.

This situation highlights a significant problem within the education system of the Masina 1 educational pool. The fact that a majority of mathematics teachers are not trained in this subject could impact the quality of teaching and, as a result, student outcomes. Although some teachers are satisfied with their role, it is essential to assess the long-term consequences of this situation, both for teachers and pupils.

2.3. The basic unit and teaching units

According to the report on basic cell training led by Inspector MAFUMU NGALU CHANTAL and the national policy on continuing training for primary school teachers in the DRC, the basic cell is defined as a technical self-training structure within the school to strengthen teachers' technical and pedagogical capacities.

It constitutes the school organised and structured pedagogically to meet the training and supervision needs of teachers. At the school, the head of the basic unit is the head teacher, who is automatically the head of the basic training unit. If he or she is unable to attend, he or she may designate either his or her deputy or a competent teacher to perform this role. Teachers grouped into teaching units and the head of studies constitute the basic unit for the training and supervision of teachers in the same subject area or scientific field.

The head teacher appoints a manager to head each teaching unit, who is the head of that teaching unit. The latter must be a qualified, competent and experienced teacher who is capable of providing training and supervision.

In the event of limited supervision capacity due to a shortage of qualified teachers or teaching resources, the head of studies, who is the head of the core unit, should arrange for twinning with other schools in the area. It is not enough simply to set up the base unit at the school; it must also be made operational, so that the hours allocated for training are included in the weekly timetables of the teaching staff, at a rate of two hours per week, under the heading 'SERNAFOR training activity'. There are two **possible approaches**: either set a time for the whole school, for example the last hour at the end of the week, or each teaching unit meets on its own day. There are two main activities: the training meeting and the supervision visit. **The training meeting**: this includes several activities that must take place within a teaching unit, namely: using training tools, drawing up subject forecasts, preparing lesson plans, composing exam questions,

organising demonstration lessons, evaluating the results obtained by teachers, using a textbook in use at the school, and producing teaching materials. **Supervisory visit**: this is carried out by the head of the base unit or their delegate. It will focus primarily on the lessons that were discussed in the teaching unit during the training meeting. HADEF (2007, p. 110) emphasises the importance of continuing education as an essential process for the professional development of individuals. He stresses that this training not only enables new skills to be acquired, but also allows existing knowledge to be adapted to changes in the professional environment.

Table VIII: Teachers' opinions on the core unit and teaching units

			Responses			
			YES		NO	
No	Variables		F	%	F	%
1	Had you ever heard of the basic cell in your school?		57	100		
2	Do you belong to an educational unit?		41	71.9	16	28
3	How often do you meet?	Once a week	15	26.3	42	73.6
		Several times a week	-	-	57	100
4	Do you organise demonstration lessons or mathematics workshops in your teaching unit?		15	26.3	42	73.6
5	Did you have minutes and reports of your teaching unit sessions?		15	26.3	42	73.6

Source: field data 21 November–20 December 2025

Comment: This table shows that 57 teachers, or 100%, have already heard of the basic unit in schools, 41, or 71.9%, belong to teaching units, and 16, or 28%, say that teaching units do not exist in their schools. 15 teachers, or 26%, confirm that they hold sessions in their teaching units once a week, in other words that the teaching unit is operational in their schools.

Table IX: Teachers' opinions on capacity-building activities organised by the Masina 1 secondary school inspectorate

		Responses			
		YES		NO	
No	Variables	F	%	F	%
1	Have you ever participated in one or more training courses or seminars on capacity building for mathematics teachers?	37	65	20	35

Source: field surveys, 21 November–20 December 2025

Teachers' justification for participating in training activities organised by the inspectorate for capacity building is best illustrated in this small table, which shows that the inspectorate had already organised a few seminars despite the lack of activities and the minority who said they had not participated and had never seen the invitations to the activities organised by the Masina 1 secondary pool.

Table X: Teachers' opinions on the capacity-building topics organised by the Masina 1 secondary pool inspectorate

No.	Variables	F	%
1	DAS training: use of a matrix	10	17.5
2	Reform of mathematics teaching	3	5.2
3	Training on the DAS programme	16	28
4	Maintenance of educational documents	5	8.7
5	Guide table and management of an operating sheet	3	5.2
6	No training activities received from the inspectorate	20	35
	TOTAL	57	100

Source: our field surveys, 21 November–20 December 2025

In light of Table 9, we note that 20 teachers, or 35%, insist that they have not received any training from the inspectorate, while the other teachers claim to have participated in some activities in different years.

Table XI: Teachers' opinions on the last lesson in their teaching units

No.	Opinion	Frequency	%
1	Very satisfied	5	8.7
2	Satisfied	3	5.2
3	Not satisfied	2	3.5
4	No activity	42	73.6
	TOTAL	57	100

Source: our field surveys, 21 November–20 December 2025

Comment: It should be noted from the table above that 5 (8.7%) rated the last lesson used in their teaching unit as very satisfactory, 3 (5.2%) rated it as satisfactory, 2 (3.5%) were not convinced by the way the lesson was taught by their colleague, and 42 (73.6%) said that no lesson had been organised.

Table XII: Difficulties encountered in teaching units

No.	Variables	F	%
1	We do not have competent people who can supervise us	-	
2	The prefect has never implemented this in schools	2	3.5
3	The unwillingness of older or more experienced staff to train new teachers	4	7
4	Lack of necessary tools for training underqualified teachers	51	89.4
	TOTAL	57	100

Source: our field surveys, 21 November–20 December 2025

Comment: As shown in Table 51, 89.4% of teachers argue that there is a lack of tools needed to train underqualified teachers, 4% (7%) say that there is also a lack of willingness on the part of experienced teachers to mentor their colleagues to become good teachers, and 2% (3.5%) say that the fault lies with the school principal, who does not implement teaching units.

Table XIII: Reasons for teachers' participation in teaching unit activities

Variables	F	%
To reduce the impact of underqualification on my training	14	24.6
To improve my scientific and teaching knowledge	43	75.4
Total	57	100

Source: our field surveys, 21 November–20 December 2025

Comment: Table 12 shows that 43 teachers, or 75.4%, participate in teaching unit activities to improve their scientific and teaching knowledge, while 14, or 24.6%, do so to reduce the impact of their lack of qualifications on their training.

3. Discussion of results

The study on the effects of teaching units on the underqualification of mathematics teachers in secondary schools in Masina 1 is highly original in that it examines a local and institutional lever, the basic unit and teaching units, as an endogenous solution to the problem of professional qualification. While many studies merely identify training gaps or the impact of general education policies, our research explores how mechanisms within the education system can or cannot correct these gaps, focusing on a key subject: mathematics. These results are fully in line with the Sustainable Development Goals (SDGs), in particular SDG 4: "Ensure access to quality education for all". Strengthening the capacities of teaching s through structures such as teaching units is a concrete way of guaranteeing inclusive and equitable education, by focusing on the continuous professionalisation of the teaching profession.

The validity of the results is based on a rigorous methodological approach combining mixed explanatory design. This approach allowed for data triangulation: the quantitative survey of teachers measured qualification levels and use of teaching units, while qualitative interviews shed light on perceptions, constraints and internal dynamics. The use of SPSS software for statistical processing, with a satisfactory Cronbach's alpha (> 0.7), reinforced the internal consistency of the scales. Thematic analysis of the qualitative data complemented this approach, allowing non-quantifiable contextual factors to emerge. However, certain limitations must be acknowledged without detracting from the value of the results. Although justified (57 teachers), the sample remains small and non-probabilistic, which limits generalisation. In addition, self-reporting and social desirability biases may have influenced some responses, as may the presence of the observer during the interviews.

The results show that the teaching units are partially used, often misunderstood, and insufficiently integrated into the process of improving skills. This is in line with the conclusions of Bongo (2019) and SERNAFOR in Oicha (2023), which recognise the value of the teaching units but highlight weaknesses in their implementation. Surprisingly, some qualified teachers themselves report that they do not actively participate in these cells, citing a lack of motivation or local leadership, which runs counter to the initial objectives of collaboration and skill sharing. The data also confirm that underqualification has a negative impact on the quality of teaching, corroborating the studies by Muhindo Binzaka (2016) and Kambale (2018). However, contrary to

some previous assumptions, poor student performance is not solely linked to the academic level of teachers, but also to their low engagement in continuing professional development programmes. Thus, our study confirms previous diagnoses while shedding specific light on the role of teaching units as a potentially transformative but still under-exploited tool. The link between continuing professional development, institutional support and teachers' personal commitment appears to be a key issue for the future of education in the DRC.

4. Conclusion

We have now completed our research on the impact of teaching units on the underqualification of mathematics teachers in Masina 1 secondary schools. The study on the effects of teaching units on the underqualification of mathematics teachers in Masina 1 secondary schools highlights a worrying reality, but also one that offers hope. While underqualification remains a major obstacle to the quality of education, our research shows that teaching units, although underused and poorly exploited, are a strategic lever for reversing this trend.

In line with the Sustainable Development Goals, particularly SDG 4 on quality education, the study calls for institutional strengthening of basic units, greater emphasis on continuing professional development, and better synergy between qualified and unqualified teachers within teaching units. The mixed method used made it possible to capture both the numerical reality and the deep perceptions of educational actors. Despite the limitations associated with non-probabilistic sampling and self-reporting bias, the results provide a solid basis for considering targeted and contextualised reforms.

Ultimately, it is not enough to denounce underqualification: existing structures must be equipped, teachers must be involved in their own skills development, and the role of teaching units as spaces for collective learning must be strengthened. This is the key to transforming Congolese schools.

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Conflict of interest

There are no conflicts of interest regarding this publication.

Ethical considerations

This study does not fall within the scope of an experimental protocol involving risks for participants or medical procedures. Nevertheless, we took care to respect the integrity of the respondents by strictly ensuring their anonymity, obtaining their informed consent, and making strictly limited use of the information collected.

Authors' contributions

Pierre O. designed the subject, wrote the manuscript, collected data, analysed statistics

Lucien M. collected data and analysed statistics.

Jean Marie K. proofread, edited the content and validated the final version.

All authors read and approved the final version of the manuscript.

Authors' ORCIDs.

Pierre O.https://orcid.org/0009-0000-6672-7593

Lucien M.https://orcid.org/0009-0007-3188-7854

Jean Marie K. https://orcid.org/0009-0002-8260-8409.

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