

Mathematics teachers' self-efficacy beliefs and its relationship with teaching practices

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Abstract

Given that teachers' self-efficacy belief is correlated with students' performance and positive behavior in terms of teaching, the present study examined the teaching practices of mathematics teachers and their self-efficacy beliefs with regard to some variables (gender, educational background, teaching phase, and school type). This study is underpinned by a positivist paradigm and a quantitative research approach. The researchers employed a survey research design. The population for this study is made up of all mathematics teachers in schools located in the Eastern Cape Province, South Africa from which a total of 266 mathematics teachers teaching in senior phase, further education and training phase, and intermediate phase were randomly sampled. In order to collect data, teachers teaching practice self-efficacy scale, which consisted of 23 items and four dimensions was employed. One-way analysis of variance, independent samples t-test, and arithmetic mean were conducted in analyzing the collected data. Despite having a high degree of confidence in their instructional strategies, teachers' low self-efficacy beliefs were found to be influenced by the kind of schools, where they were teaching and their level of education. Based on these findings, it was recommended that relevant stakeholders in the education sector should make schools conducive to learning through the provision of required instructional materials that supports the teaching and learning of mathematics.

Keywords: mathematics achievement, self-efficacy, teaching practices, teacher self-efficacy belief

INTRODUCTION

Self-efficacy is defined by several scholars. According to Bandura (1994, p. 72), Self-efficacy is the "belief in one's skills to execute and organize the set of intended actions needed to draw out given accomplishments." Self-efficacy is characterized as a person's assessment of his or her own capacity to plan and carry out tasks in order to achieve optimal performance (Mookkiah & Prabu, 2019). Self-efficacy beliefs influence how people motivate, behave, think, and feel themselves. Through four main processes (which include selection, affective, motivational, and cognitive processes), such beliefs bring about these various effects (Bandura, 1994). Similarly, Ozlu et al. (2013) add that self-efficacy is the confidence needed to complete a task, not a belief in one's ability to do so. In many ways, one could argue that feeling very effective enhances one's capacity for achievement and general well-being. This is why most

people with high confidence levels see difficult jobs as challenges rather than dangers to be avoided (Bandura, 1994; Olawale & Hendricks, 2022; Ozlu et al., 2013).

Research has therefore revealed that teaching self-efficacy, also known as "beliefs teachers hold regarding their capabilities to undertake professional tasks," is an important predictor of teachers' instructional strategies and student achievement (Morris et al., 2017; Yurekli et al., 2020; Zee & Koomen, 2016). Thus, given the advantages of teaching self-efficacy, scholars have focused on the origins of these crucial teacher beliefs and what life events and psychological factors cause some teachers to have confidence in their abilities while others struggle with self-doubt (Clark & Newberry, 2019; Cobanoglu et al., 2019; Gao, 2020; Olawale & Hendricks, 2022; Peura et al., 2021; van Rooij et al., 2019). Despite several studies' efforts to address the above-mentioned concerns, inconsistent conceivability and measurement of the theorized origins of self-efficacy have impeded a

Contribution to the literature

- The study enhances the understanding of the relationship between self-efficacy beliefs and teaching practices, and deepens the understanding of the complex interplay between beliefs and practices in the context of mathematics education.
- The study identifies specific challenges that mathematics teachers face in relation to their self-efficacy beliefs and teaching practices; and informs the creation of mentoring or coaching programs that focus on building teachers' self-efficacy beliefs.
- The study provides empirical evidence and insights that aligns with existing theories and adding to the cumulative knowledge base in the field of mathematics education.

true understanding of how teachers form and modify their efficacy beliefs (Morris et al., 2017; Tam et al., 2021).

According to Nurlu (2015), student attitudes, parental support for learning, school type, resources available at the school, instructional strategies, and teacher characteristics are parts of the factors affecting students' learning and achievement in mathematics. Similar to how students learn and perform, teachers' personal characteristics like gender, age, and experience are believed to have an impact (Siddiquei & Khalid, 2018). Researchers also concur that teachers' attitudes about mathematics and the teaching profession are essential elements to having a positive learning impact on students (Akbulut & Karakus, 2011; Kanadli, 2017; Shulman, 1986). As a result, the self-efficacy of a teacher is the teacher's opinion of their ability to organize and carry out their instruction—is linked to improving students' academic achievement and professional behavior (Nurlu, 2015).

While many studies have been conducted to develop and support the theory that the perceptions of people of their own abilities influence their motivation, behavior, and, ultimately, their success or failure (Bandura, 1994; Kahyaoglu & Yangin, 2007; Korkmaz & Unsal, 2016; Mookkiah & Prabu, 2019; Olawale & Hendricks, 2022), exploring teachers' self-efficacy beliefs regarding their mathematics teaching practices becomes paramount. Similarly, despite the fact that there have been several studies on teacher self-efficacy conducted in a variety of areas of education, pre-service mathematics teachers have generally been the focus of the studies (Unsal et al., 2016). This evidence shows that there are not many studies on the self-efficacy beliefs of mathematics teachers in the literature (Olawale & Hendricks, 2022; Unsal et al., 2016). Likewise, most research on characteristics that predict academic achievement has concentrated on demographic, socioeconomic, and cognitive aspects. However, non-cognitive factors like teachers' self-efficacy, early learning experiences, resource accessibility, home language, and instructional language, which can predict academic success in mathematics and science, have gained less attention (Khalo et al., 2022; Visser et al., 2019; Wilson Fadiji & Reddy, 2021). Thus, given poor educational achievements, particularly in low-income environments

in South Africa, understanding relationship between the non-cognitive factor (teacher self-efficacy) and teacher's teaching practices in relation to other specific variables becomes paramount. Hence, this study is needed.

**THEORETICAL FRAMEWORK:
BANDURA'S (1986) SELF-EFFICACY
THEORY**

Self-efficacy theory (SET), a branch of Bandura's (1986) social cognitive theory, serves as the theoretical foundation for this study. In accordance with this theory, perceived self-efficacy and outcome expectations are the two primary essential variables influencing behavior (Bandura, 1986; Schunk & DiBenedetto, 2021). The latter construct speaks of the perceived advantages and disadvantages of engaging in the behavior (Schunk & DiBenedetto, 2021). According to SET, people often only try things they think they can succeed at and avoid trying those they think they would fail at. However, despite the task appearing difficult, those who have a high feeling of efficacy believe they can accomplish it (Bandura, 1994). As a result, these individuals view these difficulties as obstacles to overcome rather than threats to be avoided. Conversely, those unsure of their capacity to complete challenging tasks perceive these tasks as threats. As a result, they avoid them based on their own personal shortcomings or the challenges standing in their way of success (Bandura, 1994). Therefore, such people frequently give up when faced with issues or challenges and lose confidence in their abilities (Bandura, 1994, 1997). SET thus introduces the notion that somatic and emotional state, verbal persuasion, vicarious experience, and mastery experience are four factors that affect the perception of efficacy (Bandura, 1994, 1997; Pajares, 2002) (Figure 1).

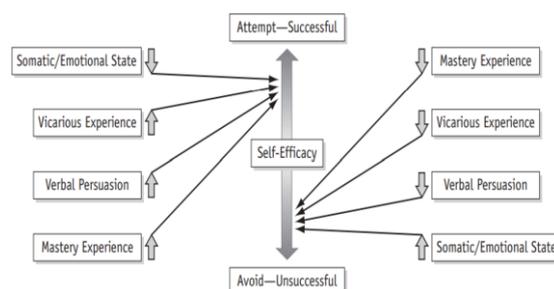


Figure 1. Bandura's self-efficacy theory (Bandura, 1994)

Bandura (1994) claimed that when we try something and succeed, we have achieved mastery. Due to the fact that when something is related to what people have already done well before, they believe they can do something new, mastery experience becomes the most effective way to increase self-efficacy (Bandura, 1994). In terms of vicarious experience, Bandura (1994) contends that witnessing someone as you succeed at something you want to try raises one's self-efficacy. As a result, "the degree to which vicarious experiences influence self-efficacy is correlated with how similar you perceive the model to be to yourself" (Bandura, 1994, p. 78). Verbal or social persuasion is the third factor that impacts self-efficacy. According to Bandura (1994), people are more likely to complete a task if they are verbally convinced that they can complete it or master it. As a result, receiving verbal affirmation for achieving or mastering a task greatly contributes to a person's self-confidence.

Lastly, Bandura (1994) described the final factor as a somatic and emotional state that happens when someone considers doing something and gives a clue as to the likeliness of failure or success. Therefore, according to Bandura (1994), emotional arousal impacts one's sense of self-efficacy, which in turn impacts how one makes decisions. Hence, it is said that self-efficacy is likely to change if emotional arousal or stress is reduced (Bandura & Adams, 1997). The implication of SET for the study is that all of the previously mentioned elements, including somatic and emotional states, verbal persuasion, vicarious experiences, and mastery experiences, impact our self-efficacy and, consequently, our behavior. These factors impact teachers' decisions and the actions they choose to take in the classroom. This theory is also critical because it predicts how much effort teachers will put into a chore, how long they will endure challenges/difficulty, and how tough they will be under pressure. As such, present study examined mathematics teachers' views on their self-efficacy with regard to their teaching practices and other specific variables.

Research Questions

1. What are the views of mathematics teachers on the sub-dimensions of the scale measuring teaching practices self-efficacy?
2. Do the self-efficacy beliefs of mathematics teachers regarding their teaching practices differ with respect to their demographic characteristics?

METHOD

Research Paradigm, Approach, & Design

Underpinned by a positivist research paradigm, the present study employed a quantitative research approach and a survey research design. According to Glasow (2005), survey research is a research approach used to quantitatively describe a specific aspect of a

given population. The survey design was found appropriate for the study because it aims at examining the relationship amongst different variables as well as the description of the present and past state of a group in its present condition. Therefore, the purpose of this study was to investigate whether the opinion of mathematics teachers about their teaching practice and their level of self-efficacy related to educational background, teaching phases, school type employed to teach, and gender are the variables of the present study.

Population, Sample, & Sampling Techniques

For the present study, the target population comprised of all the 905 secondary schools from all 12 districts in the Eastern Cape Province, South Africa. The study therefore uses a simple random sampling technique as a method of sample selection because it gives each member of the entire population an equal chance of being included in the sample. Similarly, to achieve high internal validity and minimize the impact of potentially confounding variables, a simple random sampling technique was found suitable for selecting the participants (Thomas, 2020; West, 2016). Thus, given that the sample frame for the study includes all mathematics teachers in the 905 secondary schools, the researchers used 20% of the sample frame to calculate the number of schools in the sample size. The sample size comprised of 181 secondary schools in the province from which two participants (mathematics teachers) per school were selected, amounting to 362 participants. From these participants who took part in the study, analysis was only conducted on the data from 266 participants who completed the questionnaires correctly, and other data were excluded based on lack of information, voluntary withdrawal, not completing the personal information, and failure to return the questionnaire, amongst many other reasons. For ease of access, the data for the study was obtained by means of electronic questionnaires, which were generated using Survey Monkey. Participants were sent the link to the questionnaire via WhatsApp and emails, and all the questionnaires were accompanied by unambiguous and concise worded instructions developed to meet the level of understanding of the target population. **Table 1** shows the demographic information of the study participants.

Table 1 shows that 44% of the respondents were made up of males, while 56% of the respondents were female. With regards to their educational background or qualification, 75% of the participants had a Bachelor of Education degree, 12% had a PGCE (a year postgraduate program that allows students from other faculties to teach at schools), 9% had a master's degree, and only 4% had a doctorate degree. In terms of the educational phases, 41% of the participants teach at the intermediate phase (grade 4-6), 33% of the participants teach at the senior phase (grade 7-9), and 26% teach at further education and training (FET) phase (grade 10-12). With

Table 1. Personal information of participating mathematics teachers

Variables	Level	n	Percentage (%)
Gender	Male	118	44.0
	Female	148	56.0
	Total	266	100
Educational background	BEd degree	199	75.0
	PGCE	32	12.0
	MEd degree	24	9.0
	PhD	11	4.0
	Total	266	100
Teaching phase	Further education & training phase	69	26.0
	Senior phase	88	33.0
	Intermediate phase	109	41.0
	Total	266	100
Type of school of practice (CAPS curriculum)	Public secondary schools	191	72.0
	Private secondary schools	75	28.0
	Total	266	100

respect to the type of school of practice, 72% of the participants work at public secondary schools, while 28% are in private schools.

Data Collection Tool

The teacher self-efficacy scale developed by Korkmaz and Unsal (2016) was adapted as an instrument for data collection. Participants' gender, educational background, current teaching phases, and types of schools in which they work were all listed in the first portion of the questionnaire that asked for personal information.

The second section of the scale consists of 23 items and four dimensions, as suggested by Korkmaz and Unsal (2016). These dimensions are individual differences, planning, various methods and techniques, and the use of different activities. These dimensions were adopted directly from the study of Korkmaz and Unsal (2016) with the reliability coefficients of the scale for the study, which was the alpha reliability coefficient at .86 for the individual difference dimension, .82 for the planning dimension, .74 for the method and technique diversity dimension, .72 for the use of various activities dimension, and .92 for the overall scale (Korkmaz & Unsal, 2016, p. 101). These dimensions provide insight into how the factors influence teachers' self-efficacy and pedagogical strategies. 23 items in the scale were presented as "never, rarely, sometimes, frequently, and always," and the study participants were asked to respond using a five-point Likert scale questionnaire. The participants were then asked to check the item that best reflected their response.

Table 2 shows the scale's limits and options as suggested by researchers (Kahyaoglu & Yangin, 2007; Unsal et al., 2016). In **Table 2**, the option "never" means I am not efficient, "rarely" means I am partly efficient, "sometimes" means I am moderately efficient, "usually" means I am relatively efficient, and "always" means I am fully efficient.

Table 2. Limit in evaluating participants' self-efficacy perceptions about their teaching practices

Level	Options	Range
1	Never	1.00-1.79
2	Rarely	1.80-2.59
3	Sometimes	2.60-3.39
4	Usually	3.40-4.19
5	Always	4.20-5.00

Table 3. Participants' M & SD on teachers' pedagogical strategies & self-efficacy beliefs on dimensions

Dimensions	n	M	SD
Individual difference (D1)	266	4.09	1.199
Planning (D2)	266	3.89	1.000
Methods & techniques diversity (D3)	266	3.48	1.082
Use of various activities (D4)	266	3.82	1.209

Data Analysis

The quantitative data were analyzed using the statistical software SPSS 25.0. The data was analyzed using descriptive statistics, the parametric independent samples t-test, and the one-way analysis of variance (ANOVA). The significant level used was 0.05 at a 95% confidence interval.

RESULTS

This section analyzed the data collected from the participants through the questionnaires used in the order of the sub-problem. Tables were used to present the findings.

The first sub-question of the study states that "what are the views of mathematics teachers on the sub-dimensions of the teaching practice self-efficacy beliefs?" **Table 3** displays the participants' response standard deviation and mean to this sub-question. **Table 3** shows the values of standard deviation and mean of participants' (mathematics teachers) opinion on their self-efficacy beliefs in classroom practice based on dimensions. **Table 3** shows that mathematics teachers

Table 4. t-test analysis of self-efficacy level of mathematics teachers based on gender

Dimension	Gender	n	M	SD	T	p
Individual differences	Male	118	5.00	0.000	14.916	0.000
	Female	148	3.37	1.185	16.712	0.000
Planning	Male	118	4.69	0.466	16.298	0.000
	Female	148	3.26	0.852	17.326	0.000
Diversity in methods & techniques	Male	118	4.44	0.499	21.385	0.024
	Female	148	2.71	0.758	22.367	0.024
Various teaching activities	Male	118	4.83	0.377	18.315	0.000
	Female	148	3.01	1.023	19.968	0.000

Note. $p < 0.050$

Table 5. t-test analysis of mathematics teachers' self-efficacy on their teaching practices based on educational backgrounds

Dimensions	Educational qualifications	n	M	SD	T	p
Individual differences	BEd degree	199	4.69	0.464	18.279	0.000
	PGCE	32	3.13	0.336	23.023	0.000
	MEd degree	24	1.88	0.680	4.235	0.000
	PhD	11	1.00	0.000	6.307	0.000
Planning	BEd degree	199	4.35	0.591	12.875	0.000
	PGCE	32	3.00	0.000	32.165	0.000
	MEd degree	24	2.58	0.504	8.090	0.000
	PhD	11	1.18	0.405	8.786	0.000
Diversity in methods & techniques	BEd degree	199	3.92	0.774	8.116	0.236
	PGCE	32	2.78	0.420	12.328	0.236
	MEd degree	24	1.88	0.338	8.521	0.236
	PhD	11	1.00	0.000	12.689	0.236
Various teaching activities	BEd degree	199	4.40	0.658	13.894	0.002
	PGCE	32	2.72	0.457	17.998	0.002
	MEd degree	24	1.79	0.415	6.278	0.002
	PhD	11	1.00	0.000	9.349	0.002

Note. $p < 0.050$

believe they are entirely effective in their jobs in the dimension "individual differences" (mean $[M]=4.09$, standard deviation $[SD]=1.199$) and are rather efficient in the dimension "planning" ($M=3.89$, $SD=1.000$), dimension variety of methods and technologies ($M=3.48$, $SD=1.082$) and the dimension of the use of different activities ($M=3.82$, $SD=1.209$). The mean scores for mathematics teachers were greatest ($M=4.09$) and lowest ($M=3.48$), respectively, with the highest mean being efficient for the individual differences dimension and the lowest being only moderately efficient for the variety of methods and techniques dimension.

Results on Self-Efficacy Levels of Mathematics Teachers in Terms of Teaching Methods Depending on Gender

The study's second sub-question was "do mathematics teachers' opinions of their level of self-efficacy in relation to their teaching practices differ significantly across gender?" **Table 4** summarizes the result of t-test in evaluating self-efficacy level among mathematics teachers in relation to gender-related classroom practices.

With regard to the view of participants' individual differences on the teaching practice self-efficacy level in relation to gender, **Table 4** revealed a significant difference in the mean score in favor of males compared

to females (male $M=5.00$, female $M=3.37$, $p < 0.050$). In relation to planning, **Table 4** further revealed that there is a significant mean score difference between male and female teachers, which is in favor of males (male $M=4.69$, female $M=3.26$, $p < 0.050$). In addition, based on teaching activities, **Table 4** shows that the difference in mean scores between males and females is statistically significant in favor of males (male $M=4.44$, female $M=2.71$, $p < 0.050$). Also, with regard to diversity of techniques and methods, there is a significant difference in the mean score based on gender, with males scoring significantly higher (male $M=4.83$, female $M=3.01$, $p < 0.050$). This demonstrates that there were gender differences in the views of respondents regarding the use of various teaching activities, planning, individual differences, and diversity of method and technique.

Results on Self-Efficacy Level of Mathematics Teachers in Their Teaching Practices Based on Their Educational Backgrounds

The third sub-question of this research stated that "is there any significant difference in the self-efficacy levels of mathematics teachers' teaching practices' in connection to their educational background?" The t-test result of third sub-question is revealed in **Table 5**.

The t-test analysis in **Table 5** revealed the response to the third sub-question evaluating the mathematics

Table 6. ANOVA test of mathematics teachers' teaching practices self-efficacy beliefs with regards to teaching phase

Dimension	Teaching phase	n	M	SD	F	p	LSD
Individual differences	Intermediate	109	5.00	0.000	681.843	0.000	0.000
	Senior	88	4.32	0.468			
	FET	69	2.38	0.972			
Planning	Intermediate	109	4.74	0.439	768.863	0.000	0.000
	Senior	88	3.89	0.319			
	FET	69	2.57	0.717			
Diversity in methods & techniques	Intermediate	109	4.48	0.502	727.490	0.000	0.000
	Senior	88	3.25	0.435			
	FET	69	2.19	0.753			
Use of various activities	Intermediate	109	4.90	0.303	1,231.689	0.000	0.016
	Senior	88	3.81	0.397			
	FET	69	2.13	0.765			

Note. $p < 0.050$

Table 7. Test of ANOVA on self-efficacy beliefs & teaching practices according to school type

Dimension	School type	n	M	SD	F	p	LSD
Individual differences	Public	191	4.72	0.452	630.277	0.000	0.000
	Private	75	2.51	1.032			
Planning	Public	191	4.40	0.533	477.513	0.000	0.000
	Private	75	2.60	0.697			
Diversity in methods & techniques	Public	191	3.96	0.767	480.011	0.000	0.000
	Private	75	2.25	0.755			
Use of various activities	Public	191	4.46	0.604	557.182	0.000	0.000
	Private	75	2.20	0.771			

Note. $p < 0.050$

teachers' degrees of self-efficacy in relation to their teaching practice depending on their educational backgrounds. **Table 5** shows that mathematics instructors' perceptions of their degrees of self-efficacy in teaching practice with relation to qualifications differ significantly in terms of the utilization of diverse activities ($p=0.002$), planning ($p=0.000$), and individual differences ($p=0.000$). However, according to the method and technique variety dimension ($p=0.236$), there is no significant difference among participants' views of their degrees of self-efficacy in terms of their teaching practices with reference to their level of education.

Results on Level of Self-Efficacy of Mathematics Teachers in Terms of Their Instructional Strategies Based on Teaching Phase

The fourth sub-question stated that "is there any significant difference in the self-efficacy levels of mathematics teachers' teaching practices self-efficacy levels with reference to teaching phases?" The t-test analyses of the fourth sub-question are analyzed in **Table 6**.

Table 6 reveals ANOVA test of mathematics teachers' teaching practices self-efficacy beliefs with regard to the teaching phase. With regards to the teaching phase, the study shows that the differences among all the sub-dimensions of teachers teaching mathematics are significant. The individual difference ($F=681.843$, $p < 0.050$), planning ($F=768.863$, $p < 0.050$), method and technique diversity ($F=727.490$, $p < 0.050$),

and using various activities ($F=1231.689$, $p < 0.050$). This indicates that the teaching practices self-efficacy is influenced by the teaching phase. LSD test was conducted to detect between which groups the difference occurred. Participants in the teaching phase intermediate were classified as "a", senior teaching phase as "b", and FET phase as "c" and their significance were compared. Finally, significant differences were observed among mathematics teachers' opinions concerning the individual difference, planning, method and technique diversity and use of various activities sub-dimensions ($p < 0.050$) of the teaching process self-efficacy scale.

Results Based on Mathematics Teachers' Teaching Practice Self-Efficacy Beliefs in Relation to School Type

The final sub-question of this study stated that "is there any significant difference in the self-efficacy levels of mathematics teachers' teaching practice based on school type?" **Table 7** revealed the analysis of ANOVA test of this sub-question.

Table 7 reveals ANOVA test, which answers the fifth sub-question. **Table 7** shows that the differences among the dimensions of teachers teaching process self-efficacy based on school type are significant. The individual difference ($F=630.277$, $p < 0.050$), planning ($F=477.513$, $p < 0.050$), method and technique diversity ($F=480.011$, $p < 0.050$) and using several activities ($F=557.182$, $p < 0.050$). This indicates that the type of school (public

and private schools) determines teachers teaching process self-efficacy. LSD test was conducted to detect between which groups the difference occurred. Finally, no significant differences were observed among mathematics teachers' opinions concerning the individual difference, planning, method and technique diversity and use of various activities sub-dimensions ($p < 0.050$) of the teaching process self-efficacy scale.

DISCUSSION

In this study, self-efficacy of mathematics teachers' teaching practices was compared with various factors such as gender, educational background, teaching phase, and different types of schools of practice. According to study findings, self-efficacy levels of mathematics teacher about their teaching practices are very high. The analysis done on sub-dimensions revealed a high self-efficacy level among mathematics teachers in adapting to technique diversity, method, individual differences, and planning using a variety of activities. This finding correlates with other studies, such as Dede (2008) and Unsal et al. (2016), which investigated mathematics teachers' self-efficacy levels. The study findings revealed that self-efficacy believe of the teaching of mathematics teachers is high self-efficacy, which could be seen as a good result given that mathematics teachers with higher levels of self-efficacy in their teaching methods have positive effects on their students' attitudes toward the subject, their academic performance, as well as their course performance (Dede, 2008; Kilinc et al., 2021; Unsal et al., 2016).

In a similar manner, the gender, educational background, teaching phase, and other types of school characteristics were compared with the teaching practice self-efficacy views of mathematics teachers. When comparing results, the findings revealed that the difference on how different activity dimensions were used depending on gender is significant, no other significant differences were found. This finding agrees with some studies such as (Henderson et al., 2020; Peker et al., 2018; Unsal et al., 2016), which suggests that self-efficacy among teachers differs with regard to gender. While Budiarti et al. (2022) and Kalender et al. (2020) argued that male teachers have high efficacy beliefs. On the contrary, Marshman et al. (2018) argued on behalf of female teachers.

According to this study, there are considerable differences between mathematics teachers' views about their efficacy as teachers and their educational backgrounds. This result showed that mathematics teacher' perceptions of their degrees of self-efficacy with reference to techniques and teaching methods are influenced by higher qualifications. It could be that as teachers progress in further studies, they tend to be more confident about their abilities and the experiences gained during their higher-degree studies. This finding

is similar to those of Connor et al. (2005), Darling-Hammond and Youngs (2002), and Fives and Buehl (2010), who suggest that teacher qualification, and experiences increase self-efficacy, which in turn predicts students' outcomes. In terms of qualification and experience, SET by Bandura (1994) also suggest that gaining mastery experience is the best way to increase self-efficacy since it will make people more likely to think it is possible to achieve new things as long as it is familiar to the learning experiences.

With regard to the teaching phase, research findings revealed that the teaching phase (FET phase, senior phase, and intermediate phase) determines mathematics teachers' teaching practices' self-efficacy. This could result from students' maturity levels across different phases, which made it possible for mathematics teachers to develop a good student-teacher relationship. This is in line with the findings of Wettstein et al. (2021), who argued that high self-efficacy views in subject teachers are linked to teacher-student interactions, better perceptions of disruptions in the classroom, and management of the classroom both from the students and teachers' perspectives. Similarly, when comparing participants' views on their teaching practice self-efficacy with regard to the type of school, findings revealed that the type of school (public and private schools) determines self-efficacy process of mathematics teachers. This could be a result of the availability of resources and the teaching and learning environment, which are friendlier and more conducive to learning in the different types of schools. This finding corroborates that of Ustuner et al. (2009), who argued that the self-efficacy beliefs of senior schoolteachers varied significantly depending on school type. No appreciable differences were found in favor of the groups or sub-dimensions when comparisons were made on gender influence and the teaching phases on mathematics teacher self-efficacy in their teaching practices. However, a significant difference was recorded about how types of practice schools and the educational backgrounds of the teachers impact their efficacy beliefs in their teaching practice.

CONCLUSIONS

This study examined the view of mathematics teachers about their teaching practice and their level of self-efficacy in relation to their educational background, teaching phases, school type employed to teach, and gender. The study concludes that one major important factor, which affects mathematics teachers' performance and accomplishments is their type of school and educational background. No matter how well-versed in their subject matter teachers are, when their levels of self-efficacy in the teaching practices are low, they may not demonstrate the success and performance expected. As a result of the findings, it is recommended that relevant stakeholders in the education sector make

schools conducive for learning through the provision of required instructional materials that supports mathematics teaching and learning. School heads should also encourage on-the-job training for mathematics teachers or the provision of opportunities for further studies. Mathematics teachers should always try to further studies, such as the acquisition of a master's or doctorate degree. In terms of the implications for policy theory and practice, department of basic education should strive towards the provision of quality in-service training courses geared towards the improvement of teachers' beliefs and attitudes towards the teaching profession. The limitation of the study was, however, in its quantitative research approach employed; further studies may consider mixed methods or a qualitative approach. Similarly, the study was limited to teachers in one of the rural and underperforming provinces; other studies could consider using teachers in the urban region and more provinces for more in-depth deeper information.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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